Heavy oil thermal energy storage

With the strategic goal of "carbon peaking and carbon neutral" in China, new requirements are also put forward for the thermal recovery of heavy oil. In view of the problems of excessive greenhouse gas emission, low steam utilization rate, poor economic efficiency, and limited reservoir application of steam stimulation replacement technology in China, the ...

Thermal energy storage deals with the storage of energy by cooling, heating, melting, solidifying a material; the thermal energy becomes available when the process is reversed [5]. Thermal energy storage using phase change materials have been a main topic in research since 2000, but although the data is quantitatively enormous.

The worldwide energy demand is expected to increase by 30% in 2040 compared to 2010 [1], [2] 2040, oil consumption is expected to reach 111.1 million barrels per day [3].Due to population growth and rapid industrial development, it has become increasingly important to improve oil recovery from declining oil reserves in response to depleting oil reserves and ...

Thermal energy storage (TES) is a key element for effective and increased utilization of solar energy in the sectors heating and cooling, process heat, and power generation. ... The most widely applied media, in this respect, are water and thermal oil. Solid Storage Materials Solid materials can be utilized in a wide temperature range and ...

In order to promote the development of a solar photothermal conversion... Energy Storage Science and Technology >> 2020, Vol. 9 >> Issue (S1): 62-69. doi: 10.19799/j.cnki.2095-4239.2020.0047 o Energy Storage System and Engineering o Previous Articles Next Articles Study on key technologies of solar energy photothermal conversion for heavy oil thermal recovery

Thermal energy storage is a means to store renewable energy generated onsite until the time that energy is needed. It can also deliver a range of benefits to industrial energy users, from security, reduced costs and lower CO2 emissions. Here, Dr Christian Thiel, CEO of ENERGYNEST, explains how.

Apart from the conversion from the storage tank of heavy fuel oil to the heat storage tank, this paper provides insight into the operation of high volume heat storage tanks with a very small ratio between the height and the diameter of the tank (Tank 1-0.601, Tank 2-0.393). ... Thermal energy storage systems and applications, 2 nd edition ...

With declining conventional reserves, tapping heavy oils generates substantial emissions yet is essential to meet energy demands. This study pioneers an integrated approach using silica aerogels to develop thermally stable flue gas foams for enhanced CO 2 sequestration and heavy oil recovery. Microfluidic experiments and

molecular dynamics simulations revealed ...

China is the fourth largest producer of heavy oil, and the production has steadied above 1.5 × 10 7 tons for ten years (Lee and Babadagli, 2020). 80% of China"s heavy oil production is developed by thermal recovery, and the primary technology is steam injection (Zhang et al., 2005; Dong et al., 2019) plex reservoir conditions are the main limiting ...

To advance the utilization of solar thermal energy, a novel solar-driven microcapsule was designed by the combination of high-performance CuS nanoconverter and the microencapsulated n-Eicosane with a brookite TiO 2 shell via in situ sol-gel method. The resultant n-Eicosane@TiO 2 /CuS microcapsules possessed excellent thermal properties with high latent heat density ...

The technology for storing thermal energy as sensible heat, latent heat, or thermochemical energy has greatly evolved in recent years, and it is expected to grow up to about 10.1 billion US dollars by 2027. A thermal energy storage (TES) system can significantly improve industrial energy efficiency and eliminate the need for additional energy supply in commercial ...

Thermal energy storage (TES) is a technology that reserves thermal energy by heating or cooling a storage medium and then uses the stored energy later for electricity generation using a heat engine cycle (Sarbu and Sebarchievici, 2018) can shift the electrical loads, which indicates its ability to operate in demand-side management (Fernandes et al., 2012).

The organic material present at the same depth as the oil in the reservoirs has the potential for conversion, as indicated by analyses conducted before and after heavy oil combustion. Therefore, in this study, we examined the oxidation and pyrolysis reaction pathways of hydrocarbons, specifically benzaldehyde (C7H6O) and naphthalene (C10H8), before and ...

Therefore, the development of heavy oil reservoirs is crucial to meeting the world"s future energy needs. Major heavy oil resources are primarily located in Canada, Venezuela, Russia, and China (Dusseault, 2001; Moore et al., 1995; Wang et al., 2023a). Compared with conventional oil production, the development of heavy oil is more challenging ...

Heavy oil is a vital petroleum resource globally. As per the statistics of the International Energy Agency (IEA), the global producible heavy oil reserves, including oil sand deposits, are about 190 × 10 9 t, constituting nearly 36% of the world"s producible oil reserves. The statistics also reveal that the global annual heavy oil production from thermal recovery, ...

Rocks thermal energy storage is one of the most cost-effective energy storage for both thermal (heating/cooling) as well as power generation (electricity). ... 190 Existing reports from different energy statistics agencies 206-208 show that both industrial activities and energy sectors (power stations, oil refineries, coke ovens, etc.) are the ...

In this article, we summarize the recent progress of carbon materials derived from heavy oil by-products and their utilization as electrode materials for energy storage devices. At first, we give a brief introduction to the features and ...

1. Introduction. According to the classification method of the United Nations Institute for Training and Research (UNITAR), crude oil with a viscosity of >100 MPa s or a relative density of >0.934 g/cm 3 is generally defined as heavy oil, which can be divided into two categories: heavy oil and asphalt (oil sands). Heavy oil resources are very rich in the world, ...

Solar energy increases its popularity in many fields, from buildings, food productions to power plants and other industries, due to the clean and renewable properties. To eliminate its intermittence feature, thermal energy storage is vital for efficient and stable operation of solar energy utilization systems. It is an effective way of decoupling the energy demand and ...

Cement seal failure is common in heavy oil thermal recovery wells, but the effects of steam stimulation on wellbore interface seal performance is unclear. The finite element model of plastic zone formation of cement sheath during high temperature circulating is established. The damage variable of the cement sheath is proposed to define the elastic-plastic transformation ...

Even though each thermal energy source has its specific context, TES is a critical function that enables energy conservation across all main thermal energy sources [5] Europe, it has been predicted that over 1.4 × 10 15 Wh/year can be stored, and 4 × 10 11 kg of CO 2 releases are prevented in buildings and manufacturing areas by extensive usage of heat and ...

According to EIA"s International Energy Outlook 2017, the total world primary energy consumption is about 575 quadrillion Btu (British thermal units) in 2015 and is expected to increase by 15.3% from 2015 to 2035, and then to 736 Btu by 2040 [1]; the world consumption of liquid fuels will rise from 95 million barrels per day (b/d) in 2015 to 113 million b/d in 2040.

Semantic Scholar extracted view of "Advances in electrical heating technology for heavy oil production" by C. Sandberg et al. ... Retrofitting coal-fired power plants for grid energy storage by coupled with thermal energy storage. Qingqing Yong Yanpei Tian Xin Qian Xiaobo Li. Engineering, Environmental Science. Applied Thermal Engineering.

Thermal energy storage (TES) systems provide both environmental and economical benefits by reducing the need for burning fuels. Thermal energy storage (TES) systems have one simple purpose. ... Thermal oil undergoes a slow degradation with aging after long hours of high temperature exposure and repetitive thermal cycles. Thermal oil vapor is a ...

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