HYBUILD
Hybrid Energy Storage for Buildings

Introduction to HYBUILD

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HYBUILD

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

Sustainable Places 2020 - Integrated Storage systems for Residential buildings Workshop

29 October 2020
Digital Event

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

- Project start: **10/2017**
- Project end: **03/2022**
- Overall EU contribution: **5,995,840 €**
- Consortium: **20 partners, 9 countries**
- Coordinator: COMSA

Kick-off meeting Brussels - 10/2017

COMSA CORPORACIÓN · Universitat de Lleida · Consiglio Nazionale delle Ricerche · ATAE · AIT Austrian Institute of Technology · University of Cyprus · R2M Research to Market Solution

eurac research · FAHRENHEIT · csem · stress · μmetal · PINK · ENGINEERING

OCHSNER HEAT PUMPS · DAIKIN · AKG · Nobatek

www.hybuild.eu

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1 HYBUILD in a nutshell

- HYBUILD aims to develop **two innovative hybrid storage concepts**
  1. For **Mediterranean climate** primarily for **cooling energy** supply
  2. For **Continental climate** primarily meant for **heating and DHW** supply

- The concepts are based on innovative components such as:
  - a **compact sorption module**
  - a **high-density latent storage**
  - a **reversible vapour compression heat pump**
  - a **DC-bus interconnection**

- The whole systems will be properly managed by **advanced controls** and **Building Energy Management Systems (BEMS)**

- The systems will be **validated** in **three different demo-sites**

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1 HYBUILD in a nutshell

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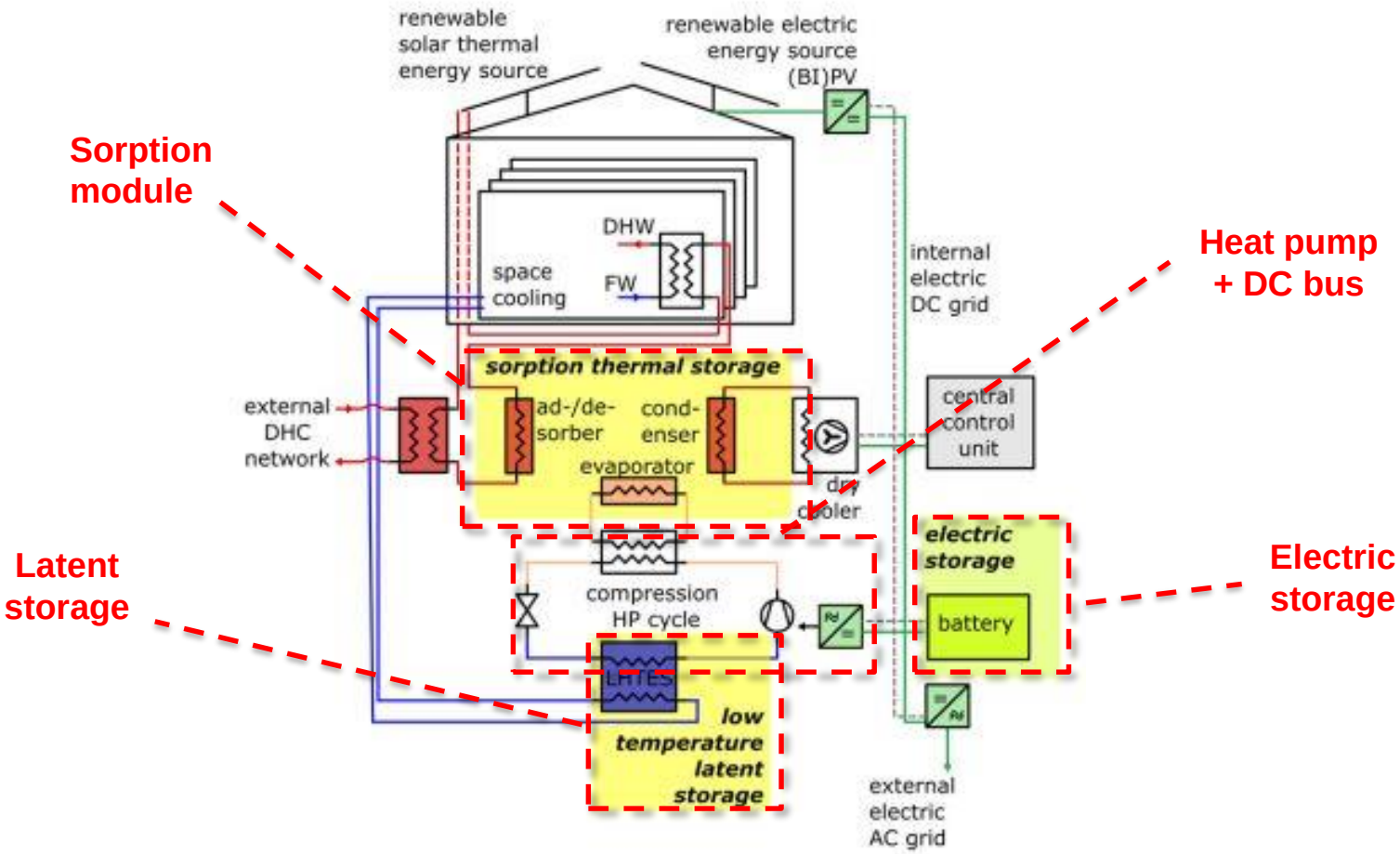
2 Overall concept

