



ECOFYS

Ecofys bv
P.O. Box 8408
NL-3503 RK Utrecht
Kanaalweg 16-G
NL-3526 KL Utrecht
The Netherlands
www.ecofys.nl

tel +31 (0)30 280 83 00
fax +31 (0)30 280 83 01
e-mail info@ecofys.nl

SOLTHERM EUROPE - EUROPEAN MARKET REPORT

Edited by: Bart van der Ree

With the collaboration of:

- Christian Fink and Ernst Blümel (AEE INTEC)
- Christiane Egger (ESV)
- Luc Degheselle (3E)
- Klaus Ellehauge (Ellehauge)
- Bruno Gagnepain (Ademe)
- Reinhardt Six (RAEE)
- Olivier Drücke (Door2Energy)
- Gerhard Stryi-Hipp (DFS/BSi)
- George Markogiannakis (CRES)
- Martin Ménard (Ambiente Italia)
- Frank Zegers, Maarten de Bruijn and Giel Linthorst (Ecofys)
- Jaume Serrasolses (Trama Tecnoambiental)
- Gema Torres (ICAEN)
- Monika Munzinger and Nick Davies (BRE).

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Foreword

Solar heating can make a significant contribution to meeting the EU's Kyoto targets for CO₂-emission reduction. The Soltherm Europe Initiative is the central action network in which all parties can contribute to the realisation of this target are brought together under one umbrella, with the goal to make an important contribution to EU's CTO target of realising 15 million m² of total installed collector area in 2004.

The most promising market segments for a solar thermal market development strategy are the renovation market of water heaters in single houses, collective water heating systems, combined solar space and water heating systems and solar water heaters for new housing. A crucial link in the market development is to give potential buyers good information and to guide them to trained and motivated sales and installation organisations. The Soltherm Europe Initiative aims to create this link in all EU countries by creating a co-operation between sales and installation companies and info centres and information campaigns. Much synergy can be gained by co-operation at the European level and by collaboration with existing initiatives.

In this European Market report, the European markets for solar heating products are analysed and described in thirteen 'Country and Region Summaries'. Success factors and challenges for new market acceleration actions are given, based on the experience of the last decade of market development in European countries. Soltherm Europe is also making available several other resources and tools for market actors in the solar thermal branch:

- ☀ A central web-site, www.soltherm.org, with general information
- ☀ An on-line database of tools and resources used by market actors and campaign organisers throughout Europe. Each tool is accompanied by a concise description on how and when to use it, in English and in the language of the tool.
- ☀ Campaign Guidelines that bring together the experiences and lessons learned from European solar water heater promotion campaigns in the last decade
- ☀ An overview of quality management tools relevant to solar thermal products and installation

Utrecht, **February 2003**

SUMMARY

This report is a synthesis of thirteen Market Analysis Reports – for ten European countries and for three regions - published in the framework of the EC Altener project ‘The Soltherm Europe Initiative’. It highlights main patterns and aspects of the situation in the European markets for solar heating products and analyses how these markets have developed and what underlying factors have influenced them. Furthermore, measures to overcome non-technical barriers to market introduction are discussed, including incentives, regulations and agreements, and opportunities and potentials for new market actions and campaigns are identified.

The cumulative solar collector area installed in the EU through 2001 is about 11 million m², which is 0.029 m² per inhabitant or 0.073 m² per household. Collector sales in 2001 have amounted to well over 1,000,000 m² with considerable changes between countries and even regions. EU market growth 1999 and 2000 was approx. 10% per year and acceleration is expected. In absolute terms, Germany has the largest market. Austria and Greece lead Europe in penetration with both about 0.29 m² per inhabitant – ten times the average European penetration.

It is expected that the market will continue to grow, but a steep market growth will be needed to meet the European White Paper target of 100 million square meters of solar collectors installed by 2010. Extra supporting measures are necessary to further accelerate the European solar thermal market to meet this goal, including increased efforts for targeted, local/regional and national market stimulation campaigns and knowledge exchange between such actions, support for well-organised demonstration projects in smaller markets, knowledge transfer and training programs towards installers and more powerful quality management.

Presently there are about 340 manufacturers active in solar heating in the investigated countries. The European heating industry has started to take over solar manufacturers in order to extend its product range, most notably in Germany, Austria and the Netherlands. Components of solar thermal systems like absorbers and pumps are traded internationally. The market for complete solar thermal systems (collector, storage and control) is still mainly national.

Success factors for market acceleration actions have been inventoried from experiences in the past decade. Important success factors include the coupling of thorough quality management to intensive promotion activities, intensive and complete campaigns uniting the most important market actors and stakeholders, combining intensive actions creating demand with adequate actions to effectively meet that demand, and coupling quality requirements and educational activities to promotion schemes.

Bottlenecks include the need to increase the interest of installers, roofers and engineers in the utilisation of solar energy, and to give them a stronger role, as they are the first contact in energy advice. The goal must be that installers offer solar plants in an active manner, instead of viewing the technology as an 'alternative'. Further, unstable policies and inefficient incentives can seriously damage the production and sales chain as well as consumer confidence. The integration of the products into architecture is still a point for improvement. In all markets, there is still a need for information on solar thermal applications, their possibilities and advantages.

High quality systems are available in all European countries. However, in some countries also systems with inferior quality levels are sold and often it is not easy for the customer to find good information on the quality of the products on the market. This is a major barrier to market growth in these countries.

Some important lessons learned in the various countries include:

- ☀ communication and networking between all actors is an important factor for success;
- ☀ marketing approaches should be used sensibly because the same approach can lead to different results when applied in different conditions;
- ☀ intensive market activities with well-organised follow-up, maybe restricted to certain sectors or regions in order to limit the budgets, are an adequate approach to the challenge to bring consumers from relative ignorance to a purchase decision, and at the same time organising the supply and quality well;
- ☀ rather than having a large number of informed but ill-motivated installers, it is important of working towards well-motivated, proactive solar heating installers who know how to install but also how to sell a solar system.

Further development of the market of solar water heaters for single houses is crucial for achieving the goal of the EU of 100 million m² in 2010. Opportunities for specific countries are given. The most obvious general market development strategy is the renovation market of water heaters with single-family solar water heaters and solar combi-systems (space and water heating). Combined with developing the market of collective water heating systems and other special markets, the 100 million m² collector area could be reached. This means that solar thermal technologies can reach an energy reduction of about 1.5% of the European energy consumption, which is a significant contribution (almost 20%) to the Kyoto goals.

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1 Introduction

This report is a synthesis of thirteen Market Analysis Reports – for ten European countries and for three regions - that have been published in the framework of the Soltherm Europe Initiative project. It highlights a number of main patterns and aspects of the situation in the European markets for solar heating products, and analyses how these markets have developed and what underlying factors have influenced them.

Furthermore, the supply and demand sides are discussed, costs and prices given, and measures to overcome non-technical barriers to market introduction are discussed, including incentives, regulations and agreements.

It identifies opportunities and potentials for new market actions and campaigns. It thus serves as a background document on parties wanting to increase the market for solar thermal products.

The report was based largely on country reports published by the Soltherm team members:

- ☀ Austria: Christian Fink and Ernst Blümel (AEE INTEC) with separate information for Upper Austria by Christiane Egger (ESV)
- ☀ Belgium: Luc Degheselle (3E)
- ☀ Denmark: Klaus Ellehauge (Ellehauge)
- ☀ France: Bruno Gagnepain (Ademe) with separate information on the Rhone-Alpes region by Reinhardt Six and Christine Joder (RAEE)
- ☀ Germany: Olivier Drücke and Gerhard Stryi-Hipp (Door2Energy / DFS)
- ☀ Greece: George Markogiannakis (CRES)
- ☀ Italy: Martin Menard (Ambiente Italia)
- ☀ Netherlands: Bart van der Ree, Maarten de Bruijn, Giel Linthorst (Ecofys)
- ☀ Spain: Jaume Serrasolses (Trama) with separate information on the Catalonia region by Gema Torres (ICAEN)
- ☀ UK: Monika Munzinger, Nick Davies (BRE).

2 The EU Solar Water Heating Market

Every European market for solar heating products has its own story of development. In the past decades, the markets of individual countries have shown their own rises and falls. However a number of markets share an overall basic pattern of a first development in the 1970's and early 1980's as a result of the oil crises. Then, a number of markets collapsed in the 1980's as a result of low oil prices and decreases in government support. In addition, in some countries the quality of the products and/or installation was insufficient, which created a long-lasting poor image of the products. In the 1990's, most markets grew strongly, partly as a result of commitment of the public, authorities and market parties to environmental concerns.

In this chapter a description and analysis of the present market for solar thermal products is given, with a focus on the main product: solar water heaters for single-family application. The term 'solar water heater' or SWH will in most cases be interpreted to include solar combi-systems that contribute to hot water supply as well as to space heating.

2.1 Size

In this section, a short overview of the market statistics is given. No extensive overview of market statistics is given, as the goal of this report is to analyse the underlying factors and find action opportunities. Furthermore, market statistics on the European solar thermal market are presently available from several other sources like DFS [3], IEA [4], the PRETIR report [5], Sunrise [6], Euroserv'Er [7] and in the near future from ESTIF [8].

The current situation of the solar thermal market can be summarised as follows:

- ☀ The cumulative solar collector area installed in the EU through 2001 is about 11,000,000 m², which is 0.029 m² per inhabitant or 0.073 m² per household.
- ☀ In the past 20 years growth rates of the EU collector market varied considerably per year, varying from -20% (1987) to +50% (1992) with an average growth rate of 13% since 1990.
- ☀ Collector sales in 2001 have amounted to well over 1,000,000 m²
- ☀ The value of the market at present can be estimated at about 500 million Euro per year.
- ☀ The EU market growth 1999 and 2000 was approx. 10% per year and acceleration is expected.
- ☀ The sales in Germany represent 50% of the annual EU collector sales at the moment
- ☀ Yearly market growths per country vary from 0% to > 20%.

In Table 1, the market size, trend and plans for the year 2010 are given for European individual countries and regions.

Table 1: Present market size, trend and development goals for a number of European countries and regions.

Country / Region	Source	Total installed (m ²)	2001 (m ² /a)	Trend now	Target 2010 (m ² /a)
GE	DFS	4,365,000 (2001)	900,000	-	10,000,000
AT	AEE	2,371,000 (2001)	170,000	=	400,000 – 600,000
BE	3E	25,000 (2001)	3,500	++	
FR (incl. overseas terr.)	Ademe	554,500 (2001)	35,500	+	
GR	CRES	2,960,000 (2000)	150,000	=	
IT	DFS/AI	271,000 (2000)	55,000	++	700,000
SP	TTA	400,000 (2000)	40,000	+	
NL	Ecofys	218,000 (2001)	27,000	=	150,000
SW	DFS	172,000 (2000)	15,000	+	
DK	Ellehaug	259,000 (2000)	13,000	--	
UK	BRE	170,000 (1997)	10,000	+	
Upper Austria	ESV	550,000 (2001)	45,000	=	45,000
Catalonia	ICAEN	30,000 (2000)	7,000	++	70,000
Rhone-Alpes	RAEE		1,300	++	

In absolute terms, Germany has the largest solar thermal market in Europe. Austria and Greece lead the European market in terms of penetration with both a penetration of about 0.29 m² per inhabitant¹ – ten times the average European penetration. Counted in installations per household, Greece has the highest penetration (installations per households): in Greece about 22% of the households have a solar water heater whereas in Austria 13% of

¹ Based on the figures for 2000, the cumulative installed collector area in Greece in 2001 can be estimated at 3.1 million m². For Austria, covered and uncovered collectors are included in this figure.

all one and two family homes possess a solar water heater. This difference is related to the fact that in Austria each installation has a much larger collector area than in Greece.

