UNIVERSITÀ DEGLI STUDI FIRENZE

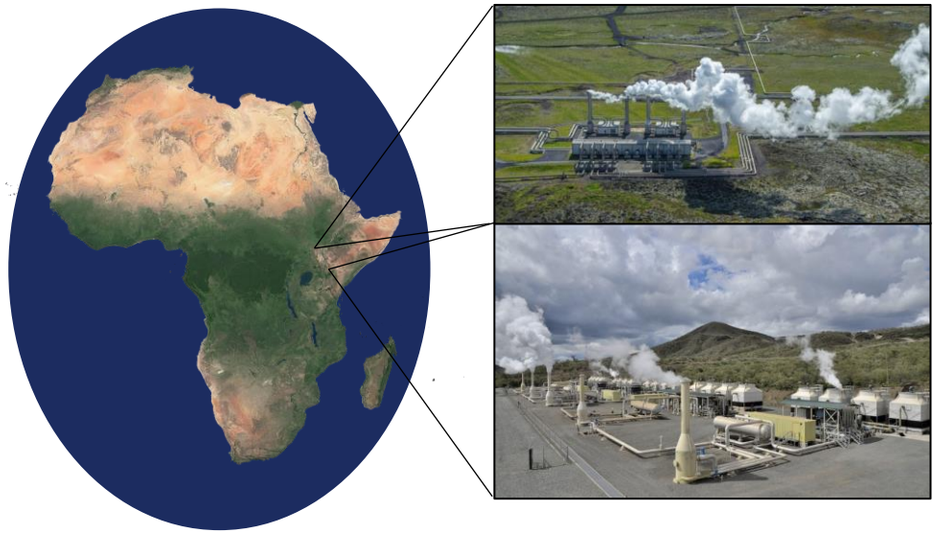
Sustainable exploitation of Geothermal resource in Africa

PhD program in Industrial Engineering

European Horizon 2020 project

LEAP-RE

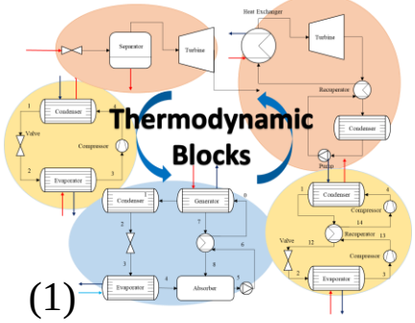
Long-Term Joint EU-AU Research and Innovation Partnership on Renewable Energy



The aim of the LEAP-RE project is to create a geothermal atlas for Africa and thus characterize the resources at a geophysical, Engineering and Social level. SERG's contribution is to develop a tool to assess which is the best engineering solution to exploit this resource for electricity and heat production. The analysis performed considers all aspects of sustainability considering thermodynamic performance, economic costs and environmental costs.

Thermodynamic modeling

Thermodynamic blocks are defined (1), which are used to calculate as multiple input data (2). Power systems (flash, ORC) and other cycles (Absorption Cycle, Heat Pump, Heat Exchanger) are modelled. The output is a metamodel that allows the thermodynamic performance of the system to be assessed (3).



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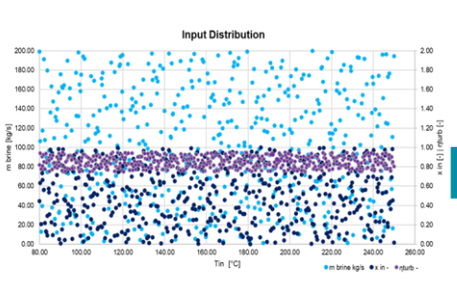

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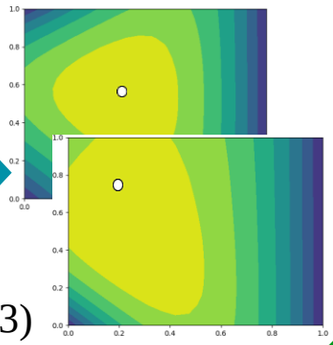
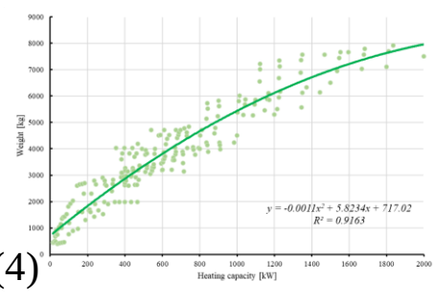


(3)

Life Cycle Assessment

A parametric Life Cycle Inventory of each thermodynamic block is created by generating the typical weight and material composition for each system (4). Using the outputs of the thermodynamic model as input, the environmental cost in terms of kg CO_2 (5) and single score (6) per kWh produced or kW installed is obtained.



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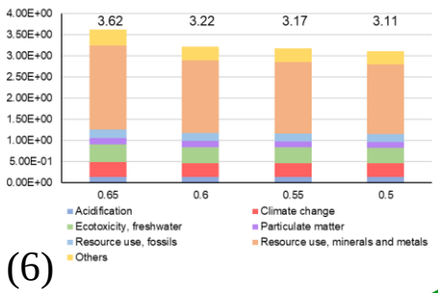
(5)



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