Mediterranean system (cooling)



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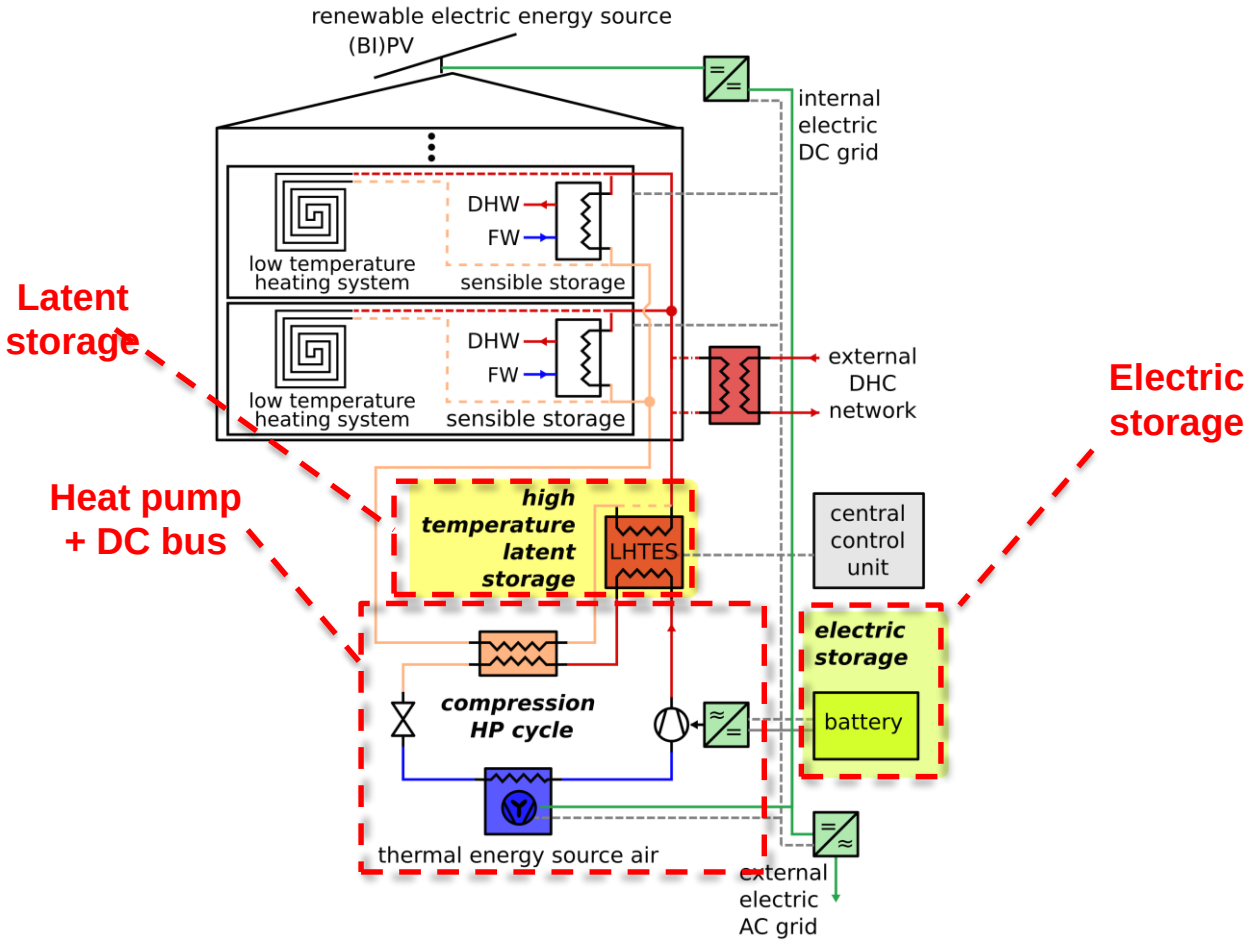
2 Overall concept

