Introduction to the Hybuild project

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HYBUILD

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

Sustainable Places 2018

27 June 2018

Aix-les-Bains

This is part of the project that has received funding from the European Union's Horizon 2020 research and innovation programme *under grant agreement No 768824.*
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0 Outline

1. HYBUILD in a nutshell
2. Overall concept
3. Implementation
4. Innovation in HYBUILD
5. Critical aspect in the implementation
6. Conclusions

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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**

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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

COMSA CORPORACIÓN — Universitat de Lleida

KickOff Meeting Bruxelles 10/2017

HYBUILD storage solutions will be demonstrated across 3 pilot sites.

- Bordeaux France

- Aglantzia Cyprus

- Almatret Spain

www.hybuild.eu

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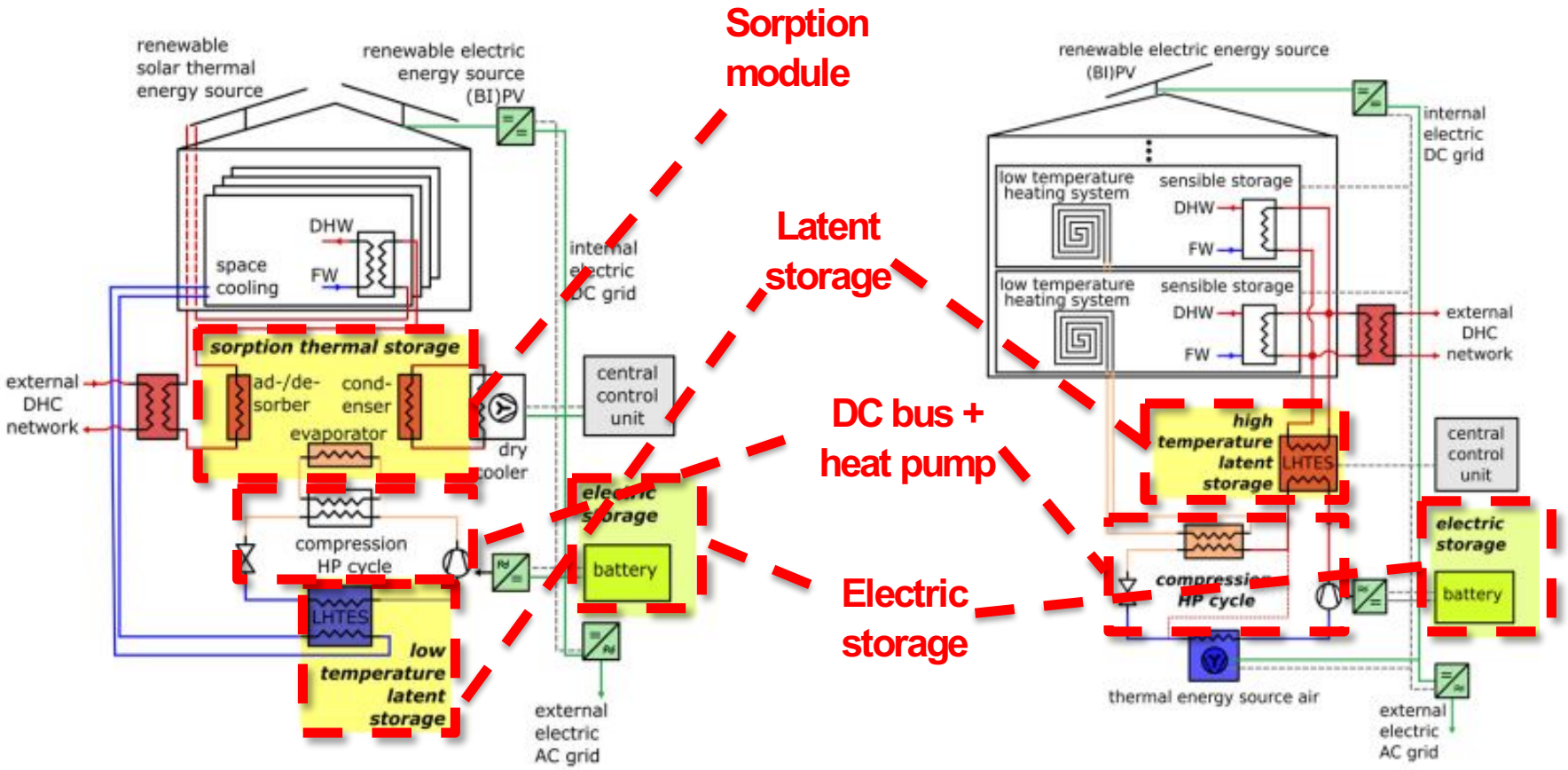
2 Overall concept

