



Market potential and development prospects of the solar water heater field in Algeria



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ABSTRACT

Although Algeria prides itself on a huge solar energy radiation potential, such important applications as solar water heating have not yet been sufficiently developed in the country. The present paper deals, in fact, with the analysis of the Algerian case by the examination of the available data and the discussion of the main reasons that have led to the insufficient development of the field in the country. An examination of the installed solar water heater surfaces around the whole country proved that there was not a significant development of this application. This is mainly due to the availability of natural gas at low price and the expensiveness of solar water heaters which were imported from Europe and neighboring countries. In order to increase citizens' interest in this application, it is essential to launch a local production of this device by making good use of the existing industrial capacities based on a subcontracting production mode.

The paper presents, also, a concrete project dealing with the development of a solar water prototype intended for local industrial reproduction. It was made thanks to narrow partnerships held with local industrial actors. This practical experience allowed us to provide evidence that local production of this equipment if associated with the existing incentives would certainly induce a rapid growth and development of this important application in Algeria.

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1. Introduction

The spectacular and rapid growth, in the last few years, of the world energy demand associated with a sharp rise in oil prices, the problem of global warming and the continuous decrease in gas and petrol world reserves have incited experts and scientists to express their real concern and anxiety about the energetic future of our planet [1].

This unexpected situation has urged many countries to re-examine and re-adapt their energy policy by resorting to the diversification of energy resources and development of renewable energies. In fact, in February 2011, the Algerian government has launched out its own program for the development of renewable energies and energy efficiency so as to preserve the existing reserves of oil and natural gas, to branch out its energy sources and enters a sustainable energy era [2]. The program aims at reaching 12 GW of electricity that would be produced, by 2030, from renewable sources which would correspond to 40% of the whole national electricity consumption [2]. In terms of energy efficiency, the adopted strategy intends to largely spread and enhance the use of more efficient devices, materials and equipment in such sectors as household, building and tertiary which are identified to use more than 40% of the whole energy consumed in the country [3].

The program provides a prominent place to solar water heaters that should, gradually, substitute for the conventional water heaters working with gas or electricity. It is important to note that, in Algeria, solar water heaters market penetration is very low because of the abundance of natural gas at low cost and the expensiveness of systems that are generally imported from neighboring countries and/or Europe. An imported solar water heater of 200 l capacity costs, in fact, around 1130 € all taxes included. Regarding the average income of most Algerian citizens, it is very expensive and out of reach for the large majority of the population. Accordingly, the energy and mines ministry intends to subsidize the acquisition of solar heaters through the establishment of a national fund (FNME: Fond National de la Maîtrise de l'Énergie) which will be in charge of supporting around 45% of the cost of mounted solar heaters. This financial tool is managed by APRUE (Agence Pour la Rationalisation de l'Utilisation de l'Énergie) which is a national agency created by the energy and mines ministry. This newly established promotional action has been introduced to encourage citizens to turn towards the acquisition of solar water heaters instead of the conventional devices. In fact, the first experimental operation to test this new formula was initiated in 2011 by the energy and mines ministry through the emission of 400 domestic solar water heaters (DSWH) destined to households. Surprisingly, only half of the programmed quantity has been distributed during a period of eighteen months. This prompted us to carry out a deep analysis of the main reasons that would prevent such an operation to generate the expected results.

The present work, in fact, focuses on the study and analysis of the current state of the Algerian solar water heater field and market, the identification of the constraints, and the presentation of the development prospects for this application. Proposed solutions that would induce a high growth and development of this application are, also, discussed. Finally, the analysis is reinforced by the presentation of a concrete pilot project performed at UDES

(Unité de Développement des Equipements Solaires) concerning the design and construction of a solar heater prototype destined to local industrialization.

2. State of the Algerian solar water heater field compared to other countries

Since the awareness, on a worldwide scale, of the importance and reliability of renewable energy applications, water heating by solar energy has become an accepted and adopted technique by populations in many countries. This is due to the fact that several countries have succeeded in developing their solar water heater market through encouraging large-scale production of the equipment supported by adapted laws and incentives that are generally applied and executed in several steps [4]. Table 1 which shows the level of development and market penetration of solar water heaters in Europe gives a clear idea about the degree of progress the application has reached in those countries. It is interesting to note that even though Germany is ranked first regarding the extent of the mounted surface, Cyprus which is a relatively very small country lines first in the world in terms of installed surface per capita (990 m² per 1000 inhabitants) [5].

With a total area of 487,000 m² installed solar water heater surface at the end of the year 2012, Tunisia is the first North African country which has successfully implemented and executed a large plan for the popularization of this equipment [6,7]. The Tunisian program has met a great success thanks to the support of a well-developed local solar industry which is able, today, to satisfy the needs of the local Tunisian market and ends up in the exportation of solar heater systems to neighboring countries such as Algeria and Libya.

Although Algeria has a huge potential market for the solar water heater, its development and commercialization remain in their nucleation phase due to factors such as the absence of a local specialized industry and the deficiency in specific incentive laws. Indeed, the first attempt to launch a local manufacturing of solar water heaters began in the 90s through the establishment of a pilot production line at UDES [8,9]. The installed fabrication process was able to manufacture a dozen of individual solar water heater units and flat plate collectors per day using manual and semi-automatic equipment and machines. Although this experience has served for mastering of the technique and training of UDES researchers and technicians, the non-integration of this operation into an overall clear strategy including the distribution and marketing of the product has not led to the creation of a real industrial dynamic. Moreover, the absence of incentives did not

Table 1
Solar water heater installed surfaces per country in Europe [4].

Country	Installed solar heater surfaces (m ²)
Germany	13,824,000
Greece	4,24,200
Austria	3,836,509
Italy	2,671,730
Cyprus	715,022

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