



PERGAMON

Energy Conversion and Management 44 (2003) 1885–1901

**ENERGY
CONVERSION &
MANAGEMENT**

www.elsevier.com/locate/enconman

The PHILOSOL project: a strategic market development of the solar thermal sector in Southern Europe

Michaelis Karagiorgas^a, Theocharis Tsoutsos^{a,*}, Rainer Berkmann^{b,1}

^a Centre for Renewable Energy Sources (CRES), 19th km Marathon Avenue, Pikermi, GR 19009, Greece

^b European Solar Industry Federation (ESIF), Dieselstrasse 45, D-87437 Kempten, Germany

Received 27 July 2001; received in revised form 16 May 2002; accepted 2 September 2002

Abstract

Given the rapid development of the European ST market and the tremendous potential of the local markets due to favorable climatic conditions, the local Small and Medium Enterprises (SMEs) of the EU face the opportunity to enter this rapidly growing market with reliable technologies and know-how.

In order to assist them, the PHILOSOL project aimed at stimulating awareness of the local authorities, promoting the use of ST technology and involving the local market actors in business partenariat meetings.

The experiences of the more ST technology mature countries show that more than a product and a subsidy programme are needed. Amongst others, the motivation of the population by information and image campaigns can assist solar energy in becoming an intrinsic part of household technology.

© 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Solar thermal technologies; Marketing; Promotion; SWOT analysis

Abbreviations: ANEA: Agenzia Napoletana Energia e Ambiente; APISOLAR: Associacao Portuguesa de Industriais Solar; AREAM: Agencia Regional de Energia e Ambiente de Regiao Autonoma de Madeira; ASENSA: Asociacion Espanola Empresas de Energia Solar y Alternativas; ASSOLTERM: Associazione Italiana Solare Termico; ASTER: Agenzia per lo Sviluppo Tecnologico dell' Emilia Romagna; CCE: Centro para a Conservacao de Energia; CRES: Centre for Renewable Energy Sources; DGTREN: Directorate General for Energy and Transport; EC: European Commission; ESIF: European Solar Industry Federation; EU: European Union; GRs: guaranteed results; HVAC: heating, ventilation, air conditioning; IDAE: Instituto para la Diversificacion y Ayorro de la Energia; MEDEA: Agenzia Mediterranea per le Energie Rinnovabili e l'Acqua; NERA: Empresarial de Regiao de Algarve; OPET: Organization for the Promotion of Energy Technologies; RES: renewable energy sources; SMSS: solar market strategy study; SWOT (analysis): strengths, weaknesses, opportunities, threats (analysis); ST: solar thermal; STMG: solar thermal marketing group; TPF: third party financing; VAT: value added tax.

* Corresponding author. Tel.: +30-1603-9900/1660-3300; fax: +30-1603-9904/1660-3302.

E-mail address: ttsout@cres.gr (T. Tsoutsos).

¹ Tel.: +49-831/57500-70; fax: +49-831/57500-72.

1. Introduction

Italy, Portugal and Spain are three Mediterranean EU Member States with very similar climatic conditions: they have high sunshine hours, especially during the summer and the ambient temperatures are also quite high throughout the year. Consequently, a high solar potential exists, which makes the use of *ST systems particularly advantageous* [1].

In parallel, the southern regions of these countries and their islands, besides the favorable climatic conditions they have, receive an *increasing number of tourists*, which makes an additional factor in favor of ST technologies penetration. In the summer, when the main bulk of tourists visit these areas, the population of the regions increases dramatically, and the demand for hot water reaches its highest peak.

Given the rapid development of the European ST market and the tremendous potential of the local markets, the local Small and Medium Enterprises (SMEs) are faced with the opportunity to enter this rapidly growing market with reliable technologies and know-how.

The ESIF and the CRES, realizing the urgent need for an Action Plan capable of matching market opportunities and ST technology solutions by stimulating local markets and developing businesses in Southern Europe, established the PHILOSOL project. The project has been financed within the framework of the Thermie and Altener EU programmes [2].

The aims of the PHILOSOL project have been:

- dissemination of ST systems,
- stimulation of the awareness of local authorities concerning ST energy,
- involvement in business partenariat meetings of local market actors, like:
 - local manufacturing and installation SMEs,
 - local authorities and municipalities and
 - local professional associations,

as partners in developing the use and application of solar energy in the local markets.

However, as is obvious, in Europe, different levels of ST market maturity exist, so different interventions had to be implemented. For instance, the needs of a full maturity market are dependent on mass media campaigns in contrast to the weak markets in which specific technical missions and site tours are required [3].

The specific actions of the PHILOSOL project have been: business missions, partenariat contacts and outcome information from key actions and business agreements related to six business partenariat events, organized by CRES and led by ESIF in the following six target regions: Napoli, Palermo, Loule, Madeira, Palma/Majorca, Murcia.

2. ST market development in Europe

The White Paper of the EC on Renewable Energies, adopted in 1997, has set optimistic targets for 2010 for RES, particularly ST energy (by that year 100 million m² of solar collectors are to be installed in Europe, 15 million m² by 2003 [4]). Right now, 10.4 million m² of glazed solar collectors are in use in Europe [5]. The active European countries are being supported in their efforts

Table 1
Market data of ST markets in Europe (glazed collectors) [6]

Country	Installed (1999) (m ²)	Total installed by the end of 1999 (m ²)	Installed per 1000 inhabitants (1999) (m ²)	Market growth (1999) (%)
Germany	420,000	2,290,000	5.1	20
Greece	160,000	2,645,000	15.2	3
Austria	141,000	1,476,000	17.5	-15
Italy	24,000	244,000	0.4	20
Portugal	4500	219,500	0.5	-10
Spain	33,000	313,000	0.8	50
Total Europe	890,000	8,482,000	2.4	7

to speed up introduction of RES to the market, and other countries are being pressured to address the issue.