Within countries, the penetration in different regions often varies widely, for instance in Germany.

Based on the data of Table 1 and the above-mentioned references, the market situation can be summarised in Figure 1 to Figure 5. These figures present data for glazed collectors only. In Austria, the Netherlands, Germany and some other countries there is also a significant market for unglazed solar collectors.

In Figure 4 and Figure 5 a strong growth of the German market is visible until 2001. Preliminary data for 2002 suggest a decline in 2002, see also 2.2.

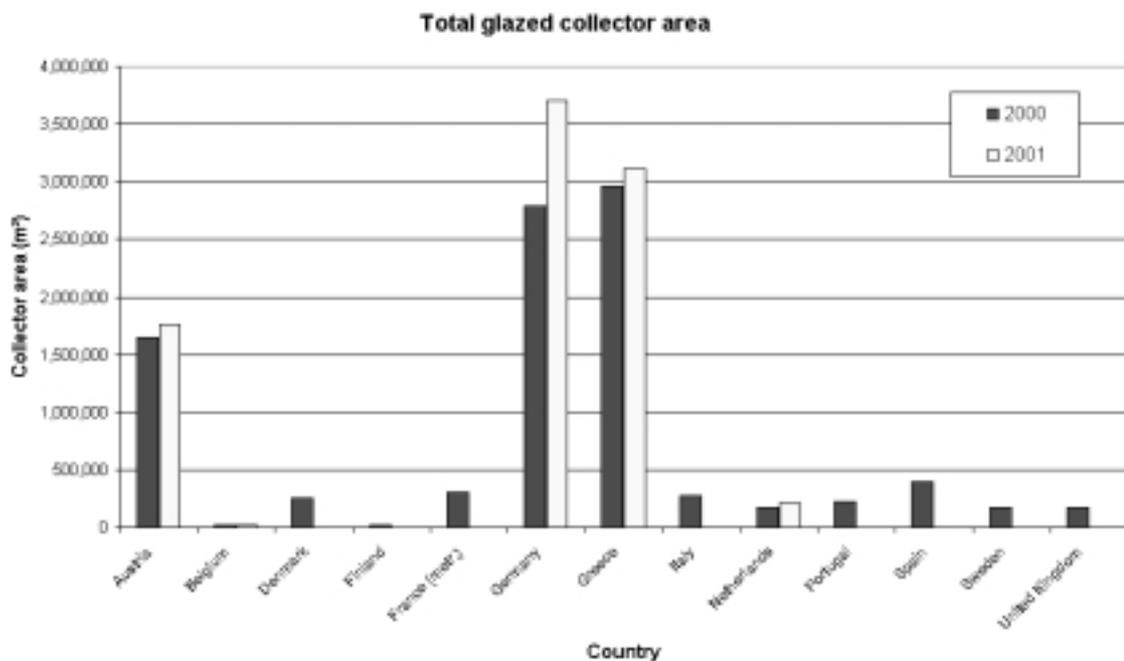


Figure 1: Total installed area of glazed collectors per country

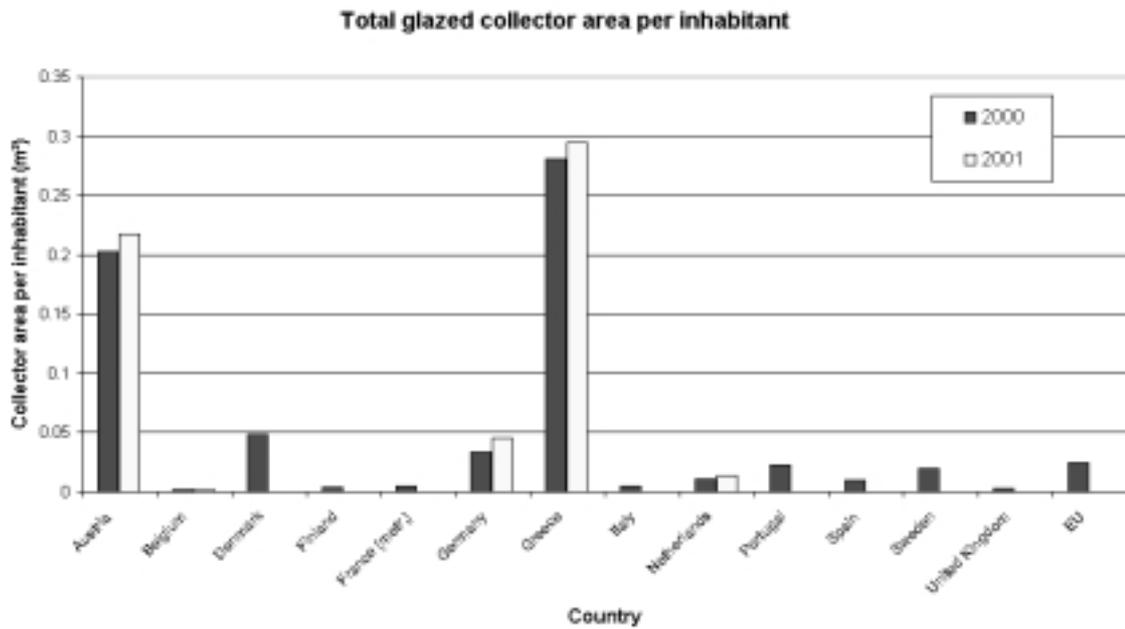


Figure 2: Total installed area of glazed collectors per inhabitant

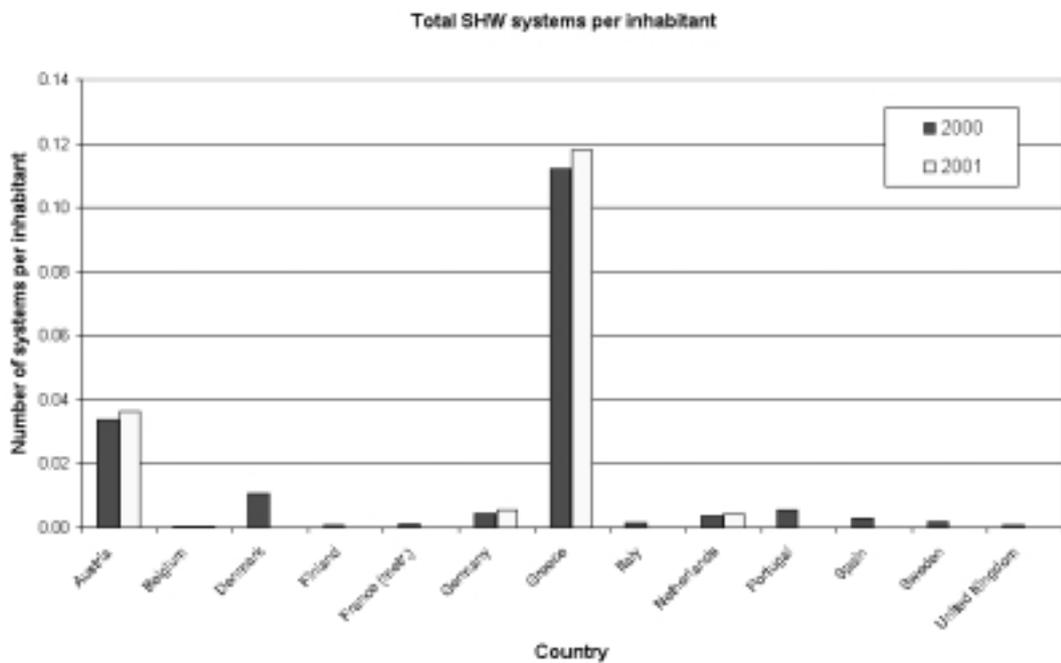


Figure 3: Total installed number of installations per inhabitant².

² Derived using average sizes of SWH installations.

Yearly installed glazed collector area

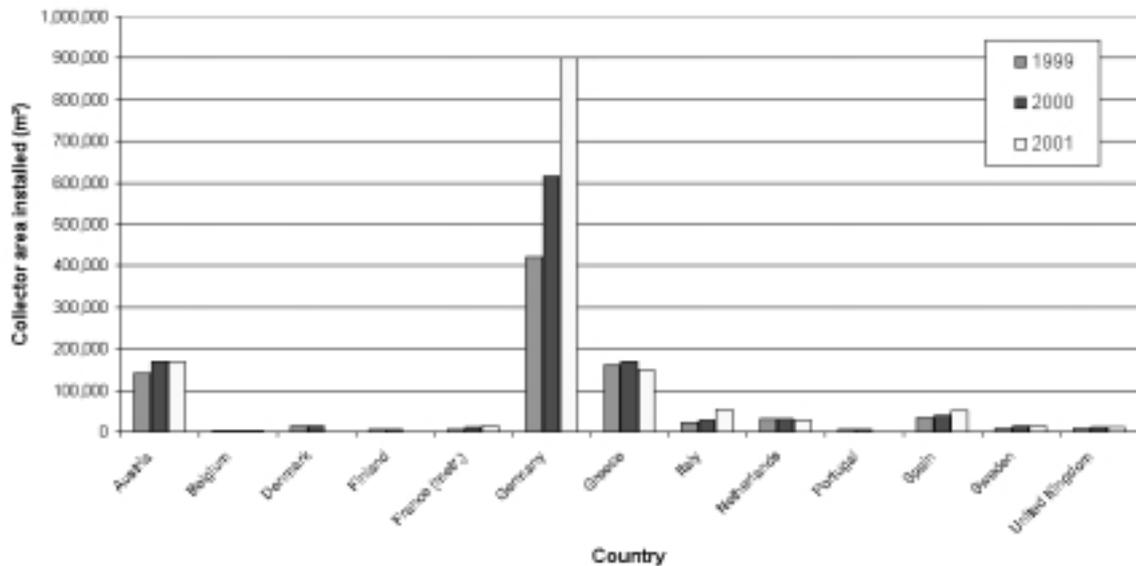


Figure 4: Yearly installed area of glazed collectors per country

Yearly installed glazed collector area per inhabitant

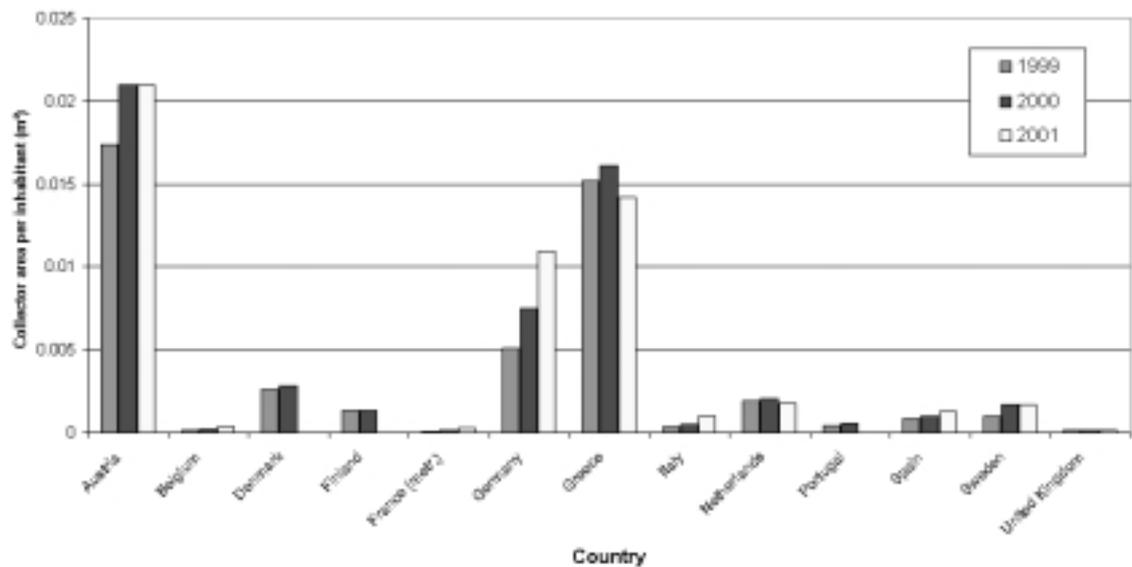


Figure 5: Yearly installed area of glazed collectors per inhabitant

2.2 Forecasts and European targets

The varying collector sales growth rates per year and per country demonstrate that the market development of solar thermal systems depends strongly on external factors like the existence of financial support and effective information campaigns. In the near future the market growth will continue to depend on these external factors. Growth rates of 20% and more are expected for Italy, Spain, (metropolitan) France, Belgium and the United Kingdom, mainly because of new stimulation programs. For Germany, the optimism that the market would continue to grow strongly has been tempered by latest figures that indicate a strong decrease of the market in 2002. Reasons mentioned for that decrease are the introduction of the Euro and unfavourable economic conditions.