Continental system (heating & DHW)



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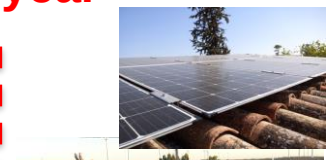
3 Implementation

1st year

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

Control development and **pre-intervention** one-year demo-sites **monitoring**

3rd year



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

4th & ½ year

TRL 3 - 4

TRL 5

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

2nd year

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

4th year

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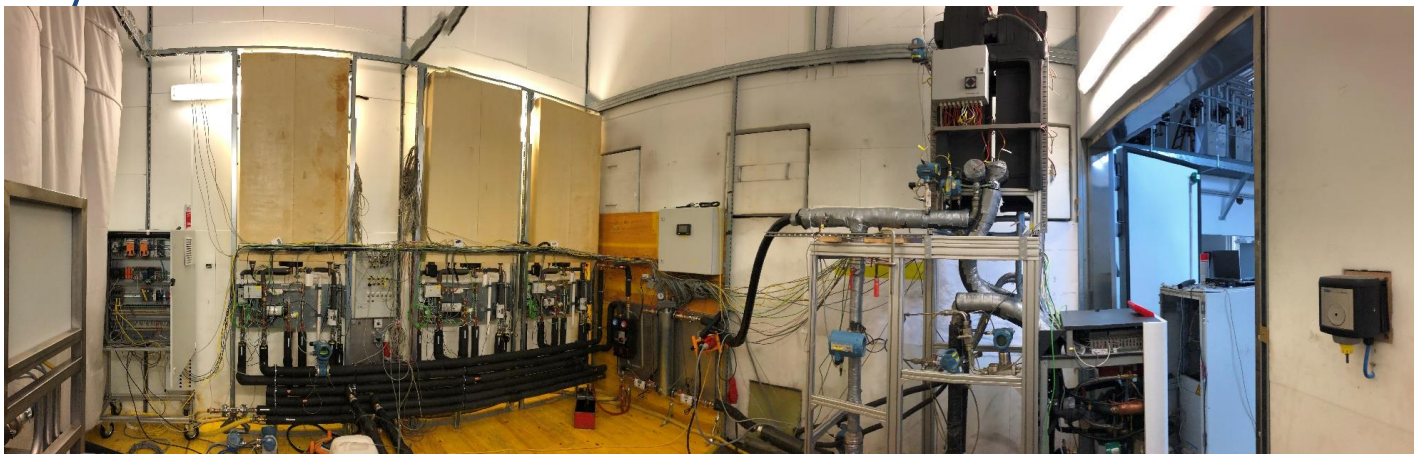
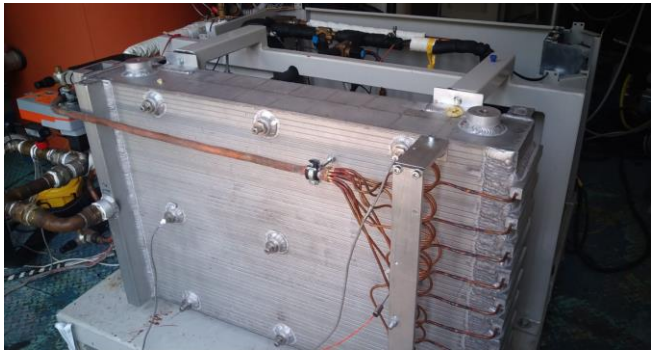
3 Implementation

