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Development and Validation of an Innovative Solar Compact Selective-Water-Sorbent-Based Heating System

— Renewable Heating and Cooling Solutions for Buildings and Industry Workshop, *Sustainable Places 2020*—

Digital event, 29 October 2020

– Claudia Fabiani –
– University of Perugia (UniPG) –

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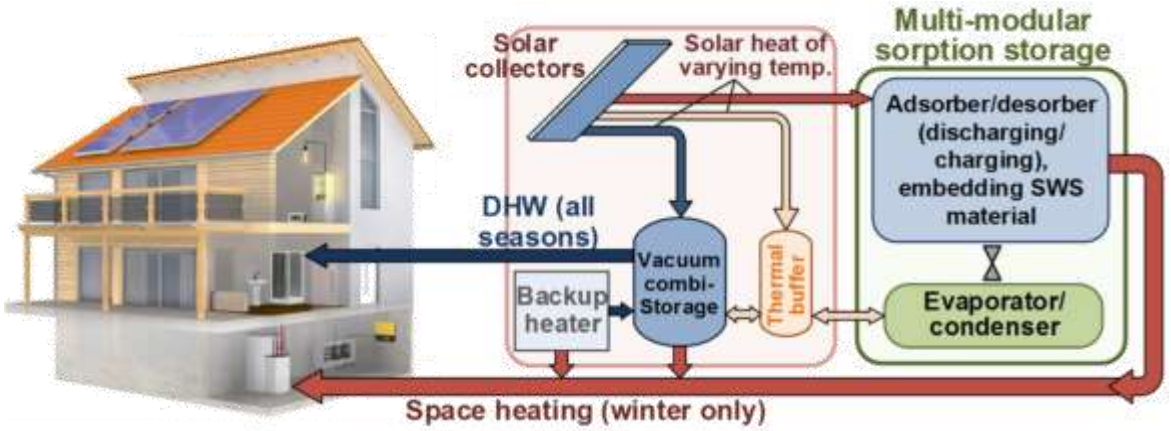
OVERALL CONCEPT

- The SWS-HEATING project aims to develop an innovative **Seasonal Thermal Energy Storage** (STES) unit
  - with a **novel sorbent storage material** embedded in a **compact multi-modular sorption STES unit,**
  - including **advanced components and smart control** for solar active houses.



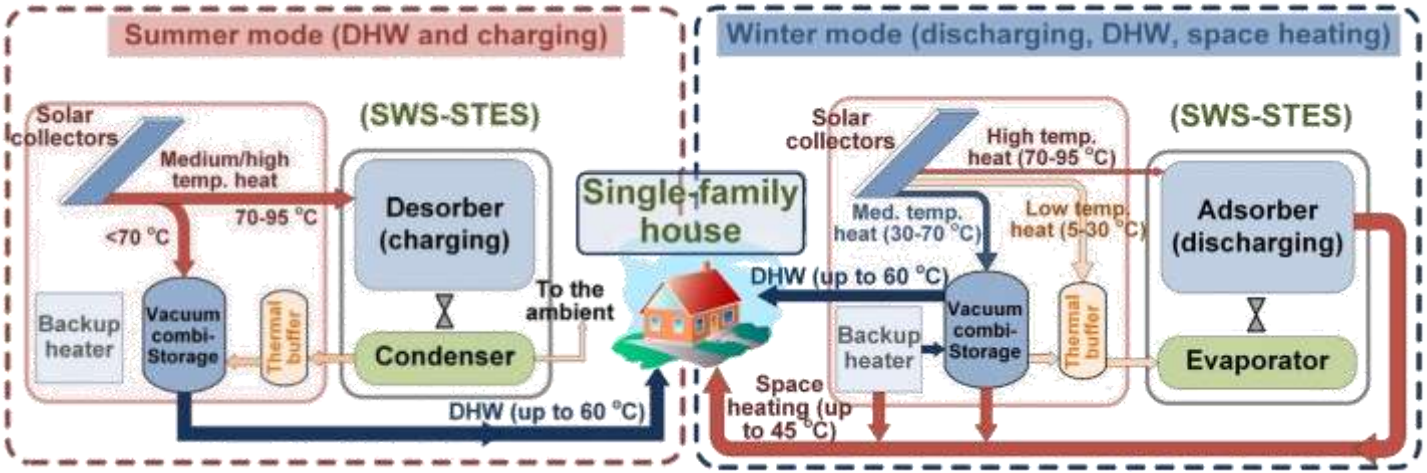
Allow to store and shift the harvested solar energy during summer to the winter period

