This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No. 864496

ComBioTES

Compact bio-based thermal energy storage for buildings

SUSTAINABLE PLACES

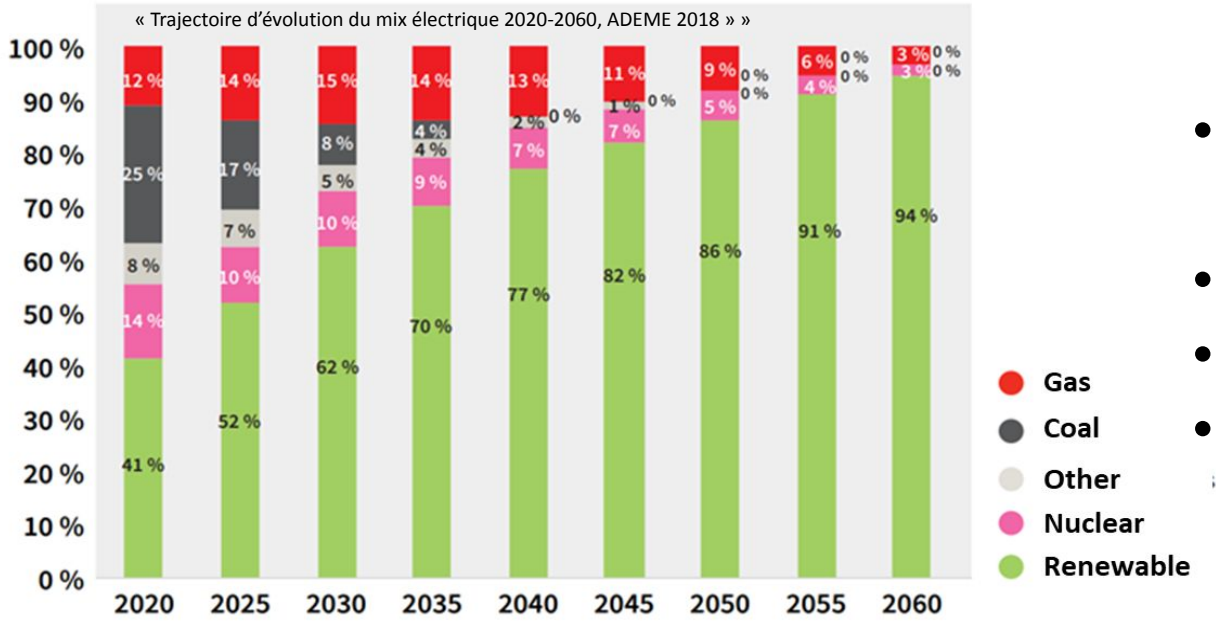
ComBioTES in a nutshell

Start: 01/11/2019
Restart date: 01/06/2021
Duration: 48 months
Coord: CEA
Consortium: 9 + 1
Budget: 4,193,978.75 €
Topic: LC-SC3-ES-6-2019 Research on advanced tools and technological development
Type of action: RIA (Research and Innovation action)

Context of ComBioTES – Grid POV

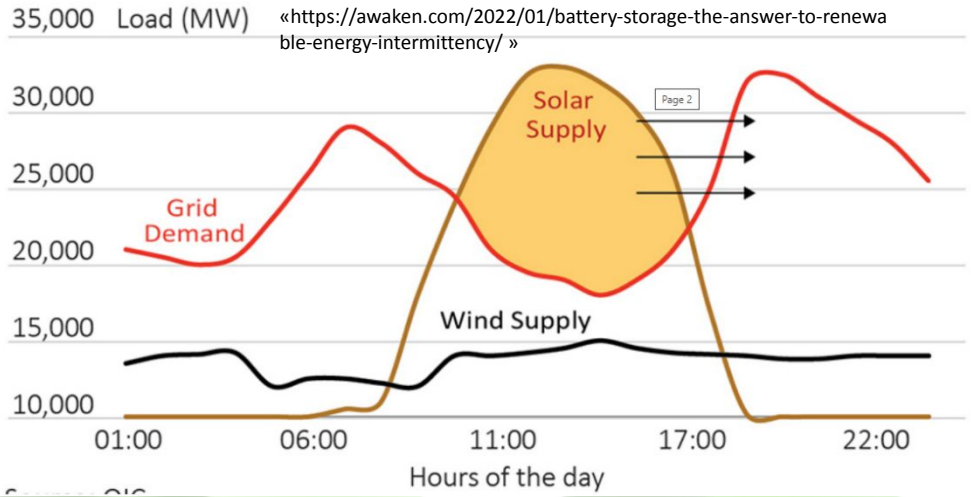
« Trajectoire d'évolution du mix électrique 2020-2060, ADEME 2018 »

