Optical analysis to implementation of Linear Fresnel Collector systems in heat generation for industrial process

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1. Introduction – Solar energy is a real alternative to cover part of our society's energy needs. Currently, the industrial sector has an important weight, with approximately 40% worldwide and 37% at European level. Likewise, heat generation for industrial process account for 54% of total energy consumed, being interesting the implementation of systems based on solar thermal technology [1]. This is the case of Linear Fresnel Collector (LFC), wich have, among other adventages, a great structural simplicity (reduction of manufacturing and maintenance cost) and lower consumption of energy used to tracking solar disk [2]. However, the use of solar energy for industrial sector is still lower, due in part to the lack of knowledge of the technology to end user. Therefore, it's necessary to develop new tools and applications that provide simple and direct information about the adventages of its use [3]. In present work, a series of simplified energy audits have been carried out in industries located in south-western Europe. Next, a procedure was established to determine the degree of susceptibility of industries for installation of a LFC system, including optical performance evaluation of a plant throughout the year.

2. Experimental – A series of industries with significant steam consumption were selected for the study. The most relevant data for the analysis were defined, some of them, such as those related to production, work schedules, seasonality and energy consumption. A simulation of the optical behaviour of an LFC collector plant was carried out, which was performed using Matlab software, obtaining average values of optical performance per month and analyzing the losses due to shadowing between rows, optical losses and non-lite pipe factor [4].

Table I. Industries selected for the study

Industries	Capacity
Small capacity meat industry	5,800 pigs/year
Medium capacity meat industry	116,000 pigs/year
High capacity meat industry	170,000 pigs/year
Processing nuts industry	180 Tons nuts/year
Fat processing industry	19.800 Tons fats/year
Rice industry	34,500 Tons rice/year
Tomato industry 1	420,000 Tons tomato/year
Tomato industry 2	53,500 Tons tomato/year
Cleaning products manufacturer	90,000 Tons cleaning products/year
Industrial waxes manufacturer	13,000 Tons waxes/year
Cardboard packaging manufacturer	96,000 m2 cardboard/year
Medium capacity laundry	1,650 Tons clothes/year
High capacity laundry	2,000 Tons clothes/year

3. Results and Discussion – The developed procedure is constituted as a useful tool for the comparison between sectors and/or industries, being able to interpret the obtained results in a simple way, without the need of specific knowledge.

5. References

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