Approximately 890,000 m² of solar collectors are annually sold in Europe (1999), with major markets in Germany, Austria and Greece. Almost half this figure is sold in Germany, while Greece and Austria follow with 160,000 and 141,000 m², respectively. All other countries have smaller market shares (<5% each), amounting to only 19% of the European market (see Table 1).

Table 1 sees the industry on a path of growth, as wished by the EC's White Paper. However, development must accelerate substantially to reach the 2010 target. New applications can yield this objective [7].

Although Greece, with similar climate, has a relatively high density of ST installations, Portugal, Spain and Italy are making hardly any use of the sun so far. Moreover, Portugal, Spain and Italy are still battling problems left over from the past period:

- solar energy has a bad reputation due to the often faulty technology installed in those years,
- the technology has not been yet advanced and
- as oil and gas prices dropped greatly, no new motivation to use solar energy developed.

At present, the markets in Italy and Spain are experiencing a significant growth. In northern parts of Italy, such as South Tyrol, the number of ST plants increased in recent years. Since Italy brought in a national subsidy programme that reimburses 43% of investments through tax rebates, the market is now also expanding strongly into the central and southern parts. In Spain, the ST market remains largely concentrated on Andalusia. The PROSOL subsidy programme, funded jointly by Andalusia and the EU and providing subsidies of 35–45%, has boosted demand since 1997 [6].

3. Methodology of the project PHILOSOL

3.1. Introduction

The PHILOSOL project comprised business partenariat missions in six targeted regions: Napoli, Palermo, Loule, Madeira, Palma/Majorca and Murcia.

The above regions have similar typical characteristics as follows:

- Tourism is a major economic activity.
- There is a huge potential for ST applications.
- Penetration of the ST systems is very low with weak dynamic action (dormant markets).

The selection of these six targeted regions has been based upon:

- The results of the STMG. Sicily was approved by all members of the Group as a region of first priority for further dissemination of ST technologies [8].
- The SMSS elaborated for each targeted region.
- The consultation and desire of the members of ESIF by taking into account the local needs and priorities, including the trade competition among ST suppliers.

In order to analyze and assess the typologies of ST markets, events have been scheduled in two types of market regarding maturity:

- Mature markets with leading roles and concise commercial networks (i.e. Napoli, Palermo) and
- Dormant markets regarding ST applications (i.e. Loule, Murcia),

as well as in two types of region morphology:

- In a continental region in which commercial networks are multi-supplier based (i.e. Napoli, Loule, Murcia),
- In an island region where it was expected that the commercial networks could be interlinked or monopolized (i.e. Madeira, Palma/Majorca).

3.2. Elaboration of SMSS

The purpose of the SMSS was to integrate the results of previous projects in order to depict the main and crucial parameters for the selection of events to pursue in the various markets, taking also into consideration the EU policy regarding opening of local markets and priorities for RES promotion. The appropriate campaigns and other market intervention actions have been identified based on the market analysis (Fig. 1).

For completion of the SMSS, the partners provided, through a questionnaire, the following information:

- sales—forecasts in regions or countries,
- market actors,
- examples from similar actions,
- mass media,
- incentives—tariffs,
- product typologies.

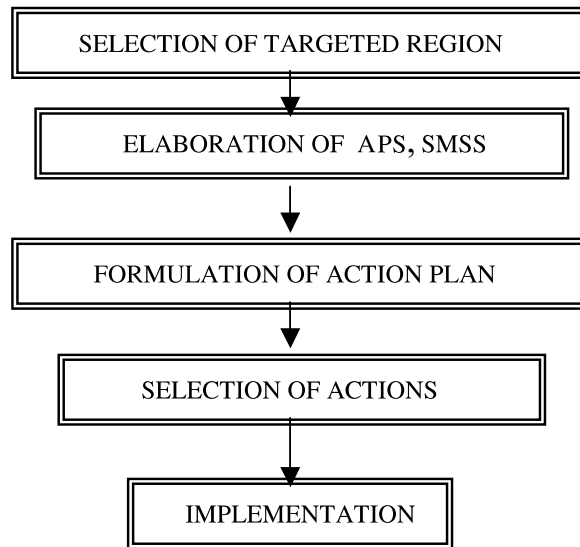


Fig. 1. Overview of the adopted methodological scheme.

As far as previous results were concerned, an important source for new priority actions has been the cumulative experience of the STMG [8]. According to the members of the STMG, as well as of the Steering Committee of PHILOSOL, the following group of projects should have a first priority in the PHILOSOL actions:

- Local, national and European awareness campaigns adapted to the characteristics and needs of each region. The main target was the general public, and the campaigns were conducted through mass media (TV, press) and direct efforts (mailing lists, exhibitions etc.).
- Training of technicians (including plumbers) in order to improve the quality of installations of ST systems.
- Promotion of financing tools, such as third party financing (TPF) or guaranteed results (GRs), especially for large applications.
- Promotion of institutional tools to be applied by European/national policy makers, such as:
 1. tax reduction (value added tax (VAT), direct taxes),
 2. internalization of the external costs for fossil fuel systems,
 3. legislative interventions,
 4. subsidies for exports in Third Countries and
 5. available budget for ST demonstration projects.

