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Revived Energy Storage Technology Offers Major Grid Benefits

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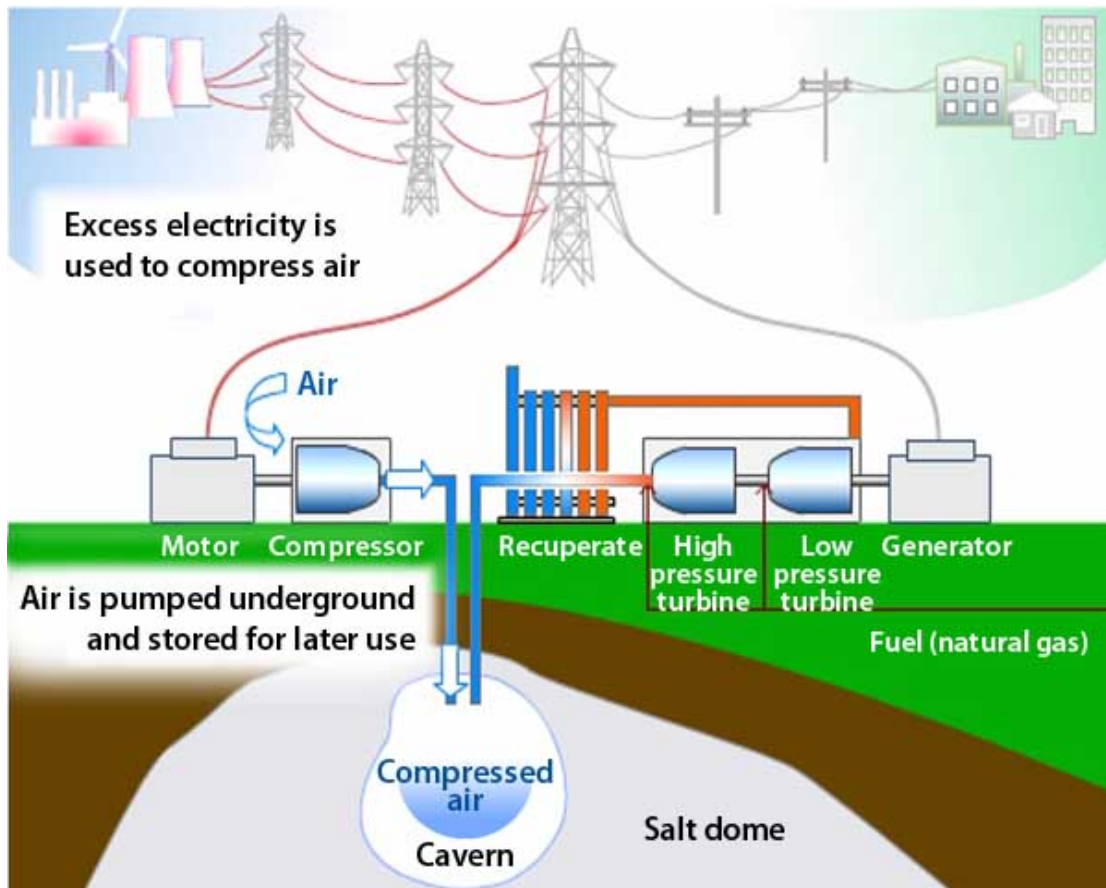
In a move that could boost the value of wind and nuclear generation, relieve stress on the nation's transmission grid, and reduce utility carbon emissions, PSEG Global LLC and energy storage pioneer Michael Nakhamkin have announced that they have formed a joint venture to market and deploy "second-generation" compressed air energy storage technology.

The joint venture, Energy Storage and Power LLC (ES&P), will market and license the updated compressed air energy storage (CAES) technology, which builds on technology Nakhamkin developed and deployed nearly two decades ago in the nation's only CAES plant, a 110-MW unit in McIntosh, Ala., owned by PowerSouth Energy Cooperative. The world's only other CAES plant is in Germany.