« Trajectoire d'évolution du mix électrique 2020-2060, ADEME 2018 » »



- Roadmap for large increase of renewable sources in the global electricity mix.
- PV and wind are intrinsically intermittent.
- PV production from 8 AM to 8 PM max.
- Typical trend of the grid demand highlights 2 peaks, before and after the PV production period.

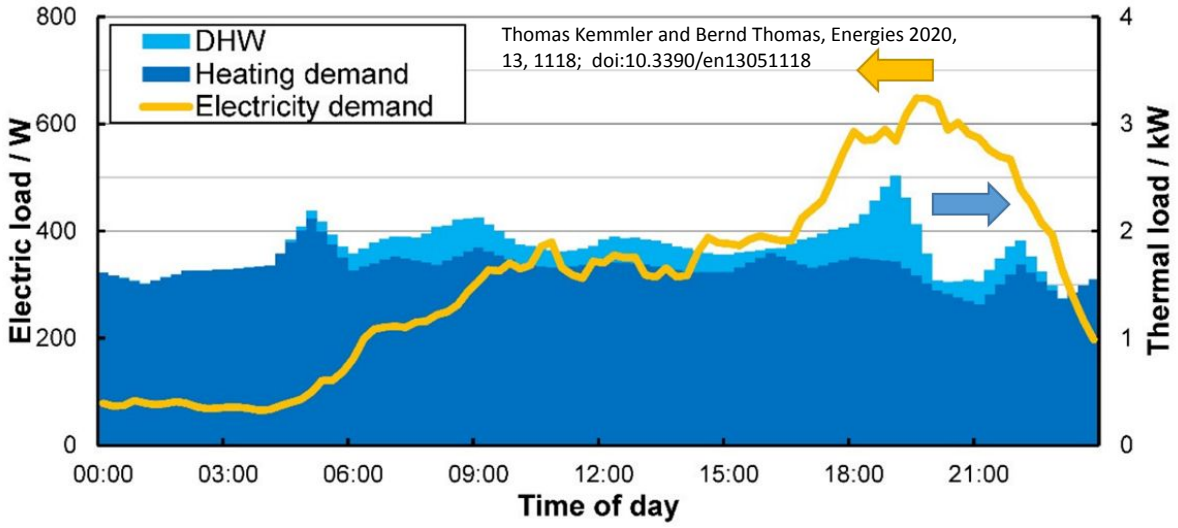
«https://awaken.com/2022/01/battery-storage-the-answer-to-renewable-energy-intermittency/ »

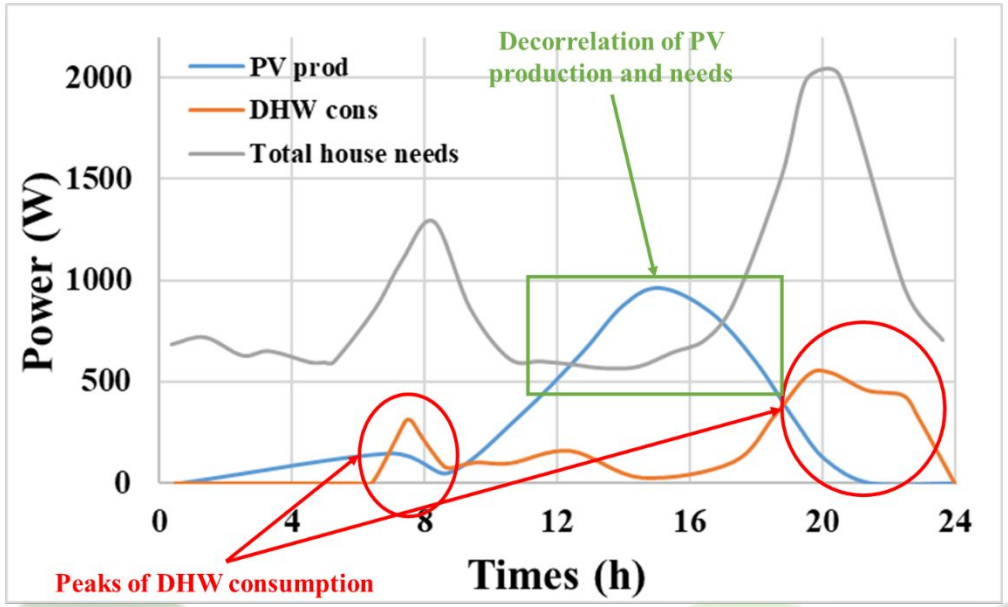


Energy storage is needed to consider large to full proportion of renewable sources in the electricity mix

