



ThumbsUp



INTERPED



IDAE
Instituto para la Diversificación
y Ahorro de la Energía



Swedish Energy Agency

Knowledge Exchange Forum on **TES in PEDs**

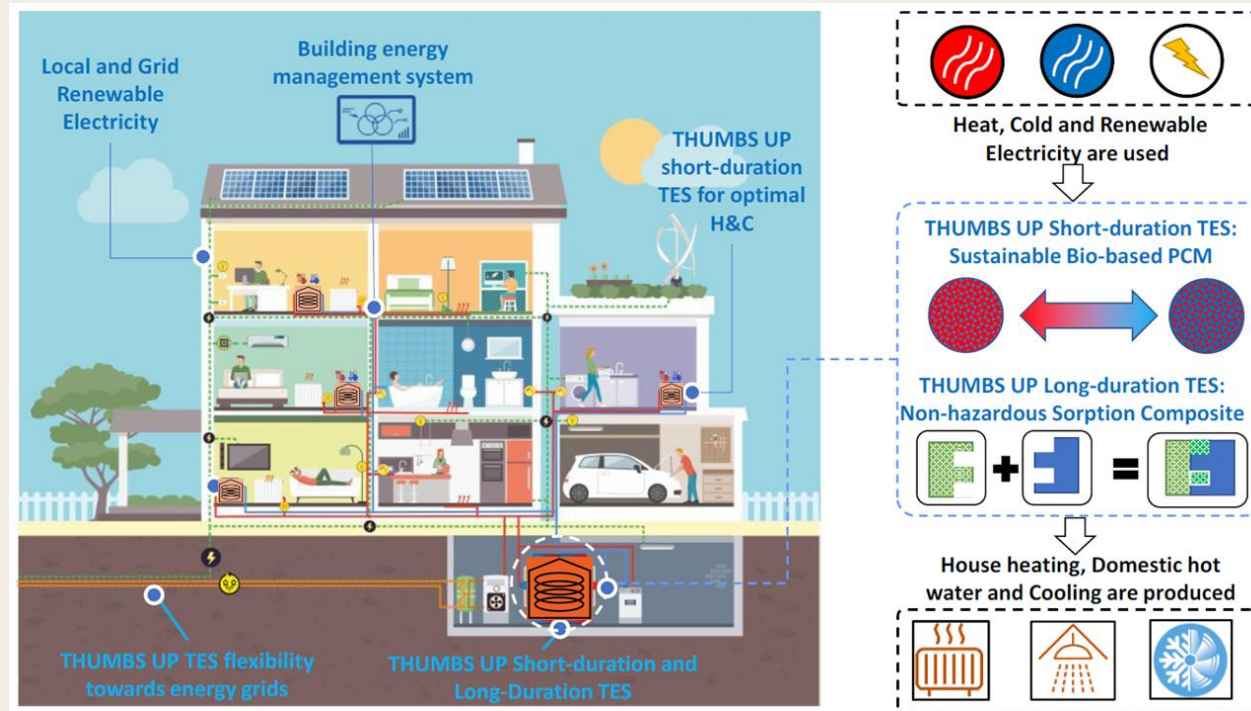
Tuesday April 14, 2026

Online



THUMBS UP
project GA101096921
funded by the European Union

Unlocking the potential of your home!

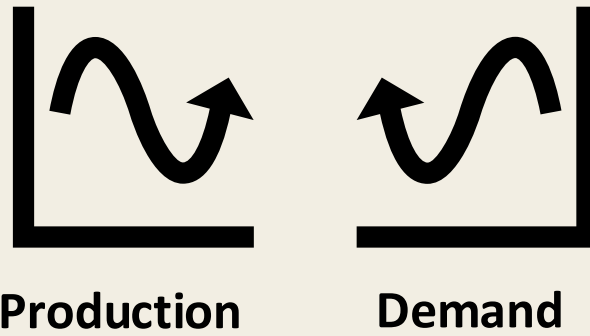





The sun does not always shine when we want it to...



What can we do?

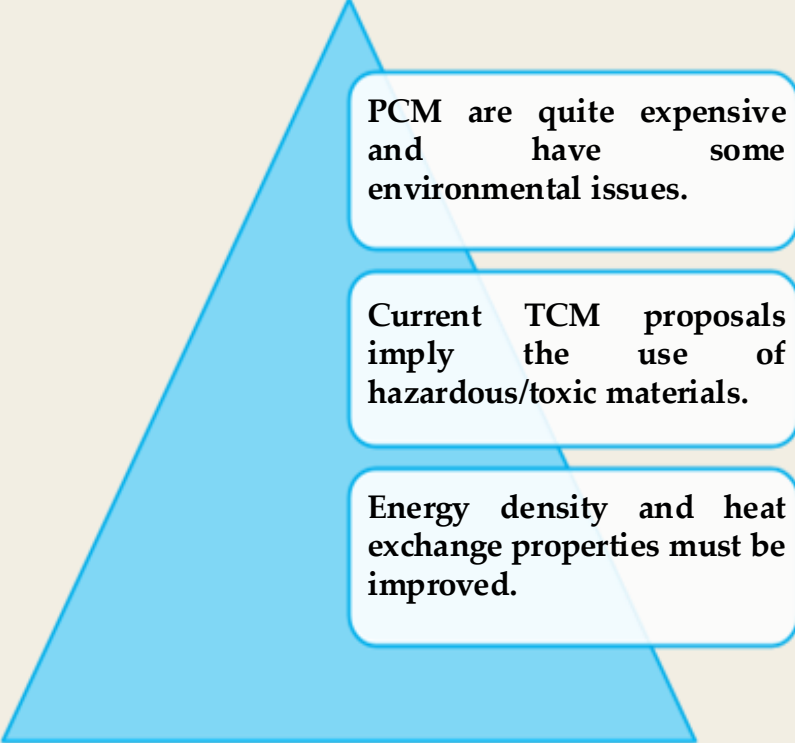


 **Let it be**


 **Share**

 **Store**

What is the challenge?



PCM are quite expensive and have some environmental issues.

Current TCM proposals imply the use of hazardous/toxic materials.

Energy density and heat exchange properties must be improved.

The available heating and cooling storage solutions are:

- **Expensive**
- **Inefficient**
- **Use hazardous materials**
- **Have a large environmental footprint**
- **Standalone** – not easily integrated to the existing infrastructure



Thermal energy storage solUtions to optimally

Manage BuildingS and Unlock their grid

balancing and flexibility Potential



Working with the best

Consortium of 21 organisations

- ✓ R&D Centers
- ✓ SMEs
- ✓ Large companies

9 European countries

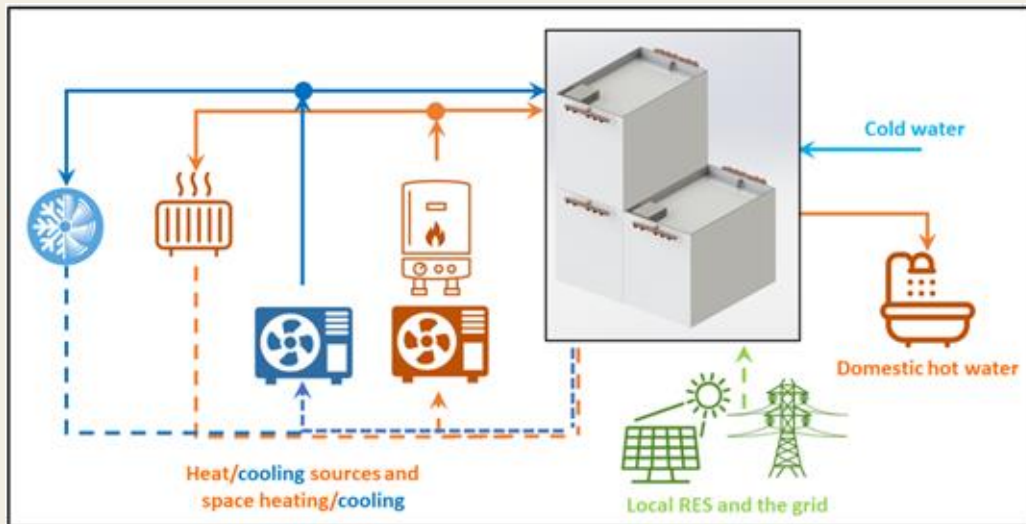
- ✓ Sweden
- ✓ United Kingdom
- ✓ Ireland
- ✓ Netherlands
- ✓ Spain
- ✓ Belgium
- ✓ Germany
- ✓ Italy
- ✓ Greece

**Balancing the grid
one building at a time**



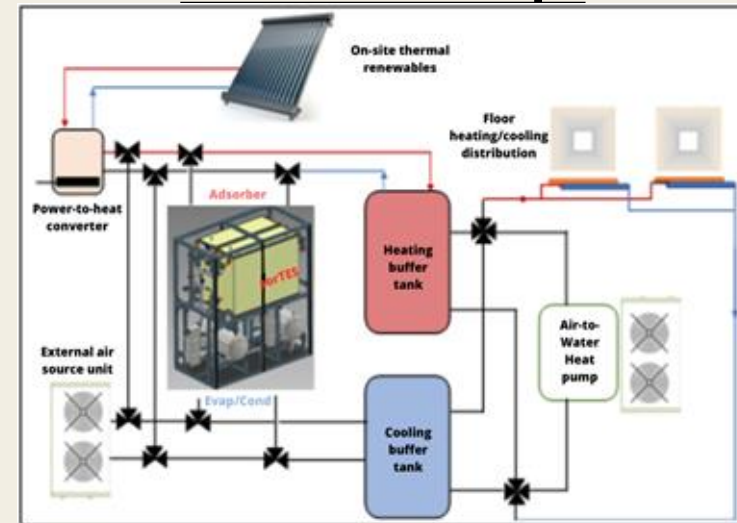
Developing groundbreaking technologies

FractLES concept



- Development and **optimisation** of **bio-based PCMs** (cost, energy density, stability, scalability).
- Use of **wastes from food industry** and **environmental friendly** fabrication process.
- Validated cycling stability **up to 12,000 cycles**.
- **Short duration latent TES** for intraday use with a high energy density storage.

