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Risk modeling of domestic solar water heater using Monte Carlo simulation for East-coastal region of India

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Abstract

One of the key barriers to diffusion of domestic solar water heater in India is its high capital cost. Hence, there is a perception among people that it is not economically viable. The objective of this paper is to check the validity of this perception using net present value as a tool. An explicit formula has been developed from first principle to calculate the net present value of a domestic solar water heater which can be used globally. Scenario analysis has been conducted taking three scenarios: current, pessimistic and optimistic, to understand the spread in net present value. Taking probability of each scenario, expected net present value is calculated. The next objective is to go a further step to simulate using Monte Carlo simulation to attach a probability value with the net present value. Monte Carlo simulation model has been developed for risk assessment of solar water heaters. A range of values of all input variables have been considered assuming a normal distribution curve and based upon that a probability distribution curve of net present value is obtained. It was found that solar water heater is a viable option for east-coastal region of India.

Keywords: *Monte Carlo simulation, Net present value, Risk modeling, Solar water heater, Scenario analysis*

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