

Heat Driven Cooling Cycles: The Property and Transfer Issues

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When comparing competing processes for the same duty, e.g., thermo-electrics vs. organic Rankine cycles vs. Kalina cycle, for power production from low temperature heat, predominantly the characteristics of the working substances and process schemes are discussed. The part which is played by heat transfer often is under-estimated. However, there are some technical heat transformation devices, such as absorption heat pumps and refrigerators, whose performance is dominated by the heat exchangers which communicate with external heat sinks and sources. This statement, in essence, holds for all heat driven cooling processes. For such devices, the discussion of the performance of the internally reversible (endo-reversible) idealization of the cycle provides information of some technical relevance because the impact of heat exchange can be investigated easily. The properties of the working substances exert their influence on efficiency and from there feedback on the heat exchangers. The main finding is that processes which allow for better heat transfer will be the better processes, overall.