

**PV IN COMBINATION WITH MICRO WIND
TURBINES FOR RURAL HOUSEHOLD ELECTRIFICATION
IN THE NORTHEAST OF BRAZIL**

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ABSTRACT: The use of PV for rural electrification has been approved in several thousand cases all over the world during the last decades. It enables a modular, clean and reliable source of energy, but its initial cost makes it prohibitive expensive for the local population. To overcome this dilemma the combined use of PV with cost-effective locally manufactured micro wind turbines was implemented. The additional source of energy allows to significantly reduce the size and the cost of a PV panel for a typical household electrification in the North Eastern part of Brazil, where wind conditions are favourable and relatively stable.

Keywords: Rural Electrification, Economic Analysis, Energy Options.

1 APPROACH

Baseline of the project was a household electrification with illumination by fluorescent lights (0.25 kWh/d), water pump (0.23 kWh/d), refrigerator (1.0 kWh/d), Sat-TV (0.34 kWh/d), Stereo equipment (0.14 kWh/d), small computer (0.15 kWh/d), Blender (0.03 kWh/d), drilling tools (0.04 kWh/d) which totals to 2.18 kWh per day in average.

Using a conventional PV power supply and the local parameters (irradiation: 2,200 kWh/a, performance ratio 0.7, further electrical losses (battery, charge controller, inverter): 30%), seven 100W_p modules become necessary leading to material costs of the system (including battery, sine inverter, charge controller and wiring) of 6,500 €

2 RESULTS

Using a PV system in combination with the local manufactured wind turbine, requires just three PV modules and leads to a total system costs of 4,550 € including a spare wind generator (250 €), thus leading to a cost reduction of 30% (28% including installation) in comparison to a conventional PV system.

While the local strong thermal winds occur at night, the necessity for storage of PV electricity is reduced, thus leading to increased lifetime of the batteries and reduced storage losses. Long-term measurements are on the way and will be published soon.