Efficiency in Energy and Water

SELF-CLEANING HEAT EXCHANGERS IN ORC GEOTHERMAL POWER PLANTS

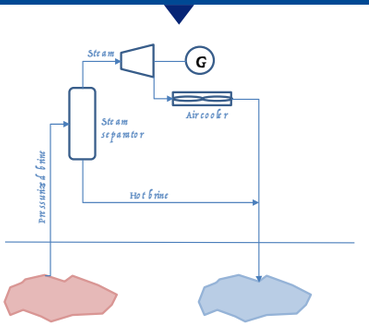
In high pressure and temperature geothermal wells geothermal water is extracted and flashed in a separation vessel. The flashed steam is used for power generation in a steam turbine. The remaining geothermal water still has high temperatures often in the range of 160°C. This water has still a high potential for power generation in a ORC where a working fluid is evaporated which is later expanded in a turbine. While evaporating the working fluid the geothermal water cools down.

This geothermal waters of this type usually have a high silica content. Silica has a reverse solubility in water. When cooling down the solubility decreases and silica precipitates and fouls the heat exchangers making it impossible to transfer energy anymore. This problem is seen as the main limitation to increase power output efficiency in geothermal plants.

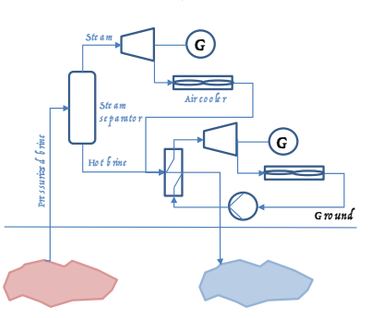
With a self-cleaning heat exchanger this issue disappears since the heat exchangers can be kept clean. Therefore, a significant potential for power output increase in geothermal plants can be unveiled by use of self cleaning heat exchangers.

The business case for this application is in essence comparing the use of an ORC with our heat exchanger versus not having this ORC and disposing the hot brine in a re-injection well. The business case for the implementation of such an expansion project with a ORC shows positive indicators.

Flashed steam geothermal power plant



Flashed steam geothermal power plant with ORC



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