3.3. Main market criteria for selection of the actions

The following parameters guided the specific project actions:

- (i) *The current maturity of the local/regional markets:* Areas with high maturity are appropriate for a large campaign through mass media in order to formulate positive attitudes of potential customers. In contrary, areas with low maturity needed to know more about the product by exhibitions and by close cooperation with local manufactures and traders.

- (ii) *The priorities of the European ST industry:* The strategy applied was in harmony with the marketing policy of the ST companies, who desired stimulation of transEuropean agreements and know-how transfer.
- (iii) *The European policy:* To obtain financing support by the EU has been a critical parameter for manufactures. Formulating European priorities in a positive way was very essential for setting up joint ventures inside the EU.
- (iv) *The replication and adaptation of successful examples:* Successful market behavior in some countries (i.e. in Greece) can be replicated for similar areas in other countries under certain conditions (i.e. in Italy).

Additional criteria for selection of the proper PHILOSOL actions were:

- (i) *the geographic position of the targeted region*
 - The most promising markets (ST potential, weather conditions similar to Greece, parallel events relevant to the tourism/hotel sector).
 - The current local facilities for exhibitions and workshops.
 - The previous experience of the local partners of the consortium.
- (ii) *the local involvement in the targeted region*
 - Sensitization of the local market actors.
 - Familiarization of local representatives of the EU manufacturers with the ST products.

The major aim of the SMSS consisted of the implementation of an effective and realistic plan for the appropriate dissemination actions, taking into account the critical market characteristics of each geographic targeted area.

4. Market audits

4.1. Market stocks and market trends of ST in Spain, Italy and Portugal

According to market data provided by local partners and associations, it has been possible to deduce two basic parameters to estimate the size and the annual growth of the relevant market in the six targeted regions:

- the thermal market stock (m² total),
- the annual growth (m²/year) for the regional markets (see Figs. 2–4).

In terms of stock as well as in terms of annual growth, Andalusia remains the most important regional market in all regions. Sicily is a mature market, while the Campania/Napoli market, as well as the Murcia region's market, are still dormant, the latter representing 10% of the Andalusian ST stock or a 3% of the total Spanish stock (see Fig. 2).

Market growth in Spain and Italy is estimated equal to more than 20,000 m² yearly, while Portugal reaches 6,000 m² yearly.

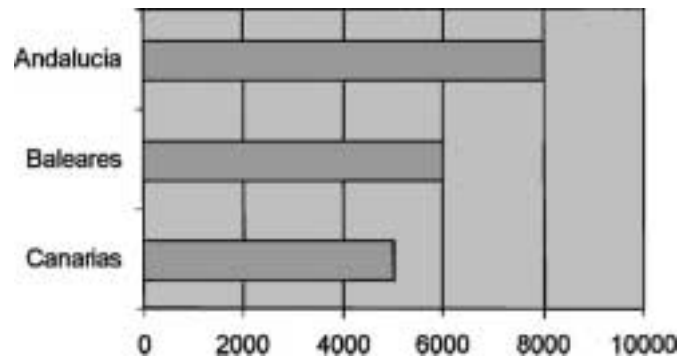


Fig. 2. Market growth (m²/year) in the various Spanish regions.

