CHESS
SET UP

Webinar

An innovative approach to Thermal Energy Storage and Self-Sufficiency in Buildings

With special collaboration from

RELaTED

SunHorizon

HYBUILD
Hybrid Energy Storage for Buildings

19th December 2019

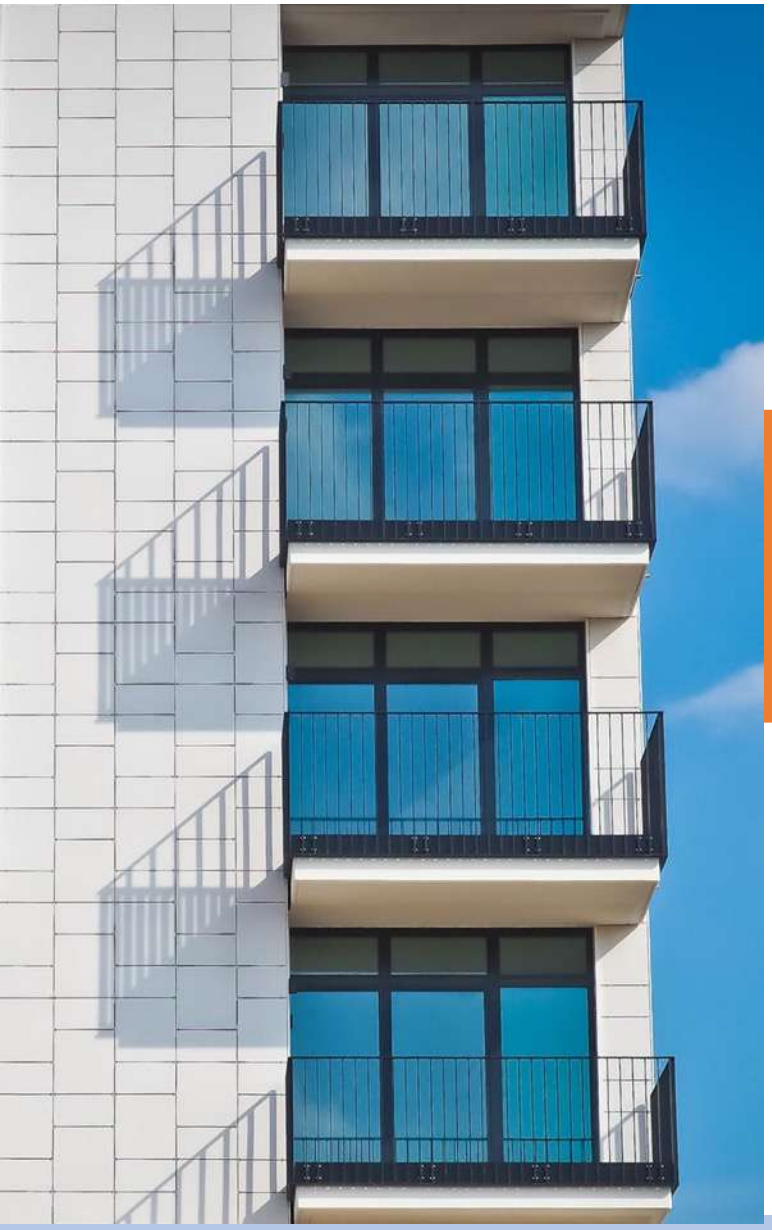
Agenda

11:00 to 11:05	**Welcome to the webinar by moderator** – Ariadna Caixach, CHESS SETUP Communication and Dissemination Partner (Edenway)
11:05 to 11:10	**Introduction to CHESS SETUP** – Arnau Alarcón, CHESS SETUP Project Coordinator (Barcelona Ecologia)
11:10 to 11:20	**Presentation of empirical results of CHESS SETUP and its approach to Thermal Energy Storage and Self-Sufficiency in Buildings** – Arnau Alarcón, CHESS SETUP Project Coordinator (Barcelona Ecologia)
11:20 to 11:35	**ReLATED Project** – Roberto Garay, ReLATED Project Coordinator (Tecnalia)
11:35 to 11:50	**SUNHORIZON Project** – Alessandra Cuneo, SUNHORIZON Project Coordinator (Rina Consulting S.p.A)
11:50 to 12:05	**HYBUILD Project** – Sergio Valentino, HYBUILD Project Coordinator (COMSA Corporación)
12:05 to 12:30	**Q/A Debate** and **Closing** of the webinar

This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 680556.

CHESS SET UP

Welcome



Thermal Energy Storage and Self-Sufficiency in Buildings

The Energy Performance Building Directive (EPDV, 2010) states that by 2020 all new buildings should reach "nearly zero-energy" performance levels using **innovative and cost optimal technologies** with **integration of renewable** energy.

The use of **Thermal Energy Storage (TES)** in buildings in combination with space heating, domestic hot water and space cooling **has recently received much attention.**

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Welcome

The **Thermal Energy Storage capacity of a building** may be employed to **optimize efficiencies** and to **suppress the heating and cooling energy costs** for the full diversity of space conditioning technologies and strategies.

These strategies can include:

- Fossil fuel-fired heaters,
- Heat pumps,
- Active and passive solar collectors,
- Economizer modes,
- Application of off-peak electrical energy rate structures and,
- General strategies associated with low energy requirement buildings.

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Welcome

Sustainable buildings need to take advantage of renewable and waste energy to approach ultra-low energy buildings.

Utilization of low-exergy heating and cooling sources requires that **energy storage is integrated into sustainable building design.**

Seeking buildings' self-sufficiency!

Well designed and combined systems can improve **building's self-sufficiency, energy efficiency and comfort level**, yielding significant **cost savings**, promising payback period and **less green house gases emissions** to the atmosphere.

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CHESS SETUP

Combined HEat Supply System by using Solar Energy and heaT pUmPs

CHESS SETUP System responds to the increasing heating and domestic hot water demand in the building sector.

The **Project** has designed, implemented and is promoting a **reliable, efficient and profitable system** able to supply **heating and hot water** in buildings mainly from **renewable sources,** increasing the **self-sufficiency** of the building and **reducing its emissions.**

CHESS SETUP can allow **significant energy savings** for the buildings:
the energy produced on-site will be consumed on site or reverted to the power grid if necessary. CHESS SETUP could bring key solutions for our future: a **self-consumption system** that could drive us towards NZEB, energy independence, a higher productivity of the grids and a low-carbon society.

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CHESS SETUP

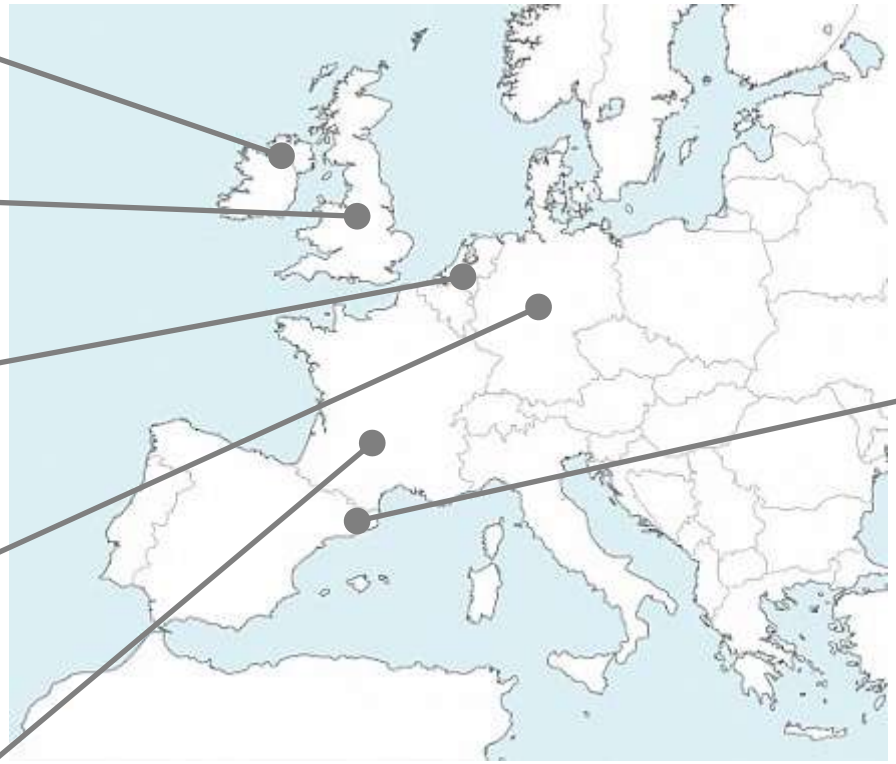
The Consortium gathers 10 partners

Ulster University

Electric Corby
Switched on thinking

EUROGRANT

edenway



6 European countries

BCN ECOLOGIA
Agència d'Ecologia Urbana de Barcelona

lavola
Anthesis

Ajuntament de SantCugat

WATIA

VEOLIA

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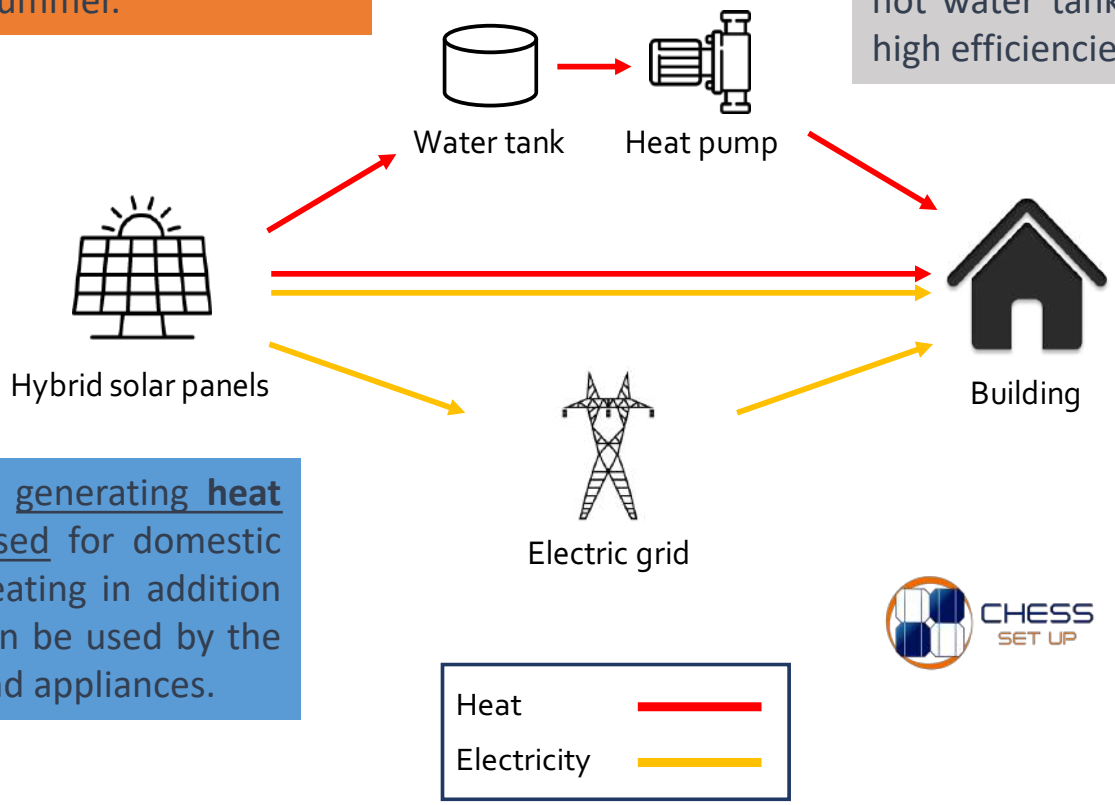
CHESS SETUP System

Approach to Thermal Energy Storage and Self-Sufficiency

A **hot water tank** to **store the thermal energy** produced by the hybrid solar panels, especially in summer.

