



## Thermodynamic modelling and simulation of geothermal power plants: case studies and environmental impact

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The emissions associated with Geothermal power plant (GTPP) due to geothermal fluids represents a compelling challenge addressed in the last decades. The on-line measuring of pollutants generated by GTPP might result in a complicated task to handle. Simulation of GTPP has become an excellent tool to monitor and control the emission of pollutants. In the present work, the pollutant emissions of GTPP of Hellisheidi (Island), Chiusdino, and Castelnuovo (Italy) are modelled and developed with Unisim Design R480 using well understood thermodynamical models implemented in OLI. The presence of brine in the thermodynamical models has been taken into account. Carbon dioxide, methane, and hydrogen sulfide are the chemical pollutants considered for the process simulation. The AQ framework model in OLI is being used for binary mixtures and non-condensable gas. Furthermore, for liquid mixtures containing more than two components, the MSE-SRK Thermodynamic model is desirable depending on the original geothermal fluid source. The simulation process outcome agrees with experimental data for pressure between 30 and 100 bar within 5% deviation. A systematic study of the spatial distribution of the emissions has been made for the area surrounding the GTPP. Furthermore, an economic evaluation overview has been performed to highlight the equipment needed for maintenance and tool substitution.