Hydrogen energy storage patent data

What is a hydrogen patent?
Their patent portfolios are mainly focused on production by electrolysis and applications based on fuel cells but also extend to established technologies for the storage and distribution of liquid or gaseous hydrogen, an area of focus for these countries which plan to import stored hydrogen in the near future.

What happened to hydrogen patenting in the US?
By contrast,hydrogen patenting decreased significantlyin the US after 2015,and the US was a distant third to the EU and Japan in 2020,despite being the main innovator in hydrogen in 2011 in terms of volume of international patent families.

Which companies have patented hydrogen technology?
Two Japanese companies - Toyota and Honda - as well as R. Korea's Hyundaistand out. All three feature in this list thanks to patent portfolios in established technologies for the storage,distribution and transformation of gaseous or liquid hydrogen.

How important are technology trend studies on patent analysis of hydrogen technology?
Technology trend studies on patent analyses of hydrogen technology are criticalin understanding the status of present and future technology,as well as,its market opportunity. However,the studies were mostly limited to specific countries and lacked the details of green hydrogen production technology.

How many patents are there in Green Hydrogen Energy?
Comprehensive analysis of 5,471 patentsin the areas of green hydrogen energy from year 2002 to 2022. Classification of water electrolysis (ALK,PEM,AEM,SO,ALL) and system operation (BOP,CON). Natural Language Process (NLP) method for automatic parsing of the patent database.

Are hydrogen patents a good indicator of innovation?
Patents are strong indicators of innovation activitywhich can give very detailed insights into the state and direction of the science. This study,which combines the expertise of the International Energy Agency and the European Patent Office,is the most comprehensive,global and up-to-date investigation of hydrogen-related patenting so far.

It is found that the hydrogen energy industry is in a period of rapid development; the succession and integration of hydrogen energy technologies are good, and the ...

Hydrogen Patents for a Clean Energy Future: A global trend analysis of innovation along hydrogen value chains is the third joint study produced by the European Patent Office (EPO) ...

Highlights o Zero carbon technologies facilitate the clean energy transition on specific technology trajectories.

o Hydrogen electrolyser benefits energy storage technologies ...

This paper leverages patent data to explore the developmental trends and research status of emerging energy storage technologies in China, including electrochemical, compressed air, ...

Abstract Safe and flexible hydrogen storage technology (HST) emerges as a crucial element in driving the industrialization of hydrogen energy. Consequently, HSTs are ...

By extracting patent data of hydrogen fuel cells from IncoPat database between 2003 and 2022, the knowledge map of hydrogen fuel cell technology was drawn in this paper ...

The research aims to assess and progress hydrogen storage systems from 2010 to 2020 with an emphasis on obtaining high efficiency, safety, and capacity. To strengthen ...

Commercial Technology Defined A commercial technology is defined as an invention or intellectual property that is developed into a technology (hardware, process, technique, design, ...

This study - the third of its kind undertaken in collaboration with the IEA since 2020 - addresses innovation trends related to hydrogen which is a core element to energy transitions in the EU ...

Findings reveal energy storage"s dominance, with water energy storage and emerging hydrogen technology leading the trajectory. Global energy patent scrutiny ...

Using the Derwent World Patents Index (DWPI), the study includes bibliometric analysis, technology evaluation, and technology updates in the field of hydrogen production. ...

The data presented in this report show trends in high-value inventions for which patents have been filed in more than one office. 3 Patent information provides robust statistical ...

Beginning in FY2008, PNNL has conducted an annual review of patents related to fuel cells, hydrogen production, delivery, and storage resulting from HFTO R& D funding*

Identify and document research and development (R& D) innovations and intellectual property resulting from Hydrogen and Fuel Cell Technologies Office (HFTO) support as an indicator of ...

[0059] The grid scale renewal energy storage and release system 10 can provide efficient and grid scale storage of energy for solar and wind energy using hydrogen and for the transport of...

Hydrogen energy storage systems (HydESS) and their integration with renewable energy sources into the grid have the greatest potential for energy production and storage ...

Hydrogen energy storage patent data

This article comprehensively reviews hydrogen production technologies, storage technologies, and end-use applications of hydrogen, based on the input energy source, ...

Literature Review The hydrogen energy industry is a typical strategic emerging industry with high complex-ity, integration, and uncertainty [5]. The development of strategic emerging industries ...

The report uses global patent data to provide a comprehensive, up-to-date analysis of innovation in hydrogen technologies. It is the first study of its kind ...

Hydrogen offers advantages as an energy carrier, including a high energy content per unit weight (~ 120 MJ kg -1) and zero greenhouse gas emissions in fuel-cell-based power ...

6. On-site energy storage and hydrogen production to balance power systems and create additional value. There is a growing focus on flexible energy systems to counter the variability ...

Japanese enterprises hold the majority of HST patent families, especially in hydrogen fuel cells, frequently involving high-pressure or liquid hydrogen tanks and hydrogen ...

To collect patents related to green hydrogen technologies, a wide range of research and development (R& D) projects concerning hydrogen are extensively searched as ...