A **heat pump**, to provide domestic hot water and/or heating from the hot water tank to the building at high efficiencies.



Hybrid solar panels generating **heat** to be stored and used for domestic hot water and/or heating in addition to **electricity** that can be used by the building's systems and appliances.

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CHESS SETUP Empirical Results

3 PILOT SITES

SANT CUGAT (SPAIN) / Sport center
Sport center including swimming pools
Large storage tank

CORBY (UK) / 26 homes
Earth Energy Bank (EEB) heat storage system

MANLLEU (SPAIN) (Ecoedifici Lavola) / Office
Small scale pilot
Short term storage

The installations have been **monitored and controlled** to manage the system efficiently based on key data such as available heat energy, weather forecast and electricity prices to optimize the energy flows within the system.

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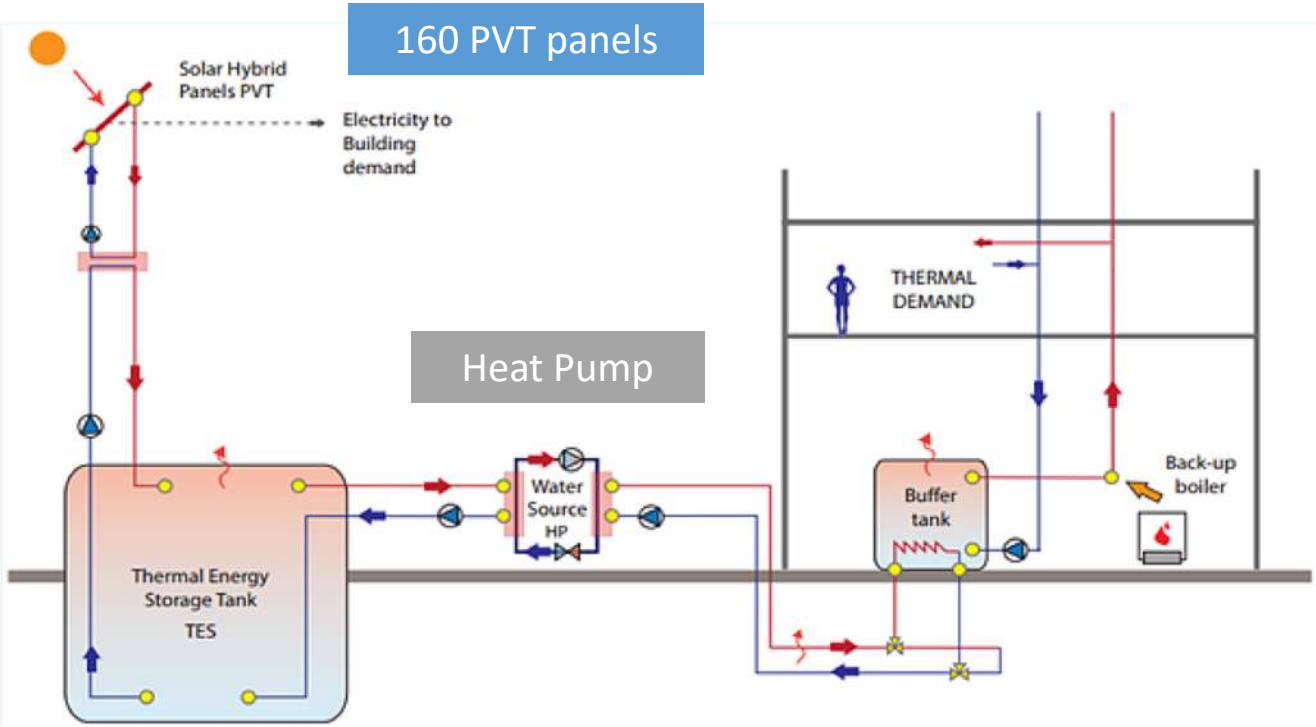
CHESS SETUP

CHESS SETUP Empirical Results

SANT CUGAT (SPAIN) /
Sport center
Climatization of the swimming pool
Large storage tank



Thermal Enery Storage Tank (TEST)

Opening days:	225 days/year
Daily opening hours:	6am to 22pm
PVT:	41,66 kW_e – Eff. 19%
STES:	100 m^3 (water)
WSHP :	97,5 kW_{th} –COP 5.30

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CHESS SETUP Empirical Results

SANT CUGAT (SPAIN) / Sport center

- Hydraulic and electrical monitoring installation done.
- Start-up phase has finished and the system is already:
  - generating energy (thermal and electric)
  - storing thermal energy in the tank
  - heating the swimming pool.

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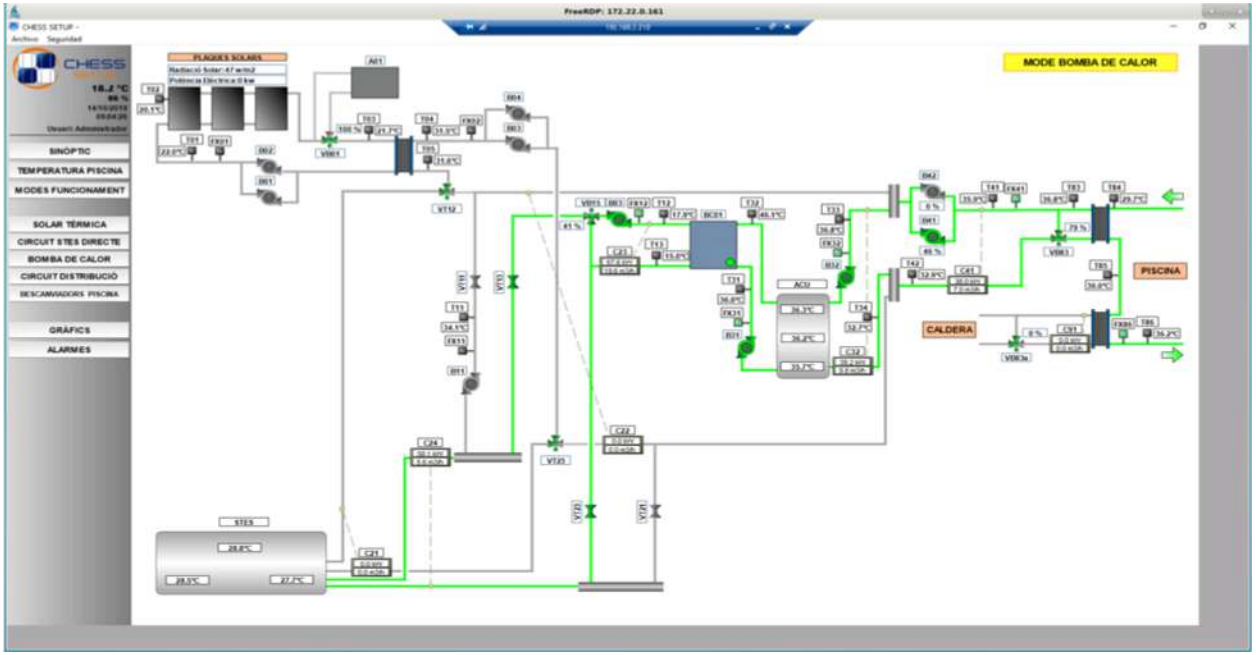
CHESS SETUP Empirical Results

Software - Selection of systems and data

SANT CUGAT (SPAIN) /
Sport center
Sport center including swimming pools
Large storage tank



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CHESS SETUP Empirical Results

Results

SANT CUGAT (SPAIN) / Sport center

Sport center including swimming pools
Large storage tank

Thermal Energy Savings

Day	Time	Energy savings (kWh)	Economic savings (€)
30/09/2019	0:00	2300	102,35 €
07/10/2019	0:00	2900	129,04 €
14/10/2019	0:00	3500	155,74 €
21/10/2019	0:00	2700	120,14 €
28/10/2019	0:00	2000	88,99 €
04/11/2019	0:00	3800	169,09 €
11/11/2019	0:00	2300	102,35 €
18/11/2019	0:00	2400	106,80 €
25/11/2019	0:00	3000	133,49 €
02/12/2019	0:00	1500	66,75 €
09/12/2019	0:00	1600	71,20 €

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CHESS SETUP Empirical Results

Results

SANT CUGAT (SPAIN) /
Sport center
Sport center including swimming pools
Large storage tank

Electrical Energy/Production

Day	E.Prod	E.Cons	E.Imp	E.Exp
01/11/2019	77	11,94	5,46	70,52
02/11/2019	93	12,89	5,42	85,53
03/11/2019	85	11,19	4,87	78,68
04/11/2019	90	225,98	193,83	57,85
05/11/2019	94	10,96	4,41	87,45
06/11/2019	102	198,39	189,48	93,09
07/11/2019	46	38,37	34,05	41,68
08/11/2019	92	257,17	248,39	83,22
09/11/2019	79	61,41	50,51	68,1
10/11/2019	81	10,77	4,63	74,86
11/11/2019	86	231,71	159,57	13,86
12/11/2019	97	34,7	19	81,3
13/11/2019	40	7,79	4,84	37,05
14/11/2019	16	127,14	112,84	1,7
15/11/2019	82	11,34	4,44	75,1
16/11/2019	89	33,89	25,17	80,28
17/11/2019	0	92,9	92,9	0
18/11/2019	5	126,48	126,2	4,72
19/11/2019	92	30,12	21,63	83,51
20/11/2019	64	104,64	99,31	58,67
21/11/2019	59	28,13	21,09	51,96
22/11/2019	55	107,34	102,41	50,07
23/11/2019	84	18,54	7,12	72,58
24/11/2019	87	129,74	120,7	77,96
25/11/2019	82	168,71	118,12	31,41
26/11/2019	83	39,15	31,54	75,39
27/11/2019	67	184,33	136,81	19,48
28/11/2019	71	13,39	6,77	64,38
29/11/2019	71	32,46	21,72	60,26
30/11/2019	79	106,74	99,77	72,03

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CHESS SETUP Empirical Results

SANT CUGAT (SPAIN) / Sport center

Sport center including swimming pools
Large storage tank

Things to keep in mind

The thermal input from the system has been low because it was launched in late summer, and it must be taken into account that the key to the system is the accumulation of energy in summer to consume it in the winter. As the system did not start working until September, we haven't had a great amount of energy during the summer, and therefore the overall energy contribution until today is low.

Electricity self-sufficiency is also low because we are in winter and consume for pool heating is high, meaning more hours of heat pump operation, which is the most consuming equipment.

