EU Regulatory Landscape for Thermal Energy Storage

21 November 2024 | 10:00 - 11:30 CET | Teams Webinar





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Agenda

10:00 - 10:15 Introduction by Giulia Malafarina *by EHPA*

10:15 - 11:00

Presentations of the experts

- Thomas Schleker from European Commission DG RTD "Thermal Energy Storage R&I the European viewpoint"
- Guillermo Andrés Nieto from Veolia "TES technologies integration: Regulatory constraints in the EU"
- Karla Zambrano from ITACA & UNIZAR "Why is TES important to prevent energy poverty?"

11:15 - 11:30 Q&A Session & Closing of the event EFFICIENT COMPACT MODULAR THERMAL ENERGY STORAGE SYSTEM

Overall budget : 8.169.948 € EU contribution: 6.169.498 € Coordinated by : CONSIGLIO NAZIONALE DELLE RICERCHE Start date : 01/01/2023 End date : 31/12/2026 Website: echo-euproject.eu

About the project

ECHO project will develop and demonstrate a plug&play, new complete, sustainable, flexible, modular, controlled, and competitive digitally system exploiting thermal energy storage (TES). ECHO results will be an innovative, compact and smart TES solution, based on the use and optimization of thermochemical materials (TCMs), combined with phase change materials (PCMs), for space heating, cooling and hot tap water production and, optionally, with ice storage for large cooling needs.



Overall budget : 5.472.550 € EU contribution: 4797.535 € Coordinated by : SOLINTEL M&P SL Start date : 01/01/2023 End date : 31/12/2026 Website: https://www.best-storage.eu

About the project

BEST-Storage aims to achieve the goal of peak load reduction and shifting, energy saving and energy cost minimization. Long and short-term high-energy density storage solutions will be developed and demonstrated in 4 demo cases around Europe. A thermo-chemical and loss-free storage technology such as seasonal storage, two phase change materials slurry concepts and vacuum insulated water storage will be developed with the aim of shifting peak load demands.



Overall budget : 8 769 951,13€ EU contribution: 7 313 464,26€ Coordinated by : ARMENGOL & ROS CONSULTORS I ASSOCIATS SLP Start date : 01/01/2023 End date : 31/12/2026

Website: <u>https://www.hystore-project.eu</u>

About the project

The EU-funded HYSTORE project will advance TES technology by combining different innovative components. The project aims to achieve up to 150 % energy density and 50 % lower capital expenditures compared to the state-of-the-art TES systems. HYSTORE also plans to develop a smart aggregator and open-source multi-service platform to optimise the provision of hybrid energy and power services. The project will cover four different use cases in various climates and environments, for district heating/cooling connected and non-connected buildings.



Overall budget : 7 631 369,00 € EU contribution: 6 369 819,25 € Coordinated by : VEOLIA SERVICIOS LECAM SOCIEDAD ANONIMA UNIPERSONAL Start date : 01/01/2023 End date : 31/12/2026

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

About the project

The EU funded THUMBS UP project will develop and demonstrate daily and weekly TES for EU buildings. By innovating at different levels, from modelling to materials and enhancing heat exchanger solutions, the project will design highperformance TES solutions in line with EU sustainable economy goals. Specifically, it will create bio-based phase change materials from raw materials currently wasted in the EU food industry and thermochemical materials relying on nonhazardous materials. The project will set up three demo sites in Spain and Sweden – in different EU climates and energy market contexts.



