

Analysis of Bank Characteristics in a Hydrogen Refueling Station

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Abstract : In constructing a hydrogen refueling station, minimizing the volume and reducing the number of banks enable lessening the construction cost. This study aims at performing the dynamic simulation on 250 kg/day of a refueling station for light-duty vehicles. The primary compressor boosts hydrogen from a tube trailer of 250 to 480 bar and stores it in a medium-pressure bank. Then, additional compression of hydrogen from 480 to 900 bar is carried out and stored in a high-pressure bank. Economic analysis was conducted considering the amount of electricity consumed by compression corresponding to the volume and the number of banks (cascade system) in charging mode. NIST REFPROP was selected as the equation of state on the ASPEN HYSYS for thermodynamic analysis of the tube-trailer, the compressors, the chillers, and the banks. Compared to a single high-pressure bank system of 3000 L, the volume of the cascade high-pressure banks (bank1: 250 L and bank 2: 1850 L) was reduced by 30%, and the power consumption of the chiller for precooling was also decreased by 16%.

Keywords : light-duty vehicles, economic analysis, cascade system, hydrogen refueling station

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