Until we have a full cycle summer-winter we will not be able to know the real operation of the system

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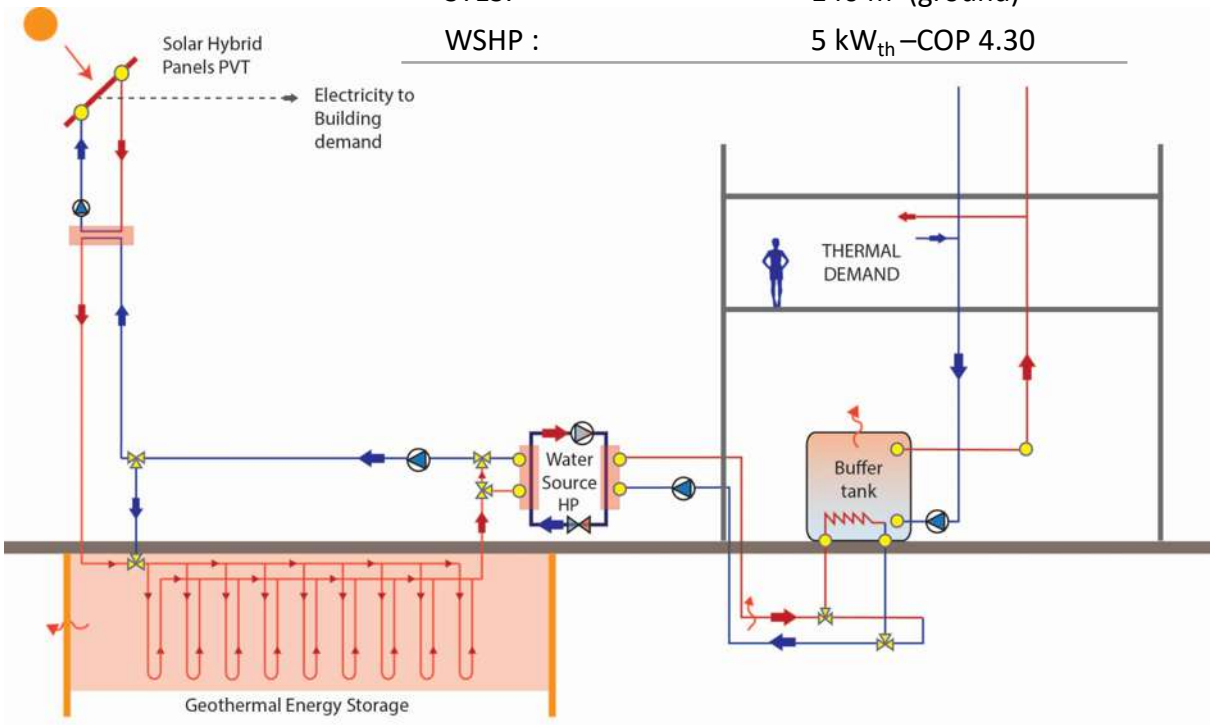
CHESS SETUP

CHESS SETUP Empirical Results

Floor conditioned area:	436 m^2
PVT:	5 kW_e – Eff. 17%
STES:	140 m^3 (ground)
WSHP :	5 kW_{th} –COP 4.30

CORBY (UK) / 26 homes
Earth Energy Bank (EEB) heat storage system



The system takes generated heat energy and stores this underground. The **stored heat** is then withdrawn from the **Earth Energy bank** for use within the building via a **heat pump**, which increases the temperature to a level that can be used for space heating and domestic hot water.

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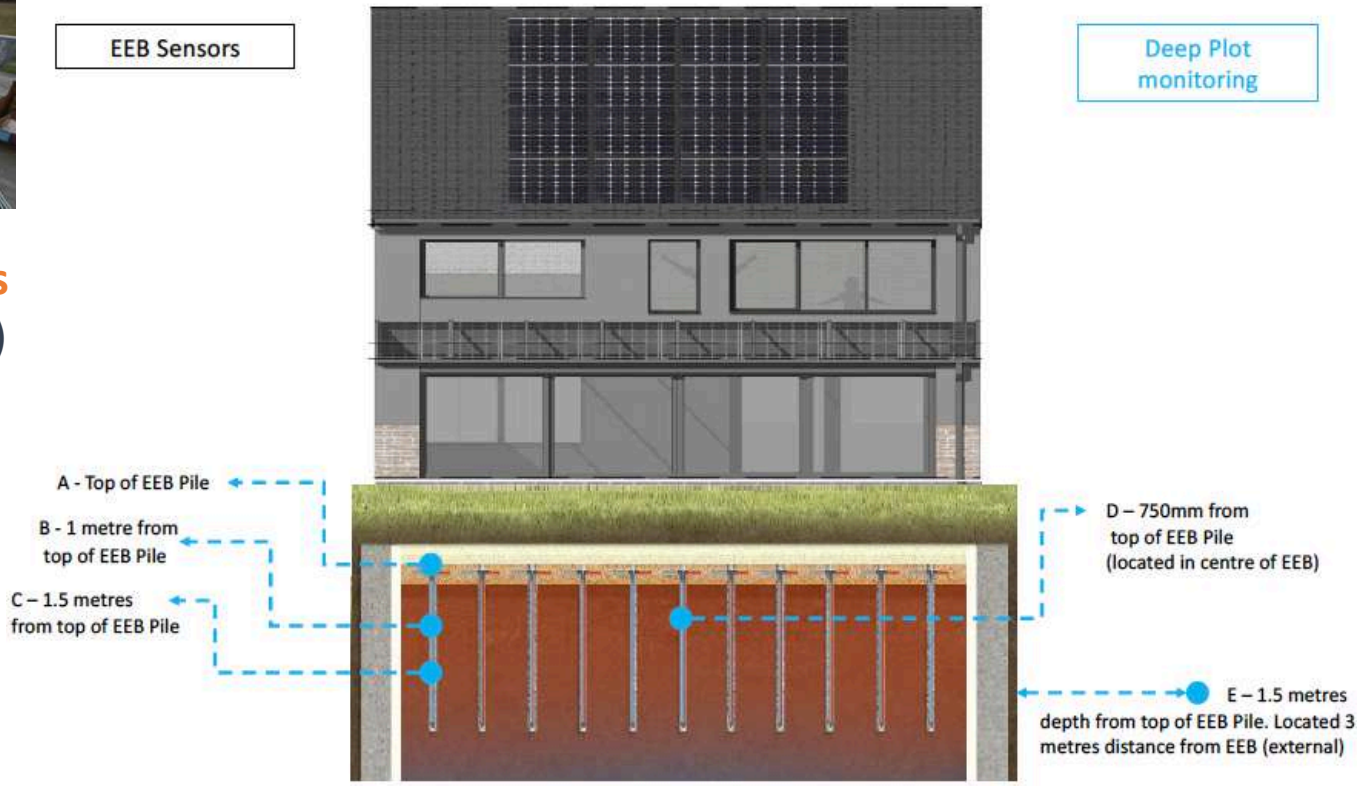
CHESS SETUP Empirical Results

Deep Monitoring

CORBY (UK) / 26 homes
Earth Energy Bank (EEB)
heat storage system



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CHESS SETUP Empirical Results

Main challenges

- Integrating Heat Pump and existing control system
- First homes will be inhabited in January
- Since then, actual system operation data will be available.

CORBY (UK) / 26 homes

Earth Energy Bank (EEB) - heat storage system

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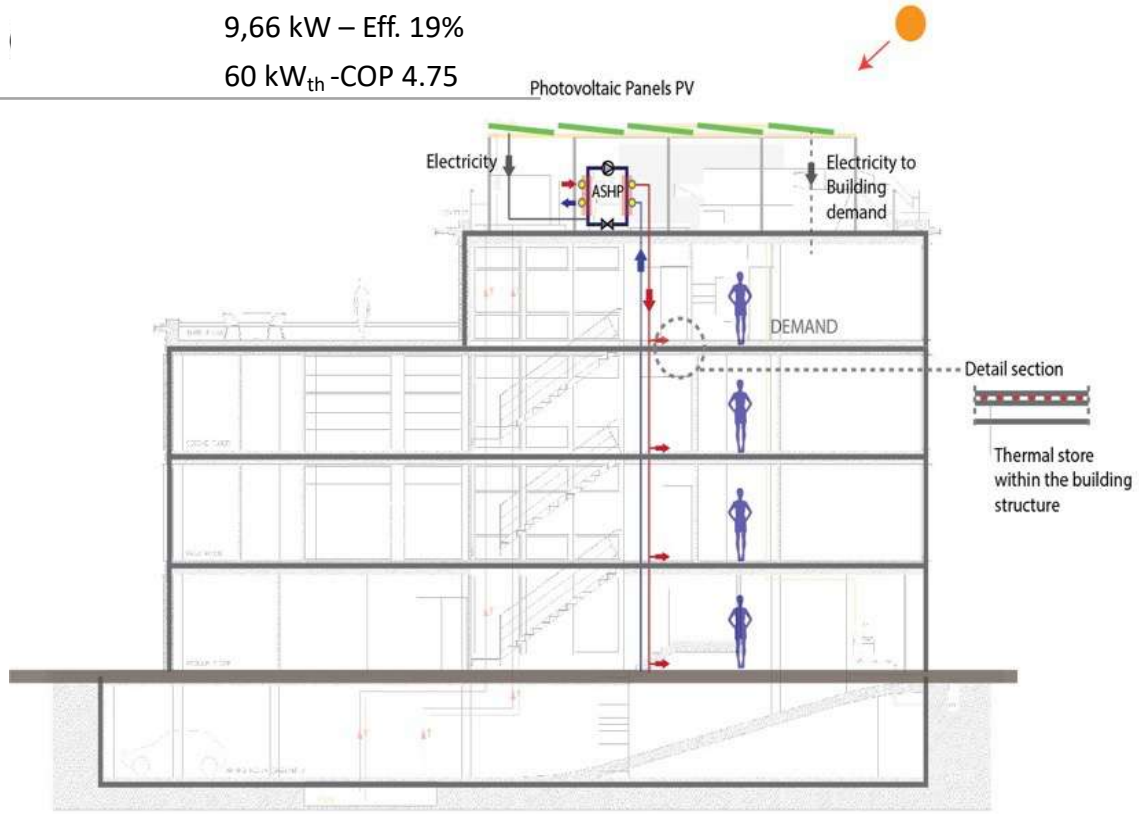
CHESS SETUP Empirical Results

MANLLEU (SPAIN) (Ecoedifici Lavola) / Office

Small scale pilot
Short term storage

Floor conditioned area:	827 m^2
Opening days:	225 days/year
Daily opening hours:	8am to 19pm
Average occupants:	60
PV:	9,66 kW – Eff. 19%
ASHP :	60 kW_{th} -COP 4.75



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CHESS SETUP Empirical Results

