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The network of Horizon Europe
Cluster 5 National Contact Point.





Using abandoned infrastructure to stabilize the grid

GREENET Brokerage Event

19 November 2026

The GREENET project has received funding from the EU Horizon Europe programme under Grant Agreement No 101069604

Topic to be addressed

HORIZON-CL5-2027-07-D3-27: Integrated Approaches for Retrofitting Infrastructures with Innovative Energy Storage Technologies

Demonstration of novel or improved technological solutions for cost-efficient, circular and sustainable energy storage, which contribute to grid flexibility and make use of existing obsolete or outdated energy or other infrastructures.

Proposals should integrate the synergies between novel or improved energy storage technologies and retrofitting of obsolete or outdated infrastructures, like e.g. old hydropower dams and basins, decommissioned power plants, former industrial facilities, coal mines, fossil fuel infrastructure etc. by optimizing at the same time storage capacity and efficiency as well as circularity and socioeconomic and environmental sustainability, which should be addressed, e.g. by stakeholder outreach and consideration of possible environmental impacts.

Furthermore, proposals should follow secure by design approach and integrate built-in security in the energy systems.

Our approach

- Objective: Longterm underground storage of renewable energy in particles at high heat (800 to 1000 Celsius)

- How? By retroffiting oil wells to create « sand battery » to store renewable energy in recycled particles such as dredging material

So called « Sand (particles) battery »

A lot of research as well as some pilots have been established and demonstrated different advantages of sand (particles) batteries compared to other thermal energy storage solutions:

- Longterm storage (several weeks/months)
- Almost infinite lifetime
- Very low energy deployment cost (<0.05 c/kWh)
- Dual use cases (heat and electricity)
- No rare materials

And lastly needed to be mentioned today: A distributed network of “batteries” can withstand potential attacks(https://energytransition.org/2026/09/in-ukraine-distributed-renewables-foil-russias-assaults/)

References:

- https://www.sciencedirect.com/science/article/abs/pii/S2352152X19315245
- https://www.cell.com/device/fulltext/S2666-9986(24)00235-7?_returnURL=htt ps%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS266699862 4002357%3Fshowall%3Dtrue
- *http://large.stanford.edu/courses/2025/ph240/schreiner2/*

Limits of existing sand and bore hole batteries : thermal storage only

The Sand Battery was invented by **Polar Night Energy** which developed and operates since 2022 the world's first commercial Sand Battery in Kankaanpää, Finland, for the energy utility Vatajankoski.



Their technology:

- 2 MW thermal output with 3 MW charging power
- High-temperature thermal energy storage for industrial and district heating applications
- 2,400 tonnes of sand-based heat storage medium
- Approximate dimensions: 16 m diameter and 15 m height



https://enertherm-engineering.com/blog/abandoned-oil-wells-could-find-new-life-as-energy-storage-sites-research-suggests

US startup Geo2Watts:

- Bore hole battery
- stores heated water at 200 Celsius
- Only 10 hours of storage duration
- Reversible High Temperature Heatpump



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With our project we expect :

- Higher temperature storage (800 to 1000 Celsius) for longer thermal energy storage (several weeks/months)
- Efficient (>55%) reconversion to electricity using sCO2 and Brayton turbine with 10 times reduced footprint compared to standard turbines
- Supercritical CO2 Brayton cycle: A state-of-the-art review https://www.sciencedirect.com/science/article/abs/pii/S0360544219315786
- Significantly reduced capex by using abandoned oil wells and dredging material (https://www.osti.gov/servlets/purl/2448072)
- Potential co-location of SOEC hydrogen production or desalination plant due to available high heat
- Planned modularity will allow to make use of different bore hole types

Our collaborators

DLR Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center

Extensive experience in thermal energy storage

- NADINE project : **National Demonstrator for Isentropic Energy Storage to develop storage facilities on a power plant scale that are able to absorb and then release large quantities of electrical energy** : https://eurec.be/dlr-is-developing-highly-efficient-energy-storage/
- **DeParT – utilising particles at high temperatures to generate heat and fuel https://www.dlr.de/en/research-and-transfer/projects-and-missions/depart**

Géosciences pour une Terre durable
brgm

Extensive experience in bore hole mapping

https://www.brgm.fr/en/solutions/declaration-description-underground-works

and analyses of using dredging material

Caractérisation de la dangerosité des sédiments dragués et gérés à terre - Principes et méthode. Rapport final. BRGM/RP-67318-FR

https://doc.cerema.fr/Default/doc/SYRACUSE/23365/caracterisation-de-la-dangerosite-des-sediments-dragues-et-geres-a-terre-principes-et-methode-rappor?_lg=fr-FR

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We are looking for partners or are prepared to join existing consortium

Technology	Demonstration & users	Impact & proposal
High-temperature particle storage and heat transfer	Operators with suitable abandoned wells and demonstration sites	Dredged-material characterization and reuse
Well retrofit, completion and engineering	Industrial heat or electricity users	Environmental assessment, life-cycle analysis and stakeholder engagement
Heat-to-power conversion and grid integration	Renewable-energy and grid-flexibility partners	Secure-by-design expertise and Horizon Europe proposal coordination

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Interested in contributing expertise, a site or a use case? CONTACT



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