SUSTAINABLE PLACES

Context of ComBioTES – Residential POV





Adapted from ECS pect, rapport final 2021 and Simulation of a ZEB Electrical Balance with aHybrid Small Wind/PV, January 2021

- Peaks of DHW consumptions in the morning and in the evening.
- Peak of electricity demand concomittant with DHW peak.
- Major temporal shift between the DHW and electricity profiles and the profile of PV production.

Thermal storage at residential scale

- Opportunity to contribute to the shifting of the peak demand on the electrical grid.
- Opportunity to correct the temporal mismatch between PV production and thermal needs.

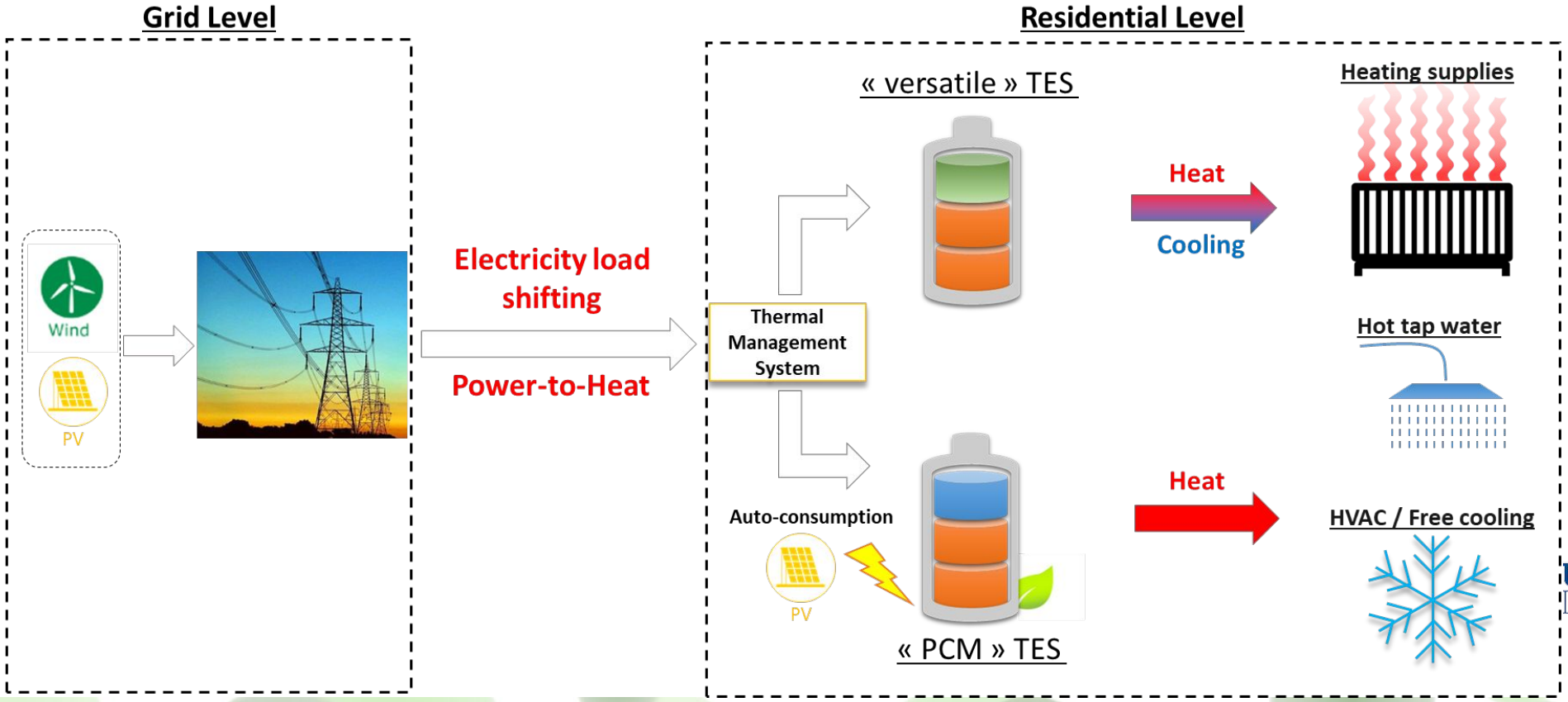
ComBioTES global concept

ComBioTES proposes to develop a thermal energy storage (TES) solution for residential needs of heating, hot tap water and cooling. This thermal energy storage solution will be fully adapted for electricity load shifting of the grid and PV auto-consumption.