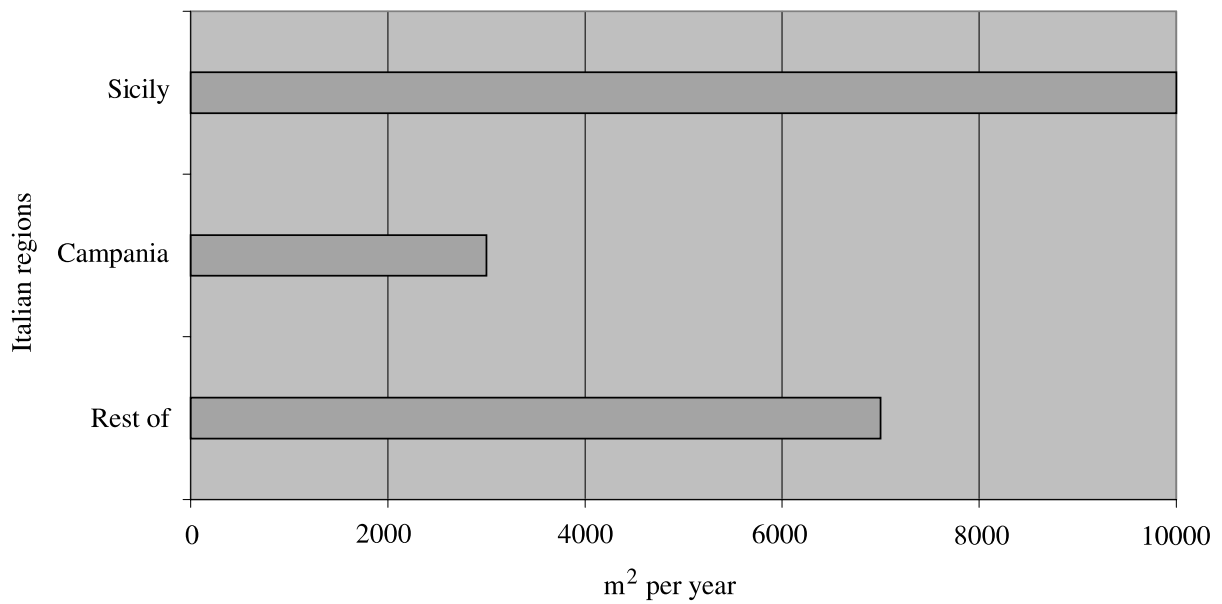
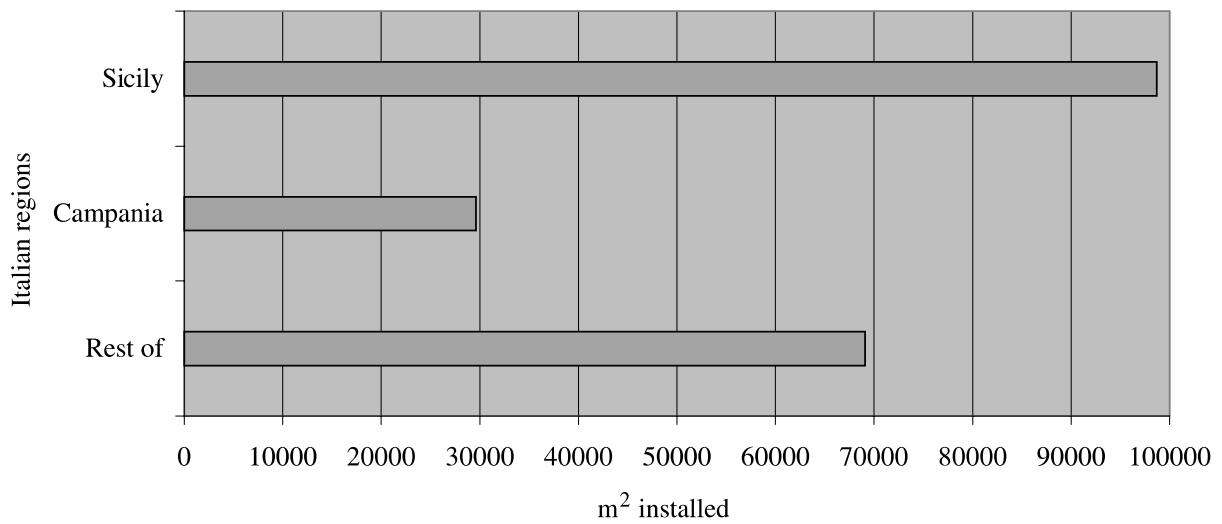


Fig. 3. ST market stock (m² total at 31-12-1997) and market growth (m²/year) in the various Italian regions.

