

POSSIBLE SCENARIOS FOR SOLAR THERMAL ENERGY APPLICATIONS IN BRAZIL.

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Thermal solar energy is one of the oldest applications of the solar energy resource. The solar thermal power can be employed in two different ways: low or high temperature applications. This paper aimed at preparing and discussing scenarios derived from the SWERA database for feasibility analysis of solar thermal energy applications in Brazil. In spite of the different climate characteristics along the Brazilian territory, the solar irradiation is fairly uniform. The uppermost daily solar irradiation – 6.5 kWh/m²/day – occurs in semi-arid climate area of the Brazilian Northeastern region. This area presents low rainfall throughout the year (roughly 300mm/year) and the lowest annual average cloud amount in Brazil. This work evaluated and discussed solar energy applications like small and large scale water heating, concentrated solar power plants and solar chimney plants in accordance with climate conditions observed throughout Brazilian territory. The results demonstrated the feasibility of large-scale application of solar energy for water heating and electricity generation in Brazil. Payback periods for water heating systems are typically below 4 years when it is used to replace residential electric showerheads in low-income families. Large-scale water heating systems also present high feasibility and many commercial companies are adopting this technology to reduce operational costs. The best sites to set up CSP plants are in the semi-arid region where the annual energy achieves 2.2 MWh/m² and daily solar irradiation is larger than 5.0 kWh/m²/day. The western area of Northeastern region meets all technical requirements to exploit solar thermal energy for electricity generation based on solar chimney technology.