Mediterranean climate
(cooling)

Continental climate
(heating)



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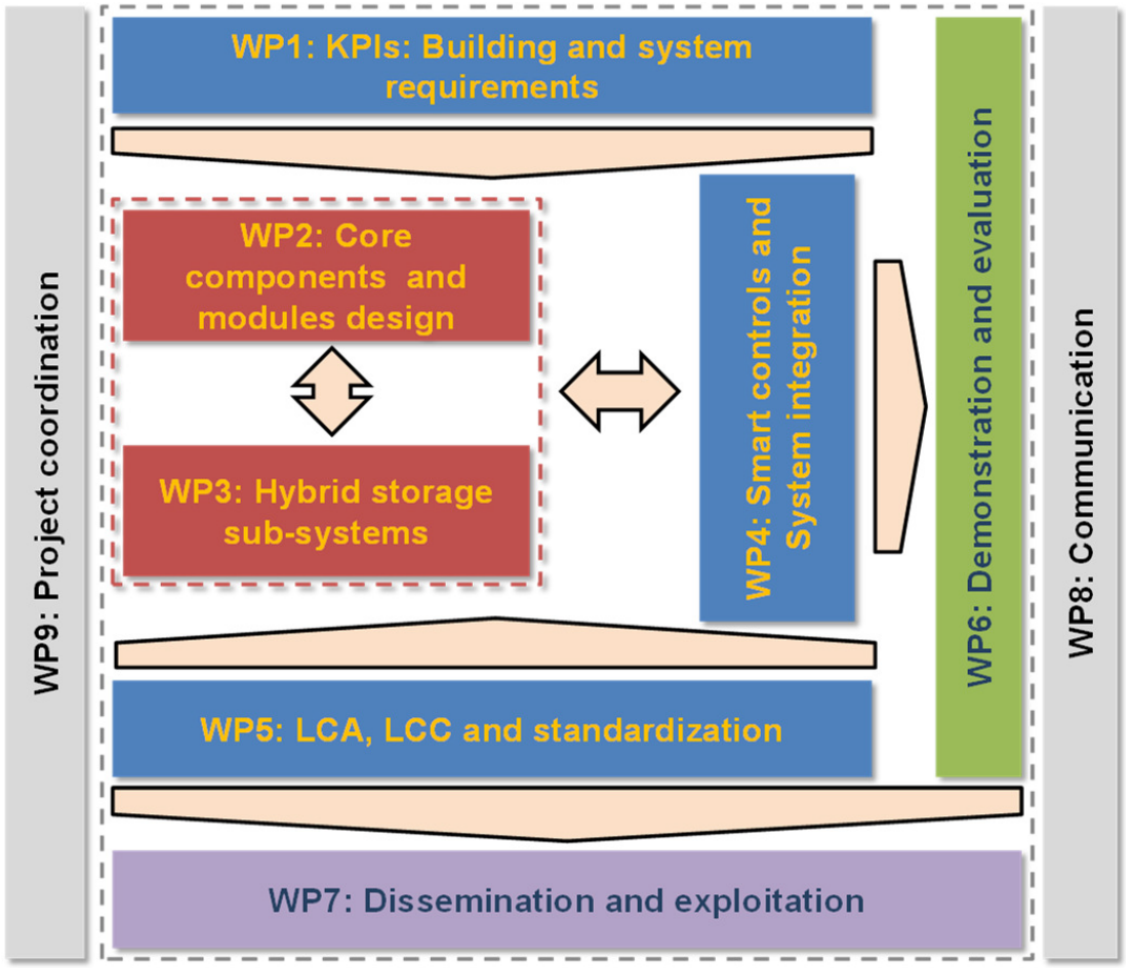
3 Implementation



