

patents (12,202 U.S. patents, 9,303 EPO patents and 14,150 WIPO patents). We grouped these patents into 22,644 patent families, with each family containing all patents resulting from the same initial application (named the "priority application"). 0 515 advanced batteries patents are confirmed to be associated with VTO funding (330

For example, a recent report by the European Patent Office on low carbon energy innovation showed that carbon capture utilization and storage inventions made up the highest percentage of international patent filings for ...

A Liquid Air Energy Storage (LAES) system comprises a charging system, an energy store and a discharging system. The charging system is an industrial air ... Some companies applied for patents regarding the LAES technology (e.g. Hitachi and Highview). The technology is very similar to CAES when considering the power island. 3. Future developments

FLASC senior researcher Daniel Buhagiar explains the value of intellectual property protection (Photo: Navingo) In a talk show held as part of Offshore Energy Exhibition & Conference 2018, Daniel Buhagiar, a senior ...

Modifications to power plants for moderating climate warming and increasing safety combine a large compressed air energy storage (CAES) system with a thermal power plant such that free power plant waste heat replaces natural gas used at existing and planned CAES facilities. The system allows higher percentages of wind and solar energy on existing grids.

Adiabatic compressed air energy storage system with liquid thermal energy storage US8572972B2 (en) * 2009-11-13: 2013-11-05: General Electric Company: System and method for secondary energy production in a compressed air energy storage system US20110127004A1 (en) * 2009-11-30: 2011-06-02: Freund Sebastian W

The most common mechanical storage systems are pumped hydroelectric power plants, compressed air energy storage (CAES) and flywheel energy storage [8]. Electrochemical storage systems consist of various types of batteries (lead acid, NiCd/NiMH, Li-ion, metal air, sodium sulphur, sodium nickel chloride and flow battery) [9]. ... [18] Spring ...

@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

What are the patents for air energy storage

reservoir and as an expander during peak demand periods to feed power ...

Amongst the energy storage technologies able to accumulate a lot of energy and store it over a long time-period, a recently proposed Liquid Air Energy Storage (LAES) technology is...

in the field of patents in the context of RET innovation: The role of patents in RET innovation is not well understood by many policy makers. In cooperation with relevant partners, IRENA should continue to develop a better understanding of the role of patents in RET innovation. Making patent information more accessible may

1. air energy storage patents can be categorized into several types, with specific focus on their mechanism and applications, 2. key types include compressed air energy ...

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" [6]. The patent holder, Bozidar Djordjevitch, is ...

Compressed air energy storage ... Yearly number of publications of academic articles and patents on energy storage from 2000 to 2018. There seems to be a decline in patents in recent years. However, this is an inherent result derived from the patenting process, in which there is a lag of at least one year between the date of application and ...

Gifford, who already shares two patents with Ma on heat exchangers that convert stored thermal energy to electricity, said the use of sand or other particles to store thermal energy has another advantage over ...

An iron-air battery has an open circuit cell voltage of about 1.28V and a theoretical energy density of 764 Wh/kg. While the current densities are at least an order of magnitude higher than would be used for discharge of batteries for grid-scale electrical storage, there is a 0.5V difference between the charge and discharge voltages.

Electrical energy can be converted into various forms of mechanical energy, such as gravitational potential energy and kinetic energy, and can also be used to compress a gas, such as air. Some of these forms of energy are ...

The importance of batteries has been growing as a solution in a very dynamic puzzle. As a set of technologies at the intersection of the clean-digital transition, their role is expected to grow further in the coming decades [6]. A report about electricity storage developments published by the International Energy Agency (IEA) in association with the ...

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The energy consumption worldwide has increased by 21% from year 2009 to 2019 and is expected to grow with more than 50% by 2050 [1]. To meet this demand, the world energy production reached 14 421 Mtoe (million tonnes of oil equivalent) in 2018, with more than 81% driven by fossil fuels (natural gas, coal and oil) [2] the meantime, awareness has been ...

An energy storage system converts variable renewable electricity (VRE) to continuous heat at over 1000°C. Intermittent electrical energy heats a solid medium. Heat from the solid medium is delivered continuously on demand. An array of bricks incorporating internal radiation cavities is directly heated by thermal radiation. The cavities facilitate rapid, uniform heating via reradiation.

If we look at filing activity for liquid air energy storage compared to compressed air storage, we see there is a slower and later increase in patent filing activity. Looking more deeply, the activity in 2010 included patent ...

Amongst the energy storage technologies able to accumulate a lot of energy and store it over a long time-period, a recently proposed Liquid Air Energy Storage (LAES) technology is distinguished by the freedom from any geographical, land, and/or environmental constraints inherent in other large-scale energy storage technologies such as Pumped ...

An underwater energy storage system comprising a container where energy is stored by transporting water between the container and a body of water, is disclosed. The container comprises a water- and gas-tight membrane surrounding a container volume, where the container is rendered mainly incompressible by a fill material comprising densely packed, ...

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 ...

In addition to aluminium being an abundant and safe material, Al-air batteries also have high theoretical and specific energy values, making them another promising and intriguing candidate for advanced energy storage systems (Li et al., 2022, Arai and Hayashi, 2009, Chantavas, 2022, Arteaga-p et al., 2012) However, some scientific and technical ...

Biomass and tidal energy patents were small in number prior to 2000, but, between 2000 and 2010, they gradually increased, accelerating after 2010. Biomass energy has since maintained rapid growth. Interest in geothermal energy seems to have peaked between 1976 and 1981, but patents in this energy source have steadily slowed since the early 1980s.

Abstract: Modifications to power plants for moderating climate warming and increasing safety combine a large compressed air energy storage (CAES) system with a thermal power plant such that free power plant waste heat replaces natural gas used at existing and planned CAES facilities. The system allows higher percentages of wind and solar energy on ...

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An energy storage system includes a module housing and multiple battery cells with insulating material and discharge directing material positioned inside the module housing. Each of the battery cells has a first end and a second end. Further, each of the battery cells has a positive terminal and a negative terminal. The energy storage system includes a first interconnect and ...

Europe and Japan are leading the pack in terms of patent numbers, closely followed by the US, says Hydrogen Patents for a Clean Energy Future. The EU filed 28% of all international patent families (IPFs) in hydrogen ...

WO2023228938 - COMPRESSED AIR ENERGY STORAGE METHOD. [Problem] To provide an economical compressed air energy storage (CAES) method for effectively ...

The Naval Postgraduate School in Monterey, California, has filed for a 20-year utility patent on a recently modeled dual-Stirling engine recovery for Liquid Air Energy Storage systems.. The details of the patent application were ...

The power industry continues to be a hotbed of innovation, with activity driven by the growth in renewable generation, need for improved efficiency and reduction in greenhouse gas emissions, and growing ...

Compressed air energy storage technology is a promising solution to the energy storage problem. It offers a high storage capacity, is a clean technology, and has a long life cycle. Despite the low energy efficiency and ...

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