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Sustainability in an architectural project: proposal for the Lagoa do Açu State Park (PELAG) headquarters – photovoltaic energy generation and use

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Photovoltaic energy is electrical energy produced from sunlight, and is considered a renewable, clean and sustainable alternative energy source. Using a solar inverter converts sunlight energy from photovoltaic panels in electrical energy that can be locally used in any electric equipment. This paper aimed to design the use of photovoltaic energy panels to generate the energy required to supply the whole park headquarters. Electric appliances to be housed (datashow, electric bulbs, computers, electric showers) were estimated, as well as their quantities, electrical power and times of use. Photovoltaic panels were incorporated to the architectural project and placed in the roofs of the two main buildings, with a little distance from one another. They were placed in a way that neither takes much space nor brings unnecessary visual impact, but that fulfills favorable solar orientation requirements. Seventy one panels were projected, each having dimensions as 1956 x 991x 40 mm and offering 300W power, for a total power of 23.43 kWp and an average monthly power generation of about 2.600 kWh. The use of a bi-directional meter was indicated, once it quantifies the amount of street energy that is used when there's no sunlight, and also the amount of solar energy produced locally in excess, which is injected in the distributor's electric network thereby generating "energy credits" that will be used at night or in the absence of sunlight. Regarding outdoor lighting, electric posts with energy saving lamps (150W multi vapor lamps) and totems for orientation lighting with photovoltaic cells were indicated. Air conditioning was included in the project for use in the auditorium and administrative offices areas during the warmest days of the year, and it will use the Split system, whose Procel A stamp ensures low energy consumption. Finally, we hope this project may have contributed for the park's sustainability goals particularly because it involves no idle generating capacity: it takes the electric network not only as a backup, but also as a way of distributing all energy produced yet not locally used.

Keywords: Alternative energy. Photovoltaic cells. Conservation Unity.

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