SorTES concept



- **Optimisation** of a composite sorbent (cost, energy density, stability, scalability).
- Use of **environmentally friendly** and **low corrosive materials**
- Validated cycling stability **up to 10,000 cycles**.
- **Long duration TES** guaranteeing high energy density storage for **more than 4 weeks**.

From lab to life with validation and pilot sites



Validation Site
CARTIF III, Spain



Student Housing
Gothenburg, Sweden



Single Family Building
Valladolid, Spain



Elderly Home
Valladolid, Spain

Different climate areas, building typologies and user behaviours

Get engaged!!



Knowledge Exchange Forums
Bringing together engaged actors to share, inspire and discuss how to achieve the energy transition through the deployment of thermal energy storage.

In the spotlight



Sara de la Serna

Energy Communities Lead
IDAE Spanish Institute for the
Diversification and Saving of Energy



Björn Larsson

Programme Manager
Swedish Energy Agency



Swedish Energy Agency



Lorena Sanchez

Project Manger
R2M Solution Spain



INTERPED



Ola Gustafsson

Project Manager
RISE Research Institutes of
Sweden



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Emilia Pisani

Project Manager
RISE Research Institutes of
Sweden

**RI
SE**



Public programmes to accelerate the deployment of energy communities

IDAE. Department of Demand Management and Integration of Renewables..

Sara de la Serna

14th April 2026



Financiado por
la Unión Europea
NextGenerationEU



MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA
Y EL RETO DEMOGRÁFICO



IDAE



Plan de Recuperación,
Transformación y Resiliencia

- **What has been done?** IDAE programs balance.
- **What remains to be done?** Needs.



- **What has been done?** IDAE programs balance.

- **What remains to be done?** Needs.

A support system has been designed, driving hundreds of EC projects and creating a network of offices to foster their growth; progress has been made regarding their regulatory development

SUPPORT SYSTEM (PRTR)

- Energy Communities pilot implementation, 6 calls.
- Deployment of Community Transformation Offices (OTCs), acting as a network for dissemination, support, and advice to ECs, 1 call.
- Additional aid systems at the regional/autonomous level

REGULATORY FRAMEWORK

- RD-Ley 23/2020: Introduces the definition of Renewable Energy Communities (CER).
- RD-Ley 5/2023: Introduces the definition of Citizen Energy Communities (CCE) and legal framework.
- Draft Royal Decree (RD): Developing the figures of CER and CCE.
- Enabling frameworks: Self-consumption manager, distributed storage, independent aggregator.
- **RD-Ley 7/2026: within 3 months of coming into force, a Royal Decree for regulatory development will be approved, gives direct powers to local entities to participate and promote CE; €10M for OTCs.**

SUPPORT SYSTEM FOR ENERGY COMMUNITIES



Comunidades
energéticas

Execution of the project

CE·IMPLEMENTA

Constitution as a CE and
project specification

CE·PLANIFICA

Familiarize with the CE
concept and identify
future partners

CE·APRENDE



SUPPORT MECHANISMS:

- Community Transformation Offices (OTCs)
- knowledge network,
- legal support and template documentation

 Plan de Recuperación,
Transformación
y Resiliencia



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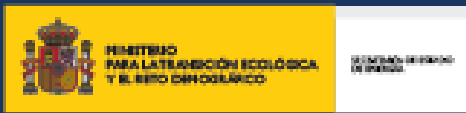
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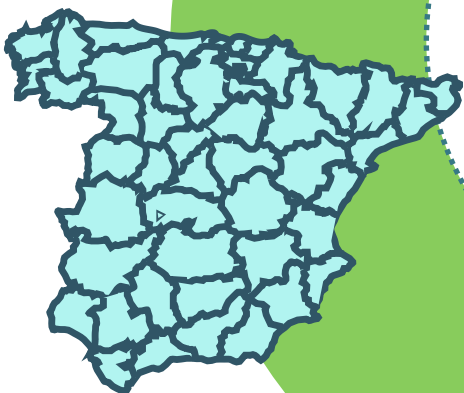
ca. 250 ECs



ca. 2500 Actuaciones



17 CCAA



01 a 06
IMPLEMENTA



+100.000



Personas



Pymes



Entidades locales



ca. 125 M€
funding



01 a 06

We invite you to check summary sheets of energy communities in the first and second call of CE IMPLEMENTA:

CEI 01:

https://www.idae.es/sites/default/files/documentos/ayudas_y_financiacion/Comunidades_energeticas/Presentacion_CE_Implementa-Fichas5.pdf

CEI 02: CEI https://www.idae.es/sites/default/files/documentos/ayudas_y_financiacion/Comunidades_energeticas/6-Presentacion_CE_Implementa_2-Fichas.pdf

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IDAIE

Plan de Recuperación, Transformación y Resiliencia

PROYECTO: PLANTA DE BIOGÁS DE DEYECCIONES GANADERAS CON COGENERACIÓN Y RECUPERACIÓN DE NUTRIENTES (ALCARRAS BIOPRODUCTORS SAT 1641 CAT)

UBICACIÓN:

DESCRIPCIÓN: Proyecto que in la recuperación

MIEMBROS: 5

FACTORES TRANSFORMADORES: Proximidad (Socios), Reto demográfico, Dinamización social

TIPO DE ACTUACIONES: Eficiencia energética

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IDAIE

Plan de Recuperación, Transformación y Resiliencia

PROYECTO: PROYECTO CER EN ALT URGELL (ASOCIACIÓ COMUNITAT ENERGÈTICA DE L'ALT URGELL – VALL DEL PORT NEGRE)

UBICACIÓN:

DESCRIPCIÓN: Comunidad Energía Renovable

MIEMBROS: 5

FACTORES TRANSFORMADORES: Proximidad (Socios), Reto demográfico, Dinamización social

TIPO DE ACTUACIONES: Eficiencia energética, Autocombustión y electricidad, Movilidad sostenible, Gestión de la demanda, Climatización

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enercoop

Plan de Recuperación, Transformación y Resiliencia

PROYECTO: COMPTEM CREVILLENT (COOPERATIVA ELÉCTRICA BENÉFICA SAN FRANCISCO DE ASÍS COOP. V.)

UBICACIÓN:

DESCRIPCIÓN: Comunidad para la Transición Energética Municipal con el objetivo de afrontar el reto de la transición energética desde la óptica local y de convertirse en "municipio verde", COMPTEM Crevillent tiene la intención de impulsar el concepto de comunidad energética local y renovable como instrumento que ayudará a alcanzar los objetivos perseguidos.

MIEMBROS: 10.928

FACTORES TRANSFORMADORES ADICIONALES: Proximidad (Socios en radio 25km de actuación), Consumidores vulnerables como socios o miembros, Dinamización social y adecuación a las prioridades autonómicas y/o locales

TIPO DE ACTUACIONES: Eficiencia energética, Autocombustión y electricidad, Movilidad sostenible, Gestión de la demanda, Climatización

Comunidades energéticas

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IDAIE

Plan de Recuperación, Transformación y Resiliencia

PROYECTO: COMUNIDAD ENERGÉTICA AGRÍCOLA SANT ISIDRE DE LA FARTARELLA

UBICACIÓN:

DESCRIPCIÓN: Desarrollo, instalación y puesta en marcha de una comunidad energética para 40 miembros de la Cooperativa Agrícola Sant Isidre del municipio de La Fatarella, en la provincia de Tarragona, compuesta por 53 miembros. El objetivo es instalar una planta solar sobre la cubierta de la sede para distribuir energía a la cooperativa y las casas de sus miembros, con un autoconsumo compartido a través de la red de distribución.

MIEMBROS: 40

FACTORES TRANSFORMADORES: Proximidad (Socios), Reto demográfico

TIPO DE ACTUACIONES: Eficiencia energética

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Plan de Recuperación, Transformación y Resiliencia

PROYECTO: COMUNIDAD ENERGÉTICA VILLALONGA (COOP AGRÍCOLA NUESTRA SEÑORA DE LA FUENTE COOP VALENCIANA)

UBICACIÓN:

DESCRIPCIÓN: Desarrollo y ejecución integral del proyecto de comunidad energética Villalonga.

