

Paper Title	Design methods for microgrids to address seasonal energy availability – A case study of proposed Showa Antarctic Station retrofits		عنوان البحث
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### Abstract

**This study reports on the optimization of a microgrid that accommodates seasonal shifts in supply and demand with energy storage solutions using the hydrogen carriers of methyl cyclohexane (MCH), ammonia, or compressed hydrogen. This design method is then applied to a proposed retrofit of the microgrid at Japan's Showa Antarctic Station. This retrofit is modeled with MCH and NH<sub>3</sub> used as seasonal hydrogen storage media, suggesting that these hydrogen carriers can store renewable energy at efficiencies of 29.0% and 31.0%, respectively. The methods developed in this article can be applied to develop comprehensive analyses of the advantages and disadvantages of long-term energy storage solutions using a variety of hydrogen carriers in microgrids.**