

REMOVAL OF NON-TECHNOLOGICAL BARRIERS TO SOLAR COOLING TECHNOLOGY ACROSS SOUTHERN EUROPEAN ISLANDS

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1. Introduction

The removal of the barriers that hamper the diffusion of solar cooling plants was the main objective of the SOLCO European Project supported by the European Commission through the Intelligent Energy Europe Programme.

In order to achieve its main objective, an international network of partners, leaded by a Sicilian Coordinator, APEA Agrigento Provincial Energy Agency, has locally acted in four different European insular regions: Canary Islands, Crete, Cyprus and Sicily. This is due to the fact that the solar radiation availability in all the islands of Southern Europe is ideal for solar cooling. The members of the project cluster were from Southern European islands where ideal summer conditions make solar cooling a reliable option for sustainable air conditioning.

LIST OF SOLCO PARTNERS

Partner name	Partner short name	Country
Agenzia Provinciale Energia e Ambiente	APEA	Italy
European Islands Network on Energy & Environment	ISLENET	UK
Environmental Engineering Department. Technical University of Crete	ENV/TUC	Greece
Cyprus Institute of Energy	C.I.E.	Cyprus
Canary Islands Institute of Technology	ITC	Spain



Fig. 1 – The SOLCO Project logo

2. The market in Southern Europe: a study at insular level.

The SOLCO project has allowed to perform a market study in each participating island and to carry out a complete evaluation of solar cooling technologies that are locally available.

The state of the art of solar thermal panels market is not the same for all the SOLCO islands. The market is very mature in Cyprus and the Canary Islands. The market in Crete is already well developed too. The Sicilian market is rather active even though the values of the local market indicators are far from those of the other islands.

The market is particularly active in the field of water or space heating in all islands. A good number of manufacturers, suppliers and installers of solar collectors is present in every island.

There is full availability of “traditional” flat solar collectors in each island. Final users can have efficient design, installation and maintenance for water or space heating plants. The local population seems to trust the technology.

The market of vacuum tube collectors is relatively less developed. The number of local suppliers is smaller than that of flat plate collectors. Final users do not understand why it is necessary to use a more expensive technology.

There are no producers of chillers based in the project islands. Chillers are available locally even though availability is very different from one island to the other. Good availability was observed both in Sicily and in the Canary Islands. The chillers market in both Crete and Cyprus is less developed. Only two firms are present in each island.

Interviews of technical actors (installers, sellers...) indicate that the local demand for chillers is rather low. Despite the fact that it is relatively easy to buy a thermally driven chiller, problems often arise later with respect to installation and maintenance procedures. Expertise of installers and maintenance firms has to be improved.

Based on the above mentioned reasons, one can conclude that the market of chillers is not mature in any of the SOLCO partner islands.

The number of solar cooling installations is very different in the SOLCO islands:

- 11 installations are located in the Canary Islands

- 2 installations in Crete
- only one plant is operating in Cyprus and Sicily
- three new installations will be implemented in Cyprus by 2011

The solar cooling market is increasing in Spain but is at a standstill everywhere else. One of the biggest problems is that the answers received from the technical actors lead to the conclusion that Solar Cooling technology is not yet sufficiently known. Technical actors have no or very little understanding of the technology.

Presently, equipment performance, financial costs and other financial considerations are still marginal factors to be considered. What is principally missing is the basic knowledge among technical actors.

Another important barrier is due to the fact that there is no grant scheme covering specifically solar cooling plants within the surveyed markets. In other words, even though subsidies are offered for the installation of solar panels, solar cooling is not among the eligible technologies.

Only in Sicily, a draft call for public subsidies dedicated to solar cooling (among other solar installations) is already in progress. It will be launched in 2009 by the regional government.

Modern methods of financing (e.g. Energy Performance Contracting with local ESCOs, TPF, etc) are not utilised within the insular markets that SOLCO studied.

3. Barriers.

The study of local markets in four different EU insular regions has identified a number of several important common barriers limiting solar cooling installations.

Not all the technological components necessary for plants are equally present on the different local markets. This market lacuna is particularly important for chillers. Local producers of chillers are missing. As a consequence, a number of technical actors, interviewed during SOLCO, think that chillers are not locally available and they definitely do not know that small size machines are now being produced and are available.

The low level of knowledge by designers, by technicians and by installers is the most relevant barrier noticed by SOLCO Consortium.

As local technical actors are not familiar with solar cooling technology, they do not propose it to their clients (potential users). Environmental advantages of solar cooling are not well known as well as the potential energy savings.

The technical actors that would like overcome the above mentioned lack of knowledge can not do it because training courses are really a rarity and it can be very difficult even the simple opportunity to visit an existing plant.

The lack of awareness is even bigger among the potential users that obviously are not expert of cooling plants.

In such a limited market, it is very hard to realise if the high costs of the technology are a consequence of the actual production costs or of the market weakness itself.