MIEMBROS: 186

FACTORES TRANSFORMADORES ADICIONALES: Proximidad (Socios en radio 25km de actuación), Planes de igualdad de género como parte de la gobernanza, Reto demográfico

TIPO DE ACTUACIONES: Eficiencia energética, Autocombustión y electricidad, Movilidad sostenible, Gestión de la demanda, Climatización

Financiado por la Unión Europea
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fontcoop

Plan de Recuperación, Transformación y Resiliencia

COMUNIDAD ENERGÉTICA VILLALONGA

UBICACIÓN:

DESCRIPCIÓN: Desarrollo y ejecución integral del proyecto de comunidad energética Villalonga.

MIEMBROS: 186

FACTORES TRANSFORMADORES ADICIONALES: Proximidad (Socios en radio 25km de actuación), Planes de igualdad de género como parte de la gobernanza, Reto demográfico

TIPO DE ACTUACIONES: Eficiencia energética, Autocombustión y electricidad, Movilidad sostenible, Gestión de la demanda, Climatización

Comunidades energéticas



OFICINAS DE TRANSFORMACIÓN COMUNITARIA

OBJETIVE:

Promote the creation and development of CEs through a network of offices providing dissemination, guidance and advice.

WHO CAN SET UP AN OTC:

Local/regional public entities, civil society, cooperatives, and companies focused on energy transition.



 **Plan de Recuperación,
Transformación
y Resiliencia**



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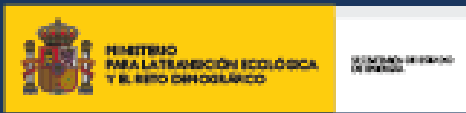
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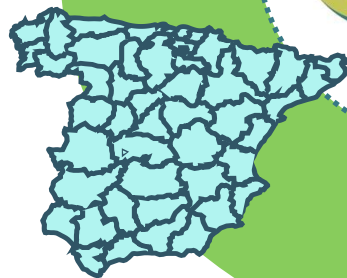


74 OTCs



+2.500
documentos
elaborados

17 CCAA



20M€
funding



+200 CEs constituidas
cientos grupos motores, movilizados

OTCs



- **What has been done?** IDAE programs balance.
- **What remains to be done?** Needs and guiding principles.

Development of an enabling framework, simplify procedures, remove barriers to finance, support value chain

1. REGULATORY / ADMINISTRATIVE

- **Legal certainty and support framework:** Royal Decree
- **Simplifying collective self-consumption and EC creation procedures:**
 - RD-Ley 7/2026, collective self-consumption administrator
 - support offices
 - standardizing processes and documents

2. ECONÓMIC

- **Removing financing barriers:** lack of credit history/guarantees
- **Supporting ECs value chain:** to enable escalation/professionalization and a competitive market offer. Businesses specialized in ECs management, local authorities,
- **Developing sustainable business models beyond self-consumption:** with storage, flexibility, beyond collective self-consumption, new sectors

Training, models to tackle fuel poverty, diversify projects beyond collective self consumption

SOCIAL

- **Concept dissemination**
- **Citizen training:** in order to shape active consumers. Training in schools (teachers)
- **Training of actors involved in ECs development:** ECs administrators, secretary of town halls, social services
- **Fuel poverty:** identify models that can benefit this type of consumers
- **Diversify EC members profile**

TECHNICAL

- **Project diversification:** beyond collective self consumption. Pilots that include energy efficiency measures, thermal renewable energy, electric mobility, storage, demand side response
- **Areas in development:** industrial state, cybersecurity, management tools

Thanks for your attention!

Sara.delaserna@idae.es





Swedish Energy Agency

PED, TES and Energy Communities at the Swedish Energy Agency

National authority for energy policy issues



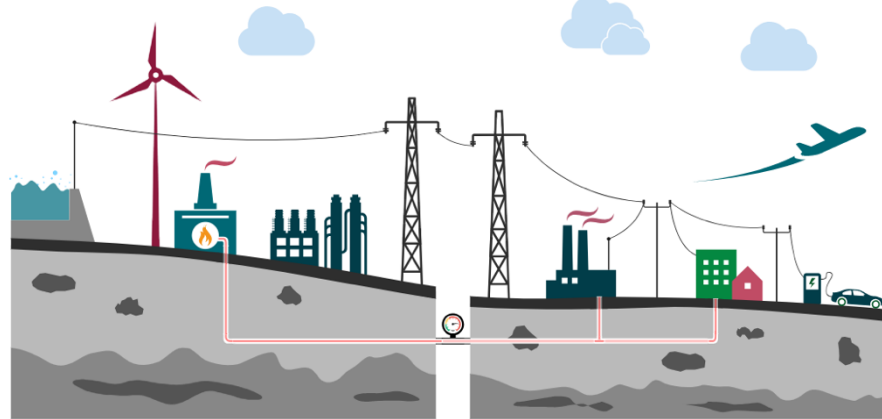
The Evolving Energy Landscape

Supply, primary energy



Biomass, water, wind, solar, coal, crude oil, natural gas, and nuclear fuel.

Transformation and distribution



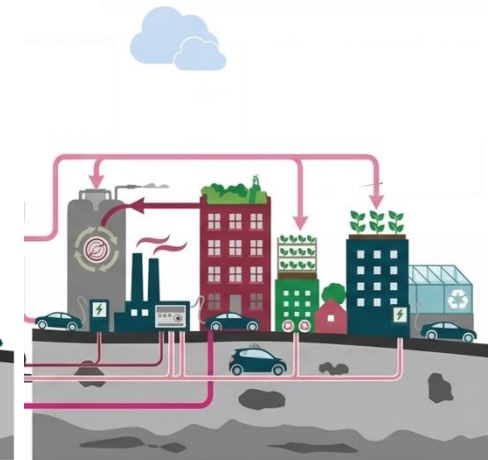
Electricity and heat production and processing of raw materials

Final use / End use



Industry, transport, residential, and services

Local systems

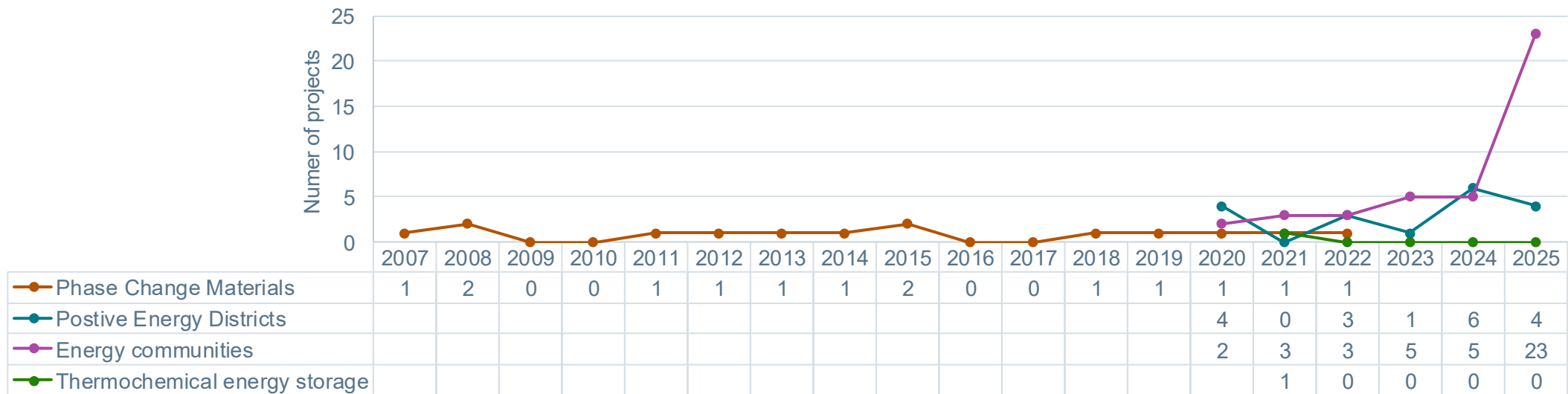


V2H, Solar, heating a cooling reassurers, and more



Phase Change Materials, Positive Energy Districts, Thermochemical energy storage and Energy communities at the Swedish Energy Agency

Number of projects - Phase Change Materials, Positive Energy Districts, Energy communities and Thermochemical energy storage



Note: Only approved applications/projects. Based on a key word search of project titles and summaries. Data is not quality controlled but serves as an overview.



Swedish Energy Agency

Swedish Energy Agency's work within PED and Energy communities



Goal: Transform urban areas from energy consumers into active energy hubs

Swedes role: Leading nation with +20 cities and +11 projects focusing on positive energy district



Government assignment: conditions for establishing and operating energy communities and proposing further measures to promote such communities.

Results: call for feasibility studies, exploratory studies or syntheses



Goal: Accelerate the transition to climate-neutral cities by 2030.

Collaboration: Partnering with 48 cities and multiple agencies through the Climate City Contract 2030, +10 projects in PED.

Resurseffektiv
bebyggelse



Part of programs: Locally produced and shared energy part of heating and cooling, built environment, electricity, and pilot and demonstration.

