Role of Italian Research in Advanced Solar Technology

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Abstract

ENEA, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development, in cooperation with the Italian manufacturing and utility industry, developed and is now implementing a new and more effective technology for the use of high temperature solar energy.

Such technology is presently under industrial demonstration in Sicily, Italy, through the Archimede Project, and ENEA is carrying out several projects for the construction of solar electric plants based on this technology in foreign countries, especially in North Africa and Middle East.

Besides, ENEA is projecting to apply the coupling of solar electric plants with water desalination units, with the aim to increase the potentialities of this solar technology and to improve the economic convenience in the investments for the construction of the facilities, considering that many instances with favorable solar conditions have also problems in availability of fresh water.

The strength of the Italian solar technology is related mainly to three elements:

- high efficiency in solar energy collection, by means of advanced coating of the solar receiver tubes and optimized design of the concentrating mirrors;
- use of a mixture of molten salts as heat transfer fluid, suitable to increase the allowable temperature and the heat transfer efficiency;
- efficient thermal storage system, based on two tanks filled with molten salts.

A key factor in the success of the Italian solar project is the cooperation with the industry; this cooperation, carried out since the beginnings of the research activities, allowed to proceed from the laboratory level research to the industrial demonstration within less than ten years; it favored the issue of important industrial patents with significant economic value and allowed some Italian firms to reach top positions in the world market of special solar components, such as the solar receiver tubes.

This presentation deals with the description of this solar technology, with the development of the ENEA solar project, with the new approach adopted by ENEA in carrying out the activities, so as with the main scientific and technical results so far obtained and the perspective of further developments.

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