MANLLEU (SPAIN) (Ecoedifici Lavola) / Office

Small scale pilot

Short term storage

PV installation

Heat Pump

Meters

Control - hydraulic installation

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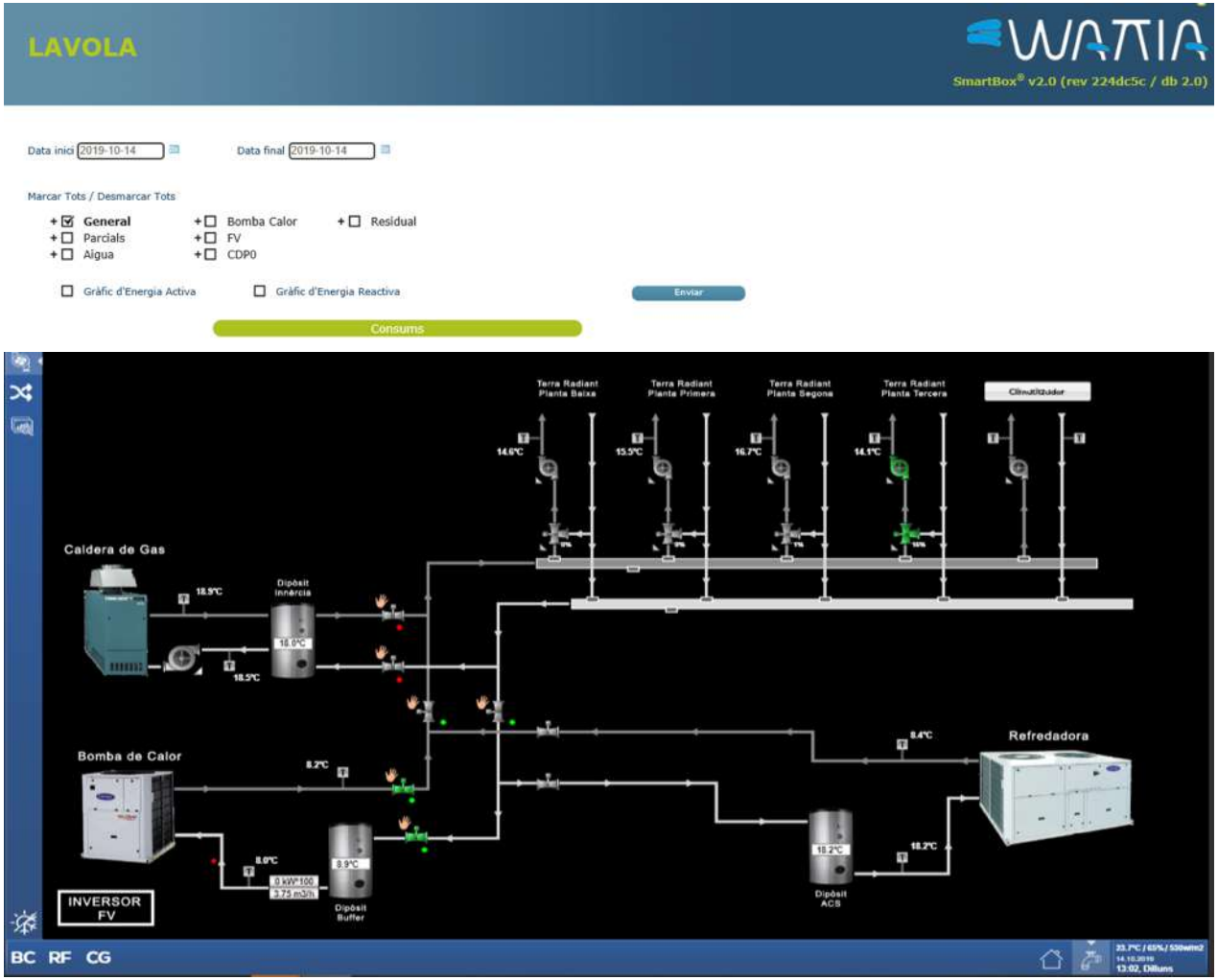
CHESS SETUP Empirical Results

MANLLEU (SPAIN) (Ecoedifici Lavola) / Office

Small scale pilot

Short term storage

Software - Selection of systems and data



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CHESS SETUP Empirical Results

Results

MANLLEU (SPAIN) (Ecoedifici Lavola) / Office

Small scale pilot
Short term storage

PV production represents 27% of energy consumption.

The system has been fully on service since the end of June 2019, and we can start to see the first positive effects of the CHESS SETUP solution in Lavola's headquarters: **the energy savings nearly reach 26%, and considering only the heating system there is a 42% savings.**

System	Consumption 2019 (kWh/year)	Consumption 2018 (kWh/year)	Savings
Lighting	3.624	3.236	12%
Power	1.230	2.964	-58%
UPS	5.315	5.033	6%
Cooling system	3.225	2.941	10%
Heating System	10.469	17.901	-42%
Total	**23.863**	**32.074**	-26%

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Thank you!

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Barcelona Ecologia – Project coordinator

https://www.chess-setup.net
https://twitter.com/chesssetup?lang=en

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RELaTED

Renewable, Low Temperature District

Roberto Garay Martinez
RELaTED Project Coordinator
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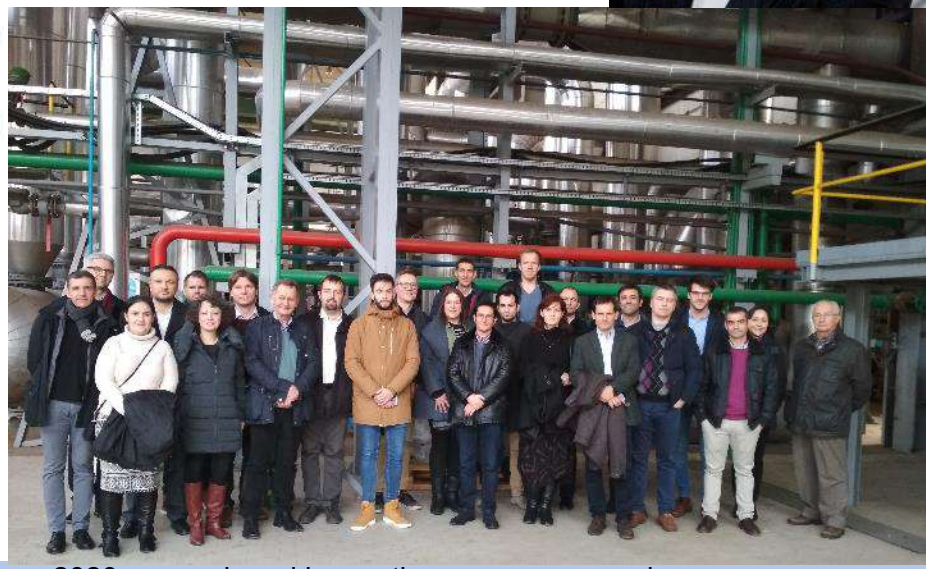

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Renewable Low Temperature DH networks

- District heating (DH) is a very energy efficient heating system with proven reliability
- DHs are key systems to the de-carbonize heating in Europe.
- Renewable and waste heat sources need to be integrated in DH systems
- Need for updated configurations:
  - Reduce operation temperature to better integrate low-grade industrial heat sources
  - Introduction of larger shares of renewable energy sources (RES) in the DH network.
  - The introduction of distributed heat sources (reject heat from cooling equipment...).
  - To guarantee economic viability with reduced heat loads in NZEB (Near Zero Energy Buildings).

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RELaTED, REnewable Low TEmperature District

- Decentralized Ultra-Low Temperature (ULT) DH networks
- Incorporation of low-grade heat sources with minimal constraints
- Reduced operational costs due to fewer heat losses
- Better energy performance of heat generation plants
- Extensive use of de-carbonized energy sources at low marginal costs
- Technology developments in line with the overall concept:
  - Building Integrated Low Temperature Solar Thermal Systems (BILTST)
  - Triple Function Substations (3FS)
  - District Heating connected Reversible Heat Pump (DHRHP)
- Demonstration in four complementary environments in Denmark, Estonia, Serbia and Spain

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Main outcome of the project

1. Ultra-low temperature (ULT) heat distribution concept, at 40-45ºC.
   a. NZEB performance or low urban density
   b. Existing systems, and new systems in existing urban environments
2. 3 key technologies: 3FS, DHRHP, BILTST
3. Proven concept in 4 clearly different environments
   a. New ULT DH in a green field development, with NZEB in Denmark
   b. Operational DH, with high share of biomass heat production, in Estonia
   c. Large DH network, in Serbia
   d. Corporate DH network in Spain
4. Replicability study in 2 European regions.
5. Profitable Low-carbon concept
6. Increased share of RES and waste heat energy production in DH.
7. Greenhouse Gas Emissions Reductions & Air Quality Improvements

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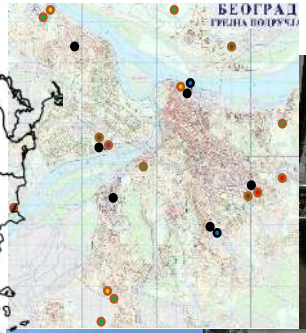
RELaTED

tecnalia Inspiring Business

RELaTED

Renewable, Low Temperature District

Our Networks



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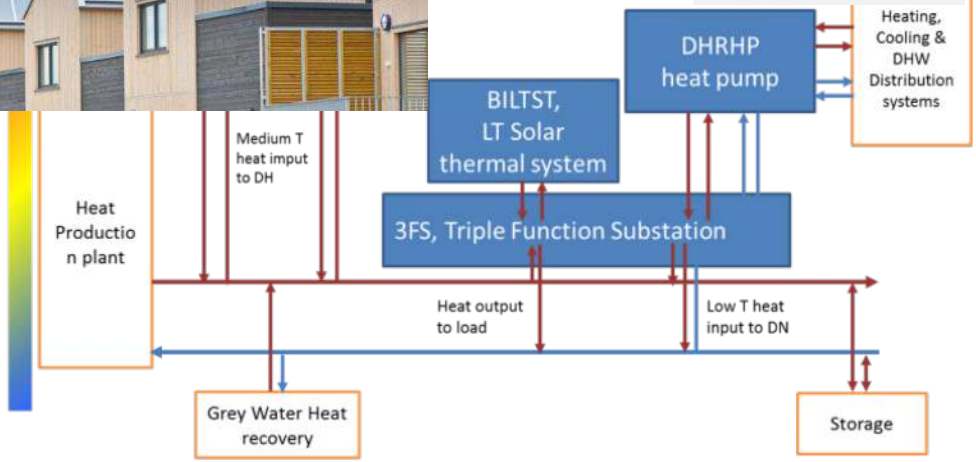
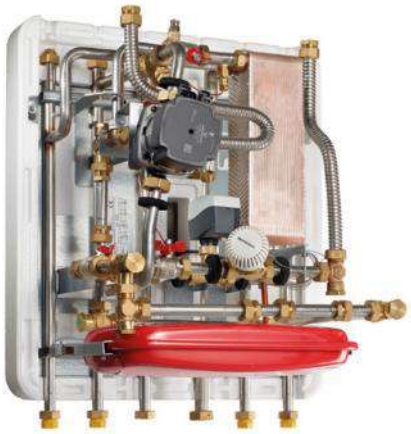
Our Technologies

BILTST
Building Integrated Low Temperature Solar Thermal Systems

DHRHP
District-Heating Connected, Reversible Heat Pump





3FS, Triple Function Substation

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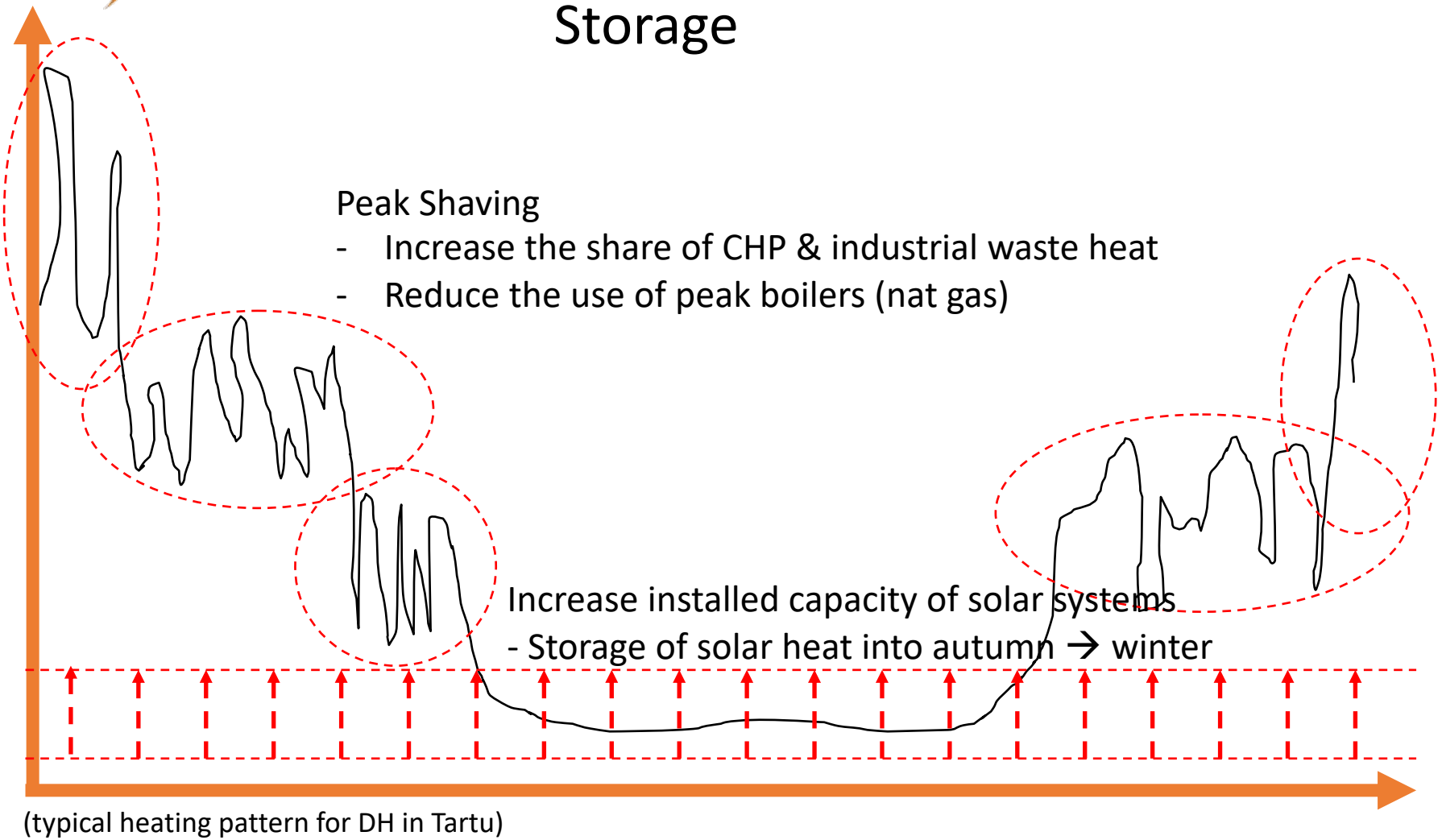
Storage