Ongoing: Currently +20 projects (primarily energi communities)



Swedish Energy Agency

Thermal Energy Storage





Thermal Energy Storage

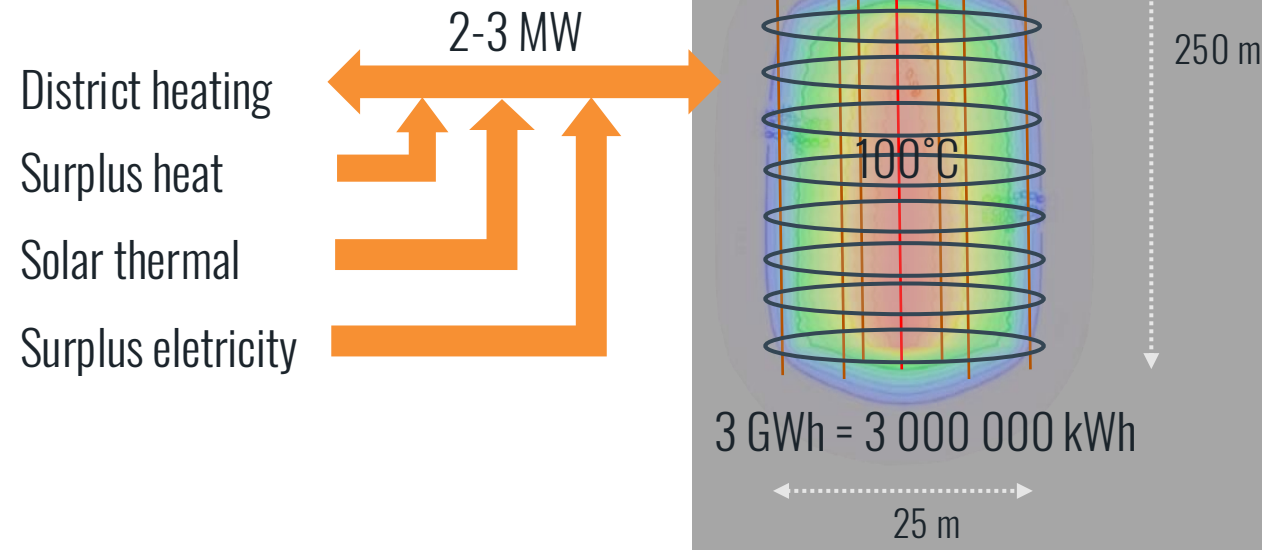
- **Current Landscape:** Phase Change Materials (PCM) and thermochemical storage are currently less common.
 - **Likely Reason:** Strong existing expertise and good conditions for other storage technologies.
- **Major Trend:** Large-scale thermal energy storage (Seasonal Storage).
- **Key Drivers:**
 - Storing excess energy (heat and electricity).
 - Decoupling electricity and heat production in CHP plants.
 - Peak shaving to balance the system
 - Resilience and overall system robustness





Hydroc

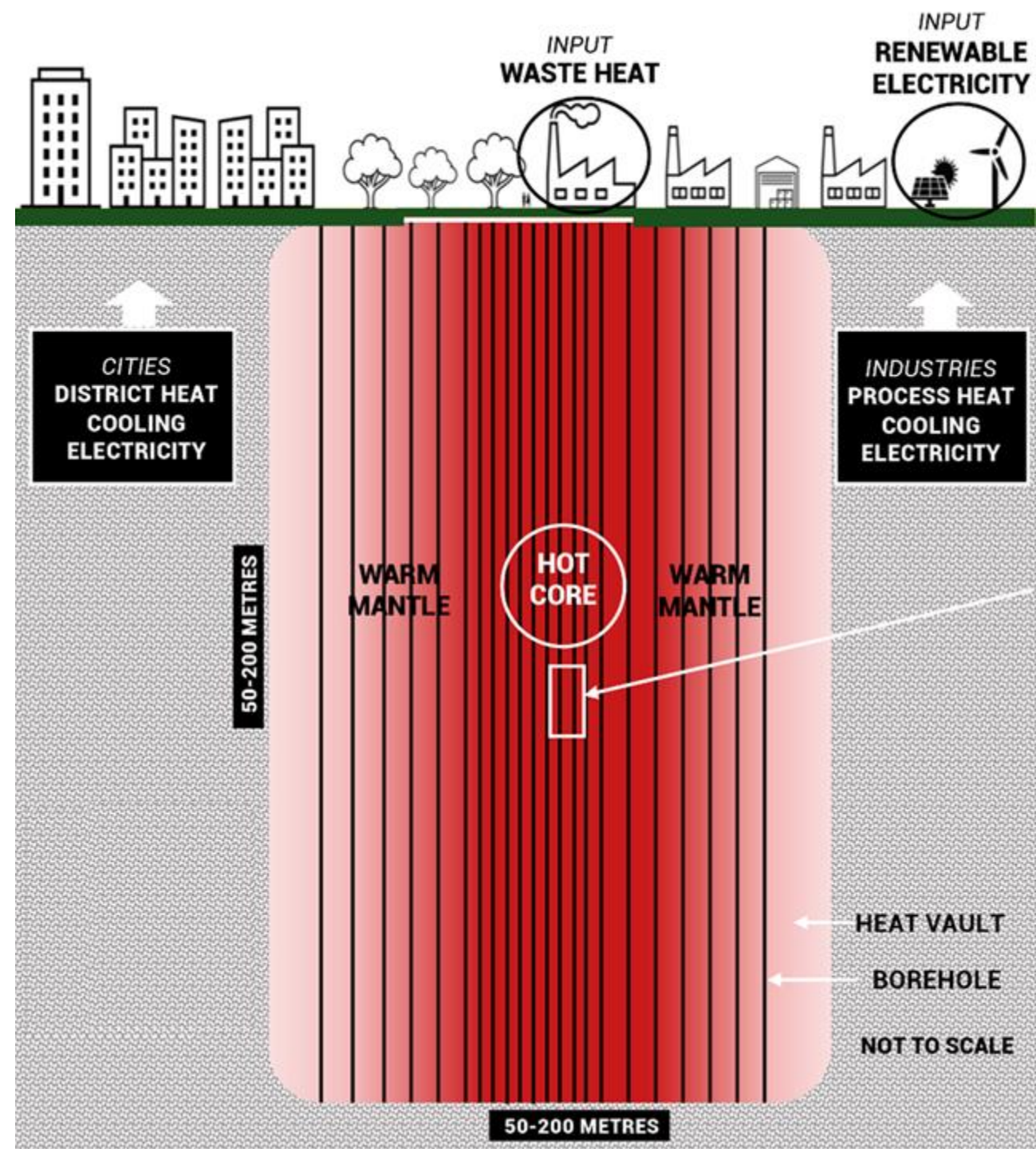
- **Concept:** 10 wells and creating a fracture system between them.
- **Heat carrier:** Groundwater to transport and store the heat.
- **Temperature:** Extracts heat without a temperature lift from heat pumps.
- **Benefits:** Few components, almost everything is located underground, which increases security of supply and ensures a small surface footprint.
- **Ongoing project:** Storing waste heat from CHP (waste incineration) for use during winter as low temperature district heating neighborhood.





Heat Vault

- **Large scale:** Demonstration project, 10 GWh storage CHP plant and district heating in Halmstad.
- **Energy community:** Project with target 0 kWh purchased heating during winter for a residential area.
 - **System Integration – three pillars:**
 - Maximum local solar power production.
 - High-temperature seasonal storage (+300°C).
 - Distribution via a local smart grid and micro-district heating network.
 - **Holistic Scope:** Evaluates technical, economic, legal, and social feasibility.





Swedish Energy Agency

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energimyndigheten.se/en



INTERPED

Thermal PEDs: A case study of InterPED in San Sebastian (Spain)

TES and PEDs Knowledge Exchange Forum, 14th April 2026

Lorena Sánchez Relaño, R2M Spain



Co-funded by
the European Union

The Project – Quick Facts

Project Coordinator:

Raymond Sterling - Lorena Sánchez Relaño

R2M Solution Spain SL

Project number: 101138047

Project name: INTERoperable cloud-based solution for cross-vector planning and management of Positive Energy Districts

Project acronym: InterPED

Start: 01/01/2024

Duration: 36 months

Costs: €6,978,353

Funding: €4.884.847





InterPED's Objectives

Integrating ICT for PEDs: Deploy a cloud-based solution enhancing sector coupling and demand flexibility.

Large-Scale Validation: Demonstrate the InterPED solution in diverse pilots, targeting a 30% unlock in demand flexibility.

Replicability Plans: Extend InterPED's impact beyond the project with strategies for adoption in 'follower' districts.