Two recent reports give more detailed data on the development of the European solar water heating market. Firstly, in the PRETIR-report [5], the total area of solar collectors in Europe in the year 2010 is foreseen to grow to 28 million m² (in the case of ‘continued policies’, which has been defined as the continuation of currently existing incentives). The PRETIR report foresees growth in separate EU countries as given in Figure 6:

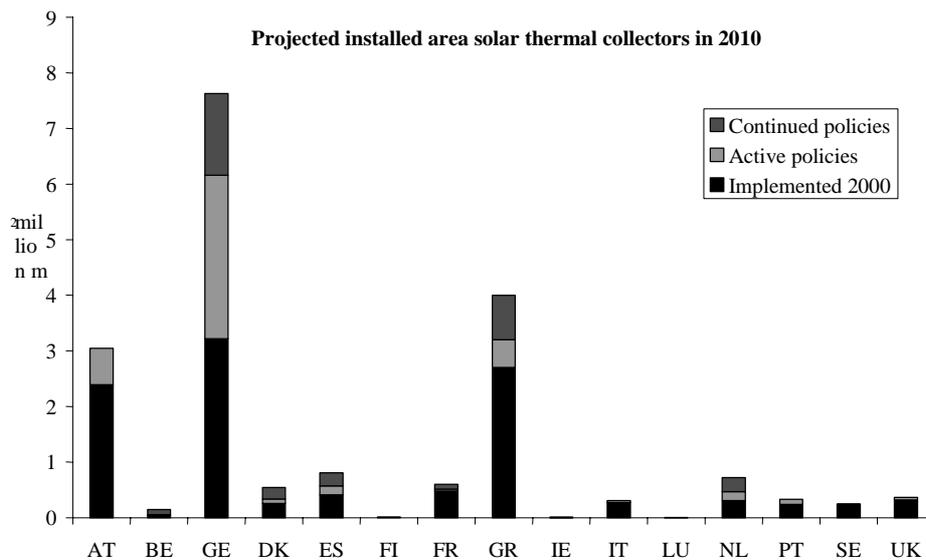


Figure 6: Projected installed area of active solar collectors in 2010 per EU Member State for active and continued policies (million m² of collector's area) (Source: PRETIR)

Secondly, the updated Eurobserv'ER Barometer report [3] is more optimistic: it foresees an increase of the total collector area in Europe to 19 million m² by 2003 and to 80 million m² by 2010. In Figure 7, this forecast is given.

It is clear that these two studies indicate different expectations on the development of the European solar thermal market. These differences are mainly caused by different ap-

proaches: the PRETIR study is based on the continuation of currently existing policy support measures whereas the ObsErv'ER study takes expected new measures into account. The fact that these different assumptions lead to large difference in the expected market development, indicates that there is a strong influence of policy support on the market expectation of solar thermal technologies.

Notwithstanding the differences, both studies indicate a significant growth of the market that will, however, probably not reach the European White Paper target of 100 million square meters installed by 2010 [12]. Reaching that target will require the installation of a collector area nine times as large as currently in operation, within 8 years from now. This is an ambitious goal. The EC DG TREN has indicated³ that extra measures should be considered to further stimulate the European solar thermal market towards this goal. Such measures would help the market to reach a critical mass, and the product to be further integrated into the built environment. Measures to accelerate the market could include:

- ☀ Increased support for targeted, local/regional and national market stimulation and awareness campaigns and increased knowledge exchange between such actions
- ☀ Support for well-organised demonstration projects in smaller markets, with appropriate publicity and exchange of knowledge
- ☀ Support for knowledge transfer and training programs towards installers
- ☀ Further introduction of European-level quality management for products (Solar Keymark, standards) and installers

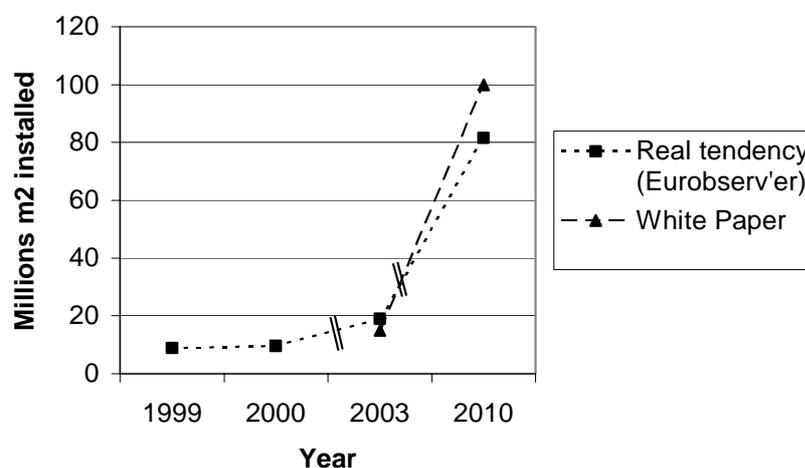


Figure 7: Forecast of the European market according to Eurobserv'ER European Barometer 2002 [3]

³ Mr Menna, DG TREN, at the Gleisdorf Solar 2002 conference, Gleisdorf, Austria

2.3 The demand side

The following main market segments can be discerned, which will be analysed below:

1. solar water heating for single-family houses
2. collective solar water heating applications
3. solar space heating
4. specific markets like solar assisted district heating new applications like solar assisted cooling and industrial applications

2.3.1 *Solar water heaters for single-family houses*

Until today the market of solar water heaters for single houses has contributed most to the market growth. There are about 150 million households in the EU of which more than 75 million are single houses. It is technically possible to install a solar water heater in roughly 50% of these houses, however in this estimate a more conservative assumption of 30% technical feasibility is made. The most obvious moment to install a solar water heater is to combine it with the replacement of existing old water heaters, which happens about every 15 years. The potential for this replacement market therefore can be estimated as one 1/15 of the number of houses where installation is feasible. A further assumption is made that an average solar water heater has a collector area of 4 m². Thus estimated, the annual 'replacement potential' for solar water heaters that could be installed in single houses when the existing water heater needs to be installed is estimated at about 6 million m². The largest replacement potentials are found in the UK, Germany and France.

There are several arguments for claiming that the moment of renovation of the existing water heater is the best moment to sell and install a solar water heater:

- ☀ It is the natural moment that homeowners think about their water heating system.
- ☀ If an installer is necessary this is the moment that he needs to make a sales visit and write an offer.
- ☀ The installation costs of the solar water heater are relatively cheaper since they can be shared with the costs of the standard water heater.

With an annual replacement potential of 6 million m² it is worthwhile to develop an EU market development strategy based on the renovation market of existing water heaters. Practical evidence supports this: in The Netherlands 50% of the solar water heaters are sold in regional campaigns aiming at the renovation of combined space and water heaters. 70-80% of the buyers of a solar water heater also buy a new high-efficiency combined space and water heater in these campaigns. Also the 2000 sales figures in Germany where 50,000 of the 93,000 solar systems were sold in combination with a new heater support the idea of this strategy.

On the other hand it must be remarked that exploiting the 'replacement potential' alone will not be sufficient to reach the White Paper goals by 2001. Firstly, it will be possible

to have significantly higher market volumes in the growth stage towards saturation. Secondly, additional market segments will have to be exploited at the same time, like collective installations, space heating installations and other application fields. In some countries (notably in the Netherlands), there is a significant potential of new housing construction. In new buildings, solar heating can be efficiently integrated when it is taken into account soon enough in the planning process.

2.3.2 Collective solar water heating systems

About half of the European households live in apartment blocks varying from two to dozens of apartments. These are owned either by housing associations or by co-operatives of house owners. The main techniques for hot water supply in apartments are local heaters (mainly electric) or collective hot water systems.

The top floors of apartments with local heaters can be well equipped with solar water heaters, but due to practical and financial reasons it is more difficult to connect solar water heaters to local (electrical) water heaters to lower floors in existing apartment blocks. There are however specialised solutions to integrate solar heating into multi-apartment buildings, such as collective collectors with individual storage vessels (Netherlands) and innovative integration into the heating network (Austria).

With an average apartment height of 4 floors, the potential for equipping apartments with local water heaters with a solar water heater, can be roughly estimated as 25%.

Collective hot water systems seem the main candidates for the application of solar water heaters. Other interesting potential applications for collective solar water heaters can be found in the tertiary sector, especially the sports, care and recreation sectors. For all these sectors the integration in the existing water heating system is important and there may be competing techniques like CHP generation.

A market introduction strategy for collective solar water heaters should be aimed at the sectors mentioned above and should include combinations with the adaptation/renovation of the existing water heating system. This gives the possibility to define 'installation renovation packages' for the various sectors with acceptable payback times for the complete package. In such renovation projects, energy savings can be coupled to increased comfort. For more information see the SOLHAS market strategy [10].

2.3.3 Solar space heating

In northern EU countries space heating is responsible for 60-80% of the total heat demand of households. For the southern EU countries this share drops to 20% or less. The energy needed for heating water per household seems quite constant for EU households with an average around 10 GJ per year.

Integration of solar energy in the space heating system faces more restrictions than the integration in water heating systems. With state of the art technologies (but excluding seasonal storage options), about 10% of the domestic space heating energy could be covered with solar energy, in the countries where the space heating demand is important.

With this the potential for solar space heating for the northern EU countries is of the same magnitude as that of solar water heating since domestic solar water heaters cover in general 50-80% of the annual heat demand. The economy of space heating systems is not as good as that of solar water heaters due to the larger amount of collector area needed. Most domestic solar space heating installations are combined space and water heating systems. Standardisation of these systems is not as developed yet as the standardisation of solar water heaters. Currently in IEA task 26 procedures for measuring the performance of these solar combi-systems are developed.

The sales figures in Austria and Germany show that there is a clear demand for solar combi heating systems in these markets. The evaluations of the Dutch Solar water heater campaigns also show that many potential buyers are at first interested in solar space heating, although the actual sales of solar combi-systems remain very small.

In mainland France, there is also a significant market for solar space heating installations with no domestic water heating function.

