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Renewable Energy Sources are beneficial over their entire Life-Cycle

Greek researchers have recently compared the environmental impacts of different renewable energy systems with those of traditional energy sources based on fossil fuels. The results show that, depending on how the produced energy is used, certain systems of renewable resources can have greater overall life-cycle efficiencies.

The use of renewable energies is one of the most important alternatives that can be implemented to reduce greenhouse gas emissions and ensure a sustainable energy supply. The overall target in the European Union is to increase the share of renewable energy production to 12% of total energy use and the share of renewable electricity production to 21% of total electricity consumption by 2010. In March 2007, all Member States agreed on a binding target of a 20% share of renewable energies in overall EU energy consumption by 2020[1]. Nevertheless, renewable energy systems themselves have an environmental impact. Land use and materials employed are just two aspects of renewable energy development that can have an adverse effect on the otherwise positive environmental picture.

Recently, Greek scientists investigated the possible environmental impacts of three renewable energy systems: solar energy, wind power, and geothermal energy. They applied the techniques of Life Cycle Assessment (LCA) to each of them in order to compare them with the impacts of equivalent non-renewable energy sources, mainly on the basis of efficiency. The LCA approach allows an assessment to be made of the flow of material and energy used in the construction, operation and ultimate decommissioning of a renewable energy supply. It also takes into account the manufacturing of components, the possible extraction and supply of fuels as well as waste generated in these processes.

The results suggest that the efficiency (energy that comes from a system in relation to the invested energy and energy generated in relation to the energy that enters the system) of some renewable energy systems is comparable, wind power and geothermal energy for example, and in some cases superior, for example systems producing thermal energy from solar energy, to the equivalent fossil fuel system over the complete life cycle. However, the conversion of solar energy to electricity using photovoltaic solar cells is less efficient in terms of materials production, running, and recycling than non-renewable energy. A large area would be needed for the installation of this energy system in order to meet the electrical need of a residential area. Nevertheless, the authors highlight that life cycle pollution of solar systems is considerably lower than any conventional system although thermodynamic efficiency is lower.

The authors conclude that a significant advantage of the use of renewable energy systems, apart from the fact they are inexhaustible, is that they are environmentally-friendly because overall they result in lower dangerous pollutant emissions over their life-cycle.

[1]For more information, see the European Council – Presidency Conclusions of 9 March 2007, available at: www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/93135.pdf

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