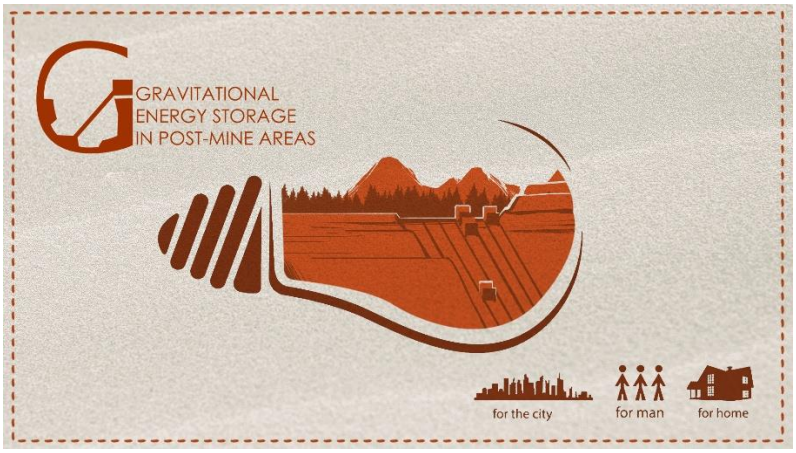


From Mining to Energy Storage: GrEnMine Moves Towards Demonstration in 2027

Can mining landscapes become part of Europe's future energy infrastructure? GrEnMine is exploring how gravity could give post-mining areas a new purpose.

Europe's energy transition is changing more than the way electricity is generated. As wind and solar power expand, electricity systems must become increasingly flexible. Renewable energy is not always available when demand is highest, making energy storage an essential part of a reliable, low-carbon electricity system.

The European research project **GrEnMine (Gravitational Energy Storage in Post-Mine Areas)** is investigating an innovative approach: using gravity to store electricity while exploring new applications for mining and post-mining landscapes.

Putting Gravity to Work

The principle is straightforward. When surplus electricity is available, heavy masses are moved uphill, converting electrical energy into gravitational potential energy. When electricity is needed, the masses descend in a controlled manner, allowing the stored energy to be converted back into electricity.

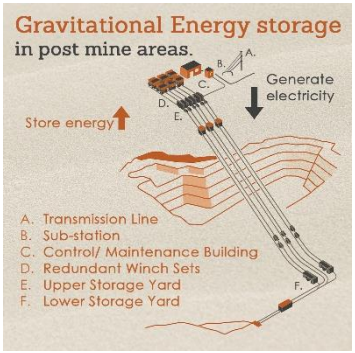


Figure 1 Operating principle of gravitational energy storage in post-mining areas.

GrEnMine is developing a Rail-Mounted Gravitational Energy Storage (RM-GES) system designed to operate on inclined terrain. Open-pit mines and overburden dumps are particularly interesting locations because of their elevation differences and existing industrial infrastructure.

The project also investigates the potential of conveyor belt-based gravitational energy storage (CB-GES) and develops methods to assess which mining areas could support these technologies.

From Engineering Design to Demonstration

GrEnMine is approaching a significant milestone at the Turów lignite mine in Poland.

The final design of the RM-GES demonstrator is complete, and the team has selected and prepared its location. Detailed 2D and 3D modelling has supported the assessment of site conditions and the installation's engineering requirements.

Construction of the track foundation is expected to begin shortly. Assembly of the demonstrator is scheduled for completion in February 2027. Initial testing is scheduled to begin in March 2027.

The tests will provide valuable data on system performance, operational safety and the practical challenges of applying gravitational energy storage in a mining environment.

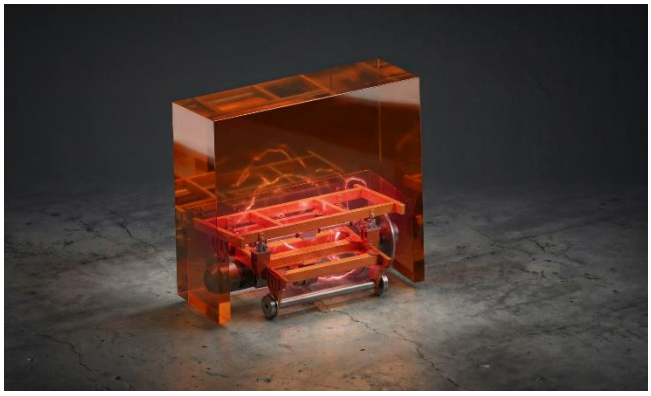


Figure 2Concept rendering of the GrEnMine RM-GES demonstrator.

A New Purpose for Industrial Landscapes

GrEnMine explores how existing mining landscapes, infrastructure and engineering expertise could contribute to the development of future energy systems.

“The project is also about giving a new purpose to areas that served mining for decades. They can contribute to the economy again, but in a different way.” - *prof. Przemysław Moczko, GrEnMine Project Coordinator, Wrocław University of Science and Technology*

By combining mechanical engineering, geotechnical research and industrial experience, the project aims to assess the technical and economic feasibility of gravitational energy storage in active and former mining areas.

For regions undergoing industrial transformation, this approach offers an interesting possibility: infrastructure once associated with energy extraction could eventually support storing electricity generated from renewable sources.

Landscapes that helped power Europe's industrial past may still have a role in its energy future.

GrEnMine is coordinated by Wrocław University of Science and Technology and co-funded by the European Union through the Research Fund for Coal and Steel (RFCS), under Grant Agreement No. 101157790.

Discover more at: www.grenmine.eu

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