2.3.4 Other market sectors

Presently in Europe, about 100,000 m² of collector area have been installed in about 60 systems larger than 500 m²; the majority in the Scandinavian countries. The systems are used in small district heating networks especially in Scandinavia, for industrial applications, for seasonal storage and for cooling. The large market share in the Scandinavian countries indicates that there is a significant niche market present there. This is connected to the large share of district heating systems in these countries. However, there is increasing competition from co-generation in district heating plants, especially in Denmark. The advantage of solar heating in connection with district heating might change in the future, but should be accommodated on the basis of an overall energy planning taking into account the need and production of electricity and heat. In the rest of Europe the share of district heating in the domestic sector is 10% or much less. It seems appropriate to develop a specific market development strategy for solar systems in combination with district heating in Scandinavia. In Austria, the largest plants have been installed as support for biomass local heating plants or to increase the return temperature in district heating networks.

Interesting large solar heating plants have been realised in industrial applications, for instance in the agricultural sector (mainly drying of crops) and the food industry. However in this sector strong competition can be experienced from low conventional energy rates and from low-temperature waste heat of other processes. Furthermore, the pay-back times of such systems are often still beyond the limit of commercial investment for such companies.

The potential and the techniques for new solar thermal markets like seasonal storage, solar assisted cooling and industrial applications have not been fully realised. Most projects in these fields can be labelled as development and demonstration projects. In the short term no significant contribution of these applications can be expected. Regarding solar cooling for example, the energy consumption for cooling in residential buildings in the

EU is negligible and it is only 4% of the energy consumption in commercial and public buildings. However, on the longer term and as a result of increasing energy prices and green energy stimulation programs this situation might improve. Further R&D and demonstration projects are required for a real market development to occur in these fields.

2.4 The solar heating industry and products

2.4.1 Products

In southern European countries like Greece, Italy, Spain, Portugal and also in the French overseas territories, the market is dominated by solar water heaters of the thermosyphonic type, with the tank mounted outdoors directly on top of the collectors. These systems are used as preheaters, solar-only systems or include an electrical element to heat a part of the store in the winter months. The collector area is generally about 2 m².

In Northern European countries including Austria, Germany, Denmark, the Netherlands, the UK, Belgium, metropolitan France and Scandinavian countries, most systems have the storage tank installed indoors and use forced circulation between the collectors and the tank. These systems can have a part of the tank that is heated by a boiler and /or an electrical element. Also, solar combi-systems with a connection to the space heating installation of the house can be found. Collector areas are often in the range of 4 to 8 m²; in the Netherlands the collector area is typically smaller at 2.5 to 4 m² per household. In several of these countries, also thermosyphonic solar water heaters have a market share.

In Germany, the UK and Scandinavian countries, the majority of the installations is assembled by an engineer/installer for the specific location, using components (collectors, store etc) from one or several brands. In Austria, France, the Netherlands, the Mediterranean countries and partly in Denmark, the installations are delivered as complete kits.

Most collectors used are of the flat plate type, although evacuated tube collectors have a significant market share in Germany and Portugal.

Large installations can be classified into two main categories. Swimming pool heating installations, mostly with simple uncovered collectors and no separate hot water store, have a significant penetration in most countries both in southern and central Europe. The other category consists of large installations with covered collectors, which in all countries except Sweden, occupies only a modest share of the market. Mostly such installations are used for collective water heating, sometimes also for space heating.

2.4.2 The industry

The solar industry still consists of many Small and Medium Enterprises (SME's). Based on the Soltherm National Reports [1], the number of manufacturers is given in Table 2.

Table 2: Number of manufacturers in ten European countries

Country	Number of manufacturers
Austria	Over 20
Belgium	3 (plus a number of importing companies)
Denmark	8
France	30
Germany	100
Greece	About 70
Italy	18
Netherlands	9 (plus 4 importing companies)
Spain	14 (plus 13 importing companies)
United Kingdom	50
Total	About 340

In countries with a well-developed market like Greece and Austria the ratio between annual collector sales and the number of main manufacturers is 12,000 respectively 5,000 m² per manufacturer. The European heating industry has started to take over solar manufacturers in order to extend its product range, most notably in Germany, Austria and the Netherlands. Components of solar thermal systems like absorbers and pumps are traded internationally. The market for complete solar thermal systems (collector, storage and control) is still mainly national.

Cross-boundary trade of solar heating products in Europe is on a steep rise. Absorbers have been exported for a long time inside Europe, mainly from Sweden. In Austria, over 200,000 m² (more than half of the production) of solar collectors has been exported in 2001, mainly to Germany, Italy, Switzerland and Spain. Also in Greece, a large part (150,000 m² or about 50%) of the production is exported to other European countries, mainly to Germany. Furthermore Belgium is a large exporter of collectors; export amounts to about 75,000 m², which is ten times the size of the internal market.

In all countries investigated there are one or more branch organisations of solar water heater manufacturers, see Table 3 for a listing.

These associations play different roles, some of them have been essential factors in the development of the national market.

2.5 Distribution and installation

As discussed, the way domestic systems are assembled varies considerably, varying from installers who compose their systems from components to manufacturers who sell complete space and water heaters with an integrated solar thermal system.

Table 3: National branch organisations. Note: in a number of cases the branch organisations include not only manufacturers but also other parties like installers.

Country	Branch organisations	Number of members
Austria	Austria Solar Guild of installers	24 2,800 (installers)
Belgium	Belsia Solar.be (These have recently merged into Belsolar)	17 3
Denmark	The Danish Solar Manufacturer Association	
France	Enerplan	9
Germany	DFS, merged into BSi BSE UVS ZVSHK	170 42 350 (mainly installers) 35,000 (installers)
Greece	EBHE	18
Italy	Assoltherm Confer	48
Netherlands	Holland Solar, UNETO-VNI	
Spain	ASENSA APERCA (Catalonia) HELIOS (Andalucia) APERBAL (Balears)	100
United Kingdom		
Europe	Astig and ESIF, merged into Estif	

As solar thermal systems are gradually incorporated in the distribution chain of space and water heating equipment, the role of installers becomes increasingly important. They are often the final link in the distribution chain and play an important role in the actual sales and installation process. The number of installers actively selling and installing solar heaters is still relatively small. For example in Germany, the largest solar heating market of Europe, installers have a relatively high level of experience and expertise regarding solar water heaters. The German national installers' organisation ZVSHK has 36,000 members. At annual collector sales of 900,000 m² (2001) and an average collector area per system of 8 m², the average ZVSHK member sells just over 3 systems per year. These statistics indicate that solar heaters are still not a common product among installers. Of course this is mainly a result of the low penetration and the fact that in most countries solar water heaters can not be sold as 'money-savers'. However in most countries, a small number installers can be found that have succeeded in pro-actively selling solar water heaters and thus acquiring a relatively large portion of the market. This shows that the attitude and knowledge of installers can make a large difference.

In most countries, the experience and expertise of the average installer of solar heating products is still low. Several initiatives are being taken on regional, national and European level to create more facilities to inform, educate and certify installers on solar heating technologies. The European Qualisol project, which is now in its final stage, has implemented course materials and other facilities in Germany, Italy, the Netherlands and Portugal. Such programs, providing technical but also sales knowledge, are needed not only to improve the knowledge but also to increase the number of successful 'pro-active' installers. In the Netherlands, separate solar water heater sales trainings are given by Intechnum.

Austria has to be mentioned as a specific case: the large market there was created from grassroots 'do it yourself' groups, in which homeowners together learned how to build their own collectors and complete their installations. The groups were accompanied by efficient promotion, assembly and quality control procedures. Since the mid-nineties, the role of do-it-yourself groups has strongly decreased and the market has changed into one dominated by commercial companies. Also in Northern parts of Italy, do it yourself groups have played and are playing a certain role.

2.6 Sales and marketing

In most small markets, the sales channel is mainly from the manufacturer to the installer to the customer. In markets where traditional boiler manufacturers have entered, like Germany and France, a part of the hardware is sold through wholesalers to the installers.

A crucial link for market development is to give interested customers good information, make them acquainted with the advantage of solar heaters and to guide them to trained and motivated sales and installation organisations. Experience from a.o. solar water heater campaigns in the Netherlands shows that if the follow-up is not well organised, an information campaign may have little effect on sales. So for optimal results a link between info centres and the information campaigns they organise and the sales and installation organisations is needed.

Success factors for campaigns can be categorised with on the demand side:

☀ Public awareness

Public awareness of solar heating technology in most countries is still low. Most people are not aware of the difference between solar heating and solar electricity. That means that they will have to be informed starting with very basic information, and guided through the whole process of acquaintance and an understanding of the technology before they can be expected to invest in it.

☀ Regulatory framework: legal, institutional and financial incentives or removal of barriers.

See 2.9 on this subject.

And on the supply side:

☀ Availability and accessibility of products and solar installers

Only in the most developed markets (Austria, Germany, Greece), good products and good installers of solar heating products are readily available. In other countries, generally it is not easy for a customer to find good help in the realisation of a system. Market development activities therefore need to focus not only on awareness but also on availability of high-quality products and well-trained, motivated installers to the customers.

☀ High quality of products and installation work (standards, certificates, guarantees)

See 2.7 on quality management.

2.7 Quality management

High quality systems are available in all European countries. However, in some countries also systems with inferior quality levels are sold. In those countries, it is not easy for the customer to find good information on the quality of the products on the market.

As mentioned in the introduction, inferior products and installation practices have had a long lasting, negative effect on a number of markets in Europe, notably in France, Spain, Belgium and Italy. Solar heating installations are products with high initial costs that are (often only partially) compensated over their lifetime. The lifetime that is mostly communicated to consumers is long – in the range of 10 to 25 years – and this seems justified but the present technology is still relatively new. Consumers therefore need to believe in those claims of a long lifetime with little maintenance. A few examples of installations of inferior quality can cause a long-lasting, negative attitude with consumers towards solar heating installations. This can be especially detrimental to the development of large-scale companies and projects.

Presently, in most countries one or more test centres are operational to test products on their performance and quality. Generally these labs partly use test methods based on European CEN (see below) and international ISO standards, but often in local adaptations. Also many labs operating locally developed extra tests. Although these test methods are functional for the national or regional markets that a particular test centre is serving, the differences in test methods and requirements pose a significant barrier to international trade and therefore to scale enlargement of the market.

In 2000, the CEN quality standards (EN 12975, 12976 and 12977) for collectors, complete factory-made solar systems and custom-built systems have been adopted. They define a minimum quality level for the mentioned products and specify test methods, and thus lay a basis for a European quality label for solar water heaters. EU countries have been obliged to accept these standards as national standards, and to remove conflicting standards. Presently test laboratories in most European countries are adopting the CEN standards in their test methods.

With regard to certification, there are a number of different certificates and labels in Europe on national and sometimes regional level. On the European level, the Solar Key-

mark is being established in a European funded project that unites a number of test laboratories and certification bodies. National certification bodies that fulfil the requirements of the Keymark certification systems will issue the Solar Keymark together with their own certificate. A product that has the Solar Keymark will have easier access to obtain other certificates. From 2003, it is expected that the Keymark can be issued to products in a number of countries. In the coming years, the Keymark will be further introduced and will be used as a tool to further internationalise the market. An up-to-date overview of the labs which co-operate in the Solar Keymark and the status of their harmonisation can be found on the Solar Keymark web-site www.solarkeymark.org.