CAES technology uses electricity to compress air into a suitable underground geologic formation or in canisters above ground. When electricity is needed, air is withdrawn from the

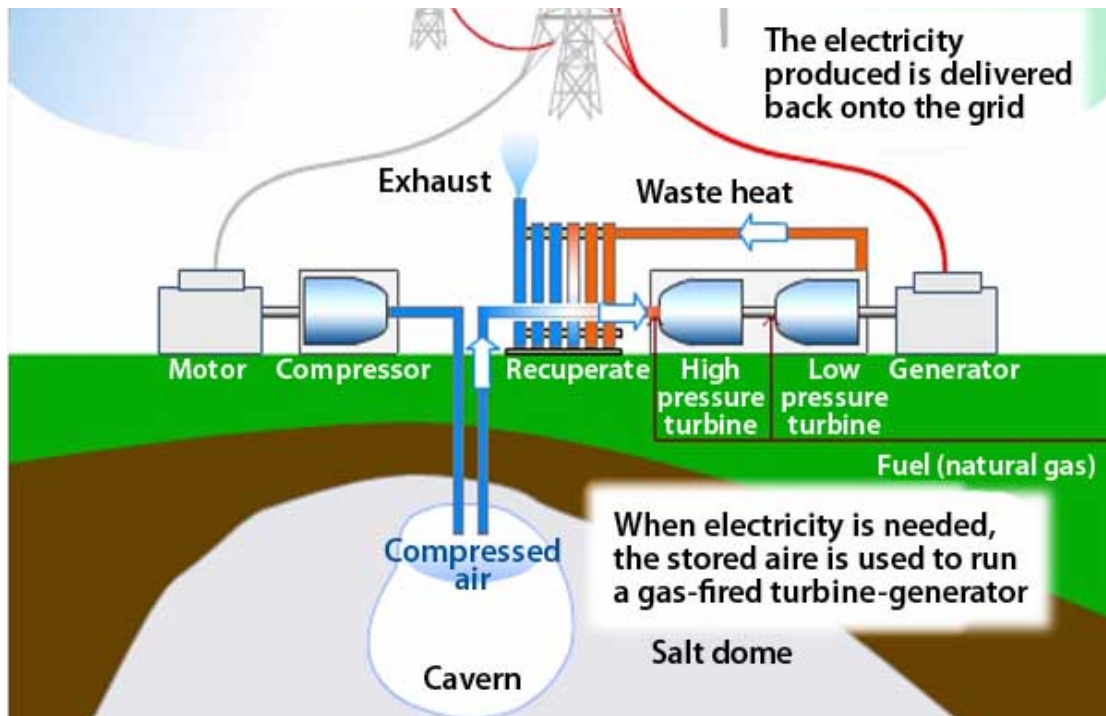
storage system, heated by a gas-fired burner and run through an expansion turbine to drive an electric generator.

Typically, off-peak electricity is used to compress air, thus “storing” the lowest-cost electricity (Figure 1). The air is released to generate power during peak demand periods, when electricity prices are highest (Figure 2).



1. The principal benefit of a compressed air energy storage project is its ability to shift electricity production to periods of high demand. The first step is to produce electricity during “off peak” hours to compress air that is stored in an underground cavern. Source: Ridge Energy Storage & Grid Services LP





2. The compressed air is then expanded through a turbine during “on-peak” hours to produce electricity when demand is high. Source: Ridge Energy Storage & Grid Services LP

Making Renewables Dispatchable

ES&P officials believe that broad deployment of second-generation CAES will enhance the value of large-scale wind generation and other intermittent renewable energy resources by converting them to firm, dispatchable resources. The technology also provides a host of other benefits to utilities and the nation’s electricity system, they said.

Nakhamkin, chief technology officer for ES&P, said second-generation CAES boasts refinements that reduce costs, boost efficiency, and slash emissions of nitrogen oxides to minimal levels.

For example, rather than using a separate gas-fired burner to

heat the air, the new CAES system employs an air expander that uses waste heat from a combustion turbine. The heated air is then mixed with gas for firing in the turbine. This improvement increases the plant's efficiency and reduces the amount of gas used to generate a given amount of power.