

Why is hydrogen a fundamental technology in China?

Hydrogen application is growing as a fundamental technology in China because of concerns regarding carbon neutrality, industry distribution, and renewable energy. As a world-class manufacturing country, China already has preconditions for the industrialisation of hydrogen energy.

How has China's hydrogen energy industry developed?

The following conclusions are drawn. From the perspective of the evolution of patent numbers and patent subjects, China's hydrogen energy industry has developed rapidly. The number of patent applications has increased rapidly since 2007 and reached its peak in 2018, showing an overall upward trend.

Which companies are pursuing hydrogen energy patents in China?

Chinese enterprises such as Sinopec, Huaneng Group, and State Grid are at the top of the list, demonstrating the innovative strength among Chinese entities regarding hydrogen energy patents. Patent cooperation plays an important role in promoting the research and development of technology and regional collaborative innovation.

Does China's hydrogen energy field have a collaborative innovation relationship?

Based on the patent data in the past two decades, this study investigates the collaborative innovation relationships in China's hydrogen energy field using complex network theory. Firstly, patent data filed between 2003 and 2023 are analyzed and compared in terms of time, geography, and institutional and technological dimensions.

What progress has been made in hydrogen storage & transport in China?

Significant progress has been achieved in hydrogen storage and transport in China. This section reviews the advancements in gas-, liquid-, and solid-state hydrogen storage technologies, as well as methods for transporting hydrogen, including pipelines and trucking.

How many hydrogen energy patents are there in China?

Figure 1. Number of patents in the field of hydrogen energy in China, 2003-2023. Figure 2 shows the top 10 provincial administrative regions for the number of Chinese hydrogen energy patents. It can be observed that Beijing (5417), Jiangsu (3397), and Guangdong (2551) rank as the top three regions with the highest innovation activity.

In continuation of the article on energy storage technologies dated 05.06.2022 and articles dated 20.06.2022 and 22.12.2022 on CSP tracking systems, below we provide for your consideration a short analysis of patent documents related to solar energy storage systems employing latent heat approach.

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 evidence of technical progress.

Shenzhen Gas Corporation Ltd., Shenzhen 518049, Guangdong, China; 2. State Key Laboratory of Oil and Gas Reservoir Geology and Exploitation, Southwest Petroleum University, Chengdu 610500, Sichuan, China; ... Key words: hydrogen energy, hydrogen storage technology, hydrogen storage capacity, physical hydrogen storage, chemical hydrogen storage ...

China Energy Investment Corp Ltd has filed a patent for a system and method to dispense liquefied fuel, such as hydrogen. This patent describes a hydrogen refueling station that utilizes pumps, heat exchangers, mixers, and dispensers to deliver gaseous fuel streams into the on-board storage tanks of vehicles. The system can accommodate different pressure and ...

The National Energy Administration of China has listed hydrogen energy and fuel cell technology as a key task of energy technology and equipment during the 14th Five-Year Plan period, and released the White Paper 2020 on China's Hydrogen Energy and Fuel Cell Industry, which expounds the development trend, development prospect and key ...

Research on technology situation and route of hydrogen production in China----based on patent analysis. Energy Storage Sci. Technol. (2017) L. Wang et al. Bibliometric analysis of prognostics and health management (PHM) in hydrogen fuel cell engines ... Collaborative operational model for shared hydrogen energy storage and park cluster: A ...

Through the retrieval of previous research on hydrogen energy patents, it is found that in 2009 [22], reviewed hydrogen production patents and paid special attention to the future trend in this field [23]. Made a comparative analysis of advanced hydrogen production technology patents in China, Japan, South Korea, the European Union and the ...

Safe and flexible hydrogen storage technology (HST) emerges as a crucial element in driving the industrialization of hydrogen energy. Consequently, HSTs are being extensively investigated globally, with an increasing number diffusing beyond national boundaries through transnational patent applications.

China Hydrogen Energy Alliance released the world's first "green hydrogen" group standard, and established quantitative standards and evaluation systems ... In terms of vehicle-mounted hydrogen storage containers, China's three-type bottle technology is mature and has achieved full localization, and the four-type bottle has reached ...

A latest joint report from the International Renewable Energy Agency and the European Patent Office (EPO) claimed that patents over offshore wind technologies are on the rise globally. The report titled; Offshore Wind Energy Patent Insights Report showed that between 2002-2022 patent filings for offshore wind technologies grew on average by 18%.

In addition, hydrogen works as an energy storage system, allowing for the integration of renewable energy sources and facilitating a more flexible and reliable energy system. ... The patent data also reveals that the WIPO and the United States were the first to file electrolyser control technology patents. In contrast, China and Russia have ...

1.1 Green Energy Development Is Promoted Globally, and the Hydrogen Energy Market Has Broad Prospects. To ensure energy security and cope with climate and environmental changes, the trend of clean fossil energy, large-scale clean energy, multi-energy integration and re-electrification of terminal energy is accelerating, and the transition of energy ...

Hydrogen Patents for a Clean Energy Future - Analysis and key findings. ... China; Egypt; India; Indonesia; Kenya; Morocco; Senegal; Singapore; South Africa; Thailand; Ukraine; ... Uniquely, it covers technologies for the full range of hydrogen supply, storage, distribution, transformation and end-user applications, as well as introducing new ...

The three leading countries in energy patents, namely China, the USA, and Japan, demonstrate remarkable innovation and research activity in the energy sector. ... Hydrogen Energy: 828072: 680776: 483311: 236828: 74668: 14930: 85990: 20476: 2425051: 2: 22: Hydrogen Fuel Cells: 81383: 100176: 86845: ... exhibiting high patent counts across ...

However, the country still lags behind the global average level in hydrogen energy storage and transportation technology as well as hydrogen fuel cell technology, indicating the need for accelerated innovation [19]. ... [35]. Established an IUR cooperation innovation network of China's graphene industry, using patent data of joint applications ...

The growing interest in hydrogen (H₂) has motivated process engineers and industrialists to investigate the potential of liquid hydrogen (LH₂) storage. LH₂ is an essential component in the H₂ supply chain. Many researchers have studied LH₂ storage from the perspective of tank structure, boil-off losses, insulation schemes, and storage conditions. A ...

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