

Who is who

Estudio geolocalizado del potencial de aplicaciones de calor solar de proceso en media temperatura



0. Executive summary

Along the last decade, the potential use of Solar Heat for Industrial Processes (SHIP) has been studied from different perspectives. However, the scope of these diverse studies has usually been more focused on the technical adequacy dimension considering temperatures, pressure and demand profiles. Despite of the fact of the relevance of either solar irradiation, availability of low cost fossil fuel, or surface availability, these variables have been either usually taken into account by a statistical approach or they have not been considered. The detailed analysis of these variables leads to a case by case approach for each industry, which might be considered as not feasible/practical due to the large amount of different industries in Spain.

This study has reduced the target industrial companies to a sufficient low figure that enables the case by case analysis of their own potential. For enabling this approach, it has been necessary to go deeper in terms of resolution. Previous studies stopped at province detail resolution, so that this study has moved a step further up to municipality resolution.

At municipality resolution, three filters have been applied for identifying those places with higher chances to implement SHIP solutions within 4 strategic sectors (Food & Beverage, Agriculture and Cattle raising, Paper and Textile). These three filters are: solar irradiation, availability of piped natural gas and energy demand profiles. In order to take advantage of synergies with previous studies, these 4 sectors have already been selected as the ones with the higher potential of implementing solar heat for industrial processes (SHIP) projects.

The solar irradiation filter is key as the higher the solar irradiation, the higher the solar heat production will be. There are several available solar irradiation studies in Spain, however none of them, based on author's knowledge, breaks down the solar irradiance by municipality. The source of information for calculating the solar irradiance per municipality has been the information released by the Project named ADRASE conducted by the CIEMAT. A solar irradiation base line has been set in order to consider the sunniest municipalities in Spain.

The competitor of SHIP projects is the current fuel that the industry is using for heat generation. If the current fuel cost is low, the return on investment period of SHIP projects increases, therefore SHIP projects become less appealing for the industry. Nowadays, the piped natural gas supply is the cheapest energy source for heat production. Besides it's widespread in Spain. As a working tool for the study, a database showing the current gas infrastructure in all municipalities in Spain, has been built up. Coming back to the study outcomes, those municipalities that have piped natural gas infrastructure online have not been analyzed, as most likely, the industries located in such locations will have a current cheap solution for heat generation. So that, the municipalities that have been the focus of the study are those that do not have piped natural gas infrastructure.

The third filter has been used for selecting the municipalities that have industries of the already chosen sectors (Food & Beverage, Agriculture and Cattle raising, Paper and Textile). For this purpose, the INE (Instituto Nacional de Estadística) database and the MINETUR (Ministerio de Energía, Turismo y Agenda Digital) database have been deeply analyzed at municipality resolution.

Once the abovementioned filters have been applied, it's granted that the non-excluded municipalities meet the following features: solar irradiation is likely to be high, there is not piped natural gas infrastructure, and there are industries of the selected strategic sectors. This procedure leads to a reduced number of municipalities which enables the detailed analysis of each of them. Then, a list of all the companies of each municipality have been created. The next step has been to select those firms with the CNAE code matching with the 4 strategic sectors. Furthermore, for each industrial company the following variables are know: name of the company, activity, location and size (micro, small, medium, big).

Among the whole list, the micro firms have been excluded as most likely these firms are local shops for either selling or distribution purposes, so that they are not manufacturing plants. Based on each firm activity, those that do not have thermal processes (for instance: storage activity) have been also excluded from the list. Eventually, among the non-excluded listed firms, a visual check through google maps has been carried out for evaluating the surface availability on their roofs.

The above-mentioned process has generated a list of 200 industrial companies where most likely the use of solar energy may be a very interesting solution for industrial energy savings using renewables source of energy. The very last step of the study has been to validate the assumptions that have been considered in the methodology. For this purpose, some meetings have been arranged with the selected industrial firms. These meetings have had the goal of sharing the potential benefits of using solar energy in industrial processes between 100°C up to 400°C. Additionally, the meetings have been the final cross-check of the methodology carried out in the study with the current real situation of the interviewed industrial companies.

Once the assumptions used for the selected industrial companies list creation have been validated, the outcome of the study is a visual representation of several maps showing Spanish areas with higher density of industries with a high potential of integrating solar energy for medium range temperature processes among one of their existing industrial processes.