Design and optimization of organic Rankine cycle recovering waste heat of CO_2 capture process

한종훈*
서울대학교 화학생물공학부
(chhan@snu.ac.kr*)

In this study, an organic Rankine cycle (ORC) recovering waste heat from a post combustion CO_2 capture process was modeled and optimized. This ORC is mainly supplied heat from steam condensate, desuperheater, and condensers of the post combustion CO_2 capture process and cold exergy from liquefied natural gas (LNG) regasification, and consequently it produces additional energy without consuming fossil fuel. The proposed ORC modifies conventional process by adopting a self-recuperated heating system and turbine bleeding system to improve both thermal and exergy efficiency. The exergy recovery from both heat source and sink is greatly improved by using multicomponent working fluid. In order to obtain optimum process design and composition of the working fluid, optimization problems are formulated using exergy analysis and heat integration. As a result of the optimization and process design, the ORC proposed in this study can produced about 20 % more power and exhibit higher thermal efficiency as compared with conventional ORC.