

Cost of chemical energy storage power station





Overview

Is chemical storage a promising option for long term storage of energy?

With respect to these observations, the chemical storage is one of the promising options for long term storage of energy. From all these previous studies, this paper presents a complete evaluation of the energy (section 2) and economic (section 3) costs for the four selected fuels: H₂, NH₃, CH₄, and CH₃OH.

How much does it cost to transport hydrogen?

Hydrogen in gas phase transported by pipeline is evaluated at 492 €/MWh H₂, and 239 €/MWh H₂ in liquid phase (in a truck). Storage of hydrogen in gas phase is the most expensive part of the process. This cost is due to the huge volume of storage required for 1 kg of hydrogen gas. The total cost of ammonia is moderate at 261 €/MWh NH₃, by pipeline.

How much does CH₄ cost?

The storage and the transport of CH₄ are not problematic, with a reduced cost. The global cost of CH₄ is estimated at 262 €/MWh CH₄, with a transport by pipeline. The CH₄ production can be directly connected to the already well-established natural gas network. The entire industrial combustion processes are also suitable for this fuel.

How do you calculate the capital cost of a chemical plant?

Haber Bosch process: 1,600 k€ The capital cost of a chemical plant can be approximately related to the capacity by the equation: $C_2 / C_1 = (P_2 / P_1)^k$ with C₂, capital cost of the plant with the capacity P₂; C₁, the capital cost of the plant with the capacity P₁; k is the scaling factor estimated at 0.7 (Trop and Goricanec, 2016).

Can electrolytic hydrogen be used as an energy storage alternative?

Benchmarking and selection of power-to-gas utilizing electrolytic hydrogen as



an energy storage alternative. Int. J. Hydrogen Energy 41, 7717–7731. doi: 10.1016/j.ijhydene.2015.09.008 Wang, H., Zhou, X., and Ouyang, M. (2016). Efficiency analysis of novel liquid organic hydrogen carrier technology and comparison with high pressure storage pathway.

What is the electrical restitution of CH₄?

The total electrical restitution is thus equal to 24.4% (Figure 3). CH₄ can be stored as a gas at different pressures, or as a liquid. The liquefaction of methane is less expensive than that of hydrogen, with only 10% of the initial energy, at atmospheric pressure and -162°C .



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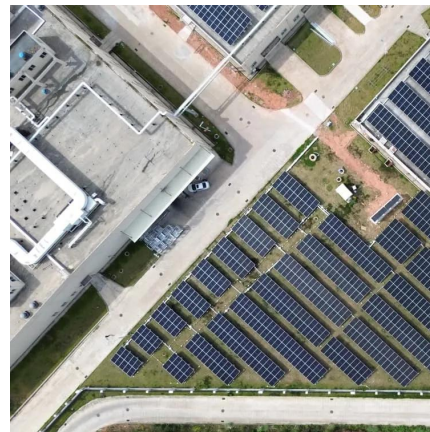


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