

APPLICATION TECHNOLOGY SCENARIOS OF METHANOL ENERGY STORAGE



Can storage technologies reduce the production cost of methanol?
Storage technologies, e.g., batteries and tanks for intermediates, in support of Power-to-Methanol plants could therefore contribute to reducing the production cost of methanol.



Can methanol be used as a cyclic energy source? Upcycling carbon dioxide (CO_2) and intermittently generated renewable hydrogen to stored products such as methanol (MeOH) allows the cyclic use of carbon and addresses the challenges of storage energy density, size and transportability as well as responsiveness to energy production and demand better than most storage alternatives.



Could methanol be an alternative to hydrogen storage? Methanol as ULDES could offer an alternative to hydrogen storage. A concept for methanol storage with carbon cycling from Baak et al. 8 is sketched in Figure 1 with all inputs and outputs. Methanol can be synthesized from electrolytic hydrogen and carbon oxides (so called e-methanol).



Why is methanol a promising liquid energy carrier? 1. Introduction
Methanol is a promising liquid energy carrier due to its relatively high volumetric and gravimetric energy density and simple handling, but it has a significantly lower roundtrip efficiency when compared with other energy storage technologies, e.g., batteries.



Is methanol a cost-effective solution? Since using the methanol system is still 29%–43% lower in cost than using aboveground pressure vessels for hydrogen, it presents the most cost-effective solution of those studied here where salt deposits are not accessible. The round-trip efficiency for hydrogen storage at 38% is higher than for methanol storage with carbon cycling at 35%.

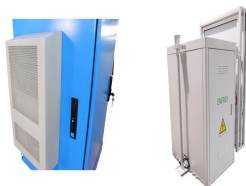
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Does methanol storage reduce the cost of electricity? The annualized cost of methanol was minimized for a grid-connected and a stand-alone case study considering current and future (2030) unit cost scenarios. The optimization results confirm that storage, especially hydrogen storage, is particularly beneficial when the electricity price is high and highly fluctuating.



Energy is essential in our daily lives to increase human development, which leads to economic growth and productivity. In recent national development plans and policies, numerous nations ???



Hydrogen energy technology is pivotal to China's strategy for achieving carbon neutrality by 2060. A detailed report [1] outlined the development of China's hydrogen energy ???



The application of energy storage technology in power systems can transform traditional energy supply and use models, thus bearing significance for advancing energy transformation, the ???



Energy storage technology can effectively shift peak and smooth load, improve the flexibility of conventional energy, promote the application of renewable energy, and improve ???