Patented compressed air energy storage

In Germany, a patent for the storage of electrical energy via compressed air was issued in 1956 whereby "energy is used for the isothermal compression of air; the compressed air is stored and transmitted long distances to generate mechanical energy at remote locations by converting heat energy into mechanical energy." [5].

Hence, hydraulic compressed air energy storage technology has been proposed, which combines the advantages of pumped storage and compressed air energy storage technologies. This technology offers promising applications and thus has garnered considerable attention in the energy storage field. ... The first patent for CAES technology was ...

@article{osti_5382914, title = {Compressed air energy storage system}, author = {Ahrens, F W and Kartsounes, G T}, abstractNote = {An internal combustion reciprocating engine is operable as a compressor during slack demand periods utilizing excess power from a power grid to charge air into an air storage reservoir and as an expander during peak demand periods to feed power ...

Hydrostor has a patented Advanced Compressed Air Energy Storage (or A-CAES) technology that delivers clean energy on demand, even when solar and wind power are unavailable. A-CAES can provide energy for 8-24+ hours, helping to balance supply and demand on the grid, with an operational lifespan of 50+ years with no efficiency degradation.

In terms of application diversity, Kobe Steel, Ingeteam, and Acciona are some of the leading players in compressed air energy storage systems. Based on geographic reach, State Grid Corporation of China, Hitachi, China Southern Power Grid, Toshiba and Schlumberger are some of the leading patent filers in compressed air energy storage systems.

The application of elastic energy storage in the form of compressed air storage for feeding gas turbines has long been proposed for power utilities; a compressed air storage system with an underground air storage cavern was patented by Stal Laval in 1949. Since that time, only two commercial plants have been commissioned; Huntorf CAES, Germany ...

compressed air energy storage: CCHP: combined cooling, heating and power: CHP: combined heat and power generation: DS: dynamic simulation: ECO: economic analysis: ESS: energy storage system: ... A Chinese patent reports a system that integrated LAES and batteries for frequency regulation of power grids [38]. When the grid needs frequency ...

As renewable energy production is intermittent, its application creates uncertainty in the level of supply. As a result, integrating an energy storage system (ESS) into renewable energy systems could be an effective

strategy to provide energy systems with economic, technical, and environmental benefits. Compressed Air Energy Storage (CAES) has ...

Compressed air energy storage means the use of the dump energy of an electric power system at the valley load wherein a motor drives an air compressor 102 to compress air into an air storage chamber 104, for example, a closed large-capacity underground cave, and thus non-storable electric energy is converted into storable barometric potential energy of compressed air and ...

Our Hydrogen CAES TM (also known as H2 CAES TM) technology uses a different configuration of existing equipment to increase the efficiency of traditional CAES by 10 - 15% while reducing its costs by over 40% and making it hydrogen-ready.. The plants can burn natural gas, hydrogen or any mix of the two. As the gas grid decarbonises, so these plants will decarbonise.

The energy storage system combines a battery and heat pump in one system in a sustainable way: it stores electricity using patented compressed air technology and also generates heat and cold. The system is designed for applications in residential areas, ...

A pressurized air tank used to start a diesel generator set in Paris Metro. Compressed-air-energy storage (CAES) is a way to store energy for later use using compressed air.At a utility scale, energy generated during periods of low demand can be released during peak load periods. [1]The first utility-scale CAES project was in the Huntorf power plant in Elsfleth, Germany, and is still ...

Low-cost fabricated compressed air energy storage (CAES) will be a most promising method to store electricity for medium- and long-term periods [2]. When off-peak electricity is available it can be used to produce compressed air via a series of compressors. ... The first patent for CAES technology was filed by Frazer W. Gay in 1948 [6]. This ...

Advanced Compressed Air Energy Storage Our patented A-CAES technology allows grid operators to draw on clean energy, even when there is no sun to fuel solar panels and no wind to generate energy from turbines Scroll Down. Charging A-CAES. 1/4. Compress air using electricity

Keeping the air at a constant temperature during compression, storage, and expansion yields a more efficient storage cycle. The new patent covers the use of a liquid spray injected into air continuously during compression or expansion and solidifies SustainX"s position as a leader in the field of compressed-air energy storage.

pressed air to generate a cooled compressed air stored in an air storage reservoir 120, e.g., a cavern . A heat exchanger 124 transfers thermal energy generated by a carbon - neutral thermal energy source 130 to cooled compressed air con veyed from reservoir 120 to generate a heated compressed air . An expander 140 is solely responsive to the ...

A compressed air energy storage (CAES) system is provided. The CAES system comprises one or more compressed air reservoirs, a compressor system configured to compress air into the one or more air reservoirs, and a turbine system configured to generate power using air released from the one or more compressed air reservoirs.

A compressed-air energy storage system according to embodiments of the present invention comprises a reversible mechanism to compress and expand air, one or more compressed air storage tanks, a control system, one or more heat exchangers, and, in certain embodiments of the invention, a motor-generator. The reversible air compressor-expander uses mechanical power ...

A compressed air energy storage (CAES) system is disclosed for the generation of power. The system may include a compressor configured to receive inlet air and output compressed air to an air storage during an off-peak period. During a peak load period, compressed air from the air storage may be released to generate power. A heat exchanger fluidly coupled to the air ...

Certain examples present an improved compressed-air energy storage system. The system can include multiple sequential stages, in which accumulators are charged with air, which influences a hydraulic fluid to influence a pump/motor, and vice versa. ... 2012-03-13 Priority to US13/419,101 priority Critical patent/US9243558B2/en 2012-08-21 ...

Such systems recover the energy of the compressed air primarily by increasing the power and efficiency of gas turbine generators. With normal gas turbines, nearly two-thirds of the energy is used to compress the air that is needed to burn the gas. With compressed air energy systems, the round trip energy efficiency can approach 80%, but the economies of this action depend upon ...

This study focusses on the energy efficiency of compressed air storage tanks (CASTs), which are used as small-scale compressed air energy storage (CAES) and renewable energy sources (RES). The objectives of this study are to develop a mathematical model of the CAST system and its original numerical solutions using experimental parameters that consider ...

Advanced adiabatic compressed air energy storage (AA-CAES) is another option which replaces the combustion chamber by some high temperature thermal energy storage system [9]. 2 We will not develop this point any further, and just mention that islands, which may benefit most from the present design, have at disposal many options, mainly solar ...

This invention relates to a Compressed Air Energy Storage (CAES) system and, more particularly, to an adiabatic CAES system that provides improved performance of renewable energy sources by operating a CAES plant with generally zero emissions and without burning any fuel.

Compressed air energy storage (CAES) is one of the many energy storage options that can store electric energy in the form of potential energy (compressed air) and can be deployed near central power plants or

distributioncenters. In response to demand, the stored energy can be discharged by expanding the stored air with a turboexpander generator.

The compressed air energy storage system (CAES) is one of the most promising technologies of the field of smart grid and poly-generation in the near future [4], ... Four patents related to storage system based on liquid piston and scroll compressor/expander technology have been filed [19]. Enairys Powertech first non-commercial prototype was ...

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