For large installations, quality problems are often related to the design of the installations (including the sizing of collectors and storage tanks, correct prediction of performance and layout of piping) and maintenance. This has, first in France and later in several countries including Spain and the Netherlands led to the development of performance guarantee (GSR or Guaranteed Solar Result), which takes away almost all risks from the end-user.

2.8 Costs for solar heating products

The pay-back time of a solar water heater is dependent on a number of factors including:

- ☀ Climate
- ☀ Solar fraction
- ☀ The energy source that is replaced and the price of that energy source
- ☀ Subsidies, tax advantages and other financial incentives
- ☀ Whether the solar water heater is sold and/or installed together with other equipment like a conventional boiler as a package
- ☀ Local conditions: flat or tilted roof, existing or new building, possible locations for collectors and store tanks etc.

For a private customer in Mediterranean countries, a standard thermosiphonic solar water heater can have a pay back time of less than 10 years and can thus be a profitable investment in its own. In most middle- and North European countries, it is not easy for a private customer to purchase a solar water heater that pays itself back, even when subsidies are obtained. It is very interesting to notice that two of the largest SWH markets (Germany and Austria) are in this region. It has to be concluded that in these countries, non-financial considerations can motivate customers sufficiently to make the investment. This is an important and encouraging observation as it proves that in the right circumstances, economical arguments do not have to be the dominating arguments for customers.

Nonetheless, the market potential for solar heating products is strongly connected to their price and pay back time and in all countries, improvement of the cost-effectiveness remains an important issue. This can be achieved through a supportive policy environment, product development and more rational production and installation, especially by installing the solar product in package deals instead of as a separate add-on.

2.9 Policy, incentives, regulatory framework

Details on subsidies in individual countries and regions can be found in the Soltherm Country Reports [1]. Often the subsidies vary strongly between regions or even cities. Also, the Astig report 'Incentives for solar thermal systems' [11] gives an overview of the existence of incentives in European countries on different levels. Based on these reports, the following general remarks and observations on regulations and incentives can be made:

- ☀ In general, stable, constant framework conditions prove effective for market development of solar heating as can be seen in Austria, the Netherlands and Greece. 'Solar-positive regulations' - e.g. exemption from building permit, energy performance in building regulations, obligation for implementation - have a generic, long-term effect (less susceptible to political influences than subsidies) which is important for stable market development.
- ☀ It is important to involve actors at regional, local and utility level. Often the absence of initiatives at local, regional and utility level can be observed in countries with small or negligible solar markets.
- ☀ In countries with an established solar thermal market, utilities have played an important role in the development of the market, not only because of their subsidy schemes, but also because their publicity campaigns and in a number of cases their commitment to contribute in CO₂ emission reduction. In general however, the role of these utilities has decreased after the liberalisation of the energy markets. A hopeful example is Italy, where utilities have been given a renewable energy production target.
- ☀ The effectiveness of incentives still varies. In a number of countries there are or have been subsidies or incentives that required so much paperwork that they were almost inaccessible to the target groups.
- ☀ A well-documented risk appears when new, higher incentives are announced too long in advance. After the announcement of a future, higher incentive, customers tend to wait in order to take profit from the new incentive, thus causing a strong temporary decrease in the demand for the supported product. This is hard to handle for the supply side market actors.

In the Soltherm Campaign Guidelines [2], some guidelines for incentives and subsidies are given which are based on the experiences in European countries. See also 2.2.

2.10 Education and certification of installers

Table 4 contains an overview of training and educational courses for installers available in the European countries. It shows that in most investigated countries, some structures for education of solar heating installers exist. In a few countries including France, the Netherlands and formerly Denmark, installers need to fulfil certain requirements in connection to government incentives on solar water heaters. In many local or regional sales and promotion campaigns, such as the French Qualisol, the Belgian Soltherm Walloon

and the Dutch Solar Water Heater Campaigns, installers need to fulfil requirements in order to be included in the campaign.

However with the exception of Germany, Austria and Greece, the knowledge and experience of average installers concerning solar heating technology is insufficient.

Table 4: Solar water heating installation courses and certificates

Country	Courses for installers	Certification of installers
Austria	Training as 'Solateur' Seminar 'Solar space heating' Seminar 'Solar multiple family houses' 'Solar and eco-energy technician'	None compulsory Voluntary 'Green Heat' certificate.
Belgium	Soltherm Wallonia	Soltherm Wallonia
Denmark	Solar Energy Centre at the Danish Technological Institute. (Abolished)	Solar Energy Centre at the Danish Technological Institute. (Abolished)
France	Qualisol France Plan Soleil	Qualisol France
Germany	SHK-Fachkraft Solarthermie Solarfachkraft Solarteuer Independent trainings f.i. DGS Solar-schule Berlin	None compulsory
Greece	Manufacturers Techn. Educ. Institutions ELKEPA Vocational trainings	None compulsory
Italy	Qualisol Altener (in preparation)	None compulsory; Solar Pass Installa (proposed)
Netherlands	Intechnium Training by manufacturers	None compulsory
Spain	By installation companies Regional, by installers associations, technical univ. and education centres FERCA/ICAEN (in preparation)	Aperca (voluntary)
United Kingdom	CAT	
Europe	Qualisol Altener	None

2.11 Information, marketing and sales campaigns / actions

In most countries, the marketing of solar water heaters on national scale has a low profile. One cannot find frequent TV or radio ads promoting solar heaters. This is of course related to the relatively small market volumes to date, but it can also be connected to the fact that also for conventional heating products other channels are used. Examples of campaigns including include national-level publicity are:

- ☀ France: the Plan Soleil (see the French Country Summary).
- ☀ Netherlands: a short TV campaign in the mid-nineties; the PDE (a national renewable energy agency) is presently organising a new national campaign to promote renewables.
- ☀ Greece: Large campaign with television adds supported by the government, in the period 1984-1986 [13], [14].
- ☀ Denmark: national advertisements with TV-spots in the late 1980ies to start 1990ies.

On a regional level, many more activities can be found. Some examples are:

- ☀ The Catalonia and Andalusia regions of Spain
- ☀ The Walloon region of Belgium
- ☀ Several provinces in the Netherlands like Brabant and Limburg
- ☀ Several regions in Austria like Upper-Austria and Styria
- ☀ Several regions in France like Alsace and Rhône-Alpes

It has been observed in several countries including Austria and the Netherlands, that low-level promotion to large groups, especially when no adequate follow-up is arranged, can have disappointing effects in terms of direct sales increase, even if they may have had a longer-term effect on the general awareness. This may be connected to the fact that often the consumer has to be brought from almost complete ignorance about solar heating to a state of sufficient familiarity and enthusiasm to purchase an installation. This means that an intensive program of well-designed publicity, advertisements, mailings and adequate follow-up with sufficient direct contact is needed. Thus it may be better to focus on a smaller region / municipality and to have intensive communication there, or to choose well-defined market segments, than to have a low level of communication in a whole country or province.

3 Conclusions

In this chapter, highlights from the thirteen Country / Regional reports [1] are given. In these reports, the main success factors, bottlenecks and opportunities for new market acceleration actions have been analysed on the basis of the experience in the ten countries of the last decade of market growth. For specific country-level conclusions, we refer to the country reports, here a number of general factors is given.

3.1 Success factors

The Country / Regional reports indicate the following factors as important for the success of campaigns and marketing actions for solar heating products in Europe:

- ☀ Thorough quality management, coupled to intensive promotion activities and sufficient capacity of qualified and well-motivated installers, has in several campaigns in different countries proven to be able to create a strong rise in the sale solar heating products.
- ☀ Complete, intensive campaigns which unite the most important market actors and stakeholders and combine intensive actions creating demand and on effectively meeting that demand, can cause dormant markets to strongly grow in a short period.
- ☀ Marketing to specific target groups, like the camping sector in Denmark, selected industries in Austria and hotels in Greece, is a powerful approach. This may be coupled to the need for complete, adapted information for the consumers.
- ☀ The coupling of quality requirements and educational activities (for manufacturers and installers) to sales and promotion campaigns is a strong method to improve the quality of products and installation work.
- ☀ Stable, 'Solar friendly' regulations are an important factor in levelling the playing field for solar technologies.
- ☀ In markets where penetration is still very low, demonstration projects are important to show the end-users the viability of the technology.
- ☀ In some countries, like the UK, metropolitan France, the Netherlands and Mediterranean countries, price and cost reduction are an attention point for campaigns (although not necessarily the most important point), e.g. through central procurement or temporary extra subsidies. In other countries like Germany, Denmark and Austria, for the so far developed market share, price is less of an issue and high quality and the visibility of a green attitude are important arguments.

3.2 Bottlenecks

3.2.1 Supply side

Even in well-developed markets like Germany, Greece, and Austria, there is still a need to increase the interest of installers and engineers in the utilisation of solar energy, and to give them a stronger role as they are the first contact in energy advice. The goal must be that installers offer solar plants in an active manner, instead of viewing the technology as an ‘alternative’. Also the involvement of roofing companies, facade constructors and other professional groups in the distribution of solar plants is a point of attention.

Unstable policies, either cutting down like in Denmark or well-meant but too quickly changing incentives in several other countries, can seriously damage the production and sales chain as well as consumer confidence. In other countries, like Italy, the political will as a whole is a barrier as well as a number of inefficiently organised financial support programmes. An important opportunity in France is the support of various local authorities to the national “Plan Soleil”. At the regional, *département* or local level, some of these authorities support and strengthen the actions of this campaign by the means of subsidies or incentives.

The integration of the products into architecture is still a point for improvement. Here, the solar thermal market could learn from the creative ways in which PV has been applied throughout Europe. It is important to raise the awareness of architects for the possibilities that solar thermal products offer.

3.2.2 Demand side

In all markets, there is still a strong need for information on solar thermal applications, their possibilities and advantages. This is not only true for homeowners but also for the other customer groups like housing associations, the tourism, sports and recreation sectors, the care sector and the commercial sector (especially SME’s).

Inefficient incentives, subsidies and regulations can severely impair the market development. Removing barriers and creating favourable conditions (including f.i. financial support for marketing campaigns) are powerful measures to increase the demand.

Public awareness and the interest of media are an important factor. For example, in Denmark there has been a shift in media interest from solar heating to PV. It is important that the general image of solar thermal technology with consumers is enhanced.

3.3 Lessons learned

Here, some important lessons learned in the various countries are mentioned.

- ☀ Communication and networking between all actors in a campaign is an important factor for success.
- ☀ There is a need for increased political attention for solar thermal technologies as an important contributor to Kyoto goals and sustainable building targets.

