

Process Heat Co-production with Heat Pump Assisted Distillation

A heat pump assisted distillation system that turns waste heat into usable steam, cutting energy use and boosting process efficiency.

Adoption of heat pumps and heat recuperation is recognized as a pivotal technology for decarbonization. However, a major drawback of heat pump systems in the context of distillation is the energy rejection that occurs at the condenser's cooling water. To resolve this challenge, researchers at Purdue University have developed a heat pumped distillation system that enables the coproduction of steam to repurpose waste heat. By recovering the energy used to power the condenser as heat to the reboiler through steam production, the overall energy efficiency of the heat pump can be increased. This technology has applications in various industries that use distillation columns, including chemical processing, fermentation, and water purification.

Technology Validation:

This technology has been validated conceptually. This technology can be used to repurpose waste heat that would have otherwise been lost.

Advantages:

- Coproduct of steam
- Recovery of waste heat
- Increase of heat pump efficiency

Applications:

- Heat Transfer
- Distillation
- Chemical Processing
- Water Purification

TRL: 3

Technology ID

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Category

GreenTech/Carbon Management
Energy & Power Systems/Power Generation
Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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