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Thomas Schleker Policy Officer, European Commission DG RTD



European Thermal Energy Storage R&I – updates from DG RTD

November 2024

Dr. Thomas SCHLEKER DG Research & Innovation Clean Energy Transitions European Commission

not legally binding

European Green Deal

The EU will:





Become climate-neutral by 2050

Protect human life, animals and plants, by cutting pollution

> Fit for 55 Package

> REPowerEU

Revision of the EU Electricity Market Design

> Net-Zero Industry Act/Critical Raw Materials Act

Help companies

technologies

become world leaders

in clean products and

Help ensure a

transition

Recommendations on Energy Storage





EU NET-ZERO INDUSTRY ACT: MAKING THE EU THE HOME OF CLEAN TECH INDUSTRIES

March 2023



Simplifying the regulatory framework for net-zero technologies

Scaling up manufacturing of net-zero technologies Fostering competitive and resilient European net-zero industry The Net-Zero Industry Act (NZIA) creates a regulatory framework to boost the competitiveness of EU industry and technologies crucial for decarbonisation

- The NZIA encompasses final products, components, and machinery necessary for manufacturing net-zero technologies, including:
 - Battery/storage technologies
 - Heat pumps and geothermal energy technologies
 - Energy system-related energy efficiency technologies, including heat grid technologies
- Enhancing skills
 - Net-Zero Industry Academies

The COMMISSION RECOMMENDATION of 14 March 2023on Energy Storage – Underpinning a decarbonised and secure EU energy system (2023/C 103/01)

The EU needs a strong, sustainable, and resilient industrial value chain for energy-storage technologies. EU countries are essential in the process. They should

- assess capacity needs for the relevant energy storage technologies as well as potential financing gaps
- identify actions necessary to remove barriers to the deployment of demand response and behind-the-meter storage
- establish cost-effective processes, such as competitive bidding systems and suitably designed capacity mechanisms
- accelerate the deployment of storage facilities and other flexibility tools in islands, remote areas and the EU's
 outermost regions with insufficient or unstable grid capacity
- publish detailed **data** on the energy market to facilitate investment decisions on new energy storage facilities
- support research and innovation in particular, long-term energy storage and launch technology accelerator programmes and dedicated support schemes

EU initiatives can play a role in facilitating the deployment of flexible resources to complement intermittent renewable production; addressing specific barriers for distributed flexibility sources, including energy storage



EUROPE'S CHOICE

POLITICAL GUIDELINES FOR THE NEXT EUROPEAN COMMISSION 2024–2029 **Ursula von der Leyen** We need a new European Prosperity Plan to:

- Make business easier and deepen our Single Market;
- Build a Clean Industrial Deal to decarbonise and bring down energy prices;
- Put research and innovation at the heart of our economy;
- Boost productivity with digital tech diffusion;
- Invest massively in our sustainable competitiveness;
- Tackle the skills and labour gap.

The European Strategic Energy Technology Plan

SET Plan key actions		SET Plan key actions	14 implementation working groups
	Nº1 in	• Performant renewable technologies integrated in the system	Offshore wind Photovoltaics Deep geothermal Solar thermal electricity
T	renewables	Reduce costs of technologies	
	Energy systems	New technologies & services for consumers	 → Energy systems → Positive energy districts → High Voltage Direct Current (HVDC)
		(e4) Resilience & security of energy system	
	Energy efficiency	New materials & technologies for buildings	 ➡ Energy efficiency in buildings ➡ Energy efficiency in industry
U		6 Energy efficiency for industry	
2	Sustainable transport	Competitive in global battery sector and e-mobility	 → Batteries → Renewable fuels and bioenergy
		(0) Renewable fuels and bioenergy	
	CCS - CCU	Carbon capture storage / use	 Carbon capture and storage Carbon capture and utilisation (CCS - CCU)
		۲	
R	Nuclear	(10) Nuclear safety	- Nuclear safety





THE EU RESEARCH & INNOVATION PROGRAMME 2021 – 27

This presentation is based on the political agreement of 11 December 2020 on the Horizon Europe. Information on some parts is pending revision.

