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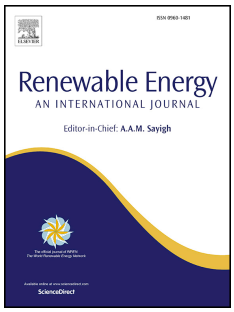

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Projection of the Diffusion of Photovoltaic Systems in Residential Low Voltage Consumers

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Abstract

With the advent of Distributed Generation (DG), the consumers start to play an active role in the electric system, where they are able to invest in a specific generation system, with solar energy, as the most promising source for residential consumers Low Voltage (LV). For system planning studies, the adoption of DG by residential consumers, introduces a factor of uncertainty, since the decision to adhere to DG relays on the subjective judgment of each individual. In this context, this work presents a new methodology for the projection of diffusion of photovoltaic systems in residential consumers of LV. The model was developed using the System Dynamic technique in conjunction with the Bass model to foresee the diffusion of photovoltaic systems in residential consumers throughout time. After the projection of these consumers, the Monte Carlo Method is used to determine the diffusion of Photovoltaic Systems throughout space. Finally, to evaluate the performance and the efficiency of the proposed method, different scenarios of diffusion projection were tested in the southern Brazil. The results demonstrate that the diffusion of Photovoltaic System depends on several factors, for example, the price of the panel's installation, energy tariff, incentives for Photovoltaic systems purchase, adoption by other consumers.

Keywords – Diffusion, Systems Dynamics Technique, Monte Carlo Method, Bass Model, Projection, Photovoltaic Systems.

Nomenclature

A – Income of 5 to 10 minimum salaries
a, b, c, d, e – Contributions in the decision-making
$Adop.$ – Adoption of PV systems by other consumers
$APV's$ – Adopters of photovoltaic panels
$Auton.$ – Autonomy
B – Income of 10 to 20 minimum salaries
$Bus.str.$ – Business strategies
C – Income higher than 20 salaries
CT – Total consumers
$Comp.$ – Complexity of the PV system
D – Urban residences
DCF_t – The cash flow
DG – Distributed Generation
$Durab.$ – Durability
E – Rural residences
EA – Economic Aspect