HYBUILD prototypes

Continental system



Mediterranean system



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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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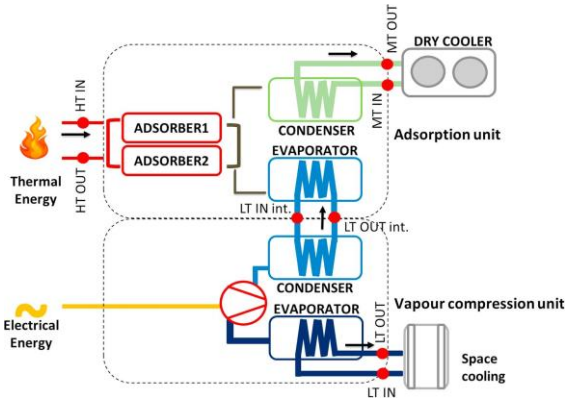
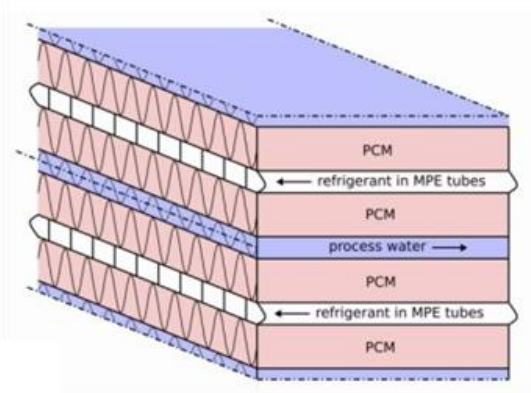
4 Innovation in HYBUILD

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

- System based on reversible heat pumps to convert electricity into energy for heating/cooling or DHW;
- 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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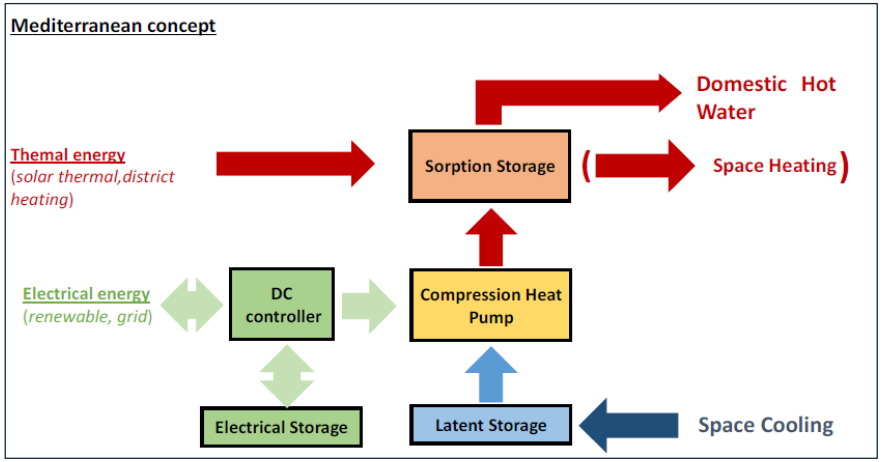
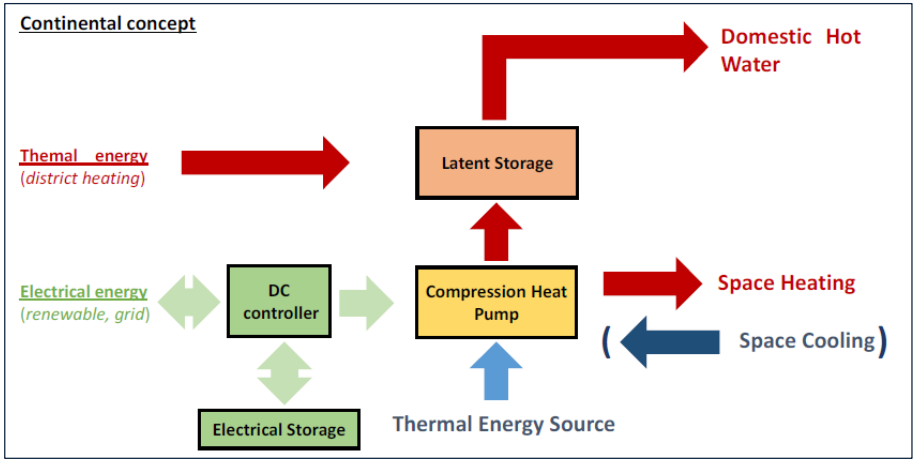
4 Innovation in HYBUILD