19 March 2021



Horizon Europe: investing in R&I to shape our future

HORIZON EUROPE

EURATOM



* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

NOT LEGALLY BINDING

Our Vision

The EU's key funding programme for research and innovation:

- Tackles climate change
- Helps to achieve the UN's Sustainable Development Goals
- Boosts the EU's competitiveness and growth
- Facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges
- Supports the creation and better diffusion of excellent knowledge and technologies
- Creates jobs, fully engages the EU's talent pool, boosts economic growth, promotes industrial competitiveness and optimises investment impact within a strengthened European Research Area.





Contribution of Horizon Europe to REPowerEU

- Cheaper and more performant renewable energy technologies (solar energy, wind energy, ocean energy, geothermal energy, hydro power, renewable fuels, heat pumps, solar heating)
- More flexible and resilient energy grids
- Better and smarter energy storage solutions



- More energy-efficient building stock
- Increased energy efficiency in industry
- More efficient mobility solutions
- Cleaner and more
 efficient transport modes
 - Broad portfolio of renewable energy technologies
 - Maturing hydrogenbased solutions

Overview of ongoing Thermal Energy Storage Projects (selected)

- HORIZON-CL5-2023-D3-01-14 Demonstration of innovative, large-scale, seasonal heat and/or cooling storage technologies for decarbonisation and security of supply (IA) INTERSTORES, USES4HEAT
- HORIZON-CL5-2023-D3-01-13 Development of novel long-term electricity storage technologies (RIA) SC020P-TES, SEHRENE
- HORIZON-CL5-2022-D3-01-14 Thermal energy storage solutions (IA) ECHO, THUMPS-UP, HYSTORE, BEST-STORAGE
- HORIZON-CL5-2022-D3-01-04 Demonstrate the use of high temperature geothermal reservoirs to provide energy storage for the energy system (IA)

PUSH-IT

• HORIZON-CL5-2021-D3-03-02 - Next generation of renewable energy technologies (RIA)

CEEGS

• **LC-GD-2-1-2020** - Innovative land-based and offshore renewable energy technologies and their integration into the energy system (RIA)

RESTORE

LC-SC3-RES-12-2018 - Demonstrate highly performant renewable technologies for combined heat and power (CHP) generation and their integration in the EU's energy system (IA)
 GEO-SMART

HORIZON-CL5-2021-D3-03-02 - Next generation of renewable energy technologies (RIA)

Project results are expected to contribute to all of the following expected outcomes:

- Available breakthrough and game changing renewable energy technologies enabling a faster transition to a net-zero greenhouse gas emissions EU economy by 2050.
- Knowledge and scientific proofs of the technological feasibility of the concept including the environmental, social and economic benefits to CONtribute to R&I strategy and policy forecast.
- Establishing a solid long term dependable European innovation base.

HORIZON-CL5-2022-D3-01-14 - Thermal energy storage solutions (IA)

- Project results are expected to contribute to all of the following expected outcomes:
 - Develop and demonstrate **novel modular**, **compact**, **high performances**, **thermal energy storage solutions** (TES) for heating, hot tap water and cooling for electricity load shifting. The integration of the solution within the energy networks of the building and its system management should allow different functions, such as **peak load reduction**, **energy saving**, **energy cost minimization**.
 - Develop and demonstrate a novel thermal energy storage system much more compact than state-of-the-art technologies, enabling the storage of heat and cold for domestic applications for periods typically of 4 weeks long.

Thank you for your attention!

Contact: thomas.schleker@ec.europa.eu





21 November 2024 | 10:00 - 11:30 CET EU Regulatory Landscape for Thermal Energy Storage



Guillermo Andrés Nieto Research Engineer and Project Coordinator at Veolia Spain





HERMAL ENERGY STORAGE SYSTEM







TES technologies integration: Regulatory constraints in the EU EU Regulatory Landscape for TES - TES Cluster Guillermo Andrés Nieto, Veolia

Thursday November 21st 2024, Online







Johanneberg

<u>Thermal energy storage solUtions to optimally Manage BuildingS and Unlock their grid</u> balancing and flexibility Potential

UNIVERSITY OF





Agenda

- ThumbsUp & Veolia
- Introduction: Constraints on the application of TES
- Situation at the EU level
- Specific example: Spain
- Conclusions





About us: **OVEOLIA**

- **Our Mission:** « Resourcing the world »
 - *Improving access to resources* Ο
 - Preserving resources Ο
 - *Replenishing resources* 0
- Solutions for water, waste and energy management.