- ☀ A certain marketing approach could lead to different results when applied in different conditions. This means that all guidelines for marketing campaigns should be analysed critically before being used in different conditions. This is elaborated in the Soltherm Europe Campaign Guidelines.
- ☀ Financial incentives and subsidies are only effective when they are stable.
- ☀ Intensive market activities, maybe restricted to certain sectors or regions in order to limit the costs, may be more effective than low-level marketing to large groups, although the latter may improve general awareness. Customers need to have confidence in the product as well as in parties they know and trust.
- ☀ In the long term, research and development remains an important driving factor to fully exploit the potential.
- ☀ Merely realising an investment subsidy for solar water heaters without taking other promotion measures has proven insufficient. In several countries, such subsidies are or have not been well used because of a lack of demand.
- ☀ The co-ordination of a large campaign with many different activities like training, marketing and promotion requires a strong central organisation that has the end responsibility on content and financial sides, and that assumes a co-ordinating role.
- ☀ In small markets or non-developed market segments (for instance: housing associations in several countries), single individuals can sometimes play decisive roles and cause a breakthrough of a market segment..
- ☀ Rather than having a large number of not-really-motivated installers with a passive attitude in following up leads, it is preferable to work towards a smaller number of well-motivated, proactive installers who are committed to high-quality follow-up and who know how to sell a solar heating product.
- ☀ Not only installations with insufficient quality can spoil the market for a long time, but even installations that have a bad appearance can give solar heating a bad reputation. This is especially true for large installations. Therefore it is advisable to take aesthetics into account.
- ☀ In well-developed markets, a switch has to be made from the present group of well-motivated installers to the larger group of conventional heating installers. This much larger group first has to become interested and motivated, and then trained to sell and properly install solar products.
- ☀ Successful incentives and subsidies are often designed as a co-operation between authorities and branch organisations; this means that branch organisations need to organise a strong lobby.
- ☀ Energy performance regulations for buildings, like the European Directive under construction, can be effective but only when they are strict enough so that solar water heaters are able to fulfil the requirements.

- ☀ The combined sale of solar water heaters with conventional boilers has proven a success in several countries.
- ☀ Central procurement, when properly carried out, could be a good way to open up a dormant market when price is an issue. However, when the market develops further, manufacturers and installers will need to keep sufficient margins in order to remain enthusiastic about the technology. Also, extra attention on the proven quality of selected products is needed.

3.4 Opportunities for new market development initiatives

Considering the options described in 2.3, further development of the market of solar water heaters for single houses is crucial for achieving the goal of the EU of 100 million m² collectors installed in 2010. The most promising market segments for a solar thermal market development strategy are the renovation market of water heaters in single houses, collective water heating systems, combined solar space and water heating systems and solar water heaters for new housing. Advantages of this market development strategy are:

- ☀ The integration of the solar water heater in the existing sales and distribution channels of space and water heating equipment. Since this distribution channel already exists there is enough sales and installation capacity.
- ☀ The reduction of sales and installation costs because of the synergy effects with the installation of a new water (and space) heater.
- ☀ The possibilities for targeted marketing. Most single houses are owner-occupied.
- ☀ With incorporation of solar combi (water and space heating) systems as an option, two major solar thermal applications can be fitted in one information campaign.

The challenge of this market development strategy is to reach and motivate the existing sales and distribution channels. The installers are a group that is especially difficult to reach because of the numbers, varying degree of organisation of the branches and the lack of knowledge on solar energy and sales experience.

In developed markets, only the market segment of existing single family houses is really developed and other sectors can be approached. This requires target group oriented marketing actions.

Opportunities for specific countries include:

- ☀ in Austria, regulatory / incentive measures and exploitation of new market segments like collective installations and industrial applications;
- ☀ in Belgium, marketing campaigns that include leasing or spread financing of the investment by the end user;
- ☀ in France, further co-operation and networking between market actors in the framework of the Plan Soleil. Also, the Plan Soleil enjoys the support of various authorities

at the regional, *département* or local level, sometimes by means of subsidies or incentives.

- ☀ In Germany, consolidating the single houses market and opening up new market segments like multifamily residences, district heating, public buildings (e.g. hospitals), commercial sector (e.g. hotels), industrial applications and solar cooling.
- ☀ In Greece, opening up new market segments like multifamily residences, public buildings (f.i. hospitals), commercial sector (e.g. hotels), industrial applications and solar cooling.
- ☀ In Italy, demonstration projects, stable and non-bureaucratic subsidy schemes and local campaigns.
- ☀ In the Netherlands, development of the housing associations segment, combining local campaigns with nation-wide publicity, and increasing the number of motivated installers)
- ☀ In Spain, designing new incentives, closer cooperation between authorities and the business sector and actions to specific target groups
- ☀ In the UK, there are new incentives set up, and the regional energy agencies could be involved.

The Soltherm Europe Initiative will work, promote, stimulate and support to exploit these opportunities towards a steep market growth. In the action network, many of the above opportunities are being seized.

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4 National Summary Reports

In this section, summaries of the Soltherm National and Regional Reports are given.

4.1 Austria

(Author: Ernst Blümel, Christian Fink, AEE-Intec, Austria)

4.1.1 General market characteristics

All in all 2,371,457 m² of collector area were installed in Austria by the end of 2001. Of this 1,760,645 m² was accounted for by covered flat plate collectors (74.2%), 28,439 m² by vacuum collectors (1.2%) and 582,373 m² by uncovered plastic absorbers (24.6%). In this respect flat plate and vacuum collectors are used in the main for the heating of domestic water and space heating supply and uncovered plastic absorbers mainly to warm private and public swimming pools.

For example in 2001 169,147m² of collector area were installed. Of this 157,860m² is accounted for by covered flat plate collectors (93.3%), 2,220m² by vacuum collectors (1.3%) and 9,067m² by non-covered plastic absorbers (5.4%).

When it comes to the installed area of covered flat plate collectors the trend in the recent past has been a slight rise. With vacuum collectors there is a slight decline and plastic absorbers are declining considerably.

main types of products (flat plate and vacuum collectors):

- ☀ Domestic hot water production in one- or two family houses (share of the overall collector area installed: 74%)
- ☀ Combined systems for domestic hot water production and partial space heating (combi-systems) in one or two family houses (share of the overall collector area installed: 20%)
- ☀ Large collective solar water heaters (share of the overall collector area installed: 5%)
- ☀ District heating (share of the overall collector area installed: below 1%)

AUSTRIA	
☀	8.1 million inhabitants
☀	2.37 million m² cumulative (2001)
☀	0.29 m² per inhabitant
☀	169,000 m² installed in 2001
☀	Market trend: =

Above all the change from commercial to the industrial production of components and systems towards the end of the 1990's made it possible to change the approach to cover larger markets beyond the borders of Austria. This development was expressed by a significant increase in the export share (240,000 m² in 2001).

In parallel fashion to the creation of industrial collector productions numerous technological innovations were achieved in close co-operation with research institutes and solar energy companies. These developments range from various product developments (collectors, storage tank concepts, control systems, etc.) to visually attractive solutions to be integrated in buildings (roof and façade integrations) through to special know-how on system-technical solutions in the field of large-scale plants.

4.1.2 Demand side

In the year 2000 Austria had around 8.145 million citizens. Of these, 57% lived in one and two family homes and 43% in multiple family homes. Around 74% of the collector area installed until now was used for the preparation of domestic hot water which means that almost 13% of all one and two family homes possess a thermal solar plant to prepare domestic hot water. 2% of all one and two family homes have a solar combi-system installed. In the case of residential buildings 1 % of the existing flats in multiple family houses were reached with solar energy so far. The potential still to be tapped in this segments is considerable.

Solar systems for domestic hot water preparation for one family homes are in the meantime offered by most Austrian installers as complete systems. In the course of new buildings a large part can thereby be directly reached via the local installation company. There are even greater deficits when it comes to existing buildings which make up for the greater part of the energy required in the „apartments“ sector. Here it is important to make solar plants interesting both for domestic hot water as for partial space heating in single and multiple family houses via corresponding combinations with grants (roof renovations, exchange of boiler). In technical terms as well as when it comes to conducting sales talks, well-trained energy advisors, installation companies and building engineers could provide important impetus. Info. campaigns and help for final customers would also appear to be important.

When it comes to the sector of multiple family houses well-trained facility management planners and architects and info. campaigns for builders could offer important help. In parallel fashion increased demand for flats erected with due consideration to energy-saving aspects (including the use of solar energy) ,on behalf of those advertising the potential properties, would put pressure on the house building companies and make the decision making „pro solar system“ easier (energy pass for buildings). The increase in funds for solar plants respectively the general adaptation of grant models for residential buildings are also absolutely essential.

4.1.3 Supply side

10 years ago all the producers (about 20 producers in 2002) of solar products directly supplied the final customer and at the same time solar installers. Another step when establishing a functional distribution and sales network was to establish an intermediate stage in the distribution network – the wholesaler (in 2002 about 15 wholesaler). The interest of the conventional heating branch which already had a very well structured wholesale (practically all the heating installers are supplied via wholesalers) was not yet high enough at the beginning of the 1990's to assume the distribution of solar systems in an aggressive manner. For this reason some companies established wholesale structures specifically for the solar branch. This strategy proved to be extremely successful and has meant that in the past the conventional heating branch has recognised the solar market as an extremely lucrative business field and now also sells solar plants via these distribution structures. This development has meant that today almost all the heating installers also offer thermal solar plants.

Another important step for the rapid dissemination of solar plants is the greater inclusion of other professional groups from the construction trade who have a very good distribution network. The very first success in this field was achieved with the inclusion of roofing companies in the distribution of solar plants.

Due to the great potential of façade-integrated sun collectors professional façade constructors are ideal for the implementation of solar plants. In this respect it is important that the existing distribution networks are made use of and thus the number of potential suppliers of solar plants can be increased relatively simply and quickly as initial experience in Austria has shown.

Façade constructors and roofers integrate the collector areas in the building, installers assembly the rest of the system.

4.1.4 Policy and grants

The energy policy of the Austrian Federal government has enabled the use of solar energy systems in the last ten years since they established constant framework conditions uninfluenced by government bodies. Effort is clearly being undertaken to reach national climate goals by establishing different budgets to promote this cause and pertinent research projects.

Direct grants are allocated for solar plants in single family home in all the provinces.

For a solar plant for example with a collector area of 8m² and investment costs of € 4.650 a grant of between 6 and 36% of the investment cost can be made use of depending on the province. The average grant for this example equals approximately 25%.

Direct grants, cost-favourable loans or annual repayment grants exist for solar plants in multiple family homes depending on the province.

In addition to the grants available in the individual provinces towns and communities in individual provinces issue grants for the installation of solar plants.

It has been seen that in the field of single family homes grants are important but they do not immediately trigger off the assembly of a solar plant. When it comes to solar plants in multiple family houses the extent of the grant is in contrast the main reason why the builder can or cannot be motivated to install a solar plant.

4.1.5 Quality

Austrian companies produce high quality solar product at favourable prices. This has a positive effect on the domestic market as well as on exports. In calculations collectors are given a life cycle of 20 years. According to practical experience and in line with guarantee specifications from collector manufacturers longer product life cycles can be assumed. Austrian producers give guarantees of on average between 5 and 10 years for flat plate collectors.

The standard systems for domestic hot water preparation in single family houses rarely represent any installation problems due to the wealth of experience of those performing the installation work and the high pre-fabrication rate in many cases. The situation is different when it comes to combi-systems respectively large scale solar heating applications. To repair this deficit a national standardised training programme for installer and planner is in preparation.

4.1.6 Most important campaigns

There is limited experience with solar promotion campaigns in Austria but one campaign was very successful and decisive for the market development:

Solar Systems by Do-It-Yourself Groups:

In 1984, at a time when Austrian solar technology had experienced a decline after the first boom of the mid-seventies, the first self-build groups were formed in Styria. The organizers of the first loosely connected self-build groups, founded as a result AEE INTEC, a non-profit organisation, providing advice and assistance on a professional basis. Self-build and assembly procedures were optimized, technical and organisational material prepared, and a chain of advice centres established throughout Austria. By the end of 1997, about 42.000 solar devices, with a total collector area of approx. 400.000 m², had been installed by use of the strategy.