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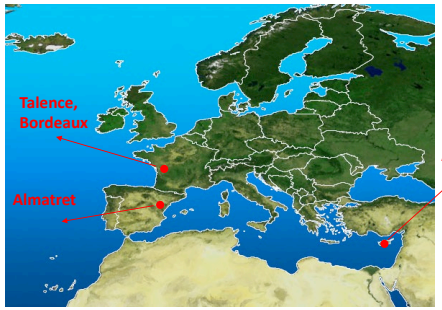
3 Implementation

1° year

KPIs definition and first **modules modelling and design**

Installation of the integrated storages in the **demo-sites** and **start monitoring**

3° year



TRL 3 - 4

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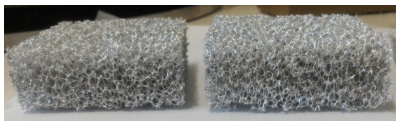
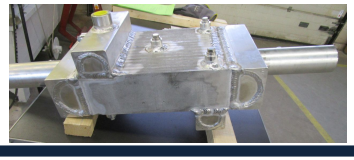


Integrated systems at **lab-scale, testing** and design **optimization**



2° year

Full-year demo-sites **monitoring** and **system model validation** for replicability analysis

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4 Innovation in HYBUILD

From the EEB-06-2017 call:

… hybrid approaches encompass different aspects, which may be addressed separately or coherently:

- *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.*

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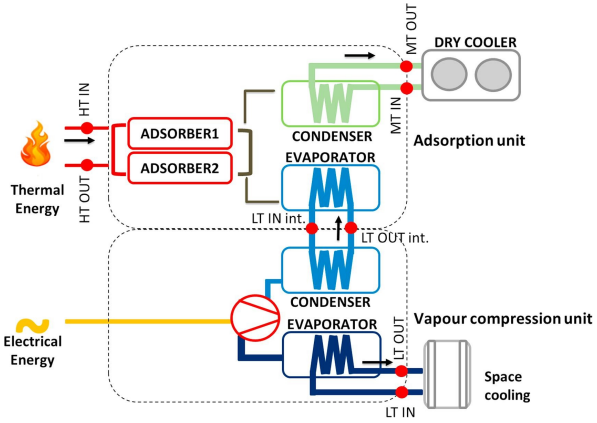
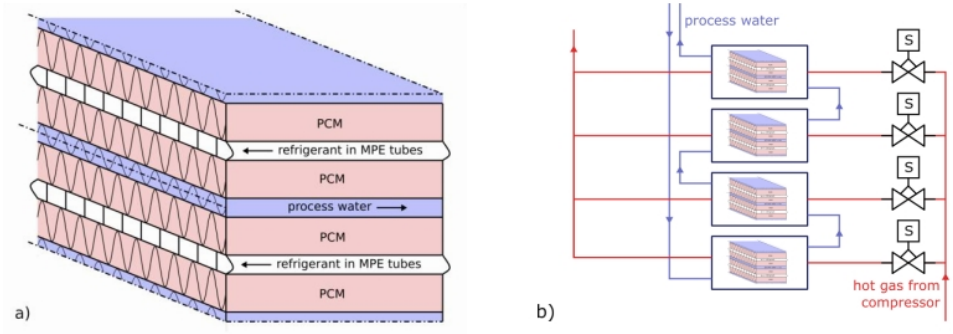
4 Innovation in HYBUILD

high efficiency conversion and storage of surplus renewable electricity into heat:

- System based on reversible heat pumps to convert electricity into heating/cooling energy;
- Innovation @ heat pump level fully integrated with the sorption and latent storage.