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

Integration of the heat pump & sorption chiller & latent storage

Overall system control logic definition and implementation

Continuous one full-year post-intervention monitoring at demo sites

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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 lab-scale systems have been completed and their testing under lab-controlled conditions is performed
- A clear critical aspect is represented by the overall system control implementation at the demo sites

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THANK YOU

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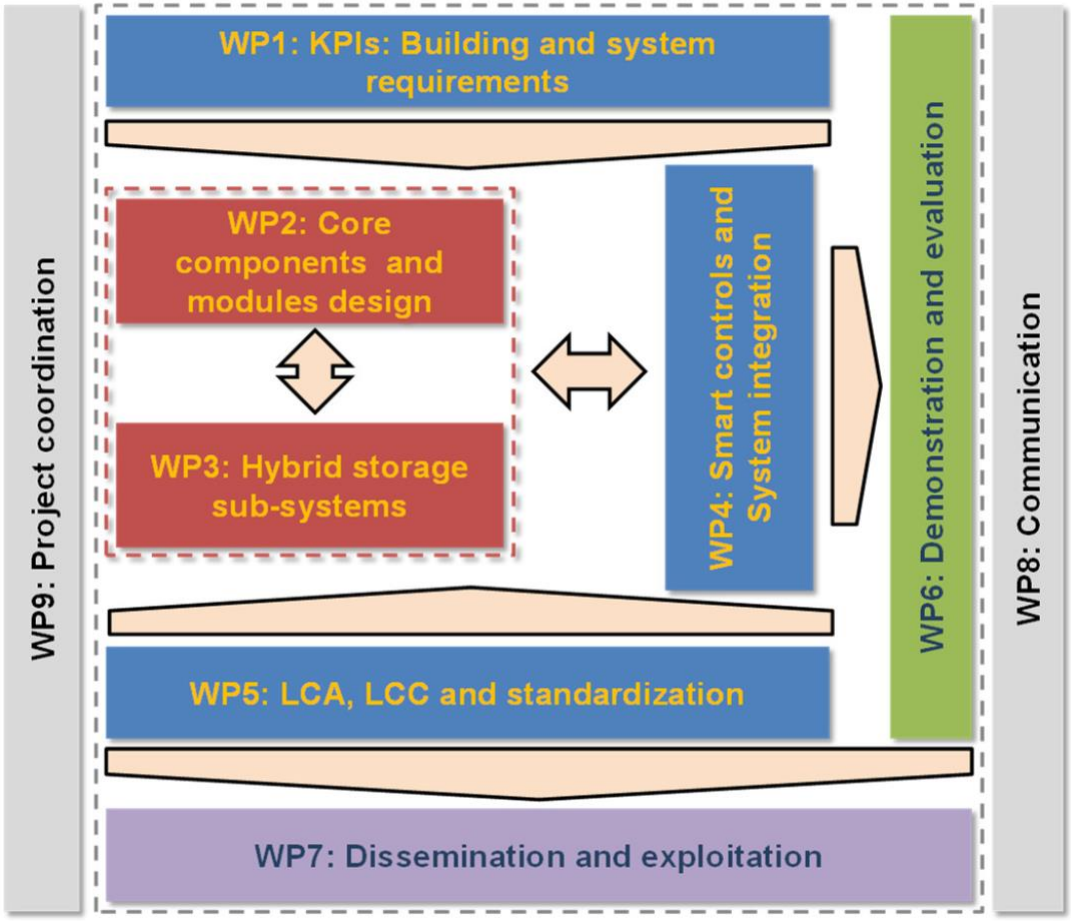
3 Implementation