Intermittent renewable electricity production
Production/consumption temporal shift
Consumption peak

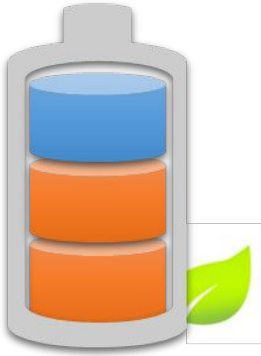
→

Residential thermal energy storage for thermal end-uses
Grid load shifting and PV auto-consumption



Overview of ComBioTES TES

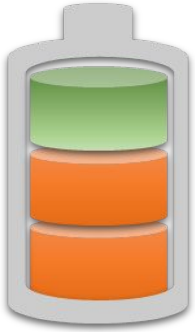
LATENT TES (LTES)



- Hot water or space heating
- Charge 2-4 kW, up to 3h
- 6-30 kWh
- 80-100 kWh/m^3
- Discharge: 4-15 kW
- Water outlet T>60°C

- Benchmark on existing PCM TES and TES geometry done
- First design almost finalized
- Engineering phase in Autumn 2022
- Construction phase in end 2022-Beginning 2023
- Test in Spring 2023 in well controlled lab-conditions

VERSATILE TES



SUMMER

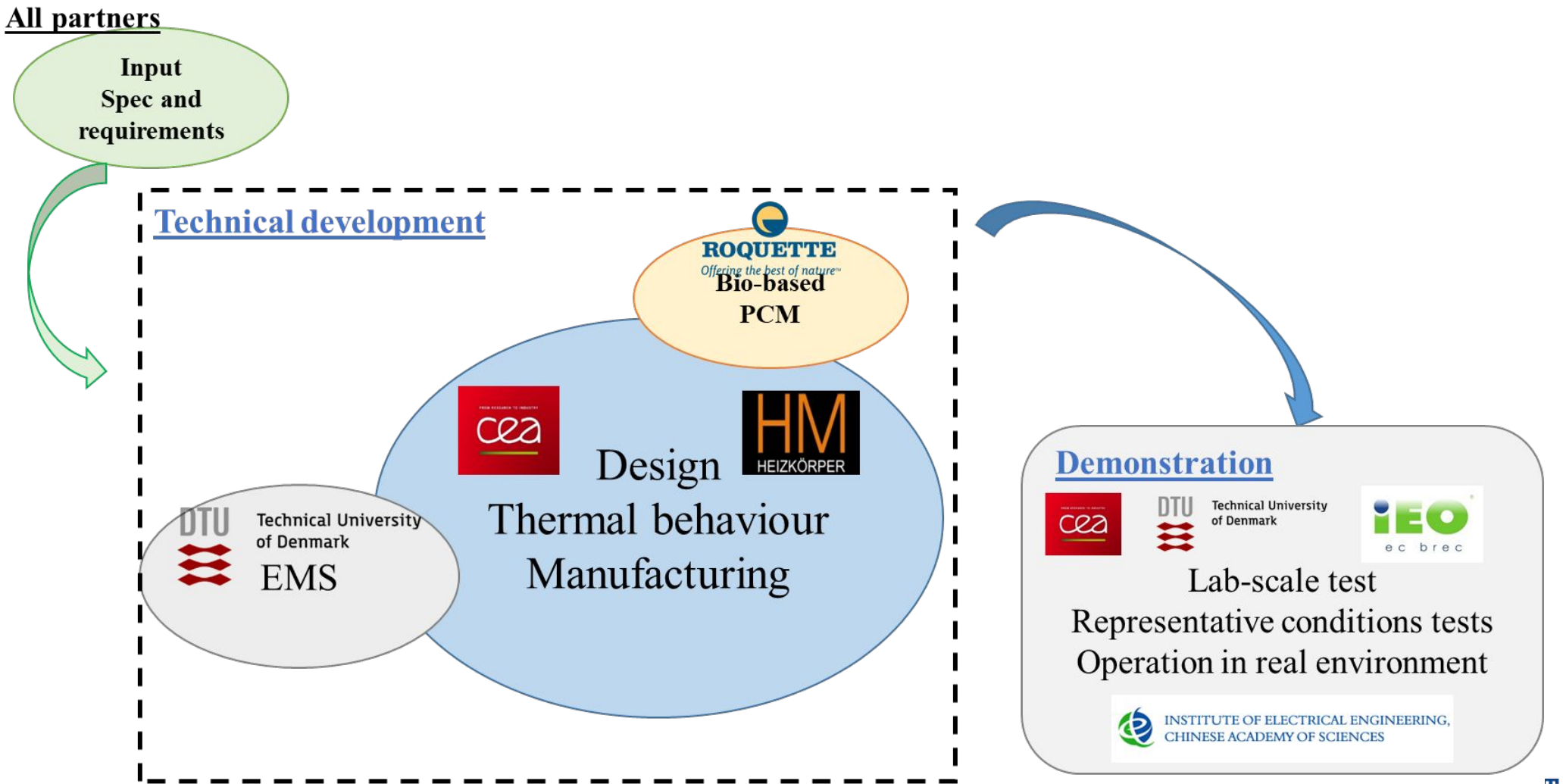
- Space cooling
- Water/Ice PCM TES
- 100 kWh/m^3; 15 kWh; 4-6 kW