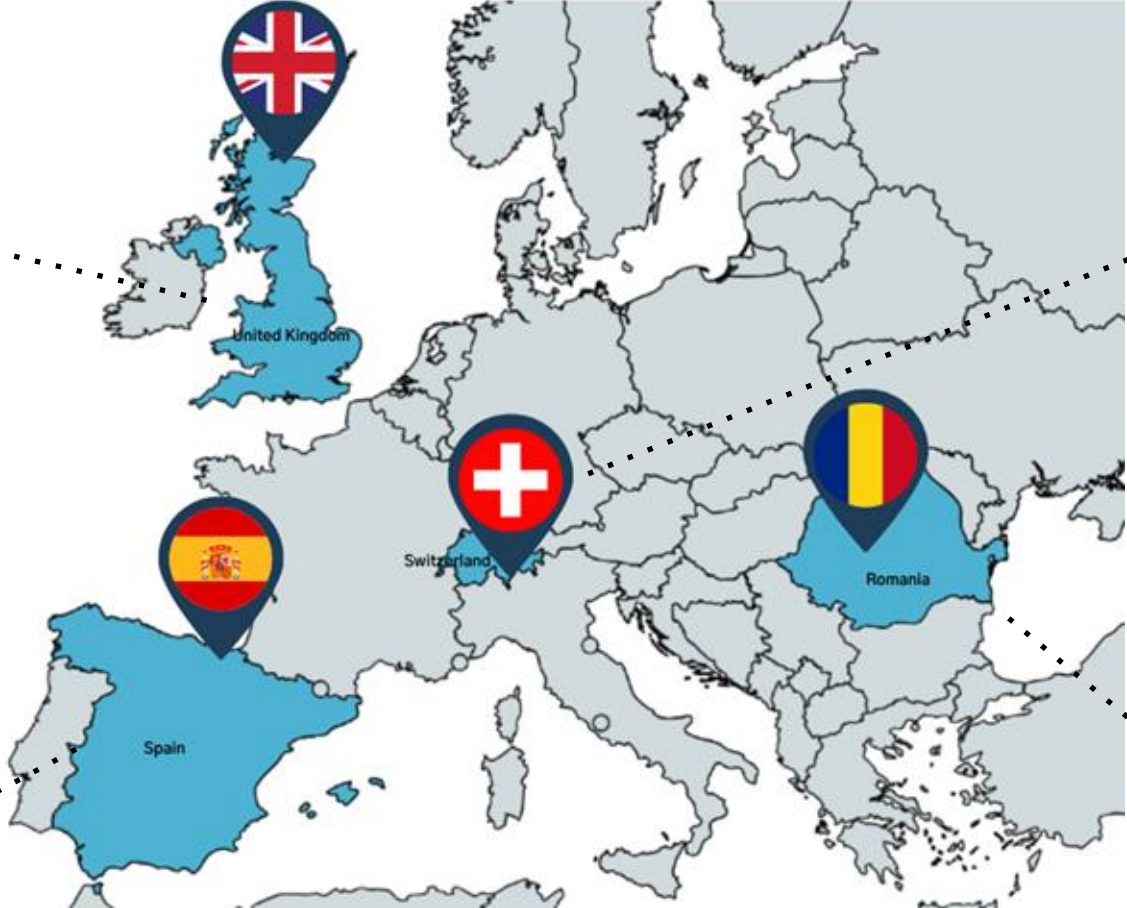
InterPED Pilots



Pilot Name: Ecovillage Findhorn
Pilot Type: Mixed - residential and commercial buildings



Pilot Name: : Lugaritz-Matía Community
Pilot Type: Mixed - tertiary and residential buildings

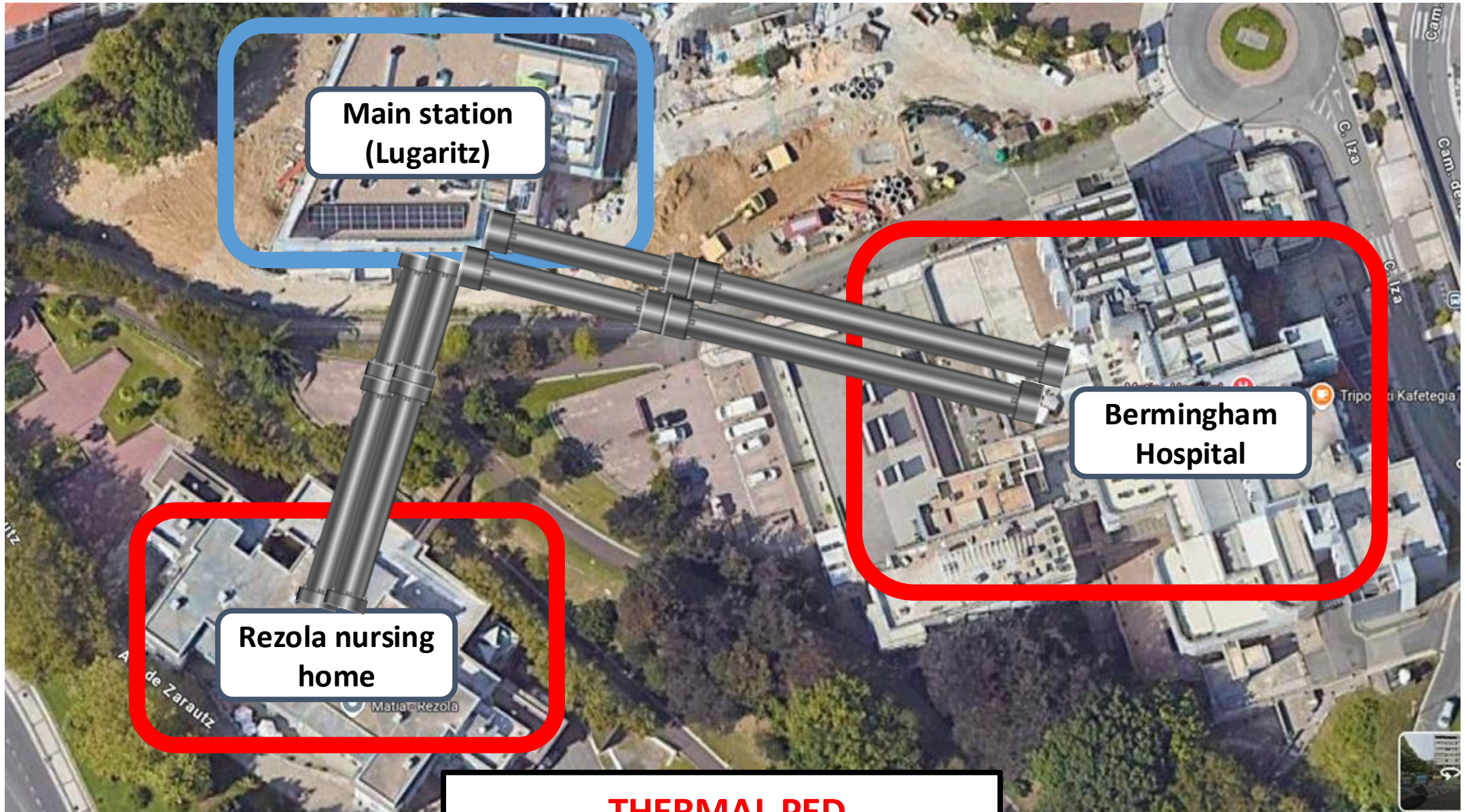


Pilot Name: Arena Innovation Community
Pilot Type: Mixed - tertiary and residential buildings



Pilot Name: Alba Iulia College District
Pilot Type: Tertiary buildings, with surrounding residential area

Lugaritz-Matia Community Pilot (Spain)



Main station
(Lugaritz)

Birmingham
Hospital

Rezola nursing
home

THERMAL PED

Lugaritz Residence: “supervised” housing for elderly people



2 Biomass Boilers
(500 kW & 300kW)



2 x 650 kW
Condensing Boiler



160 kW Geothermal HP



218 kW Chiller

Birmingham Hospital



Solar Thermal Collectors
40 x 0.4 KW



16 kW Aerothermal HP

3 x 270 kW Conventional
Gas Boilers
(Only for backup)



Rezola Nursing Home



115 kW
Condensing Boiler



270 kW Conventional
Gas Boiler
(Only for backup)