In the beginning of these self build groups almost every installer was against the initiative, although only few of them had solar systems under offer. After some time they realised that a lot of public relations was done within this campaign which led to great interest by on-family-house owners who were not disposed to build a solar system on their own. These „non-self-build-groups“ were then in fact served by local installers. Over the years the price level of solar systems offered by installers sank drastically so that the price advantage for a do-it-yourself-construction was no longer that attractive. Moreover, after a campaign period of almost 15 years the potential of strenuous self-builders was somewhat exhausted. Both aspects were responsible for a decrease of demand of self-build-systems and an increase of effort to fund new self-build-groups. In the end nineties the organisational activities of this initiative almost stopped. A few organisations still

carry on solar-self-building on a small scale. Therefore in the year 2001 yet nearly 6.000 m² collector surface area in Austria was built by self-build-groups.

4.1.7 Outlook

Compared to other European countries Austria has a functional solar plant market. Yet heat production from the overall collector area installed to date only assumes slightly more than 1% of the overall heating requirements in Austria. Realistic estimates revealed that the collector area installed in Austria to date can be multiplied by the year 2010 given the corresponding framework conditions and activities. Thus in 2010 the solar contribution towards heating requirements in Austria could already equal 4.25%. To achieve this numerous activities and initiatives exist and are planned in Austria (partly established in the Soltherm project).

In the future it will be necessary to conquer the applications tested in Austria in pilot and demonstration plants for the wide market and in addition to find new applications for solar energy. Apart from the solar supply of a large share of the need for domestic hot water, the solar share of the supply of space heating has to be increased step-by-step. Apart from extending applications in the construction of stories buildings, in tourism companies, in sports centres, in local and district heating networks, in hospitals, etc. the segments of „low temperature heat in industrial companies“ (solar process heat) and „solar cooling“ offer considerable future potential.

4.2 Austria – Upper Austria region

(Author: Christiane Egger, O.Ö. ESV, Austria, edited by Bart van der Ree)

4.2.1 Policy background

In Upper Austria, renewable energy sources provide 30 % of the primary energy consumption, of which about 2 % is solar and other RES. This percentage increased from 25 % in 1993 to 30% in the year 2000. Solar energy, especially solar thermal, was always considered as a strategic sector because of its high visibility and its strong industrial base in Upper Austria.

In 1993, a target was set to reach an installed surface area of solar thermal collectors of 300,000 m² until 2000, an objective which was later increased to 500,000 m² (as the original goal had already been achieved in the mid-nineties). In the year 2000, the new energy strategy "Energy 21" set a further target of reaching 1,000,000 m² solar thermal collectors by 2010 - equalling nearly 1 m² per inhabitant!

Presently 550,000 m² thermal solar collectors are installed in the region of Upper Austria (0.357 m² per inhabitant), a value that makes Upper Austria one of the leading solar regions in the world. Annually 165 mio kWh heat are produced by those collectors and about 40,000 – 50,000 m² new collectors are installed. The solar collectors are mostly installed in single-family houses with a typical size of 8 - 12 m². Typical costs for such an installation are 5,000 - 8,000 € including storage tank and installation, for larger installations costs/m² may decrease to 350 – 400 €. Whereas in the beginning of the

market development thermal solar collectors were mainly used for the production of domestic hot water, an increasing trend of using the sun for space heating as well (especially in spring and autumn) can be noticed. Already more than 50 % of all installations are also used for seasonal heating. The following describes some of the programmes implemented to further increase the market share of solar energy in Upper Austria.

4.2.2 *Creating demand*

Information & awareness raising

The lack of information is still considered to be the most important barrier for further market penetration of renewable energy sources. That is why numerous awareness and information activities are carried out, including for example:

- ☀ A free-phone energy hotline answers all questions about renewable energy and energy efficiency (about 9,000 enquiries/year)
- ☀ Free energy advice and auditing: this service is directed towards private households, public institutions and companies which are on the point of making an investment decision in the energy field. In 2000, more than 10,000 of these energy advice sessions were held, in many of them the question of using solar energy was addressed.
- ☀ Numerous publications and other information tools, for example: videos, interactive CD-ROMs, information folders

Financial support

Financial support is granted by the regional government for solar collectors installed in the domestic sector, for those in commercial buildings by the national government. The regional government increased the subsidy for solar collectors last year (both for small and large-scale installations). A 10 m² solar collector installation, for example, receives 1,850 € (which is about 25% of the total costs), a similar support is provided for solar installations in apartment blocks.

Administrative & legal instruments

A number of administrative and legal measures have been implemented to promote solar energy installations, e.g.:

- ☀ no building permits are necessary for installations up to 20 m²
- ☀ solar energy and other renewable energy sources have to be given priority when choosing an energy supply system for a public building
- ☀ the regional building legislation foresees that an energy label has to be issued for each new and retrofitted building which includes an energy performance indicator taking into account the solar gains.

☀ a target was fixed for increasing the share of electricity from RES (4% by 2007).

4.2.3 Meeting the demand

A number of solar companies have established themselves in Upper Austria as a major driving force for the market development. Several programmes support regional companies active in this field in Upper Austria.

The "Oekoenergie-Cluster OEC" for example is a network of green energy businesses in Upper Austria which is managed by O.Ö. Energiesparverband and financed by the regional government. So far, 100 companies and organisations have joined the OEC partnership (as of February 2002).

One of the most interesting projects was aimed at increasing the market share of solar installations in apartment buildings. In co-operation with all solar collector producers a planning manual, "the solar guide", has been developed establishing quality standards and planning procedures for large-scale solar installations. Based on the manual, a training programme has been launched for housing associations, architects, plumbers and other professionals active in the housing sector.

4.2.4 R & D initiatives

Continuous R&D efforts are necessary to maintain the leading role of the Upper Austrian solar energy companies. A research and development centre, the ASIC (Austrian Solar Innovation Centre), has been established in Upper Austria to support the local companies in their research activities.

4.3 Belgium

(Author: Luc DeGheselle, 3E, Belgium)

4.3.1 General market characteristics

Belgium is a federal state with 3 regions which have substantially different levels of market development initiatives.

Autonomous market growth in Flanders and Wallonia has been at 30 to 40% over the past 4-5 years although of course absolute values remain very low: The annual

installed collector surface for Belgium in 2001 is estimated at 6000 m² (1300 m² for Wallonia, approximately 4500 m² for Flanders and <100 m² for the Brussels Capital Region). Over 90% of this market is related to flat plate collector systems, an estimated 6-8% by non-glazed collectors for swimming pool applications and a minor 2-3% by evacuated tubes.

Limited active market development has been performed over the past decade although different subsidy levels existed since the late nineties. Below, recent, more extensive

BELGIUM	
☀	10.2 million inhabitants
☀	25,000 m ² cumulative (2001)
☀	0.0024 m ² per inhabitant
☀	3,500 m ² installed in 2001
☀	Market trend: ++

market initiatives are described in more detail.

Of the installed systems, 66% cost less than 1000 Euro per square meter (taking into account installation work and VAT). When taking into account subsidies, 85% of the systems cost under 1000 Euro per square meter (data from SOLTHERM).

4.3.2 Demand side

The existing market is to a very large extent composed of residential applications with flat plate collector systems. The market consist for around 80% of renovation market and for about 20% of new buildings. In the renovation market 50% is simultaneous renovation of solar water heater and auxiliary heating equipment. Some general structural measurements as a central information dissemination point, market facilitators (active support) and a lobbying organisation have not been able to boost the market so far.

The fraction of the total collector surface related to non-residential installations is estimated at 20%. The most important subsectors at this moment are small and medium enterprises, such as hair dressers, garage, food processing, recreational centers) and social housing project development (with mainly individual solar water heaters 150-200 housing units). Existing subsidy schemes for educational and health care sector organisations have had very limited success. More active campaigns towards these target groups are developed in the frame of SOLTHERM.

4.3.3 Supply side

Industry & main products

Belgium has some 40 different brands of solar water heating systems on the market. It can be seen from the graphs below, that most solar water heaters are imported. System integrators are companies that import components rather than a line of products from a main brand. They combine the components into a product line of their own. Three manufacturers are known to be active with their own collector/absorber production or assembly line in Belgium. Regarding the unglazed absorbers for swimming pool applications, two Belgian companies manufacture two different types of systems (dome-shaped tubular collectors and tube-in-tube) and some ten brands actively market other unglazed collectors (mats, plates).

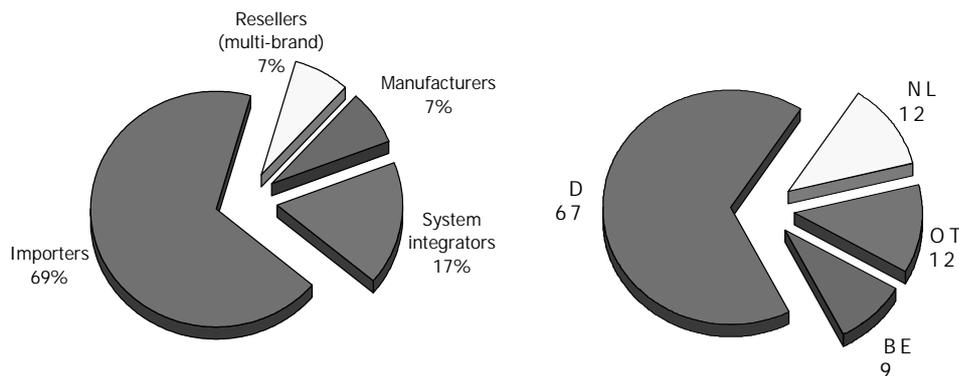


Figure 8. Categorisation of market players in Belgium based on their main activity with respect to solar water heaters (Left hand side pie chart) and based on the country of origin of the product distributed (right hand side pie) (D: Germany ; NL : the Netherlands ; BE: Belgium; OTH : other countries).

One major investment project was realised in 2000-2001: The Solarmundo Project, a concentrator technology for integration in solar thermal power plants for electricity generation. This collector type is not marketed in Belgium but in the Sunbelt (Mediterranean, Middle East, North Africa).

Due to the fact of the market being mainly single-family systems, no large size collectors specifically designed for large systems are actively distributed on the Belgian market. Evacuated tube collectors are imported both from EU as Far East manufacturers.

In 2002, two existing branch organisations have merged into the national organisation: BELSOLAR.

Distribution and sales

Installers are considered by the suppliers to be the main sales and marketing channel of solar water heaters. An increasing interest is noticed from wholesale companies selling solar water heaters of different brands to either installers and/or private customers. These wholesale companies often mainly sell sanitary or heating equipment. In the frame of the Soltherm project in Wallonia a specific marketing and sales training program is given to the installers.

Installation

In Belgium about 7000 to 10000 professional installers are active in the three most relevant professional categories (heating equipment installer, heating and plumbing (sanitary equipment) installer and roof construction work installer). Most of the solar water heater suppliers have a list of installers selling their products. It is estimated that in total about 200 installers are currently active and have practical hands-on experience of realising a

solar water heater. Some 200 more are interested, which means they are trained and mentioned on specialised address-lists from solar suppliers, but did not yet realise installations.

Like in conventional heating equipment, the majority of the installers do not have exclusive collaboration agreements with a certain brand. Independent installers sell typically two or three brands. Most often systems sold by independent installers are custom made or designed systems.

Although no branch organisation for solar installers exists, some centralised independent information and address lists are realised by public campaigns such as the “Solar installer pages” in Soltherm (www.soltherm.be). Within the frame of the Solar water heater promotion campaign of the Brussels Capital Region, a list of installers indexing their training level and experience is under construction.