(typical heating pattern for DH in Tartu)

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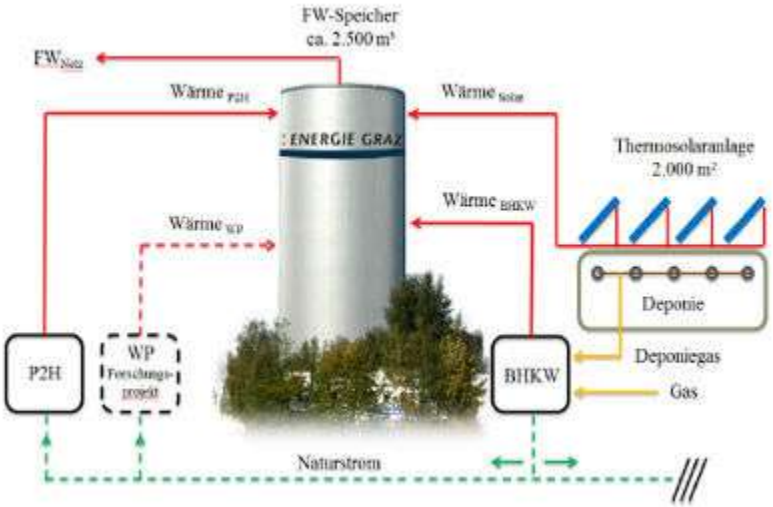
Storage

Not directly dealt with within the Project
Typical concepts:

- Vertical storage (day/week)
- Pit storage (seasonal)



RAMBOLL
https://ramboll.com/media/rgr/two-ramboll-projects-among-the-eight-most-efficient-district-heating-and-cooling-systems-in-the-eu

HELIOS Project, Graz.
http://www.immobilien.graz.at/cms/beitrag/10263625/4158663/Speicherprojekt_HELIOS.html

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RELaTED, Next Steps (19/20 heating season)

• Network Temperature Reduction	Fortum Tartu DH network, Estonia
• Deploy Technologies	DTI Energy Flex Houses, Denmark
• Finallize testing of solar systems	IMAR test bench, Spain
• Deploy new substations & solar systems	UN School, Belgrade
• Deploy low temperature distribution network solar systems & reversible HPs	Basque Government Site in Iurreta, Spain
• Network temperature reduction	BEOELEK network, Serbia

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RELaTED, Available information

- Public Deliverables
  - D2.1-D2.6 Low-T district concept, Interconnection Schemes & Development Schemes
  - D4.1 Energy price assessment
- 6-monthly newsletters
- Journal and Conference Papers (selected)
  - Solar District Heating Graz 2018 (2 papers + posters)
  - Journal of Façade Design & Engineering (1 paper)
  - EUSEW 2019
  - IBPSA 2019 (1 paper)
  - IAQVEC 2019 (2 papers)
- Public dissemination materials
- Direct information by e-mail: roberto.garay@Tecnalia.com

http://www.relatedproject.eu/

https://www.linkedin.com/in/related-project-h2020/

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Thank you!

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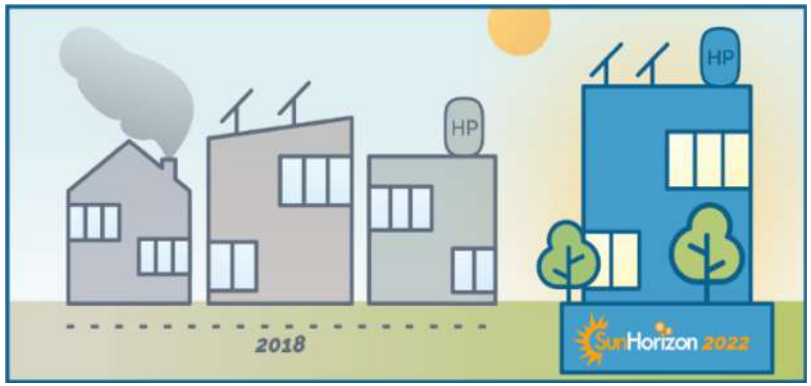
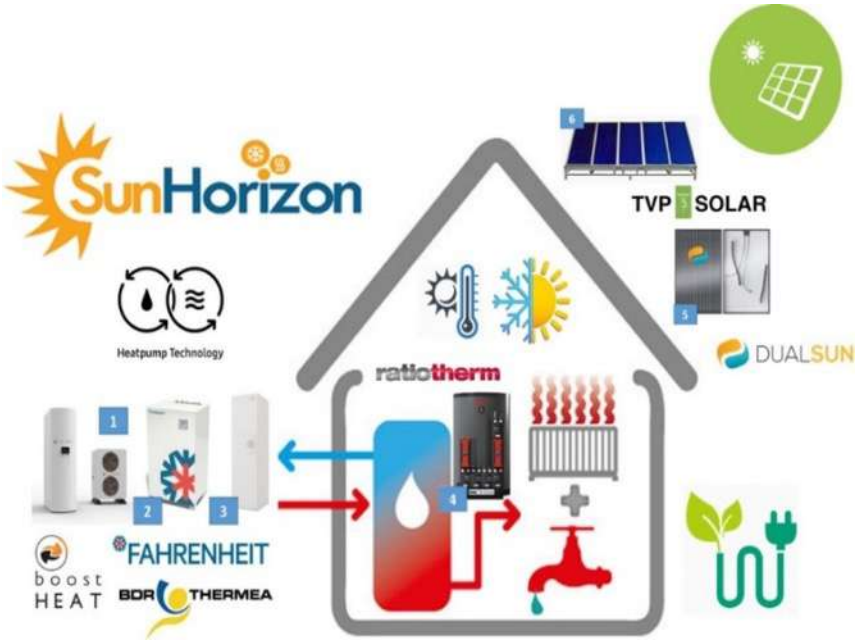


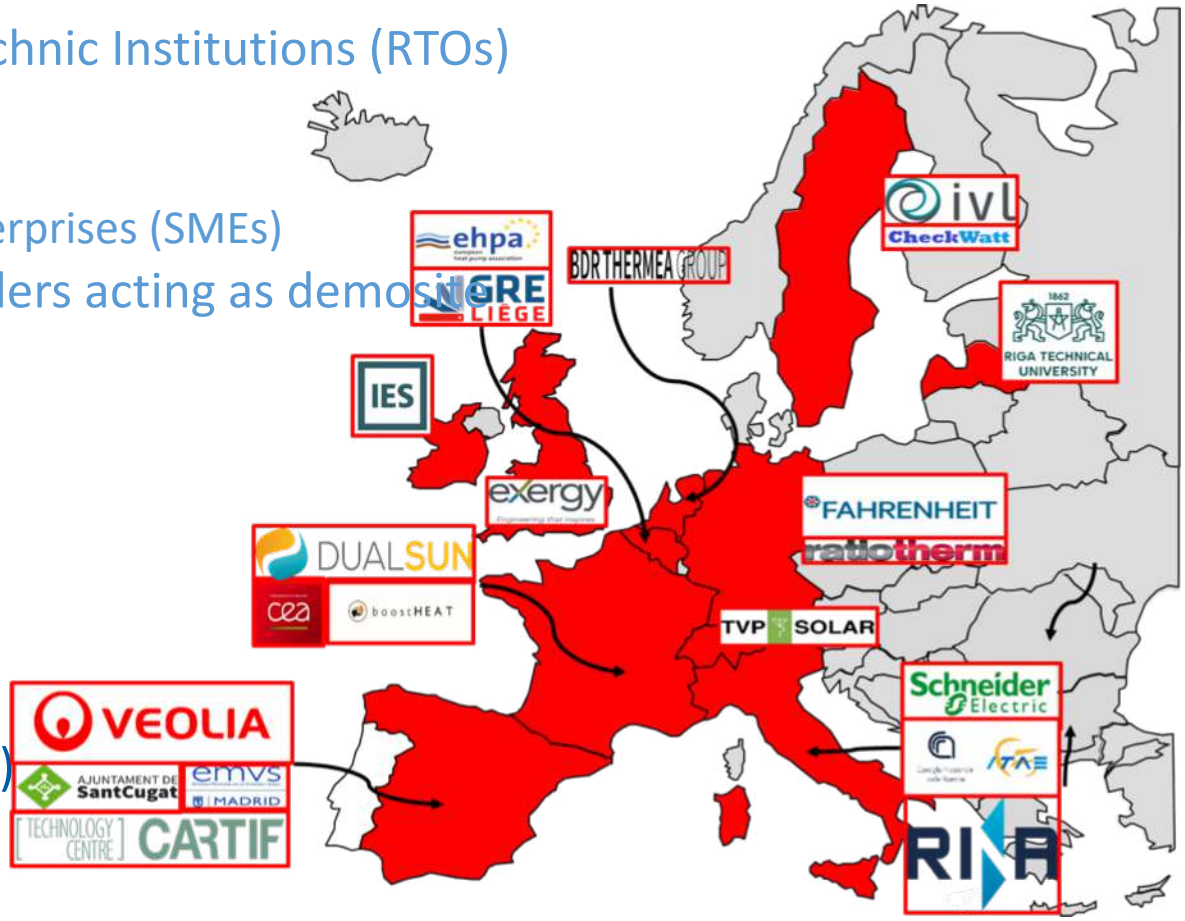


TRL 7 – Sun and HP as baseload of EU H&C systems
6 Technologies to be integrated – 5 Technology Packages – 7 Demos
3 Research Pillars based on Functional Monitoring Data exploitation

DESIGN – MANUFACTURE - CONTROL

An Industry Driven Consortium

- 5 top level Academic Polytechnic Institutions (RTOs)
- 12 industrial partners:
  - ✓ 5 Large Enterprise (LE)
  - ✓ 7 Small and Medium Enterprises (SMEs)
- 4 association and stakeholders acting as demosites



Third Parties involved:

- IES UK (LTP of IES Ireland)

MO1: Increase SunHorizon H&C technologies performances – WP2 - WP3

HOW? Enhancement of BH, BDR, FAHR, TVP, DS, RATIO performances

MO2: Promote cloud based functional monitoring for H&C purposes – WP4

HOW? Smart End User interface - platform as data mine for H&C manufacturers for optimized management and design

