

**MAXIMUM THERMODYNAMIC EFFICIENCY EVALUATION OF A CONCEPTUAL DIRECT
STEAM GENERATION SOLAR POWER PLANT**

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ABSTRACT

It has been established for years that comparing the thermal performance of operating power plants under the classical thermodynamic vision with the maximum performance proposed by Carnot; narrows the understanding of the real limit that the power plants present. One of the proposals has been developed by Curzon and Ahlborn, in which the irreversibilities in the heat transfer in the high and low-temperature reservoirs are modeled to approximate the maximum theoretical limit to a more realistic situation. This view of thermodynamics is known as finite-time thermodynamics (FTT) or endoreversible thermodynamics (ERT). This modeling is suitable not only for conventional power plants but also for solar energy conversion processes. The ERT analysis is carried out in a 10 MW conceptual solar thermal plant, located in Agua Prieta, Mexico, which uses Fresnel reflectors under the direct steam generation concept to feed a Rankine cycle with two and three steam extractions.

Keywords: finite time thermodynamics, solar plant, efficiency, direct steam generation