WATER

- 111 million people supplied with drinking water
- 97 million people connected to wastewater systems
- 4,130 drinking water production plants managed
- 3,506 wastewater treatment plants managed



WASTE

- **46** million people provided with collection services on behalf of municipalities
- 61 million metric tons of treated waste
- 533,759 business clients
- 823 waste processing facilities operated



ENERGY

44 million MWh produced

46,922 thermal installations managed

680 heating and cooling networks managed

2,716 industrial sites managed







Introduction: Constraints on the application of TES







Introduction: Constraints on the application of TES

- Storages energy, but **not electric energy**.
- Not energy generation facilities, but **can be connected to the primary energy grids (electric/thermal)**.
- Should be easily integrable in buildings, **must be safe to be installed near to the tenants**.

• What kind of regulations/legislations should be taken into consideration?



- Thermal facilities
- Electric facilities
- Buildings Residential Buildings
- Energy performance
- DHW handling
- Hazardous substances restrictions / Restriction of chemicals
- Health & Safety





Introduction: Constraints on the application of TES





Situation at the EU level

- Energy Performance of Buildings Directive (EPBD):
 - Minimum requirements for energy performance (buildings and technical systems).
 - **Design, installation and commissioning** guidelines.
 - **Proper sizing** mandate adapted to heat demand of the building.
 - **Heating, cooling and DHW** systems in residential buildings.
 - Wellness & hygiene requirements.
- Ecodesign Directive (2009/125/EC).
- Low Voltage Directive (LVD) 2014/35/EU.
- Machinery Directive 2006/42/EC.
- **Pressure Equipment Directive (PED)** 2014/68/EU.









Situation at the EU level

- Electromagnetic Compatibility Directive (EMC) 2014/30/EU.
- **Drinking Water Directive (DWD)** 98/83/EC.
- **Restriction of Hazardous Substances (RoHS) Directive** 2011/65/EU.
- General Product Safety Directive (GPSD) 2001/95/EC.
- Energy Labelling Regulation (EU) 2017/1369.
- Energy Efficiency Directive (EED) 2012/27/EU.
- Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) Regulation (EC) 1907/2006.











Specific example: Spain

- "Reglamento de Instalaciones Térmicas en los Edificios" (RITE):
 - Different requirements **depending on the thermal power** installed.
 - **Maintenance** requirements.
 - **Usage and inspection** requirements.
 - Related **energy efficiency** requirements.
 - **Renewable energy** requirements.
 - Waste requirements.
 - Wellness and hygiene requirements.
 - **Security** requirements.
 - Environmental impact requirements.







Specific example: Spain

- "Reglamento Electrotécnico para Baja Tensión" (REBT):
 - Different requirements for low/high voltage.
 - No differentiation between tertiary/residential buildings.
 - Regulation of those facilities generating, distributing or consuming electricity.
- Also interesting to study electricity prices regulation to enhance the flexibility with the grid:
 - In Spain and Portugal, electricity prices are regulated by the OMIE, fixing the price per kilowatt hour on a daily basis.











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Conclusions

- The situation in **every EU member state faces similar challenges**.
- Member states have **dedicated legislations that directly govern** TES-related installations, with **varying requirements**.
- Clear **necessity of having a good understanding of the regulations and legislations** that should be considered when installing innovative technologies.
- An **special focus** should be done with the **installation of TES devices**, **no specific regulation is currently worded** for their implementation.





Thank you!

