Andorra city compressed air energy storage

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A grid that runs mostly on wind and solar, part of the future that clean energy advocates are working toward, will need lots of long-duration energy storage to get through the dark of night and cloudy or windless days.

Hydrostor, a Canadian company, has filed applications in the last week with California regulators to build two plants to meet some of that need using "compressed air energy storage." The plants would pump compressed air into underground caverns and later release the air to turn a turbine and produce electricity.

The stored energy would be able to generate hundreds of megawatts of electric power for up to eight hours at a time, with no fossil fuels and no greenhouse gas emissions. Long-duration storage includes systems that can discharge electricity for eight hours or more, as opposed to lithium-ion battery storage, which typically runs for up to four hours.

This project and technology have potentially huge implications for the push to develop long-duration energy storage. But the key word is "potentially," because there are many companies and technologies vying for a foothold in this rapidly growing part of the energy economy, and the results so far have been little more than research findings and hype.

"Their technology is not overly complicated," said Mike Gravely, a manager of energy systems research for the California Energy Commission, speaking in general about CAES. "Compressed air is a very simple concept."

The company"s system begins with an industrial scale air compressor that runs on electricity and sucks in air from the environment. The compression of air produces heat, which the system removes and stores in a thermal storage vessel.

Meanwhile, the compressed air flows through a pipe into a cavern more than 1,000 feet below the surface. The cavern would be excavated for the project, as opposed to natural caves providing the storage.

To discharge the energy, the system releases water into the cavern, which forces the air to the surface, where it mixes with the heat that had been stored. The heated air then flows through turbines to produce electricity.

Hydrostor filed an application last week for a plant, called Pecho Energy Storage Center, that would be located in San Luis Obispo County and cost $800 million. It would have a generating capacity of 400 megawatts, with a duration of up to eight hours.

The company then filed an application on Wednesday for the second plant, called Gem Energy Storage

Center, that would be located just east of the Pecho plant in Kern County and cost $975 million. It would have a generating capacity of 500 megawatts, with a duration of up to eight hours.

The projects, both of which could be built as soon as 2026, would help the region replace some of the electricity that now comes from Diablo Canyon nuclear power plant in San Luis Obispo County, which is scheduled to close by 2025.

But Hydrostor does not list a buyer for the electricity from the Pecho plant. This is a key detail that will help determine whether the project is financially viable. Asked about potential customers, a Hydrostor spokesman referred to a recent interview with the company"s president, Jon Norman, who said that talks are ongoing with potential buyers and that the company hopes to announce details "in the near term."