WINTER

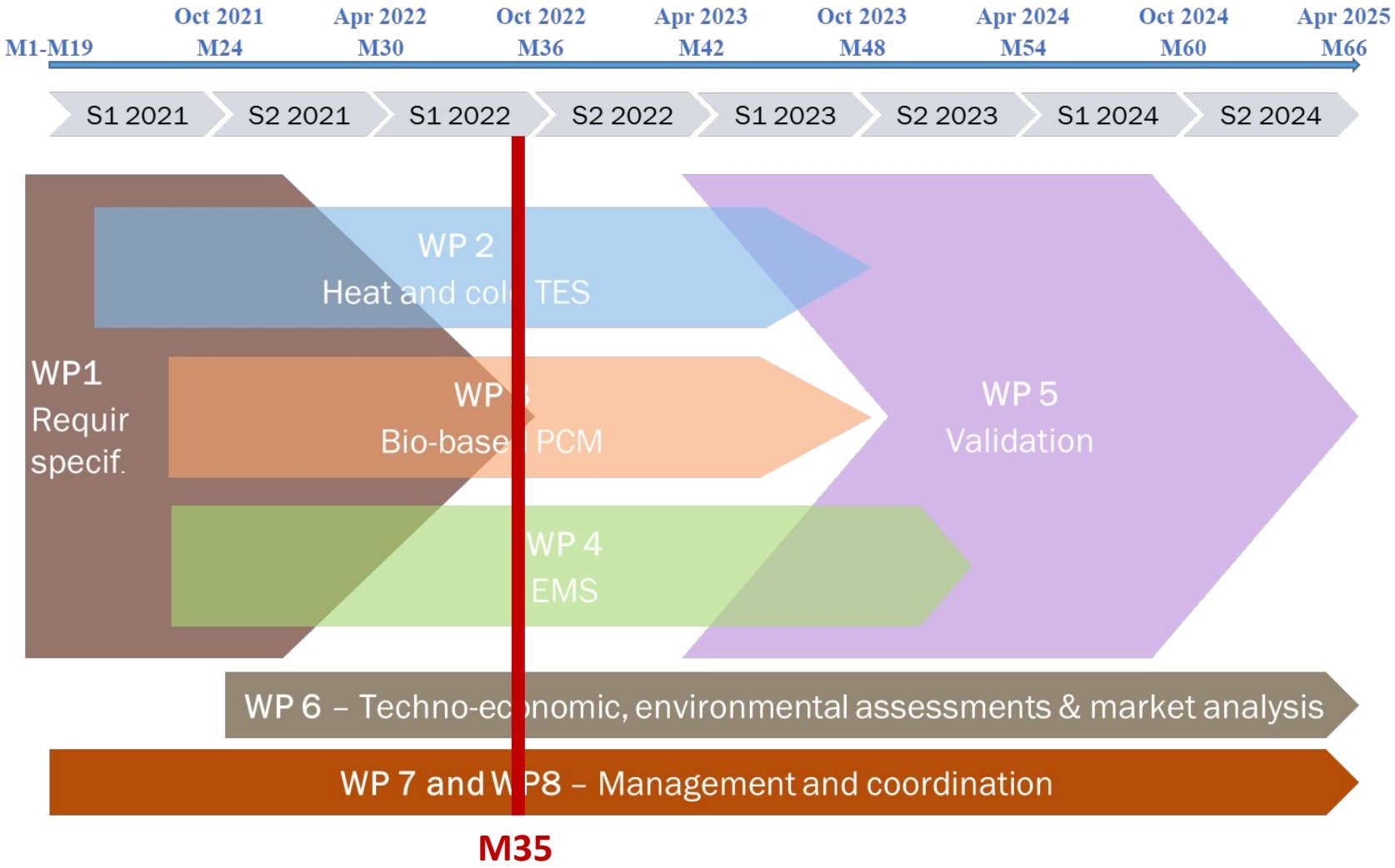
- Space heating
- Water thermocline pimped with PCM
- 80-100 kWh/m^3; 15 kWh; 4-15 kW

