Introduction

The energy demand associated to cooling systems in most industrialized and developing countries has been increasing in the agro-food sector. At the same time the refrigeration requirements in the food processing industry are leading to a renewed interest in refrigeration systems powered by renewable energies, especially solar thermal, which works more efficiently and, in certain cases, is competitive with conventional cooling systems.

Solar thermal systems, in addition to the typical advantages of renewable resources (environmentally-friendly, naturally replenished, distributed), are very suitable for refrigeration demands, because solar radiation availability and cooling requirements usually coincide seasonally and geographically. Solar refrigeration facilities could also be easily combined with hot-water applications, increasing therefore the yearly solar fraction of the agro-food industry.

In spite of the tremendous research effort made in theoretical analysis and experimental projects since the 70s, and the enormous interest related to solar refrigeration systems, their commercial implementation is still at a very early stage, due mainly to the high costs associated with these systems and the clear market supremacy of conventional compression chillers. Other obstacles to their large-scale application are the lack of practical experience and acquaintance among builders and planners with their design, control and operation.

Cooling refrigeration facilities driven by solar thermal technologies are still infrequent. However, several test facilities using this renewable technology have appeared in the literature during the last 50 years. In the last few years, many research and demonstration activities have started up in several countries.

In the agro-food sector the use of solar energy is one important contribution for the reduction of fossil fuel consumption and harmful emissions to the environment. Solar thermal cooling can significantly contribute to prevent a drastic increase in conventional energy consumption for cooling and related

CO_2 emissions. A survey done by the European Solar Thermal Industry Federation showed that in 2006 there were only about 100 solar cooling systems installed in Europe. Of those, about 70% were based on absorption cooling technology, and more than half used flat-plate solar collectors. The number of solar cooling systems will increase significantly in the near future, due to the arrival of new players into the market. There are today available on the market a number of absorption chillers driven by hot water, the smallest one has a cooling capacity of about 4 kW. This makes possible to install solar absorption cooling systems in all the agro-food industry. This report aims to

evaluate the potential of integrated solar absorption cooling systems for agro-food applications in Mexico and to make a feasibility analysis as an information support to Clean Development Mechanism projects.