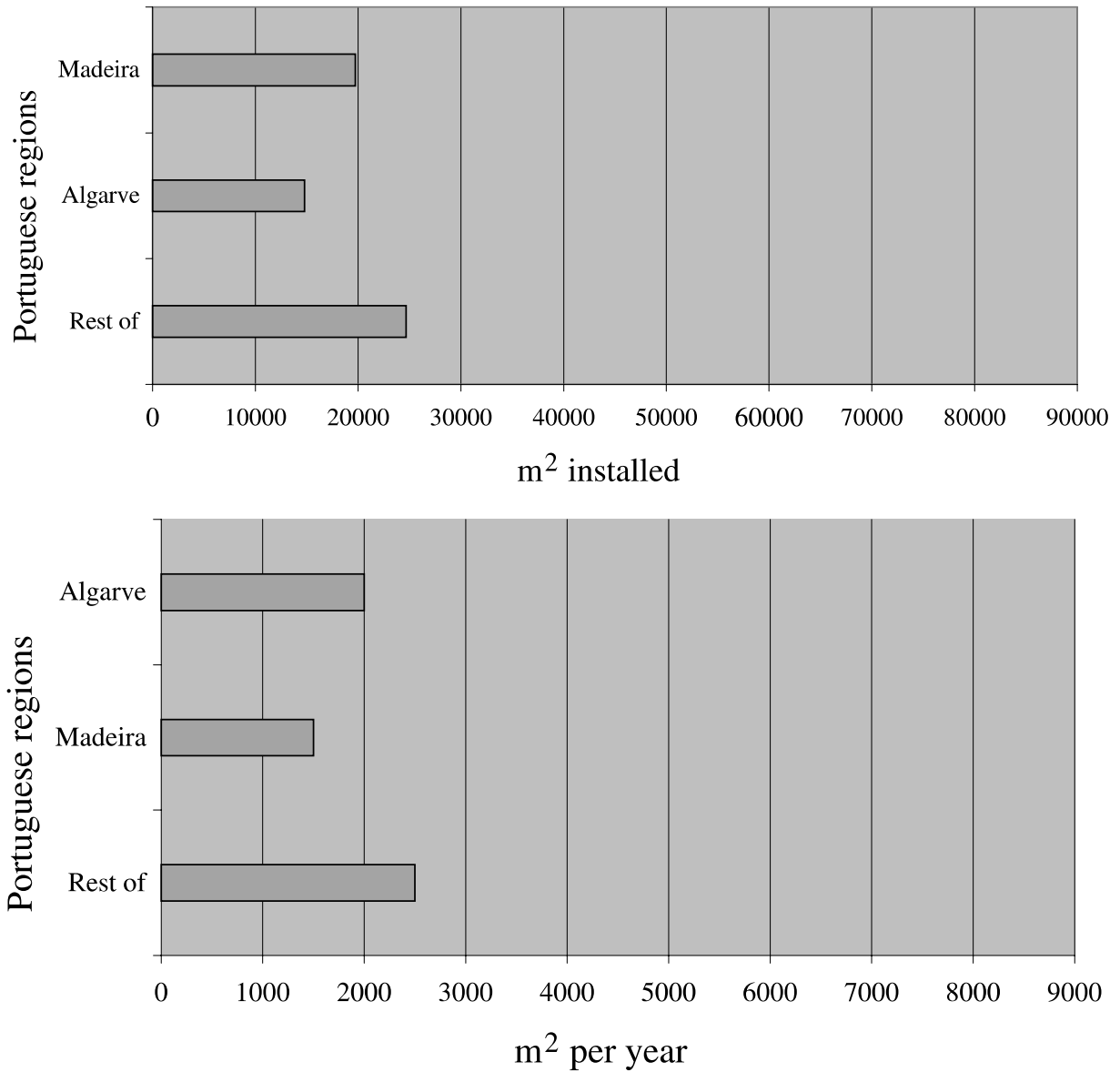


Fig. 4. ST market stock (m² total at 31-12-1997) and market growth (m²/year) in the various Portuguese regions.

4.2. Characterization of the markets

Table 2, an issue from the SMSS, displays a list of crucial market aspects accompanied by their importance (in a qualitative scale 0–10) observed in the targeted regions.

The relevant market aspects have been determined as follows:

In favor of ST penetration:

- *High tourism activity.* The region faces a large influx of domestic tourism during the summer months. It suffers from summer seasonality in the energy demands (especially hot water de-

Table 2

Evaluation of various market aspects for six targeted regions regarding the promotion of ST technologies (scale 0–10)

Market aspect	Napoli/Palermo	Algarve, Madeira	Balearics, Murcia
<i>Opportunities</i>			
High tourism activity	9	8	10
Large solar potential	10	9	10
Favorable building architecture	10	5	5
Local manufactures and suppliers	10	4	8
Operational commercial network	9	6	8
<i>Threats</i>			
Poor public awareness		8	5
Poor past experience	5	7	7
Natural gas	8		
Hotels with no central heating	0	7	0
Particular geographic morphology		10	
RES alternatives	4	7	5
Shipping costs		7	7

mands). For instance the Campania/Napoli region is very well known in Italy and attracts a lot of tourism (vicinity to the Island of Capri, Sorrento, Amalfi, Positano and the Isle of Ischia).

- *Large solar potential.* The region has many sunshine hours with relatively high ambient temperatures throughout the year and, thus, offers ideal environmental conditions for the ST market.
- *Favorable building architecture.* Building architecture in the region consists mainly of flat roofed houses. This makes the installation of ST systems easier and more cost-effective.
- *Local manufacturers and suppliers.* In the region, there exist factories of local manufacturers, suppliers and technicians involved in the wider heating and air conditioning sector with experience, expertise and technical know-how, who are able to provide technical support for ST systems.
- *Operational commercial network.* A relatively good commercial distribution network of ST systems exists in the region (i.e. ST systems can be seen and bought at shops where sanitary equipment, such as bathtubs, sinks, toilets etc., is sold).

In hindering ST penetration:

- *Poor public awareness.* ST systems are very little known. The general public is unaware of the capabilities, advantages and environmental benefits of ST systems.
- *Poor past experience.* The public in the region is still reluctant to buy ST systems due to bad experience in the past years (i.e. poor quality, bad performance).
- *Natural gas.* The region has a large domestic production of natural gas, which is cheaper than electricity rates and, therefore, offers ST systems a very fierce competition.
- *Hotels with no central heating.* Many hotels in the regions are old (20–30 years) with no central heating. This makes installation of ST systems in the hotel sector very difficult.
- *Particular geographical morphology.* The region is not very suitable for the ST market. For instance, Madeira is a tropical island that has a mild, tropical climate throughout the year.

Despite this, the island also has a large amount of rainfall (reduced sunlight) over the inland area of the island.

- *RES alternatives.* They concern mainly hydroelectric power and biomass as more viable alternatives to conventional energy sources than solar energy. Thus, these RES, perhaps, receive greater support and consideration.
- *Shipping costs.* This is particularly true for the islands, i.e. large cost of shipping cargo from Oporto to Funchal makes the cost of the ST system too expensive.

4.3. SWOT analysis

As a result of the cumulative experience from previous actions:

- The planning and monitoring of the performance of the campaigns have to be done more systematically.
- The workshops and exhibitions of solar collectors should take place within larger sectorial events (i.e. building materials, RE Congresses or Exhibitions).

Tables 3 and 4 summarize the results of the strengths, weaknesses, opportunities and threats (SWOT) analysis, as well as the results of the marketing mix of the ST product by taking into account the previous experience of the authors [9].