- Benchmark on potantial TES geometry done
- First design on-going
- Engineering phase will in Autumn 2022
- Construction phase in end 2022-Beginning 2023
- Test in Spring 2023 in well controlled lab-conditions

Project organization



Timeline of the project



Demonstration

DTU SYLAB platform (Copenhagen, DENMARK)

- Representative house and installation
- Test of advanced control and communication
- Test of EMS
- « Reference » case for TES control
- Test of PCM TES

HH test site (Henan, CHINA)

- One-stock 240 m² office building for 25 people
- Gas heater + solar thermal technology
- Test of PCM TES

IEO test site (Bączal Dolny, POLAND)

- 200 m² single-family house
- Natural gas + heat pump + PV
- Test of the PCM TES

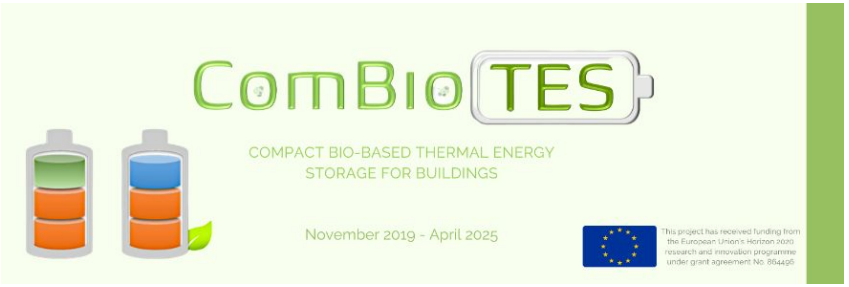
CEA test site (Chambéry, FRANCE)

- Individual representative houses
- Relevant size, thermal needs and applications
- Test of PCM TES

Exploitation and dissemination

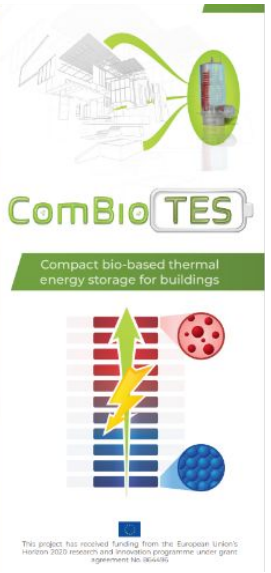
Final end-users:

- Individual clients + smart cities
- Mainly in mild climate countries: Germany, France, Russia, China



Commercialisation partners: HMH for the storage, ROQUETTE for the PCM

- Goal: 500 systems/year by 2025, 1500 by 2029.
- Research of the potential customers will start in May 2022.



Dissemination activities:

- Website: www.combiotes.eu
- LinkedIn: https://www.linkedin.com/in/combiotes-h2020/
- Twitter: @combiotes
- Twofold brochure and project factsheet
- Participation in conferences

SUSTAINABLE PLACES

CONTACT US !

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