

Performance evaluation of geothermal power plants

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The successful exploitation of geothermal energy for power production relies on to the availability of nearly zero emission and efficient technologies, able to provide flexible operation. At the moment either flash or binary cycle technology are selected; however, due to current climate change and environmental concern, advanced binary, hybrid and/or innovative power plant scheme that allow full geothermal fluid reinjection must be investigated. The design and optimization process of geothermal power plants require therefore a complex and sophisticated simulation model. The simulation model must reproduce several aspects: the flow in the reservoir, the geothermal fluid thermodynamic properties, the performance of the power plant components. A commercial simulation code (Aspen plus), which is well suited at modelling fluids with different chemical composition, is adopted for the whole system simulation. Model validation is performed on the basis of the data published in literature; as far as the binary plant is concerned, ORC application is commonly suggested, and the experimental investigation of the thermal stability of innovative working fluids may be envisaged as an synergic research process.