

Utilizing LNG cold energy for efficient hydrogen liquefaction

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Hydrogen is the most abundant element in the universe possessing the highest specific energy of all conventional fuels. As an energy vector, low energy content per unit volume of hydrogen is considered a major challenge associated with storage capacity and transportation in huge volumes at high pressure. Following on the footsteps of liquified natural gas (LNG), pure hydrogen is being liquified prior to transportation; particularly over long distances. Currently, liquid nitrogen is mostly used as refrigerant in the pre-cooling stage but considering the scale of anticipated hydrogen energy network alternative sources must be dug out. LNG is one such candidate as it is gasified at the import terminals with cold energy losses. In the present study, a simple, yet efficient and cost-effective integrated scheme is proposed wherein LNG cold energy may be utilized for pre-cooling purposes. To achieve the maximum potential benefits of the proposed integration, modified coordinate descent (MCD) approach is used to find the optimal design variables.