

Design and analysis of a water recovery system using flue gases in the petroleum refinery

유하은, 임형목, 노고산, Hasan Imran¹,

Ali S. Al Hunaidy¹, 이재형[†]

KAIST; ¹Saudi Aramco R&D Centre

(jayhlee@kaist.ac.kr[†])

Petroleum refineries generally use large amount of industrial water as a feed for steam production and cooling medium. For those located in the Middle East area which is arid, the shortage of water resource requires more efficient and cheaper water production processes. To solve this problem, water recovery system can be implemented with flue gas, which has 10 vol. % of water due to combustion of fuel gas containing plenty of hydrocarbon and hydrogen. The aim of this study is to design a water recovery system using the refinery flue gases to supplement water feed for the steam generator and analyze its economic benefits. Varying several design variables, significant ones are identified through analysis of net profit trend. In addition, since the reduction of CO₂ emission is expected to be achievable, the reduction potential by water recovery is also evaluated.