New ways of storing renewable energy - REVEAL project supported by Horizon Europe and the government of Switzerland

In July 2022, a research consortium with nine partners from seven different European countries started to develop a new and possibly revolutionary concept for storing renewable energies over longer periods such as months or even years. The new concept is based on aluminium as an energy carrier and differs substantially from ordinary ways of storing energy such as batteries or Power-to-Gas.

Renewable electricity and heat can be produced cheaply today, based on solar, hydro or wind resources, and short-term storage solutions for evening out mismatches between production and demand are available at low cost. However, technologies for storing renewables for longer periods of months or seasons are scarce or costly and thus not widely used yet.

The present struggle to reduce dependency on oil and gas imports, especially in winter when people need to heat their buildings and solar energy resources are limited, underlines the urgent need for energy storage solutions that can bridge longer periods at an affordable cost.

Why is aluminium a possible solution to this problem? It is widely known that the production of aluminium uses a massive amount of electricity. Usually, this is seen as a disadvantage from an ecological point of view, especially if the electricity is provided by coal power plants.

But what if exclusively renewable electricity is used for this process and most of this electric energy is not lost but stored chemically in the produced aluminium? And what if this stored energy can be released at a much later time and in a different place again? Then aluminium becomes an excellent energy storage solution with an outstanding energy storage density. In fact, a one-meter cube of aluminium can store more energy than the same volume of heating oil.

This is why the research project **REVEAL** is supported by the European Union's Horizon Europe programme and by Swiss funding from the SBFI. In this project, new technologies that can produce aluminium from aluminium oxide without carbon dioxide emissions are developed for storing renewable electricity. Furthermore, technologies for the production of heat and electricity from this stored energy are developed, which corresponds to the discharging of the storage. An important goal of the project is to close the material cycle. Thus, aluminium that is introduced into the storage concept can cycle between the charging and discharging processes many times and ideally will never have to be replaced by new aluminium. Besides these technical aspects, cost and environmental impact will be decisive for the success and environmental benefit and are key elements that will be analysed.

The researchers that develop and analyse these solutions have met for the first time for a Kick-Off meeting in Reykjavik, Iceland, on 7-8 July of this year, and will work on solutions for this new storage concept until summer 2026.

For further information, please see
Linkedin: www.linkedin.com/company/reveal-storage
Insta: www.instagram.com/reveal_storage
Twitter: www.twitter.com/reveal_storage

Co-funded by the European Union

Co-funded by the European Union's Horizon Europe Programme Grant Agreement 101069492.

The Swiss contribution is supported by the Swiss State Secretariate for Education, Research and Innovation (SERI) under