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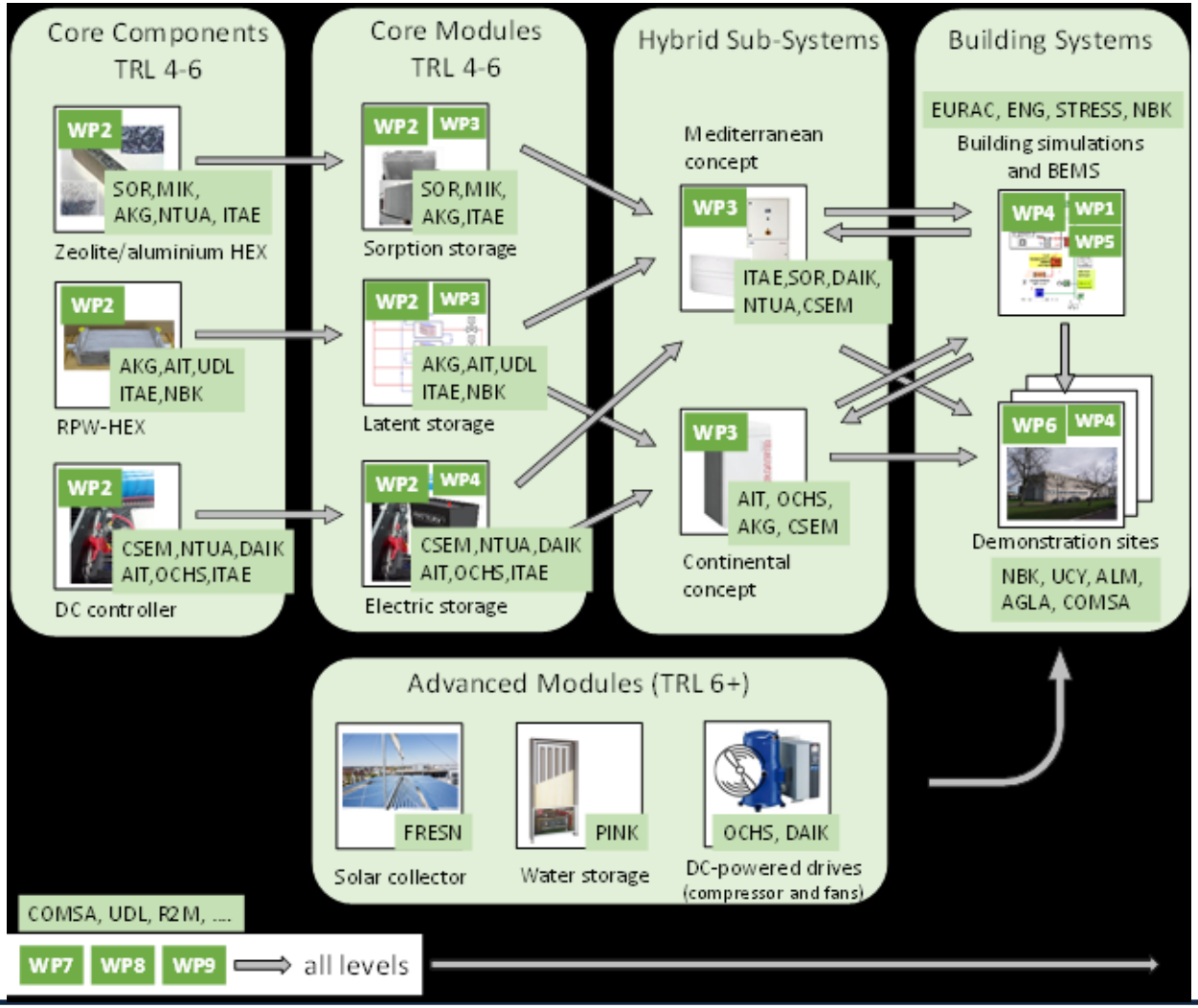
3 Implementation



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