Integrated hybrid sorption/vapour compression chiller



Modular integrated PCM/water/refrigerant storage

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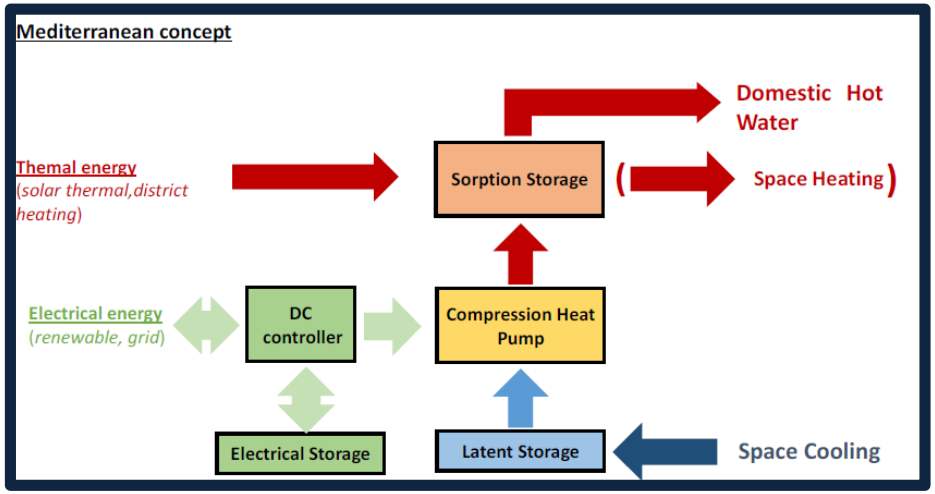
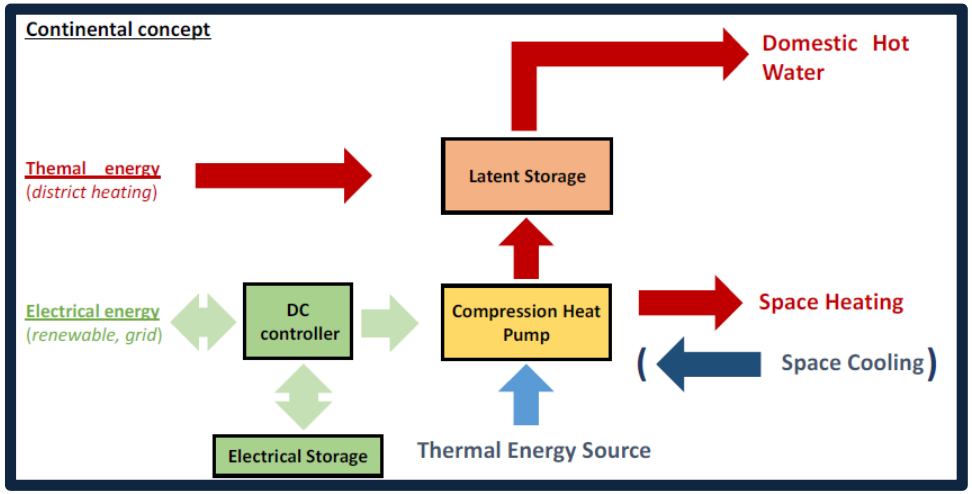
4 Innovation in HYBUILD

multifunctional use in both heating and cooling applications at different temperature grades:

- Two systems specifically optimized for cooling and heating season;
- Mediterranean concept able to increase the electric COP of the chiller thanks to the sorption storage;
- Continental concept able to recover and store energy from super-heated gas out from the compressor to provide DHW, increasing the overall COP.