MO3: Reduce SunHorizon H&C technologies CAPEX and OPEX – WP4 - WP5

HOW? Data driven Predictive Maintenance and controller, Design Under Uncertainty Tool

MO4: Demonstration of SunHorizon Innovations in different EU countries and type of buildings – WP6

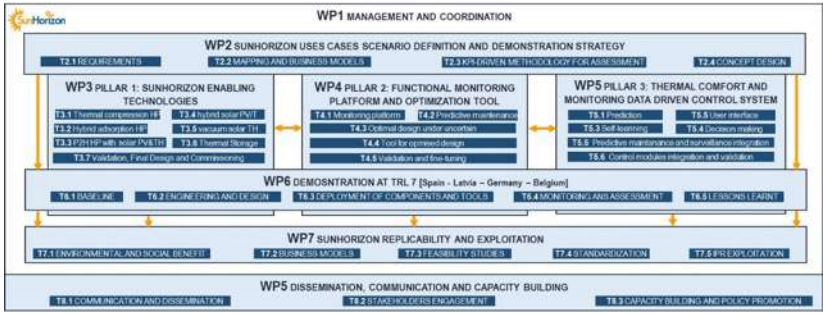
HOW? Demonstration in 7 demosites

MO5: Promote the replication of SunHorizon Concept – WP7

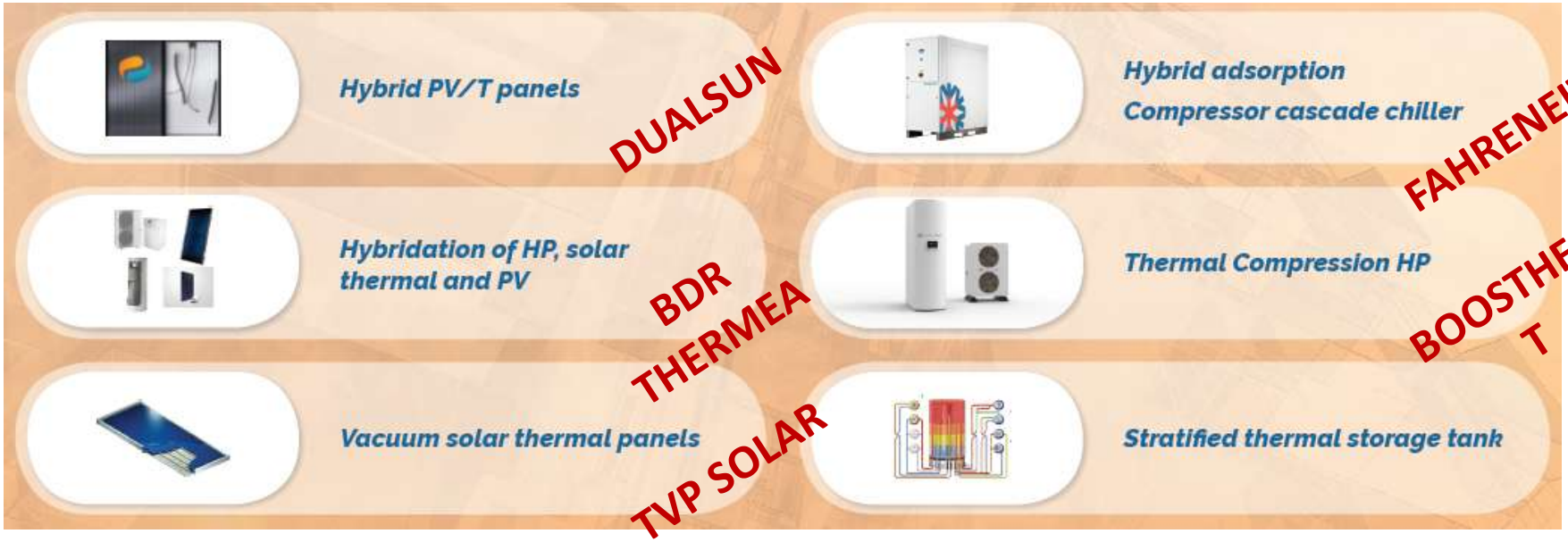
HOW? Study of specific business models – Replication feasibility studies

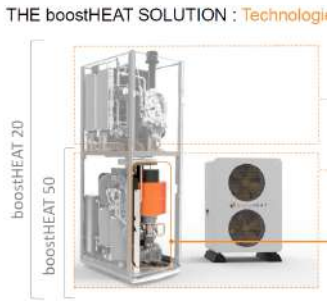
M06: Dissemination and Capacity Building – WP8

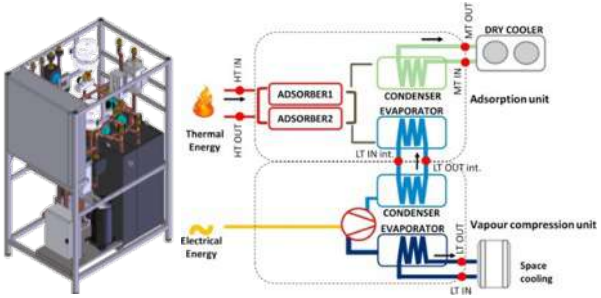
HOW? Stakeholders Engagement – Policy Positioning paper

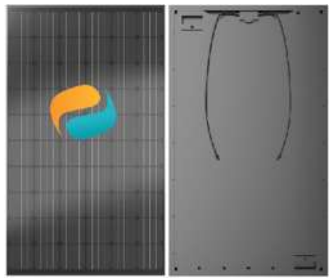


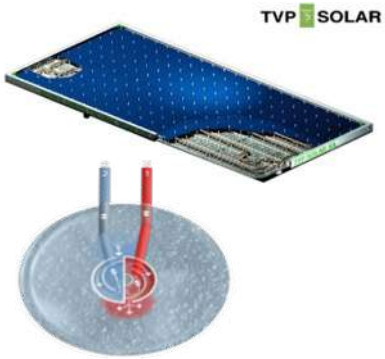
SunHorizon


Hybrid PV/T panels
DUALSUN
Hybrid adsorption
Compressor cascade chiller
FAHRENEIT
Hybridation of HP, solar thermal and PV
BDR THERMEA
Thermal Compression HP
BOOSTHEAT
Vacuum solar thermal panels
TVP SOLAR
Stratified thermal storage tank


THE boostHEAT SOLUTION : Technologi
boostHEAT 20
boostHEAT 50


DRY COOLER
MT OUT
MT IN
HT IN
HT OUT
ADSORBER1
ADSORBER2
CONDENSER
EVAPORATOR
Adsorption unit
Thermal Energy
LT IN int.
LT OUT int.
CONDENSER
EVAPORATOR
Vapour compression unit
Electrical Energy
LT OUT
Space cooling
LT IN

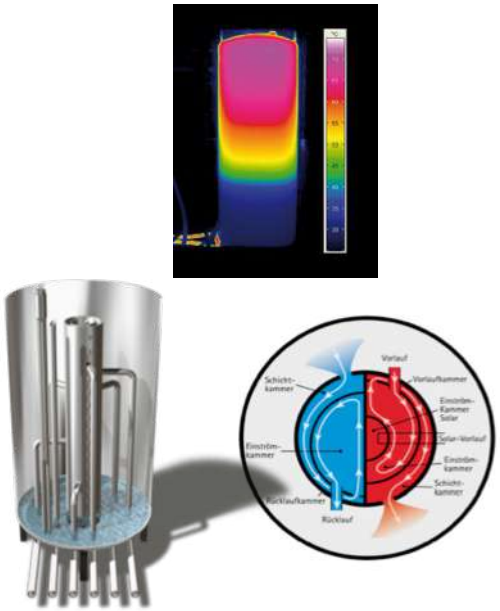



TVP SOLAR

ratiotherm
Smart Energy Systems

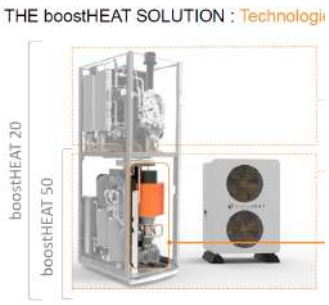
High Efficiency Stratified Storage Tanks

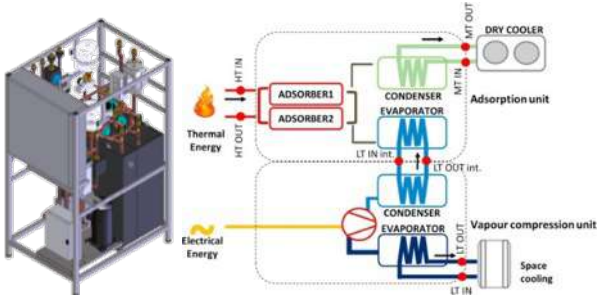
- High stratification due intelligent technic.
- Ratiotherm wants to develop an adapted stratified storage tank for special heat sources like
  - The heat pumps by Fahrenheit and BootsHeat
  - Solar panels from TVP Solar and Dualsun
- Efficiency Maximization for every heat source
- More flexible and efficient production technologies

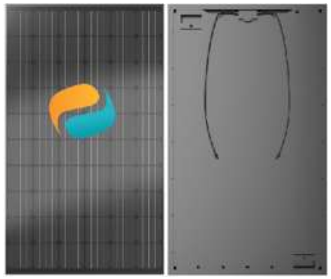


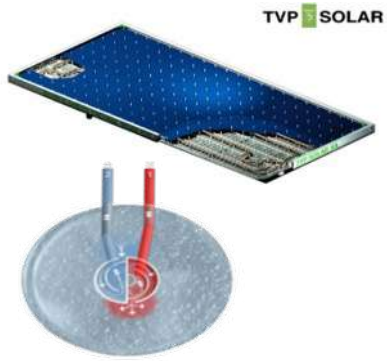
SunHorizon

SunHorizon TP		Solar-HP integration concept	Description
TP1	TVP+BH	Parallel integration	TVP for space heating + DHW; BH to cover non solar periods
TP2	DS+BH	Mixed solar-assisted/ parallel integration	BH for space heating + DHW support; DS PV-T thermal output to cover as much heat demand as possible + excess electricity production for appliances
TP3	TVP+FAHR	Solar-driven HP for cooling	TVP for space heating + DHW in winter + activation of the thermal compressor of the adsorption chiller (FAHR)
TP4	DS+BDR	Parallel integration	DS PV-T thermal output to cover part of SH and DHW heat demand + electricity production to cover reversible HP electricity consumption
TP5	TVP+BH+ FAHR	Mixed solar-driven/ parallel integration	TVP for space heating + DHW; BH to cover non solar periods; FAHR adsorption chiller activated only by BH or also by TVP





