عنوان مقاله:

Analysis of Solar PV System and Solar Thermal Energy To Meet a Dairy Industry Energy Needs : A Case Study

محل انتشار:

فصلنامه انرژی و محیط زیست ایران (ایرانیکا), دوره 16, شماره 1 (سال: 1404)

تعداد صفحات اصل مقاله: 10

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خلاصه مقاله:

The sun is the main source of energy that provides light and heat energy. With the advancements in the power electronic components, grid-tied solar PV Systems are readily available for distributed generation to meet the energy requirements of the customers. The objective of this study and analysis is to predict the potential for solar PV systems and solar thermal energy exploration and the potential for mitigating CO۲ emissions and economic benefits. A case study is carried out at Shimoga Milk Union Limited (SHIMUL) Dairy, Machanahalli, Shimoga, Karnataka, India, which handles ۷۵ lakh liters of milk, consumes ۲,۰۳,۵۲۴ units of electricity and ۱۳۵۰ tonnes of steam per month. Analysis has been made on the integration of a ۶۰۰ kW solar PV system with grid and solar water heaters with the necessary infrastructure for supplying electrical and thermal energy. The study Yields the result that a solar PV System produces ۶۰,۰۰۰ units per month reduces ۲۹.۵% of electrical energy imported from the grid and ۵۰ evacuated tube flat plate collector type solar water heaters of ۱۰۰۰–liter capacity to supply the ۵۰,۰۰۰ liters of hot water to the boiler at ۶۵°C reduces input of fuel by ۲۳%, reduces the annual reduction of CO۲ emission by ۱۶۲۶ tonnes. Return on Investment for solar PV Systems and solar thermal systems is ۴.۲۵ years and ۲.۷ years, respectively. The analysis extended for each of the various fuels typically used in boilers to produce steam. The procedure developed for estimating the potential for economic and environmental benefits using renewable energy sources for the dairy industry could be extended to any of the industrial sectors that need electrical and thermal energy.

کلمات کلیدی:

CO۲ emission, Dairy Industry, Payback Period, solar thermal energy, solar PV system