**Title:** Power generation using waste heat recovery by organic Rankine cycle in [the] oil and gas sector in Egypt: A case study

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This study examines the use of an Organic Rankine Cycle (ORC) in an existing gas treatment plant in Egypt via a simulation model using Aspen HYSYS v7.1. Specifically the basic and the regenerative cycles were studied. Various working fluids were studied and that simulation included a capital cost and profitability analysis for the two most promising working fluids, benzene or cyclohexane.

“The economics of a Rankine system is strictly linked to the thermodynamic properties of the working fluid.” R134a appeared as the most suitable for small scale solar applications. R152a, R600a, R600 and R290 were also promising but require handling precautions due to their flammability. Compared to R123, and R245fa, isobutene showed the best system performance. With most fluids the use of a regenerative ORC instead of the basic cycle reduced the irreversibility of a solar ORC.

This study used an exhaust stream from a natural gas treatment plant as the heat source which was at a temperature of ~416oC and a flow rate of 43.7 kg/s. It was found that the best working fluid for this particular case was benzene and that the payback period of a system as described would not exceed 4 years.