➢ covering a large fraction of heating and DHW demand in buildings

CORE OBJECTIVES

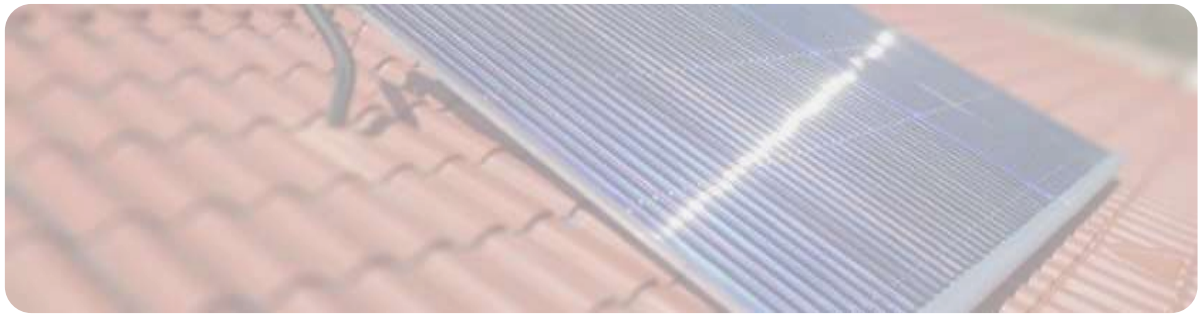
- To develop a **new sorbent material** in the SWS family with optimised sorption properties,
  - matching the working conditions of a heat storage cycle with **low temperature solar heat** charging (70 °C – 95 °C);
  - allowing **efficient application** also in **Northern Europe countries.**

- To develop a **compact multi-modular SWS-STES configuration** with high **corrosion resistance**, high **durability**, **ease of installation** & **maintenance**, and **low total cost**.



AMBITIONS

- Suitability for installation in **new or refurbished single-family houses** as a compact solution.
- Optimised system design and sizing for achieving very **high solar fraction of at least 60%** in Southern, Central and Northern Europe.
- Potential to **reduce system cost up to 20-30%** compared to other solar units.
- **Validation** of the system (**TRL5**) and **preparation** of its **further development.**



LEVEL of ANALYSIS

L1 - System

Whole SWS Heating system.

L2 - Sub-System

Set of connected components that operate together with the same purpose and method.

L3 - Component

Single part whose purpose is meaningless without the interaction with other components.

L4 - Material

Exclusively involves the substances, mixture of substances or reaction pairs.

Technical, Socio-Economic and Environmental KPIs

1. SOLAR FRACTION	L1	
2. PRIMARY ENERGY CONSUMPTION		
3. CO_2 EMISSION SAVINGS		
4. GHG EMISSION SAVINGS		
5. TOTAL SOLAR EFFICIENCY	L2	
6. STES EFFICIENCY		
7. STES POWER DENSITY	L3	
8. THERMAL ENERGY STORAGE DENSITY	L2	L4
9. PRODUCTION COST	L3	

User satisfaction, dissemination and exploitation KPIs

1. **USER'S ACCEPTANCE**

L1

2. **NUMBER OF VISITS AND DOWNLOADS FROM THE WEBSITE OR OTHER SOCIAL MEDIA**

3. **NUMBER OF PUBLICATIONS AND CITATIONS IN THE ACADEMIC LITERATURE**

CONSORTIUM TEAM

Suggested topic for discussion

1. **Combination of different technologies and storage components** with dedicated control systems.

2. Evaluation of new techonologies and systems by means of a **comprehensive multi-objective approach.**

3. Definition of a **shared list of key performance indicators** to compare different systems.

More information at:

www.swsheating.eu

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