

CO₂ solidification-based biogas upgrading followed by bio-LNG production

Naquash Ahmad, Muhammad Abdul Qyyum¹, 이 문 용^{1,†}

영남대학교; ¹Yeungnam University

(mynlee@yu.ac.kr[†])

CO₂ solidification-based cryogenic biogas upgrading is an innovative and unconventional technique. Cryogenic upgrading is integrated with liquefaction because of its dual benefit (biogas upgrading and precooling of biomethane). Therefore, a CO₂ solidification-based biogas upgrading process is proposed and integrated with the bio-LNG production process. The proposed process is simulated and investigated in Aspen HYSYS and validated against experimental data. Modified coordinate descent approach is used to optimize this integrated process aiming to reduce energy consumption. The optimized results show significantly low energy consumption (0.49 kWh/kg) than the base case (1.57 kWh/kg) process leading to 68.6 % energy savings. Further, the exergy analysis shows 23.7% exergy efficiency. The economic evaluation suggests total annualized cost savings of 37.6%. Concluding, the proposed process show comparatively significant advantage in terms of process configuration, energy and exergy efficiency, and process economics.