

# A Simulation Tool for an Energy Downdraft Tower: Evaluation of Performance under Realistic Environmental Conditions

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**Abstract:** *One group of technology that can be categorized as medium scale in terms of capital expenditure and energy production and that relies on indirect solar energy capture are energy towers. While a number of basic experiments have been conducted on downdraft energy towers, there is a need to develop a systematic simulation tool that can be used to analyze the effects of the various design and environmental parameters on the performance of the device. The aim of this project is to develop a numerical tool for the simulation of a downdraft energy tower. Two numerical techniques will be adopted and compared, namely a Lagrangian-Eulerian approach whereby droplets are treated as evaporating particles in an Eulerian flow field, and a Eulerian-Eulerian approach where the particle size and density are treated stochastically and resolved using a set of field equations. In a first phase the two techniques are evaluated and compared in terms of accuracy and performance and in the second phase a parametrization study will be carried for the simulation of the downdraft energy tower performance.*