4. Bureaucratic restraints

The legislation survey, carried out within the SOLCO project, has proved that some relevant barriers to the diffusion of solar cooling can be both directly or indirectly linked even with the legislation framework itself.

Legislation represents a direct non-technological barrier when bureaucratic procedures necessary to authorise solar cooling equipment are so strict that potential users avoid such installations.

Legislation represents an indirect non-technological barrier when, for example, standard methods utilised by law for the evaluation of energy performance of buildings do not take into account energy consumption for cooling.

Another category of bureaucratic restraints can be represented by those specific conditions (e.g. for the prevention of legionnaire's disease) that oblige the implementation of very expensive measures that make solar cooling not competitive.

The survey dedicated to bureaucratic and normative restraints has revealed that solar cooling is not mandatory in any region and there is not any plan, regulation, law or normative restraint concerning solar cooling plant construction and installation.

Solar cooling technology has not good friends among decision makers.

It has been noticed that public aid schemes and incentives generally do not include solar cooling installations among eligible actions

Most of the regions have financial incentive schemes to promote solar thermal energy installations but there are no subsidies for solar fields that could also drive chillers to produce "solar air conditioning". A roadmap for solar-assisted cooling systems on national levels and on European level is not available.

5. How to overcome market barriers.

The discussion within the SOLCO international Consortium of partners allowed the identification of the above described barriers and the strategies to overcome them.

First of all the lack of training is an important barrier. It requires considerable human and financial resources and it can be removed with following tools:

- Specific training courses for all professional actors, with particular reference to designers with, if possible, the proposal of design tools (software) and control tools. The training courses organised by SOLCO had a good success: 545 key actors were trained.

- Inclusion of solar cooling technologies into the standard education for engineers and other qualified technical actors.
- Demonstration projects are absolutely necessary in order to provide real operational data about the performance of solar cooling plants to be offered to technical actors as design tools and references.

The design and the installation of solar cooling systems in public buildings with all the economical, technical and environmental data available would certainly give an extra boost to the technology.

Market barriers can be removed by:

- Information about the solar cooling market. With this goal, the SOLCO Consortium has produced a database, as one of project deliverables, that can be downloaded from www.solcoproject.net. The SOLCO database, with reference to the four project islands, provides technical information on available chillers and solar panels together with the commercial references.
- Standardization in the field of solar driven cooling plants, design guidelines and proven operation and maintenance concepts.

A significant effort to develop the local market of solar cooling technology is necessary in order to reduce the actual cost of different components.

Obviously in order to ensure the diffusion of solar cooling, the potential users have definitely to be involved with a strong dissemination campaign necessary to improve the technology awareness.

With reference to the bureaucratic restraints, it is necessary to try:

- to include the solar cooling technologies into regional, national and European legislation regarding energy efficiency in buildings
- to consider the use of renewable energies for cooling in building regulations at national and European level
- to develop different normative and standards for different size of wet cooling towers. The most of solar cooling installations have small wet cooling towers so they should not have the same restrictions that big wet cooling towers have. This is a very important recommendation because the wet cooling towers are affected by a specific legislation to avoid the legionnaire disease, and the maintenance of the installation is more expensive and most of the potential users prefer to avoid them.

6. Recommendations and conclusions.

The general interest for solar cooling is nowadays rather high as statistics from the SOLCO project website can confirm.

These statistics indicate a very strong increase in the traffic of the website, which from a slow start in May 2007, enjoyed a steady growth of visitors, constantly, month after month, throughout the life of the project. In 2008 the website had over 100.000 hits representing 5.297 unique visitors, far exceeding expectations and showing that there is strong interest in the various aspects of the technology.

The interest continued in 2009, with 70.000 hits representing 4.754 unique visitors in the first three months of the year, i.e more than 50 unique visitors per day downloading on the average 8.5 GB of information for the period. The best month was March 2009, one month after the official end of the project, and interest and visits in 2009 continue very strong.

First bids to issue normative rules for solar cooling, as parts of energy efficiency legislations are welcome and can give an idea on the actual impact of the technology in terms of energy efficiency.

On the field of legislations, a number of issues must be broached with particular reference to the following ones:

- Require EU member states to keep statistics on the energy demand for cooling purposes.
- Inclusion in building regulations of the use of renewable energy for cooling at national and European level.
- Develop test methods to assure the good performance and durability of solar cooling plants.

A final consideration has to be dedicated to the financing of solar cooling plants.

Technologies exclusively working thanks to public financial support often do not work properly. However, financial support schemes are essential in order to overcome the financial barrier and make solar cooling technologies competitive, improve market penetration and exploit economies of scale.

Who can say how many solar cooling plants we would have in Italy, for example, in case of availability of a public financial support equivalent to that is currently provided for PV panels?

With reference to the financial support schemes , it is important to consider the opportunity to link the intensity of the financial support to the effective gained results, for example, in terms of avoided emissions of CO₂, or in terms of reduced consumptions of energy etc.

Many questions are actually still open, not all of them concern technological aspects, the discussion among relevant stakeholders can give a crucial contribution to solve them.