Table 3
SWOT analysis applied for the Southern Europe ST markets

<i>Strengths</i>
<ul style="list-style-type: none"> • Mature technology • Economically reasonable • Comfort for the consumer
<i>Opportunities</i>
<ul style="list-style-type: none"> • EC's White paper and Take off campaign • High energy cost • On-time penetration in new developing markets • ST systems usually have positive social acceptance • Joint ventures with new trade partners
<i>Weaknesses</i>
<ul style="list-style-type: none"> • Need to train the plumbers or other installation personnel • Inadequate international labeling • Integration of ST systems in the architecture • Low advertising budget
<i>Threats</i>
<ul style="list-style-type: none"> • Low environmental awareness in some regions • Seasonality • Competition from countries with low labor cost • Discredit due to bad previous examples • Natural gas introduction in the local networks

Table 4

Results from the marketing mix applied for the Southern Europe ST markets (source: [9])

<i>Product</i>
<ul style="list-style-type: none"> • The quality of the ST system • All the relevant packaging • Support after installation
<i>Place</i>
<ul style="list-style-type: none"> • Development of the distribution channels • Logistics • Optimization of the transportation system
<i>Promotion</i>
<ul style="list-style-type: none"> • Appropriate advertising • Promotion by trade actions • Wide publicity
<i>Price</i>
<ul style="list-style-type: none"> • Level of price • Potential discounts • Conditions of payment

Success factors to prepare markets: The development of a ST market depends on various factors. Not all aspects of a market need to be fully developed to achieve growth. As the ST markets show, the causes for success can be quite varied. Long term market penetration on the scale projected by the EC's White Paper [10] will only succeed, however, if all factors favoring ST energy are developed more positively than now. Important success factors for comprehensive market introduction are:

- (i) *Motivation of the population*
 - high environmental awareness,
 - high energy costs,
 - subsidy programmes,
 - image campaigns to raise awareness.
- (ii) *Technical product development*
 - increasing the durability and reliability,
 - adapting ST technology to household technology (hot water supply),
 - integration in heating technology,
 - integration in the architecture, e.g. in the roof or facade,
 - development of new applications, e.g. solar cooling,
 - cost reduction.
- (iii) *Distribution and sales*
 - inclusion in the product range of heating traders at all levels of the distribution process (wholesale, retail),
 - building distribution nets,
 - training of personnel in distribution and sales,
 - training of field sales force.

(iv) *Consumer consulting and installation*

- acceptance by craftspeople, marketing by them,
- technical training of craftspeople, initial and follow-up training programmes,
- sales training for craftspeople,
- information material available to craftspeople for consumer consulting.

(v) *Projecting and planning*

- acceptance by decision makers in the building sector (architects, house technology planners, etc.),
- integration in training,
- demonstration projects/architecture competitions.

A great opportunity for boosting market introduction in the, as yet, poorly developed markets lies in tapping the wealth of know-how gathered by countries with developed markets. Products and the norms connected with them can be used, as can the experiences in marketing and training. Experience is currently being won with information campaigns in Germany and soon in Austria, and there is knowledge gained in previous years in the Netherlands, Denmark and Greece to draw

Table 5
Marketing action plan

Subgroup	Subject
Events	<ul style="list-style-type: none"> • Solar energy and architecture • Industrial mission in selected European regions (e.g. Sicily) • Production incentives, exports incentives • Vocational training for technicians • Energy audits for house owners
Campaigns	<ul style="list-style-type: none"> • Integrated campaigns (mass media, publications, CD-ROMs, internet, videos) • Local campaigns (videos, leaflets) • Campaign combined with gas
Financing STT investments	<ul style="list-style-type: none"> • Set up of a ST financial institution • Promotion of TPF procedures in concrete projects • Tax reduction • District financial incentives to manufacturers
Publications	<p><i>Examples</i></p> <ul style="list-style-type: none"> • Brochures and manuals on urban areas and guaranteed results • Specific publications for the use of solar systems in buildings
Electronic dissemination tools	<ul style="list-style-type: none"> • Database and mailbox in internet • Support of various events
Studies	<ul style="list-style-type: none"> • Energy plans at regional level • Selected case studies—solutions • Cooling and heating
Other	<ul style="list-style-type: none"> • Demonstration • New regulations • Establishment of info centres

on, too. For that knowledge potential to be tapped, exchange and cross border cooperation need to be promoted. It is also important to open the market to foreign suppliers and to avoid protectionism, which is sometimes practiced covertly through technical demands in national or regional subsidy programmes. The assumed disadvantage in a market opening is by far outweighed by the advantage of the inflow of know-how and a greater working of the market.

A global example of a marketing action plan is presented in Table 5. Although the list of the potential subjects could be inexhaustible, the suggested items seem to be the most critical.

5. Deployment of the strategic plan

A multi-purpose mixture of actions has been selected per targeted region:

- *Promotional leaflets*, which were mailed to the potential local/regional audience (technicians, engineers, experts). The A4-page leaflet presented the PHILOSOL project. It has been edited in English, Italian, Spanish and Portuguese and distributed during workshop events.
- *Business missions* of EU companies in the targeted regions, where managers of enterprises—members of ESIF met local partners, such as manufacturers (tubing, heating ventilation, air conditioning—HVAC), craftsmen (plumbers, sanitary equipment), entrepreneurs (building works, public works), hotel and hospital managers and local authorities.
- *Exhibitions* of solar collectors.
- *Workshops* to involve the local market actors and to inform the local/regional audience, during which presentations concerning the local ST market, the European market and the participating companies were made.

According to the Strategic Plan, ESIF and CRES, in close collaboration with the local partners, realized six missions comprising business trips, exhibition of technological samples, workshops and partenariat business meetings.

