

SOLAR ENERGY ASSESSMENT AND SCENARIOS IN BRAZIL.

Tema: Evitando as mudanças climáticas

Palavras chave: *SOLAR ENERGY, ENERGY SCENARIOS, SWERA*

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The “Solar and Wind Energy Resource Assessment” (SWERA) project was an international project financed by GEF/UNEP which aimed at providing a consistent and accessible database to foster the insertion of renewable energies on the energy matrix of development countries. This paper presents the main SWERA products for solar energy: resource assessment and solar energy scenarios for Brazil.

The resource assessment was generated by using the radiative transfer model BRASIL-SR fed with satellite and climate data. The solar irradiation estimates were validated by comparing to the ground data acquired in several sites spread out the Brazilian territory. Maps on 10 by 10 km spatial resolution were generated for global, diffuse and direct normal solar irradiation. Solar irradiation on a plane tilted by an angle equals to the local latitude were also generated at the same spatial resolution. Besides the solar resource maps, the annual and seasonal variability of solar energy resource was evaluated and discussed. It is apparent from the solar resource and variability maps the great potential available for solar energy applications in Brazil, even in the semi-temperate climate in Southern region where annual mean of solar irradiation is comparable to that estimated for the equatorial Amazonian region.

The scenarios for solar thermal applications in Brazil presented here were generated by using SWERA database in order to demonstrate the feasibility of solar energy usage for water heating and electricity generation in Brazil. If government incentives were implemented, Brazil would save significant amount of electricity generated by conventional sources. This paper discusses low temperature applications (small and large scale water heating) and solar power plants to generate electricity (concentrated solar power plants and solar chimney plants). The water heating in residences presented a short payback period even for low income residences when used to replace the electric showerhead. Large scale water heating systems also presented high feasibility and many commercial companies are adopting this option to reduce operational costs. The best sites to set up a CSP plants are in the Brazilian semi-arid region where the annual energy

achieves 2.2 MWh/m² and daily solar irradiation larger than 5.0 kWh/m²/day throughout the year. The Western area of Brazilian Northeastern region shows great potential to receive a solar chimney technology.

Finally, some energy scenarios for photovoltaic applications in Brazil engendered by using SWERA database were discussed. The two major different markets for PV applications in Brazil are the hybrid PV-Diesel installations in mini-grids of the off-grid Brazilian electricity system in the Amazon region; and grid-connected PV in urban areas of the interconnected Brazilian electricity system. The potential for using PV is huge, and can be estimated in tens to hundreds of MWp in the Amazon region alone, even if only a fraction of the existing Diesel-fired plants with a total installed capacity of over 620 MVA would fit to run in an optimum Diesel / PV mix. Most of the major cities in Brazil present greater electricity demand in summertime with the demand peak happening in the day-time period. This energy profile match the actual solar resource assessment provided by SWERA Data Archive, enabling grid connected PV systems to provide an important contribution to the utility's capacity.

References:

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