REZOLA

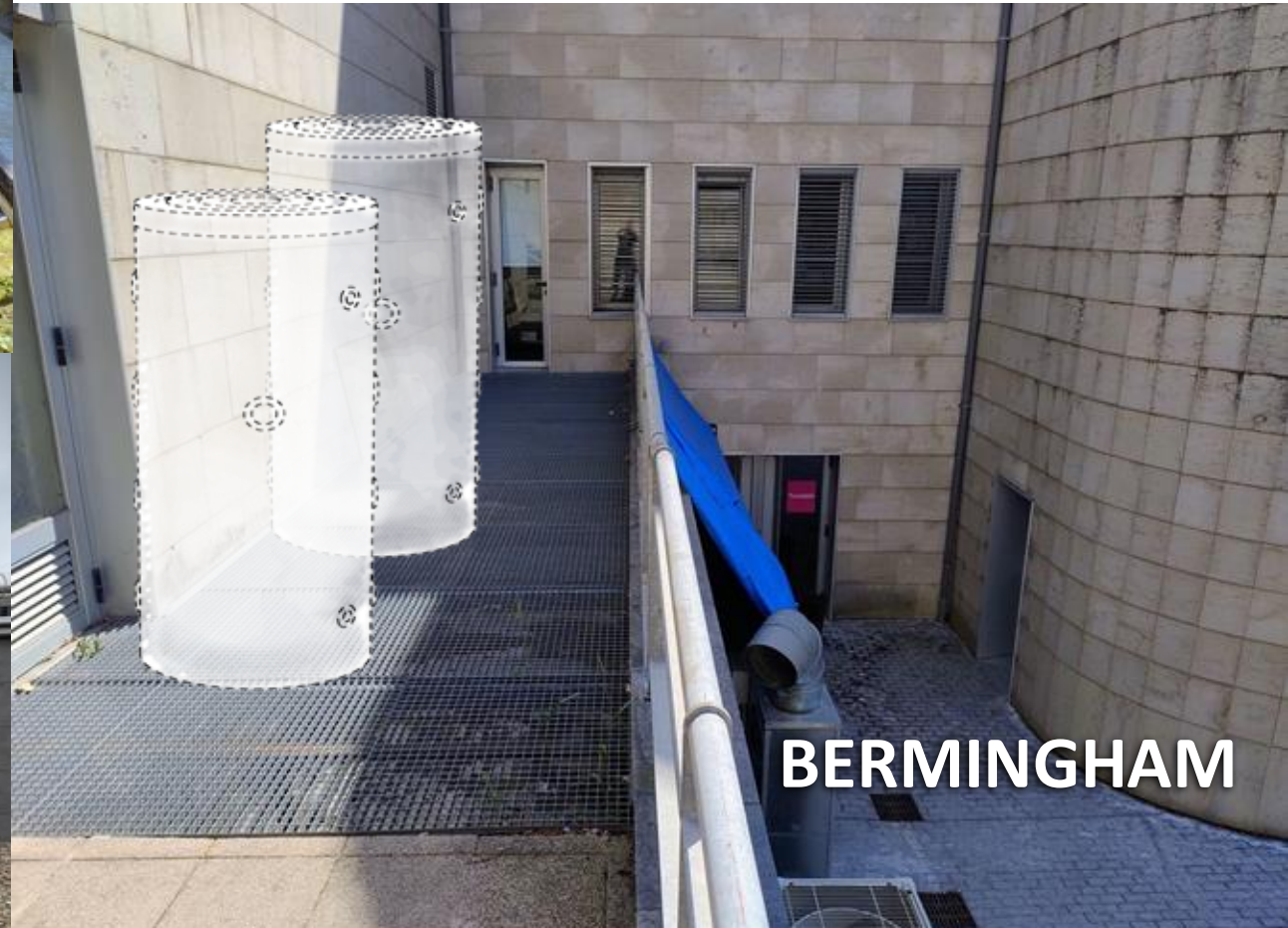
2 x 3000L water storage Tanks

Heating for Rezola and Bermingham

Cooling for Lugaritz



LUGARITZ



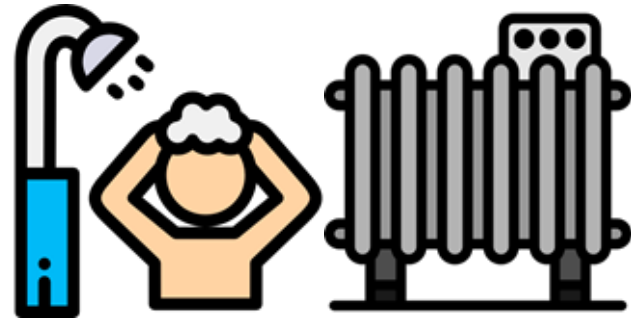
BERMINGHAM

Storage tanks and the use of Model Predictive Controllers (MPCs)

Production according to demand (start and stop of the boiler)



NOT St. Tank

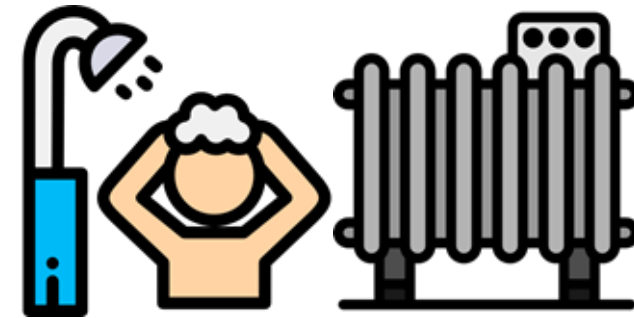


Demand
100 kWh

Hot water stored in the tank can avoid starting the boiler



WITH St.Tank

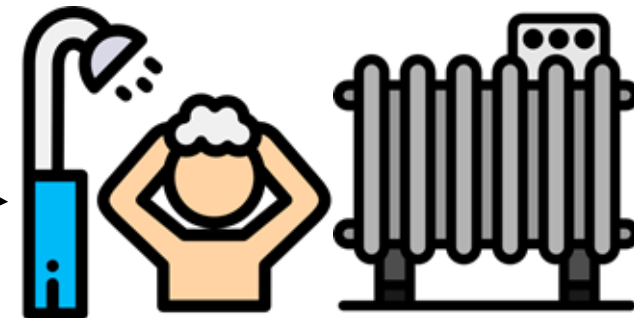


Demand
100 kWh

MPC allows the most efficient operation of the boiler according to demand



WITH St.Tank + MPC



Demand
100 kWh



Barriers and lessons learnt

- **Multi-stakeholder Governance:** Operating in buildings owned by a third party (Matía Foundation) introduces external approval loops, increasing bureaucracy and administrative lead times.
- **Personnel Turnover:** Loss of key technical personnel has required shifting and re-planning tasks, causing delays in specific equipment installations and knowledge transfer.
- **Space & Structural Constraints:** Installing thermal storage tanks in existing facilities has faced severe space limitations, requiring unforeseen structural reinforcements to floor slabs to support heavy loads.
- **Critical Healthcare Environment:** Since the pilot includes a hospital and nursing homes, physical interventions are strictly limited by seasonal heat demand to avoid any risk to patient thermal comfort.
- **Mitigation Strategy:** Future PED planning in sensitive urban areas should prioritise early structural validation and include flexible buffers for stakeholder-driven approval processes.

Thank you!

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GS-y
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ALBA IULIA
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SPAIN
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of Southern Switzerland
SUPSI

HERIOT
WATT
UNIVERSITY



Unlocking the potential of your home (and your PED)



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Energy Storage



Photo by [Bas van der Horst](#) on [Unsplash](#)

Electricity



Photo by [Ricardo Gomez Angel](#) on [Unsplash](#)

Heating



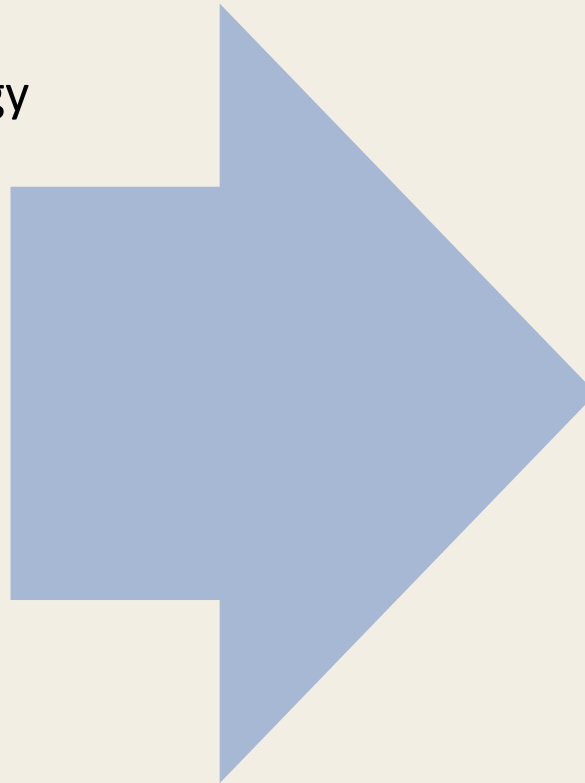
Photo by [Joyce Hankins](#) on [Unsplash](#)

Cooling

Purpose of the project

Most technologies for thermal energy storage are:

- Expensive
- Inefficient
- Use hazardous materials
- Have a large environmental footprint
- Large



Cooperation to develop new thermal energy storage that is:

- Compact
- Efficient
- Sustainable
- Affordable
- Scalable



About us

Consortium of 21 organisations

- ✓ R&D Centers
- ✓ SMEs
- ✓ Large companies

9 European countries

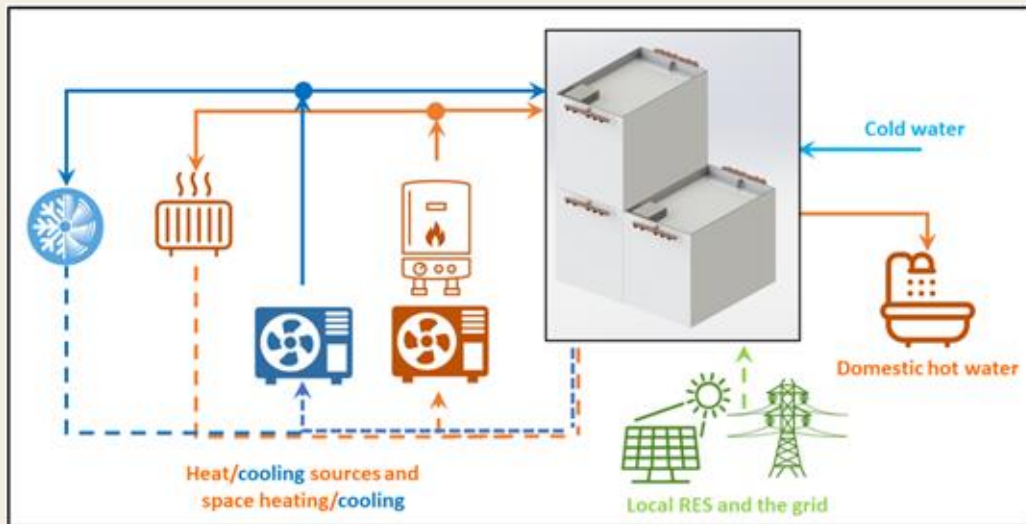
- ✓ Sweden
- ✓ United Kingdom
- ✓ Ireland
- ✓ Netherlands
- ✓ Spain
- ✓ Belgium
- ✓ Germany
- ✓ Italy
- ✓ Greece