The local partners in the six targeted regions of the partenariat missions were:

- CCE-APISOLAR (national level), also sponsored by NERA-AREAM (regional level), for Portugal.
- ASTER-ASSOLTHERM (national level), also sponsored by ANEA-MEDEA (regional level), for Italy.
- ASENSA-IDAE (national level), also sponsored by the local Government of Murcia (regional level), for Spain.

Missions have been realized in:

- Loule/Algarve (29–30 January 1999). Loule has been selected due to its exhibition facility (NERA), which also offered sponsoring and translation facilities. There was a satisfying number of participants, but very few business agreements were reached.
- Napoli/Campania (12–13 February 1999). Napoli has been selected due to its growing market and the interesting promotion projects of the local agency (ANEA) that also offered sponsoring,

local promotion and press releases. The event took place at the Hotel San Germano, and it was considered a good success with a satisfying number of participants and various business agreements.

- Palermo/Sicily (12–13 March 1999, see Picture 1). Palermo has been selected due to its growing market and the interesting promotion projects of the local agency (MEDEA) that also offered sponsoring, local promotion and press releases. The event was considered a big success with a satisfying number of participants and various business agreements.
- Funchal/Madeira (6–10 October 1999). Funchal has been selected due to its role as the major touristic and financial town in Madeira. The event took place at the Exhibition Centre of Madeira. The event was not considered a success as the local professionals and population showed very little interest in the event, and no business agreements were reached.
- Murcia/Spain (18–19 March 2000). Murcia has been selected due to its growing market and the interesting promotion projects of the local Government of Murcia that also offered sponsoring and local promotion. The event took place at the Murcia-Melia-7 Coronas Hotel and was considered a good success with a satisfying number of participants and various business agreements.
- Palma/Majorca (26–27 May 2000). Palma has been selected due to its role as the major touristic and financial town in Majorca. The event took place at the Melia Confort Palas Atenea Hotel and was relatively successful with a number of participants and various business agreements.

In order to attain the aims of PHILOSOL, a strong preparation was applied to maximize the performance of all the events (market survey, preparatory trips, mass media releases, local promotion actions and targeted mailing).

6. Results and conclusions

6.1. Synthesis

Forty-two visitant EU manufacturing companies were involved in 63 business partenariat missions to EU regions (Murcia, Majorca, Algarve, Madeira, Napoli and Sicily). During the six events, the visitant manufacturing companies met with 226 local professionals. The number of local professionals, allocated per area of interest, during the PHILOSOL events (throughout 1999–2000) is shown in Fig. 5. Moreover, 16 press actors (TV, radio, newspapers and magazines) have been involved in local promotion.

In response to these actions there were two types of reactions:

- The Workshops (a core element of the Organization for the Promotion of Energy Technologies, OPET, and relevant partners) were absolutely successful, with a high promotion impact in the field of solar energy.
- Because of their own characteristics, as missions in new markets, the exhibitions and trade actions were less successful.

As a characteristic result of the PHILOSOL project, a different performance in the targeted regions is reported:

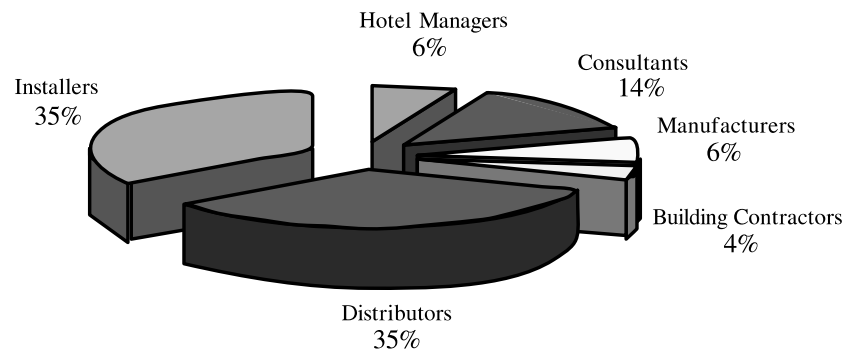


Fig. 5. Number of local professionals, allocated per area of interest, throughout the six PHILOSOL events.

- In the Italian and Spanish regions, the ST market is latent and dormant due to various reasons, but with the *appropriate support by sectorial promotion campaigns and missions, it is estimated to develop in the future.*
- In the Portuguese regions, ST products are almost unknown (as well as the current trade network for similar actions, such as heating equipment), and the technology has very low maturity for dissemination. *Consequently, more demonstration actions should be realized in the future.*

Finally, it is estimated that some 10 business agreements are today under operation as a result of the PHILOSOL events.

6.2. Regional particularities

6.2.1. Italy

Southern Italy has a good commercial network, linked with local manufacturers, distributors and installers and the general public. Although not as well informed as they should be, they are aware of ST energy and its potentials.

What is required in Southern Italy presently, besides aid in the form of financial incentives from the regional or national governments, is a *sectorial promotion campaign*. The aim of this campaign should be to promote ST energy in specific promising sectors (i.e. hotels, hospitals, public buildings and sports centers). This will help to stimulate large ST systems in large buildings and will, thus, advertise the systems more efficiently. By promoting the systems in specific sectors, the manager of the building in question is able to relate more directly to the applicability of the systems to his building. By installing large systems in well known buildings of the area, the demonstration component is enhanced, as is the marketing value of the systems.

