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Method and System for Generating Power from Low- and Mid- Temperature Heat Sources Using Supercritical Rankine Cycles with Zeotropic Mixtures

Researchers at the University of South Florida have developed a technology that relates to power plants, and the ability to convert thermal energy into electricity. In particular, this technology converts low- to mid- range temperature heat into work and electricity via a supercritical Rankine cycle using zeotropic fluids as the working fluids.

This invention was conceived in order to improve the efficiency of converting low to-mid-temperature (typically below 250°C) heat into electricity. Our system uses zeotropic fluid mixtures which, when heated at a high pressure, immediately flash into supercritical vapor. Once supercritical, the fluid powers a turbine. The supercritical vaporization improves the heat exchange efficiency in the boiler. Furthermore, our zeotropic fluid exhibits a temperature glide which improves the heat exchange efficiency in the condenser also.

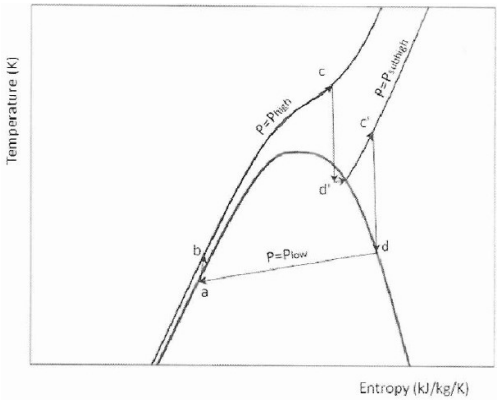
The combined effect of both of these improvements is an increase in the efficiency of the system by 60%. The working fluid is claimed to be a mixture of various refrigerants or hydrocarbons. It is important to note that the fluids used in this zeotropic working fluid mixture are environmentally friendly.

The working fluid mixture used in this invention operates in the temperate range of 80°C-250°C, which is easily available from low- and mid- temperature solar collectors, geothermal wells, or waste thermal discharges in various industrial sectors.

ADVANTAGES:

- **Ability to convert low- to mid-temperature heat into electricity more efficiently**
- **Requires a less complicated system setup**

Higher Efficiency for Solar Thermal Power



Temperature vs. Entropy diagram showing the two-stage expansion of a zeotropic fluid described in the present invention

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