**Balancing the grid
one building at a time**



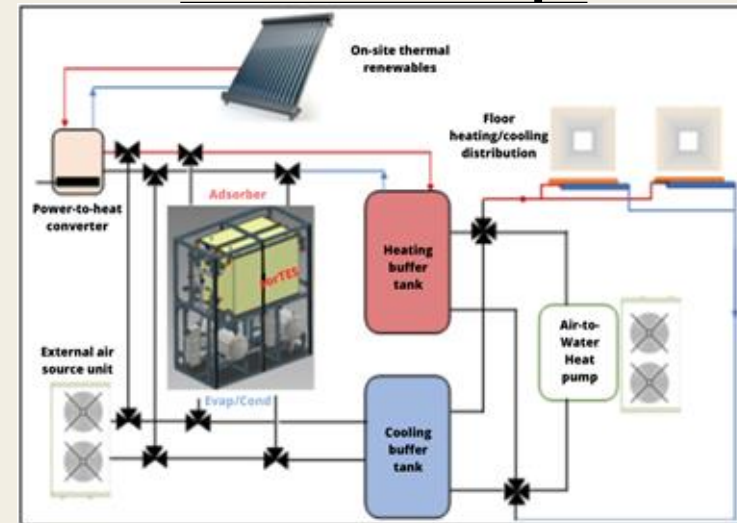
ThumbsUP Technologies

FractLES concept



- Development and **optimisation of bio-based PCMs**
- Compact energy storage
- **Short duration latent TES** for intraday use with a high energy density storage.

SorTES concept



- **Optimisation of a composite sorbent**
- **Long duration TES** guaranteeing high energy density storage for **more than 4 weeks**.



ThumbsUp

ThumbsUP Concept

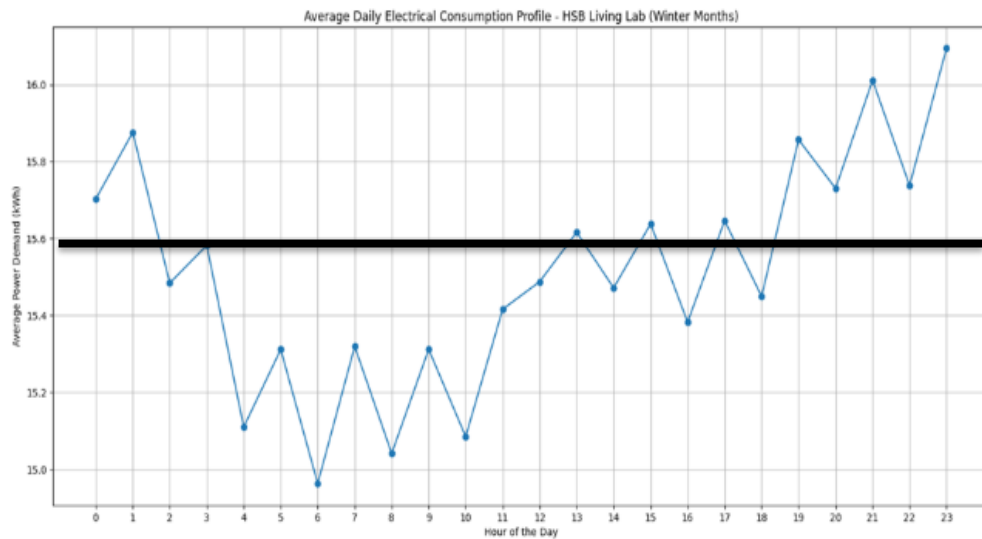


Figure 79 – Average Daily Electrical Consumption profile of the Building – HSB Living Lab (Winter months)

Purpose/potential

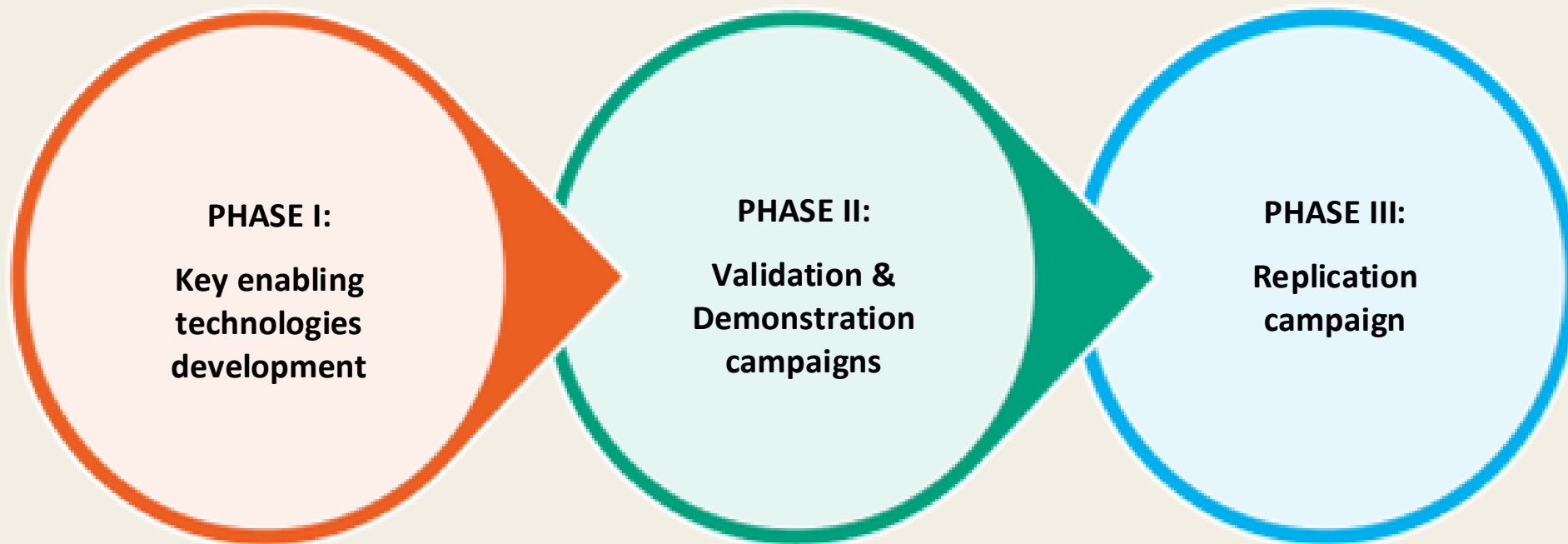
- Even out bought energy to balance electric and/or DH grid.
- Maximize the use of locally produced electricity
- Avoid power peaks
- Electricity price arbitrage

Charging when:

- Usage is low
- Energy is cheap
- Local production exceeds usage

Discharging when:

- Usage is high
- Energy is expensive
- Local production is lower than usage



Jan 2023

Jun 2027



Validation & Demonstration campaigns

- **Main objective:** ThumbsUp technologies to reach a **TRL7**.
- Demonstration actions in **different climate areas and building typologies**
 - FractLES application for **heating or DHW**
 - FractLES application for **cooling**
 - SorTES application for **H&C**

Installed at **different levels** and with the **most suitable module combination**

Pilot 1:
Single family building (Spain)



Pilot 2:
Multifamily building (Spain)



Pilot 3:
Multifamily DHN connected building (Sweden)



Demo i HSB LL (daily usage 200-400kWh) Measurements during 2026



Preheating DHW

- 4 large modules, 1400kg PCM, 76kWh storage
- Charged by DHW tank

Heating of floor heating

- 5 medium modules, 1350kg PCM, 75kWh storage
- Charged by radiator system
- Heating the floor heating return



ThumbsUP Tech in PEDs

Each building can contribute to the community:

Increase the potential for energy sharing between buildings with different energy profiles

Allow for higher local PV production

Load shifting at occasions with high electricity prices

Increase the community's energy resilience

Even out the community's energy profile



Thank you!