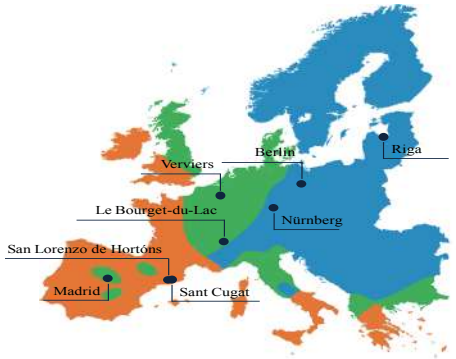




SunHorizon

Nº	Location	Climate	Building type	SunHorizon TP	Climate and local energy market challenges
1	Berlin (Germany)	Cold	Small residential	TP1: TVP+BH	Cold continental climate with harsh winters and warm summers, presences of local gas grid and DHN (increasing number of disconnections), high penetration of RES and distributed generation in the local energy market, considerable price of electricity (0,15-20 €/kWh)
2	Nürnberg (Germany)	Cold	Large residential	TP2: DS+BH	
3	Saint Cugat (Spain)	Warm	Tertiary (Civic centre)	TP3: TVP+FAHR	Good solar irradiation, municipalities looking for new reliable technologies to save money, achieve SEAP objectives and to be promoted among their citizens
4	Madrid (Spain)	Average	Large residential	TP4:DS+BDR	Cold winter and hot summers, good solar potential, social housing needs renovation both at envelope and H&C level also to reduce their OPEX and rental fees
5	S. Lorenzo (Spain)	Warm	Small residential	TP4:DS+BDR	Good solar potential, significant summer cooling demand during sunny periods, single houses can become active players on the energy market thanks to Power-to-Heat (P2H) schemes
6	Verviers (Belgium)	Average	Tertiary (Sport Centre)	TP1: TVP+BH	Sport facilities are often not well energy managed all around EU, even if heated volumes are considerable. Promote coupling of solar + HP for low temperature usage such as DHW and swimming pool water.
7	Verviers (Belgium)	Average	Tertiary (Swim. pool)	TP2: DS+BH	
8	Riga (Latvia)	Cold	Small residential	TP2: DS+BH	Scandinavian country with the higher penetration of gas grid, robust presence of HP -smart systems, harsh winters

DEMONSTRATION IS CRUCIAL IN SunHorizon – let's define details ASAP (logistic responsibilities, calendar, costs, permitting…) Collaboration between TPs/Demos responsible is crucial

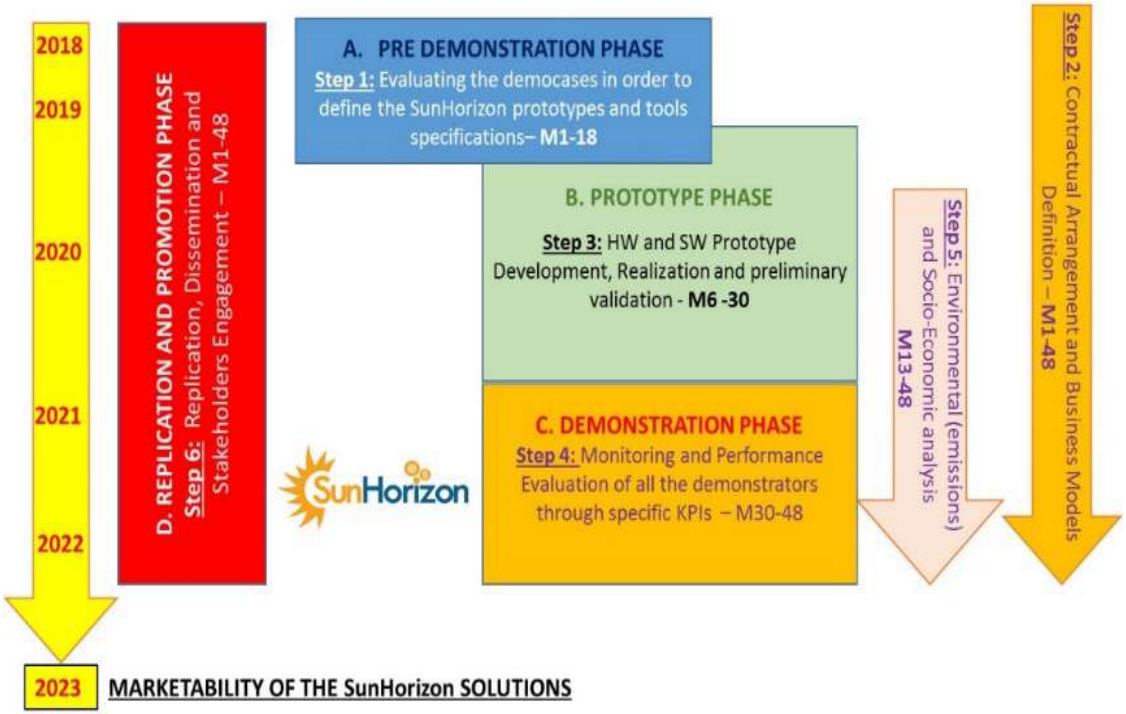


Roles

Clear and precise role – High Commitment Period

A: PRE-DEMONSTRATION PHASE: M1-18– All partners committed to pave the ground to future activities at tools, technology and demosites poiny of view

B. PROTOTYPE PHASE: M6-30 - industrial partner strongly involved



C: DEMONSTRATION PHASE: M30-48

D. REPLICATION AND PROMOTION PHASE: M1-48 – all partners involved under EHPA and RINA-C leadership

- High TRL to be achieved of integrated TPs: TRL 7
- **A pre-industrial project**
- Demonstration in different climates and type of building
- **Cruciality of Data Monitoring to drive the three research pillars**
- **Dissemination and Stakeholders' engagement is crucial: we're all committed!**
- A long but well structured project both in terms of responsibilities and timing:

- partners have to keep themselves updated even if not so much involved!
- Details and responsibilities have to be properly taken into account!

Thank you!

www.sunhorizon-project.eu

Alessandra Cuneo
alessandra.cuneo@rina.org

Agenda

11:00 to 11:05	**Welcome to the webinar by moderator** – Ariadna Caixach, CHESS SETUP Communication and Dissemination Partner (Edenway)
11:05 to 11:10	**Introduction to CHESS SETUP** – Arnau Alarcón, CHESS SETUP Project Coordinator (Barcelona Ecologia)
11:10 to 11:20	**Presentation of empirical results of CHESS SETUP and its approach to Thermal Energy Storage and Self-Sufficiency in Buildings** – Arnau Alarcón, CHESS SETUP Project Coordinator (Barcelona Ecologia)
11:20 to 11:35	**ReLATED Project** – Roberto Garay, ReLATED Project Coordinator (Tecnalia)
11:35 to 11:50	**SUNHORIZON Project** – Alessandra Cuneo, SUNHORIZON Project Coordinator (Rina Consulting S.p.A)
11:50 to 12:05	**HYBUILD Project** – Sergio Valentino, HYBUILD Project Coordinator (COMSA Corporación)
12:05 to 12:30	**Q/A Debate** and **Closing** of the webinar

From the European Commission EEB-06-2017 Call:

The storage of thermal or electric energy needs optimised operational technical solutions in order to better manage and synchronise the overall supply and demand (at residential, district and urban level).

To do this, there is a need for “high-density hybrid energy storage” systems that increase capacity to efficiently use renewable energy and provide flexibility to energy systems.

This project received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 768824

HYBUILD

- HYBUILD will develop **two innovative hybrid storage concepts:**

  1. One for the **Mediterranean climate** primarily meant for **cooling**,
  2. A second for the **Continental climate** primarily meant for **heating and Domestic Hot Water** production.

- Achieve **net energy reduction higher than 20%** and increase the share of renewable energy sources by **combining thermal and electric storage** systems in a **cost-effective, long-lasting solution**.

- 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**

This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768824

HYBUILD

- 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

This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768824

HYBUILD

HYBUILD
Hybrid Energy Storage for Buildings

1° year

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

Integrated system lab validated, Installation of the integrated storages in the **demo-sites** and **start monitoring**

3° year

TRL 3 - 4

TRL 5

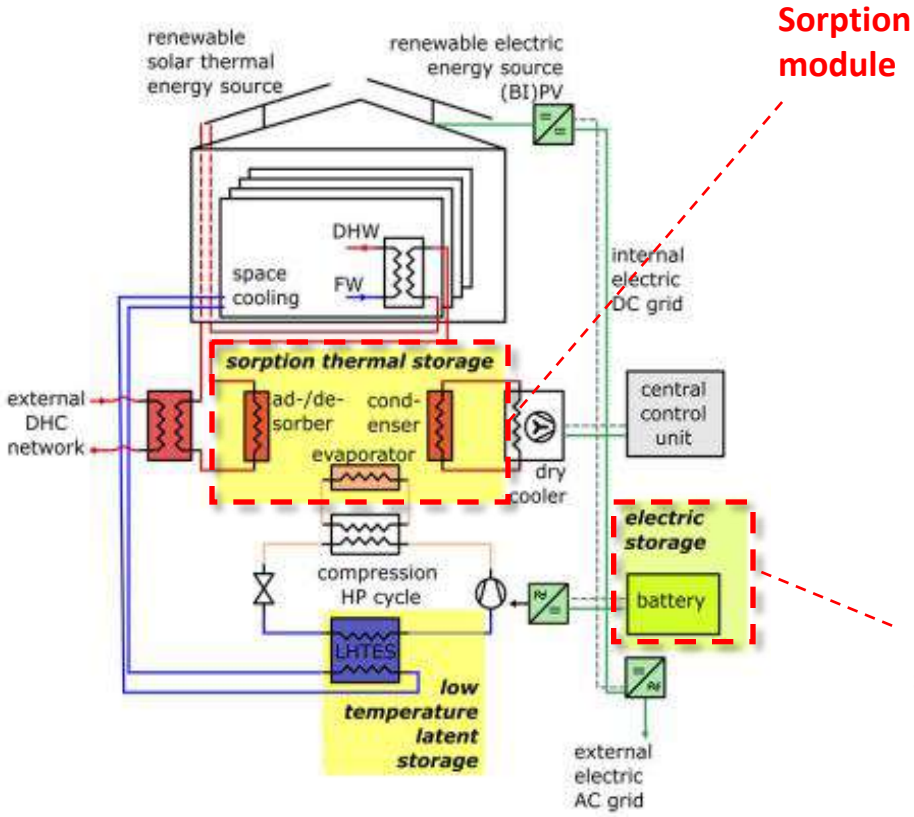
Testing systems at **lab-scale, testing** and design **optimization**

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

2° year

This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768824

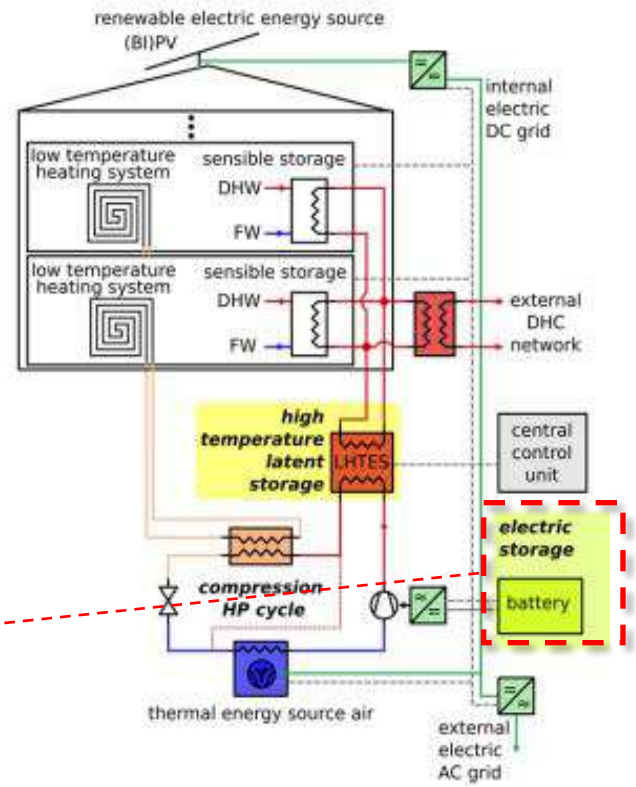
Mediterranean climate
(cooling)



Sorption module

Electric storage

Continental climate
(heating)



