

The CO₂ mitigation and Exergo- and Environ- economics analysis of Bio-gas integrated Semi-transparent Photo-voltaic Thermal (Bi-iSPVT) system for Indian composite climate

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Abstract

It is to be noted that bio-gas production is drastically reduced in cold climatic condition especially in winter due to drop in ambient air temperature which is much below optimum temperature of about 37 for fermentation of slurry. Many methods namely hot charging, passive/active for slurry heating has been tested and it has been found that the passive heating method is neither practical nor self-sustained. In order to make bio-gas heating with self-sustained, economical and friendly with an ecology and environment, new approach of Bi-iSPVT, has been adopted. Based on the finding, we have made an attempt to analyze the system in terms of CO₂ mitigation, energy matrices and environ- and exergo-economics to have clean environment and sustainable climate. The analysis has been done by using embodied energy, annual overall thermal exergy of the system for ecological balance for good health of human being. It has been found that an energy payback time (EPBT) for sustainable Bi-iSPVT system is about 1.67years along with an exergo-economic parameter (Rex) of 0.1016 kWh/[?].

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