Emilia Pisani

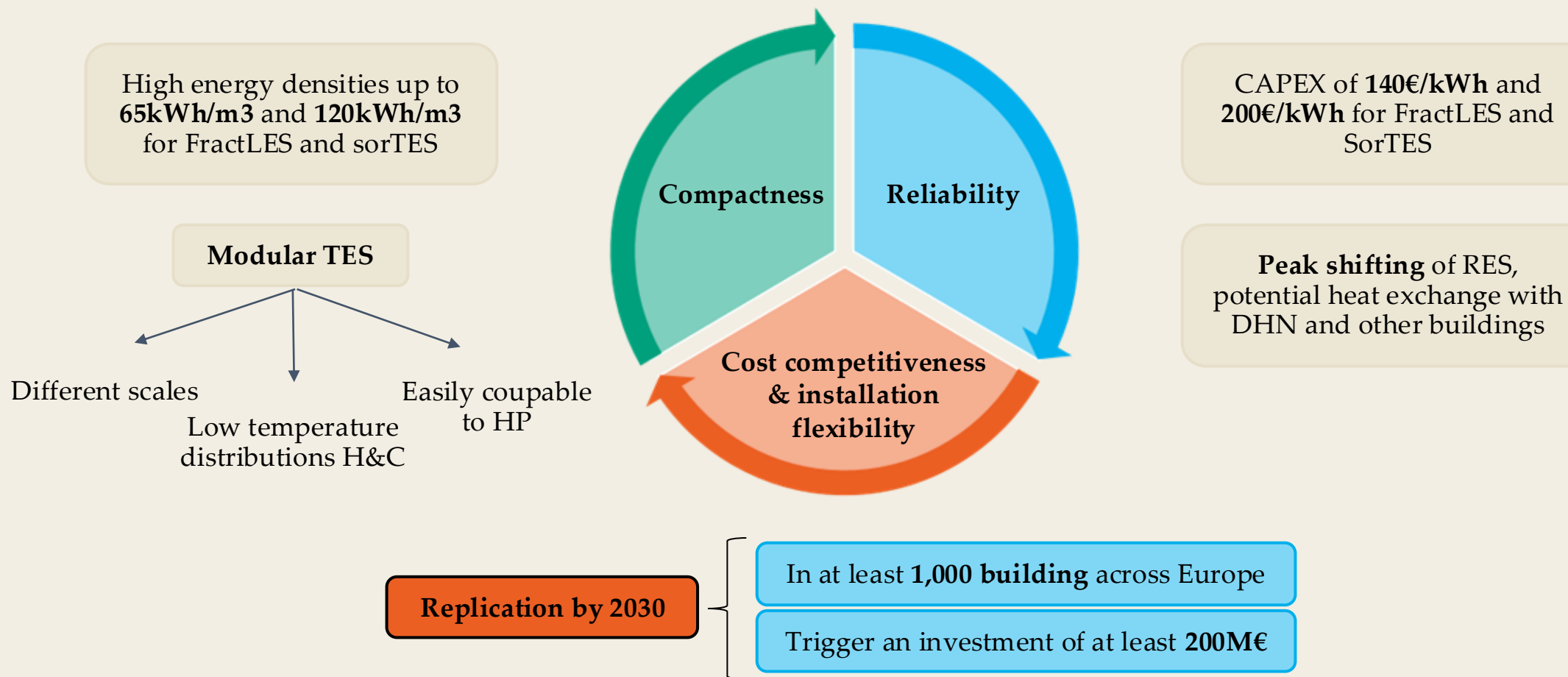
Emilia.pisani.berglin@ri.se

<https://www.thumbsupstorage.eu/>



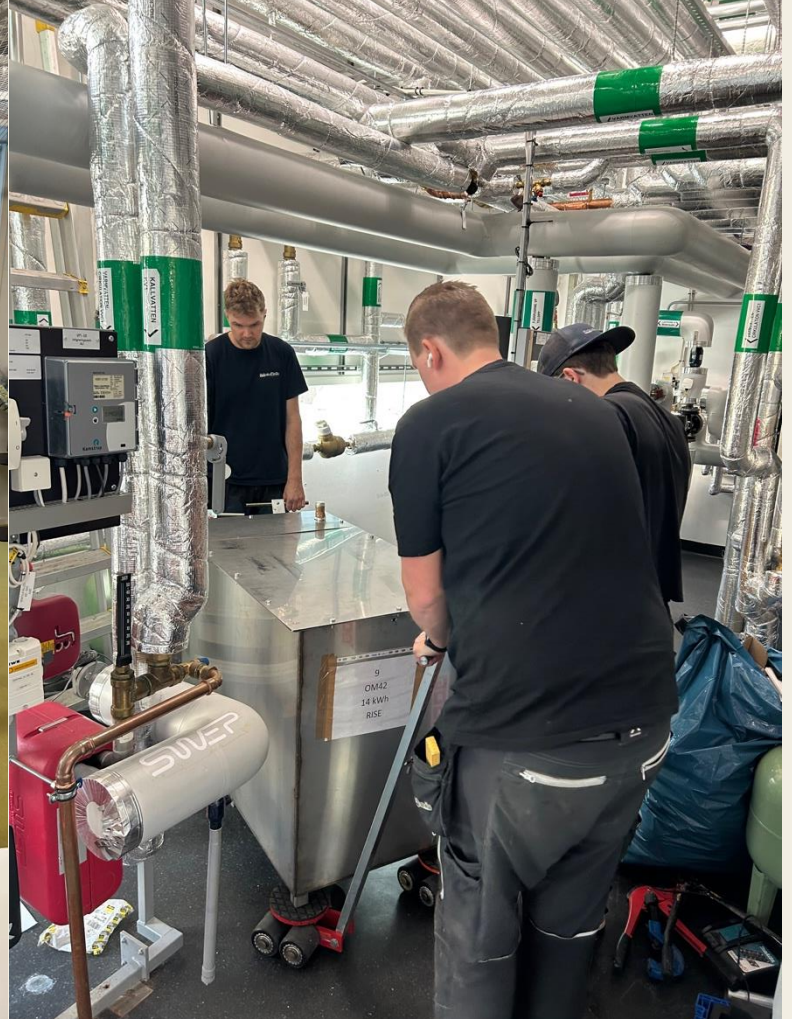
THUMBS UP project GA101096921
funded by the European Union

Expected outcomes & relevant impacts





ThumbsUp Installation

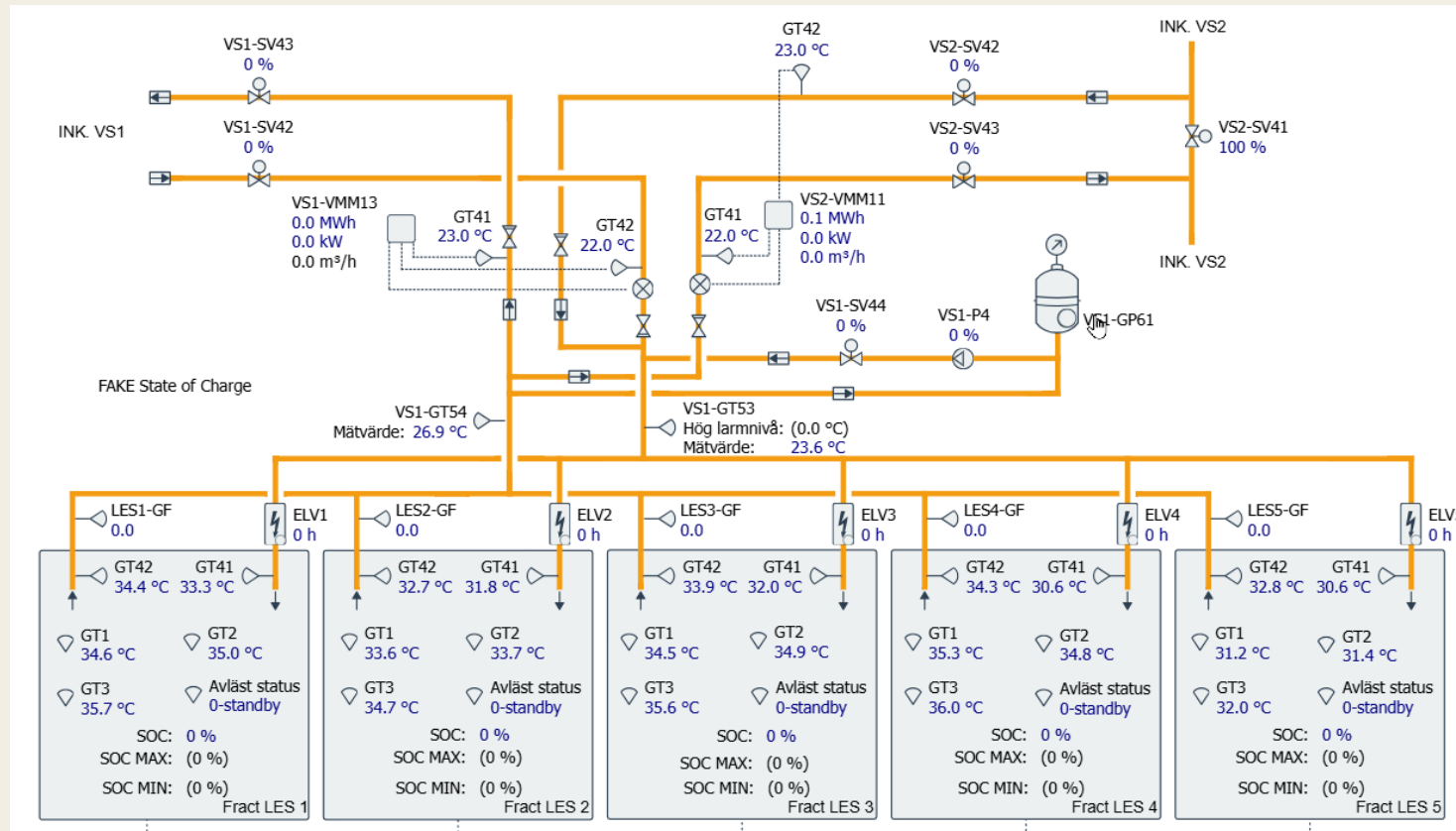




ThumbsUp - Demo i HSB LL



Styrning – integration i BEMS





ThumbsUp

Thermal energy storage solutions to optimally manage buildings and unlock their grid balancing and flexibility potential.

Let's talk about it!



What did you think?

Evaluation of TES in PEDs





Thank you!

<https://www.thumbsupstorage.eu/>



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ThumbsUp

Thermal energy storage solutions to optimally manage buildings and unlock their grid balancing and flexibility potential.