An optimization model of integrated utility and hydrogen supply network: A case study of Yeosu Industrial Complex in Korea

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Most chemical companies have been consuming and producing a lot of utility (e.g. steam, electricity) as an energy source to meet the heat duty. Hydrogen is one of the most promising energy sources for the future. A number of studies have examined an effect of large-scale utility or hydrogen generation in terms of supply chain management. They only focused on the cost optimization strategies of a large-scale utility or hydrogen generation. A further study is required to better assess their process integration potential because the remaining steam and electricity as a utility can be used in steam methane reforming and electrolysis for the hydrogen production. To manage steam and hydrogen, this study addresses an integrated performance and cost model for steam and hydrogen supply network. The model is formulated as a mixed integer linear programming (MILP) optimization problem and applied to the Yeosu Industrial Complex. The results show that both the total utility supply cost and hydrogen supply cost are reduced by optimizing the integrated supply network of an industrial complex.