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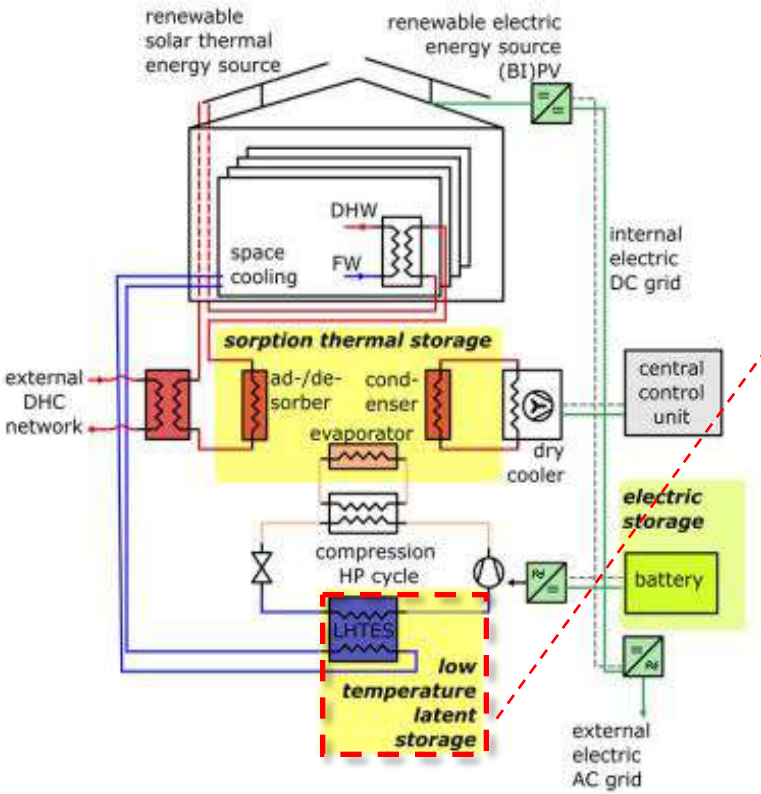
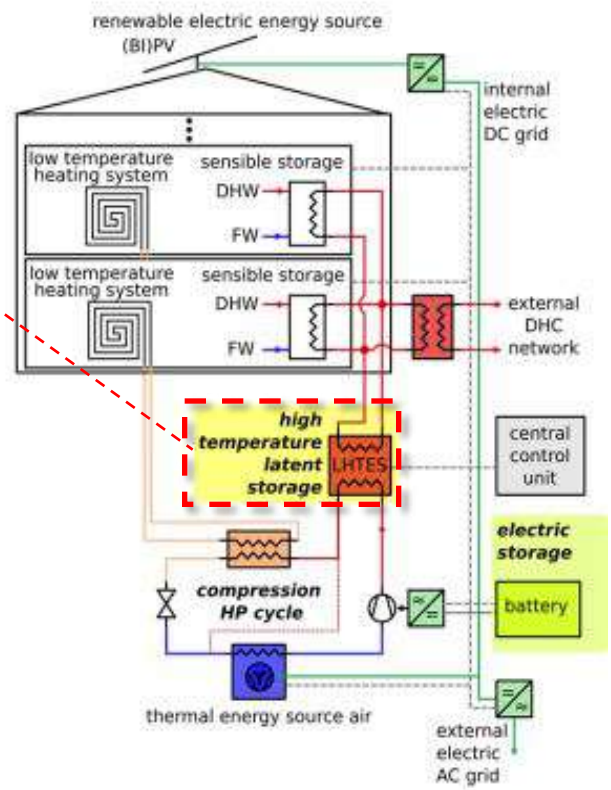
Mediterranean climate
(cooling)



Latent storage

Continental climate
(heating)



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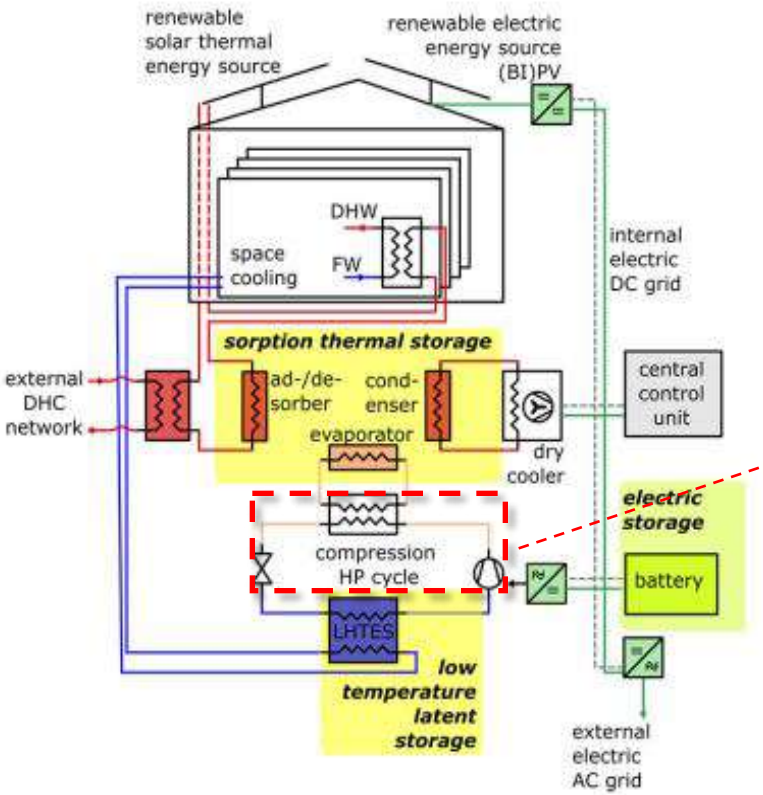
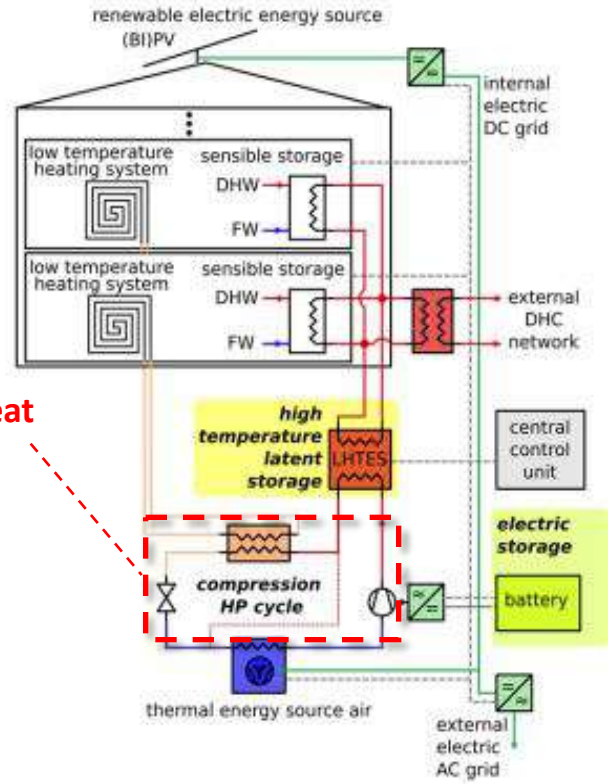
Mediterranean climate
(cooling)



DC bus + heat pump

Continental climate
(heating)



This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768824

HYBUILD

The combination of the innovations developed allow for many new market opportunities for small building owners…

- *Sorption storage + battery….*
  - Potential to use renewable thermal and electrical energy when needed, not just when it is produced.
  - Resilient buildings, off-grid + micro-grid solutions become more viable

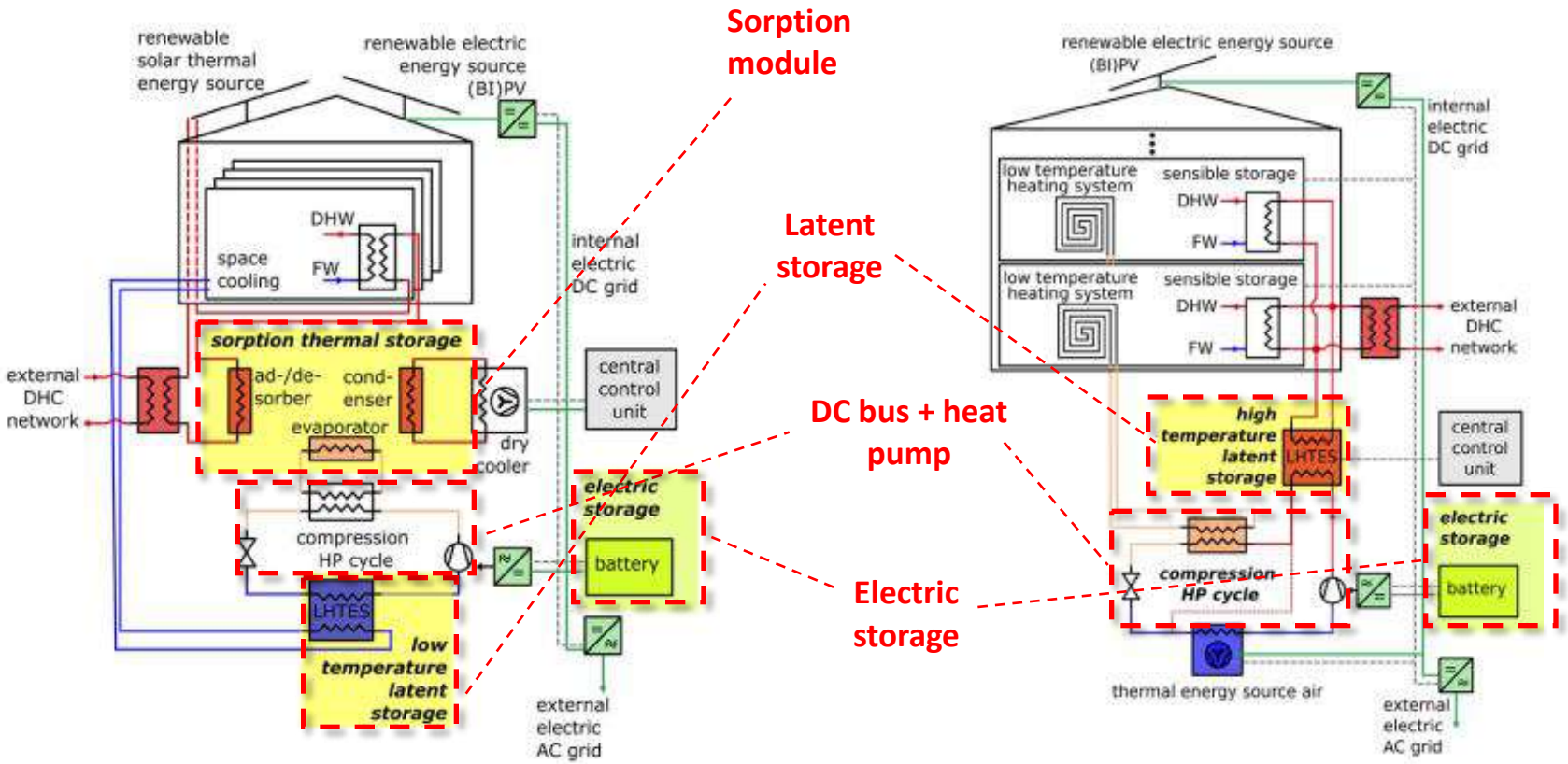
- *+ Reversible heat pump + smart control….*
  - Potential to optimize heat and electrical consumption based on available resources without impacting occupants
  - Reduced total energy demand

- *+ DC Bus…*
  - Possibility to participate in fast demand response markets

This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768824

Mediterranean climate
(cooling)

Continental climate
(heating)



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Thank you!

Sergio Valentino Costa

HYBUILD Project Coordinator
COMSA Corporación

sergio.valentino@comsa.com

Any questions?

Q/A Debate part & Closing