Gravity energy storage switzerland

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In a Swiss valley, an unusual multi-armed crane lifts two 35-ton concrete blocks high into the air. The blocks delicately inch their way up the blue steel frame of the crane, where they hang suspended from either side of a 66-meter-wide horizontal arm. There are three arms in total, each one housing the cables, winches, and grabbing hooks needed to hoist another pair of blocks into the sky, giving the apparatus the appearance of a giant metallic insect lifting and stacking bricks with steel webs. Although the tower is 75 meters tall, it is easily dwarfed by the forested flanks of southern Switzerland"s Lepontine Alps, which rise from the valley floor in all directions.

A journalist from Ticino resident in Bern, I write on scientific and social issues with reports, articles, interviews and analysis. I am interested in environmental, climate change and energy issues, as well as migration, development aid and human rights in general.

It is an imposing building without doors or windows. Inside there are 3,500 "bricks" weighing 25 tonnes. A system of elevators and tracks moves them up and down, placing them next to each other, in what looks like a modern 3D Tetris. It is not a new housing concept, but a battery that uses the force of gravity to store and release energy.

The first battery with this technology was connected to the power grid in the Chinese county of Rudong, near Shanghai, in late 2023. "We didn"t imagine that our first plant would be built in China," Robert Piconi, CEO of Energy Vault, tells SWI swissinfo . The energy storage systems company is based in the US, but it developed and tested its prototype in Switzerland.

In China the environmental imperative to accelerate the country"s decarbonisation - China is the world"s biggest emitter - and current energy policiesExternal link have, however, offered unexpected opportunities for Energy Vault and its innovation. New battery-buildings are already under construction. "We want to help solve the climate crisis," Piconi says.

Energy storage systems are an essential part of the energy transitionExternal link. Batteries solve one of the main problems of electricity production from renewable sources: volatility. That is, they allow excess electricity generated by the sun or wind to be stored and made available at times of increased demand. They can also help stabilise electrical grids. The challenge is to produce efficient batteries without consuming raw materials and rare metals. And of course, at sustainable costs.

Gravity batteries can store large amounts of energy. They do not deteriorate, and the storage capacity does not decrease over time, as is the case with the electrochemical batteries used, for example, in our smartphones.

Gravity batteries are based on the same principle as hydroelectric power plants with a pumped storage system.

These account for over 94% of the world"s installed energy storage capacity, according to the International Association of Hydropower.

However, the Energy Vault battery does not work with water, but with weights. In this case, blocks of concrete or waste material.

When the sun or wind produces more electricity than required, as in summer, the excess energy feeds a system that lifts the weights and places them on the upper floors of the battery-building. This process converts electrical energy into potential energy.

When the electricity is needed, the blocks descend to the ground or to a lower level at a controlled speed. During the "fall" they drive electric generators, transforming the stored potential energy into electric current. The computer software developed by Energy Vault, the heart of the innovation, optimises the mechanical process of lifting and lowering the blocks according to the electricity demand.

Energy Vault"s first commercial battery in China stands next to a wind farm. It has a storage capacity of 100 megawatt hours (MWh). Once "charged", it could power around 4,600 electric cars travelling 100 kilometres.

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