PROPOSALS FOR DECENTRALIZED RENEWABLE ENERGY SOURCES DEVELOPED AT UNIVERSITY OF THE STATE OF PARÁ

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Energy is an essential asset to leverage the economic and social development of a country. In Brazil, hydroelectric power stations produce most of the electricity, but also generate numerous social and environmental impacts, high construction and distribution costs. Besides, there is a strong dependence on rainfall indices to maintain reservoir levels and river flow, showing that the national energy matrix needs to be expanded and better planned through diversification of its sources. Thus, it is evident the need for new proposals of alternative and decentralized energy sources, which electricity is generated near the consumer centers, facilitating the management, minimizing the distribution expenses and losses in supply, and also, which has low environmental impacts. In this way, this work presents initial studies on decentralized alternative sources of renewable energies elaborated in the State University of Pará. The investigated systems produce energy from hydraulic, thermoelectric, solar and mechanical decentralized sources. For this, we used hydraulic microgenerators coupled to urban pipelines, Peltier thermoelectric cells with the imposition of temperature difference, light-emitting diodes (LED) of different sizes and colors exposed to solar radiation and modified bicycles connected to different dynamos. Observations were made with digital instruments such as multimeters, hydrometers, thermometers, speedometers, and when possible, through voltage, current, waterflow, and temperature sensors connected to the Arduino platform. In general, the voltage measurements produced by the different sources always increase proportionally to the number of LEDs in series on the different circuits (up to 3.0 volts), a temperature variation between the Peltier modules electrically associated in series (up to 6.2 volts), hydraulic flow (~12.0 volts) and pedal speed on bicycles (~ 60.0 volts). Finally, we emphasize that prototypes are quick to collect data and make it easier to perform measurements, and although recent, the results show promising systems with great potential for maximizing decentralized alternative power production with voltage values that could fuel small electronic devices.

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