

Feasibility Analysis and Comparison of Closed-loop Pressure Retarded Membrane Distillation (PRMD) and Previous Model

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Low-grade thermal energy is rich, everywhere, but hard to use as an energy source, because of its low energy-availability. Thus, many technologies to convert low-grade heat energy to other sources. One of these technologies is the pressure-retarded membrane distillation (PRMD) process. It was a membrane process to recover energy from low-grade heat. Also, thermo-osmotic energy conversion (TOEC) could convert low-grade heat energy to mechanical work with energy harvesting. This study suggests a closed-loop PRMD which is to combine the PRMD and TOEC. Closed-loop PRMD can produce water and energy simultaneously. A mathematical model was developed for closed-loop PRMD using Matlab, and compare the energy efficiency of open-loop PRMD, TOEC, and closed-loop PRMD theoretically. Then energy and economic feasibility for developing an optimized model was progressed and found the appropriate operating condition to improve efficiency. The result shows that improved data compared to the previous non-combined system. Therefore, low-grade heat energy can be more useful to produce water and electricity.