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4 Innovation in HYBUILD

different time scales, e.g. in seasonal storage of high temperature solar heat and peak-shaving in lower temperature heat–pump applications:

- Possibility to operate the sorption module both as short-term or long-term storage;
- Latent storages to increase flexibility in operation and efficiency of the heat pumps on daily basis;
- Electrical storages to further increase the flexibility and self-consumption of the system.

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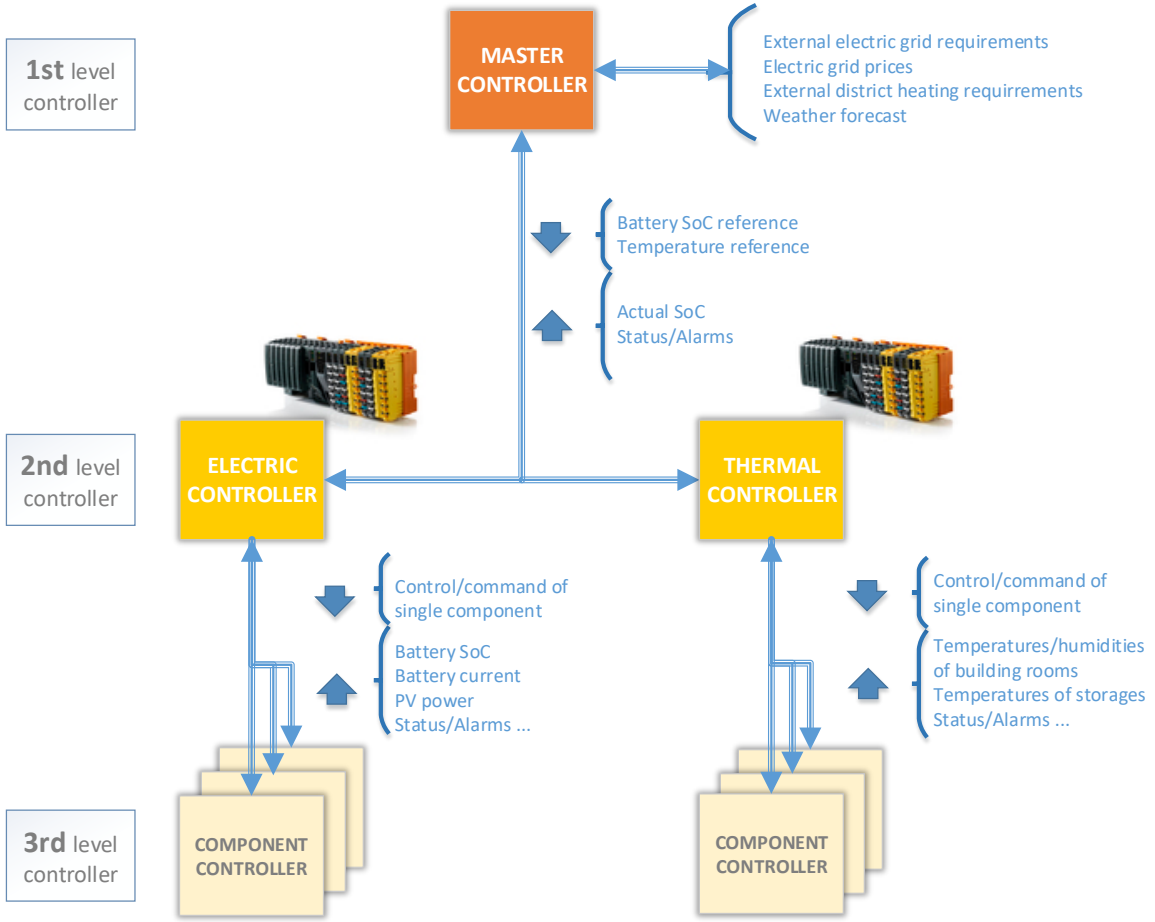
5 Critical aspect in the implementation

Overall system control logic definition and implementation



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6 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 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;
- A clear critical aspect is represented by the overall system control implementation;

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THANK YOU

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