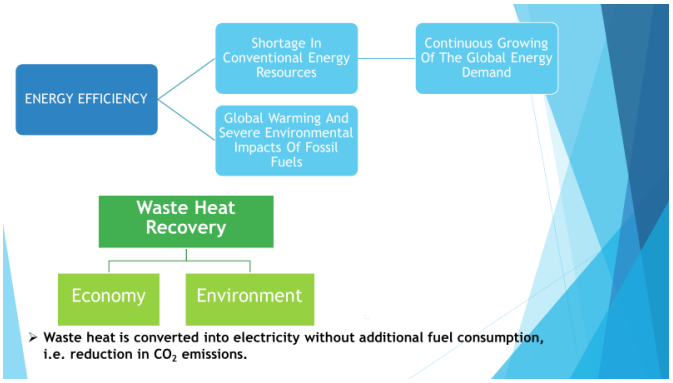
Industrial waste heat recovery

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Abstract

Energy efficiency remains one of the most important issues of energy strategies, not only for economic reasons, but also for the environment. Energy efficiency improvement could help for reducing energy production cost and could also reduce CO_2 emissions. Alternative energy resources have had great attention due to the lack of conventional ones and to control CO_2 emissions and global warming. Waste heat recovery is one of the alternative energy resources. Industrial waste heat has been recognized as a considerable heat resource for energy production in the last two decades. The utilization of waste heat from industrial processes and its conversion into electricity, without additional fuel consumption, could achieve a considerable reduction of the energy consumption as well as CO_2 emissions. There are many industries where waste heat can be recovered, such as the iron and steel, glass, cement, and lime industries. For instance, in cement industry power generated from waste heat recovery may provide about 20% of the energy consumption in a cement plant. There are three conventional systems for power generation from waste heat from industrial processes: steam Rankin cycle (SRC), organic Rankin cycle (ORC), and Kalina cycle. 66% of the waste heat discharged to the environment is in the range of low-grade waste heat. ORC systems are widely recognized as one of the most applicable technologies for utilizing low-grade heat resources from both renewable resources (e.g., geothermal and solar), fuel energy (e.g., biomass or biogas) and waste heat. The lower critical temperature of the organic fluids makes possible the optimum exploitation of the aforementioned mediums and low-grade energy sources. There has been a continuous growth in research activity related to ORC-based power systems over the last decades that has verified the value of this technology and its potential to improve energy efficiency. Selection of working fluids strongly affects the cycle performance and its efficiency. Working fluids also influences the turbine design, the safety precautions of the system, material of construction of system components, operating conditions, environmental impact, and economic evaluation of the system.



Recent Publications

1. A.M. Khater, Ahmed Soliman, Tamer S. Ahmed, Ibrahim M. Ismail (2021) Power generation in white cement plants from waste heat recovery using steam-organic combined Rankine cycle. Case Studies in Chemical and Environmental Engineering 4:100138. https://doi.org/10.1016/j.cscee.2021.100138



Biography

Aly Khater has his expertise in evaluation and passion in improving the energy efficiency through utilizing waste heat from different industrial applications. Beside his research work, he has been always keen on gaining industrial experience through his work as an operations engineer in petrochemical industry which enriched him with valuable experience and helped him developing his research skills. He works as an assistant lecturer at the faculty of engineering and technology, Badr University in Cairo. He is participating in teaching various courses. His research agenda is focused on chemical process design, process optimization, thermodynamics and energy conservation. He is trying to combine fundamental science and engineering principles to arrive at solutions for world energy crisis, including developing creative systems for improving energy efficiency through utilizing waste heat from different industrial applications and industrial process optimization to maximize its efficiency and productivity.

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