For further stimulation of the Italian market, sectorial campaigns are recommended.

6.2.2. Portugal

The Portuguese ST market is at a low maturity level. It has few products and a poor solar related commercial network. The main barrier to overcome is the low awareness of the general public. The positive aspect of the Portuguese events was the coverage of the events by the local

newspapers, magazines and TV stations, which attended both presentations and exhibitions and reported them, took photographs and conducted interviews.

The Portuguese events proved that the Portuguese public was not yet ready for such an event. The general public still knows very little about ST systems. *Portugal is in need of a public awareness campaign that will inform the people of the basic aspects of ST technology* (i.e. description, operation, performance, energy savings and environmental benefits). This aim of the campaign should be to increase the awareness and understanding of the general public, thereby stimulating the market and increasing its maturity level.

For further stimulation of the Portuguese market, a public awareness campaign is recommended.

6.2.3. Spain

The ST market is at a relatively good maturity level (for Majorca) and low maturity level (for Murcia). It has good quality local products and a good commercial network. The main barrier to overcome is the reluctance of the general public due to their previous bad experience and the competition of other conventional fuels. Local competition and/or protectionism are also delicate issues that must be confronted. *A sectorial campaign* (houses, hotels, hospitals, government buildings etc.) is required for a more effective penetration.

For further stimulation of the Spanish markets, sectorial campaigns are recommended.

6.3. Perspectives of the solar thermal market in, Italy, Portugal and Spain

Short term perspectives: Based on post campaign figures, approximately 1.05 million m² of solar collectors are sold in Europe (2000). The trends seem to be positive for Spain (+50%) and Italy (+20%) and negative for Portugal (−10%) [3]. These figures are compatible with the findings of the PHILOSOL project.

According to the results of the PHILOSOL project and taking into account the above mentioned particularities in the concerned EU regions, the following actions are suggested:

- In the Italian and Spanish regions, the ST market is latent and dormant due to various reasons, but with *appropriate support by campaigns and missions, it is estimated to develop in the future.*
- In the Portuguese regions, the ST products are almost unknown (as well as the current trade network for similar actions, such as heating equipment), and the technology has very low maturity for dissemination. *Consequently more demonstration actions should be realized in the future.*

Moreover, as far as selection of task regions is concerned, Northern EU regions, which have not as much solar energy potential available but have important investment programmes related to the general public environmental awareness, must be considered as task regions for future market expansion of ST technology. This is the case of UK, Finland and Sweden. Furthermore, there is need for market expansion in combination with know how exchange from new, advanced markets, such as Israel, and thus, this country becomes a considerable task country.

Furthermore, third countries must be considered as task regions for future market expansion, such as other Mediterranean and Latin American countries.

Long term perspectives: Overall, much work is needed in order to give the European ST markets the necessary tools to reach the targets set. The industry is only beginning to move into the heat markets. The experiences of the more advanced countries show that more than a product and a subsidy programme are needed. Solar energy can become an intrinsic part of household technology if the following requirements are fulfilled:

- a large offering of adapted products,
- integration in the heating technology market,
- the buildup of distribution nets,
- the acceptance and training of craftspeople,
- the motivation of the population by subsidy programmes,
- information and image campaigns.

In addition, there is the task of opening up new market segments beyond hot water supply in private households, such as solar heating, large scale solar plants and solar cooling, which will all play increasingly important roles in the solar economy of the 21st century.

Acknowledgements

This paper used as a main source the actions of the PHISOLOL project. PHILOSOL, which is supported by the Directorate General for Energy and Transport (DG TREN), Thermie and Altener programmes, traced the recommendations of the EU ST Marketing Group 1996 and aimed at developing and at implementing a ST market strategy in Europe.

References

- [1] European Solar Industry Federation. Sun in action. The solar thermal market. A strategic plan for action in Europe, ALTENER Programme of the DGXVII, ESIF, EBHE, 1996. p. 194–209.
- [2] Final report. PHILOSOL project, local market stimulation and business development in Southern Europe. THERMIE & ALTENER projects, European Commission, 1998–1999.
- [3] Lamarinis P, Stry-Hipp G. The solar thermal market—a strategic plan for action in Europe. In: The Conference The ALTENER Programme. Renewable Energy entering the 21st Century, Spain, 25–27 November 1996. p. 1–7.
- [4] European Commission. Energy for the Future: RES (Community strategy and action plan). Campaign for take-off. 1999.
- [5] Various. Solar thermal barometer. Systemes Solaires, no 143, June 2001.
- [6] Stry-Hipp G. The European solar thermal market, 5th International Symposium, Gleisdorf, Austria, September 2000.
- [7] Karagiorgas M, Botzios A, Tsoutsos T. Industrial solar thermal applications in Greece. Economic evaluation, quality requirements and case studies. *Renew Sustain Energy Rev* 2001;5:157–73.
- [8] Theocharis Tsoutsos. Reports of the Solar Thermal Marketing Group, a THERMIE-OPET and THERMIE Programme action by CRES and ESIF, 1993–1998.
- [9] Theocharis T. Marketing solar thermal technologies: strategies in Europe, experience in Greece. *Renew Energy* 2001;26(1):133–46.
- [10] European Commission. Energy for the Future: RES. White paper for a Community Strategy and Action Plan, COM(97)599 final, p. 49.