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INFLUENCE OF LOCATION ON THE ENVIRONMENTAL IMPACT OF A DOMESTIC SOLAR THERMOSIPHONIC SYSTEM DURING ITS LIFE CYCLE

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EXTENDED ABSTRACT

The international effort for the protection and restoration of the environment includes serious intervention on the energy system, exploitation of Renewable Energy Sources (RES) being the most important among others. Until now solar domestic hot water systems (DSHWS) have been the most widely used RES system in Greece. Although solar energy is a "clean" energy form, during the life cycle of solar systems (raw materials extraction, manufacturing, transportation, use and disassembly) important environmental transactions take place, as the use of energy and also the use of the solar systems is accompanied by the emission of air pollutants and the production of liquid and solid waste. Therefore, a complete evaluation of the solar energy technology demands the assessment of the indirect environmental impact that occurs and furthermore an analysis of solar systems based on their life cycle (use of natural resources and energy, air pollution and solid-liquid wastes).
In this paper we conduct a Life Cycle Assessment for solar thermosiphonic systems according to the international standards and guidelines. The main objective is the evaluation of the location's influence on alternative energy systems and their comparison with conventional energy forms. To achieve this we use the methodology and the database of the *"**Eco-Indicator '99**"*, that covers the greatest spectrum of processes and impacts, compared with other known methodologies. As an example a typical solar thermosiphonic system with a 4 m^2 collector area and a capacity of 150 lt, which covers the hot water needs of a three person family, is analyzed for nine different locations in Greece. The main objective of the analysis is the calculation of the environmental benefits for various locations from the use of a DSHWS in substitution of electricity during the whole life span of the DSHWS. All the materials that are used and processes that are imposed in the construction of the selected solar system are taken into account. The impact is given for each component of the solar system (collector area, boiler, mounting base, appurtenances box, transportation to installation area) as well as for each material used (steel, copper, aluminum, glass, insulation, others).

Key words: solar energy, life cycle assessment, environment