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Learn more at thumbsupstorage.eu









THUMBS UP project GA101096921 funded by the European Union



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HERMAL ENERGY STORAGE SYSTEM







EFFICIENT COMPACT MODULAR THERMAL ENERGY STORAGE SYSTEM

November 21, 2024

Why is TES important to prevent energy poverty? EHPA Webinar: EU Regulatory Landscape for Thermal Energy Storage (TES)

Dr. Karla Zambrano Member WP2 Legal Assessment of ECHO project Universitat Politècnica de València



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ECHO

Main Content

- I. PRELIMINARY CONSIDERATIONS
- II. INTERACTIONS BETWEEN ENERGY POVERTY AND ENERGY TRANSITION
- III. THERMAL ENERGY STORAGE (TES) AS A NEED FOR THE ENERGY TRANSITION
- IV. FINAL CONSIDERATIONS









Energy policy in the EU

→ Article 194 of the Treaty on the Functioning of the European Union (TFEU) states that energy is a **shared** competence between EU Member States and the EU.

 \rightarrow Each Member State has the right to decide the conditions for exploiting its own energy resources.



ECHO

 \rightarrow The main aims of EU energy policy are to:

- ensure the functioning of the energy market;
- ensure **security of energy supply**;
- promote **energy efficiency** and **energy saving** and the
- development of new and renewable forms of energy;
- promote the interconnection of energy networks.



ECHO

→ Regulation (EU) 2018/1999 on the governance of the Energy Union and Climate Action

→ The regulation aims to ensure that the European Union's (EU) energy union strategy is implemented in a coordinated and coherent manner across its five dimensions:

→ decarbonisation,
 → energy efficiency,
 → energy security,
 → the internal energy market,
 → research, innovation and competitiveness.



Art. 3.3.d. Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action)

"Integrated national Energy and Climate Plans (INECP) shall consist of (...) a description of the current situation of the five dimensions of the Energy Union and (...) shall assess the number of households in **energy poverty** taking into account the necessary domestic energy services needed to **guarantee basic standards of living** in the **relevant national context**, existing **social policy** and other **relevant policies**, as well as indicative Commission guidance on relevant indicators for energy poverty (...)"



ECHO

There is a strong connection between several fundamental rights and the risk of energy poverty

e.g. human dignity, right to life, right of integrity of the person, prohibition of torture and inhuman or degrading treatment or punishment, respect for private and family life...



Thermal energy storage (TES) is a technology that reserves thermal energy by heating or cooling a storage medium and then uses the stored energy later. So, the need to achieve climate neutrality objectives in key sectors such as energy and industry make ECHO an ideal project in the face of the climate crisis and to prevent energy poverty.



Thermal energy storage (TES) is a technology that reserves thermal energy by heating or cooling a storage medium and then uses the stored energy later. So, the need to achieve climate neutrality objectives in key sectors such as energy and industry makes ECHO an ideal project ahead of the climate crisis and to prevent energy poverty.





- a. The ECHO project is legally viable according to the analysis of international, European and EU Member States regulations. It enjoys a factual justification and, above all, a favorable European regulatory scenario. Main problem \rightarrow harmonization.
- b. There is an existing interaction between energy poverty and the energy transition. All the INEC Plans shall consider the assessment of energy poverty;
- c. ECHO project could help to meet, at least, three of the five dimensions of the Regulation of the Energy Union and Climate Action. Progressive evaluations of the development and evolution of the standards that underpin and support the implementation of the project are desirable in order to check if there is an infringement of fundamental rights.



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EFFICIENT COMPACT MODULAR THERMAL ENERGY STORAGE SYSTEM

Thanks for your attention





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Q&A Session



Giulia Malafarina EU Projects Officer, EHPA Thomas Schleker Policy Officer, European Commission DG RTD

Guillermo Andrés Nieto Research Engineer and Project Coordinator at Veolia Spain Karla Zambrano Researcher at ITACA (UPV) and AGUDEMA (UNIZAR)

Keep updated on TES Cluster projects upcoming activities and results!



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