In the frame of the Soltherm campaign (Wallonia - see below) a specific training and quality action towards solar installers is carried out. An analysis of the detailed database within the campaign, reveals that since the start of the program early 2001 a number of installers participated varying between 60 and 200. The installation records however show that over 50% of all 500 systems installed since the program start, have been installed by a small group of 10 very active solar installers.

4.3.4 Policy

Subsidies, financial & general regulations

Investment subsidies for solar thermal installations exist on different levels since the second half of the nineties. There is a subsidy given by gas and electricity utilities on national level. Separate public programs exist for small and larger systems on regional and provincial government levels. In total about 100 municipal governments also provide additional financial support. However, each of these subsidies are not stable and not guaranteed for a long period. From 2003 on several changes will be introduced.

Depending on the location of the solar thermal installation, total investment subsidies for a residential solar installation can pile up to 2750 Euro's per system. Typical mean values are around 1500 Euro's per system. At presents the mean values represent in general about 40% to 50% of the total installation cost.

For medium size and larger installations typically a total subsidy amount of 30% (and up to 40% in the Walloon Region) of the installation cost can be obtained.

A number of other financial schemes exist, from 2003 onwards a tax deduction for residential solar water heaters is foreseen.

Several more general actions have been undertaken to make the general environment for solar water heaters more favourable:

- ☀ Increased interest in collaboration with industry to jointly organise market efforts
- ☀ Simplification or abolishment of building permit issues for residential systems
- ☀ Installation of permanent information centres on renewables and solar thermal

4.3.5 Campaigns and market development actions

Campaigns

The table below presents an overview of recent market development initiatives in Belgium. It is indicated if the program contains activities on solar thermal (ST) and/or photovoltaic (PV) solar energy applications. Furthermore it is shown that 3 different aspects can be addressed: quality, market development and training of professionals (installers).

	ST	PV	Quality	Market development	Training
SOLTHERM Wallonia	●		●	●	●
VLAZON	●	●	●	●	●
SWH Promotion Campaign Brussels	●			●	
Quality System BELSOLAR	●	●	●		●

The Soltherm Wallonia program is an extensive market development initiative, combining quality efforts on installer and supplier level with marketing and communication actions. A separate subprogram is developed for tertiary sector projects, which has a higher technical content. More details available on www.soltherm.be.

The VLAZON project is an extensive strategy study in which goals and action plans for the development of solar energy over the next 10 years are developed in detail. This plan will be the basis for campaigns in Flanders over the coming years.

The solar water heater campaign for the Brussels Capital Region has developed professional tools such as a tender document for project developers and will organise a large demonstration action towards tertiary sector projects in 2003.

Belsolar (Belgian Solar Industry Association) has been actively involved in the development and implementation of a quality scheme on product and service level.

Success factors

The fact that quality issues are coupled to the promotion activities in the SOLTHERM projects has resulted in increasing confidence and interest from the customer (quality issues concerned are quality commitment contracts for suppliers and installers, training etc). Potential customers more and more actively ask installers about their participation in the Soltherm system.

The work group “Active solar municipalities” has resulted in a lot of interest and an increased momentum with limited budget implications. The municipal governments are close to the end customer and are very eager to promote renewable energies. If they are instructed how to do solar thermal promotion and are supported on the practical issues,

they are very interested and a multiplication of effort can be obtained. However, municipalities do not always have someone available who can actively realise things locally.

4.3.6 Quality structures

Belgium has no specific quality standards nor requirements for solar thermal systems.

However, increased effort for the implementation of the recent EN-standards on the matter are being conducted since late 2001. BELSOLAR is actively collaborating with SOLTHERM to implement a quality scheme. This quality system has a wider scope than the standards:

- ☀ Criteria with respect to the collaboration between suppliers and their official installers (agreements on quality of training and installation work).
- ☀ Technical criteria, based on the EN-standards, for the solar systems marketed in Belgium. The criteria integrate aspects regarding performance on component and system level as well as durability and documentation.
- ☀ A set of minimum BELSOLAR guarantee conditions towards the end customer
- ☀ A code of conduct with respect to commercial communication and information.

In the frame of Soltherm, a specific solar training program is given to installers and architects.

4.4 Denmark

(Author: Klaus Ellehauge, Ellehauge, Denmark)

The market for solar heating systems in Denmark has been characterised by a steady increase in the market, until the mid-nineties. After 1996 the market has for several reasons shrunk. In the end of 2001 the subsidies have been diminished even further, and the market has come at a minimum. Statistics are no longer available, but the estimate for 2002 is between 500 and 700 installed systems.

DENMARK	
☀	5.3 million inhabitants
☀	259,000 m² cumulative (2000)
☀	0.049 m² per inhabitant
☀	13,000 m² installed in 2000
☀	Market trend: --

About 80% of the collector area is installed on one family houses, 10% is part of a middle-sized system, and 10% serves for district heating. The worlds largest system for district heating with 18.000 m² of solar collectors , is situated in Denmark.

Approximately half of the systems for one family houses are combined systems. However, most of the combined systems are based on a principle, which is unique for Denmark.

There are approximately eight Danish producers of solar collectors. It is estimated that the two largest companies Batec and ArCon share the major part of the home market. The third company is Velux, a large producer of roof top windows.

Most storages are produced at special lines at three to four major Danish producers of hot water tanks. Some (minor) producers that are specialised in tanks for solar heating systems exist, as well. Most tanks are put in white cases with pump, expansion valves etc. integrated under the tank. Typical tank sizes are 150 – 250 litres.

It has been the policy that the systems should be offered and marketed by the local installers. A quality scheme has educated approximately 50% of all installers. These installers have a solar installation certificate.

As in other countries the installers have not been able to increase the market sufficiently, alone. Campaigns e.g. with utilities have been carried out. In the middle of the nineties especially one gas utility was active. Last year one electricity utility has been active, in particular.

It is generally believed, that the testing of components together with the certification of installers has secured a good quality of the systems in Denmark. The test certificate and the installation by a certified installer together, were the condition for obtaining the subsidy. Furthermore the amount of subsidy was dependent on the performance of the system, which lead to good performing systems.

4.5 France

(Author: Bruno Gagnepain, Ademe, France)

4.5.1 General market characteristics

The table below gives general figures for 2000 and 2001 (source Enerplan, 2002). Note: these figures are for mainland and overseas territories.

FRANCE (mainland)	
☀	59 million inhabitants
☀	303,000 m² cumulative (2000)
☀	0.049 m² per inhabitant
☀	13,000 m² installed in 2000
☀	Market trend: --

	2000	2001
Annual area manufactured or imported, and installed in France including the overseas departments and territories	30,000 m ² , of which 23,000 m ² are glazed, i.e. an accrued area estimated at 513,000 m ² .	41,500 m ² , of which 34,000 m ² are glazed, i.e. an accrued area estimated at 554,500 m ² .

The range of solar heating products is made up of four application sectors:

- ☀ the individual solar hot water device (SWH)
- ☀ the collective or centralized installations for the production of sanitary hot water

- ☀ the solar combi-systems (SCS) (solar hot water production and space heating), designed for the detached house,
- ☀ heating outdoor swimming pools

A rough breakdown of collector area installed at the end of 2001 can be given, between the different applications below:

- ☀ about 75% are used for producing sanitary hot water
- ☀ 20-22% for heating municipal or private swimming pools
- ☀ the remaining 3 to 5% contribute to houses or buildings' space heating.

We should observe that the French solar heating market is growing in a significant way. In 2001, for the first time since long ago, the mainland France market has begun to grow apace with the overseas department and territories market for the glazed collectors installed area.

4.5.2 Demand side

A study on the mainland France solar heating market has been carried out at the end of 1998 by an engineering office upon the request of ADEME in order to help define the objectives and the main orientations of the program now called Plan Soleil. The study also focussed on the growth prospects existing within the field of the production of solar sanitary hot water in the individual and the collective applications.

Energy consumption for heating water accounts for almost 8% (15 Mtoe/year) of the final energy consumption in France. In the long run, a quarter of this energy could be generated by solar heating installations. However, in the next few years, the potential market will still be restricted to a few preferred niches of development where the use of solar energy will be the most adapted and the most profitable. The choice of the targets is determined by 3 factors: the economic sector, the type of energy substitute and the site sunshine. The study previously cited identified the following sectors as presenting interesting potentials (sanitary hot water production for the fourth ones):

- ☀ sanitary sector
- ☀ nursing homes for the elderly
- ☀ tourist industry
- ☀ domestic sector (medium and large scale plants)
- ☀ detached houses (with SWH and less developed: solar combi-systems)

4.5.3 Supply side

At the present time (first half-year of 2002), about thirty manufacturers and importers of solar heating systems are present on the market in France (mainland and overseas departments and territories) with very different levels of involvement. Most of them dis-

seminate their products only in mainland France and 4 of them restrict trade to the overseas departments. The range of solar equipment distributed in France is relatively large: glazed or non-glazed collectors, flat or vacuum collectors, individual solar boiler (several types), solar combi-systems. Most of manufacturers are above all active in the individual solar boiler sector which is the most widely developed, while the most important manufacturers are also beginning to enter the collective application sector.

Among those willing to work on solar thermal energy, only a small fraction work exclusively within this field, the vast majority is being made up of craftsmen having traditional activities in the building industry (plumbing-heating-roofing, and more generally speaking “climate engineering”). Two large organisations representing the professionals are present in France within most of the regions. Among these installers, there are on one hand, installers selling several brands (general case) and on the other hand, installers which have secured manufacturers’ loyalty or are members of sales and installation networks implemented by the manufacturers and are subjected to exclusive obligations.

In mainland France, the distribution and sales circuits for products intended for the detached house are essentially of two types: short circuit (manufacturer – installer – end customer), traditional circuit (manufacturer – wholesaler – installer – end customer)

4.5.4 Policy

In order to promote the dissemination of solar thermal equipment, financial supports aimed at the private individual (individual solar boilers and solar combi-systems) and at the private and public owners (collective installations for the production of solar hot water) are proposed in the frame of the national program, Plan Soleil. These financial supports can be supplemented within the framework of regional agreements concluded between ADEME and the regional or general councils. Along that exist also other public financial supports and tax exemptions, some of them being specific to the solar heating sector, while others concern more generally the renewable energy sector.

4.5.5 Most important campaigns / market actions, success/failure factors

Since 2000 in order to accompany the financial aid scheme of Plan Soleil, large communication campaigns have been essentially carried out by ADEME with regional partnerships towards a large public of private individuals, based on TV commercials, targeted regional operations (participation in fairs, trade shows...). They will continue and concern main sectors of solar thermal energy in the coming years.

Promotion of quality of products and installation seems to constitute an element of confidence (namely in duration) for the private individuals that are making the effort of taking an interest in this equipment and purchasing it. A general increase in the knowledge and practices at Qualisol installers’ is also observed. Most manufacturers ultimately agree that the selection of equipment contributes to conveying a global quality picture to the

solar heating sector through the management of product quality, and therefore provide an element of confidence to future customers.

Among the restricting points vis-à-vis the private individuals, the persistence of the individual solar boilers' high prices do seem to significantly dampen the willingness to make the purchasing act after a first request of information. For collective applications, the strict implementation of the community regulations concerning State aids provided to the competitive sector was very restricting from the point of view of the finalisation of new projects. The lack of engineering offices with good skills in the solar field also represents a bottleneck for the development of this market segment.

4.5.6 Most important quality structures

Plan Soleil is based on one side on the promotion of installation quality, through the implementation of the Qualisol chart and on the other side on the promotion of equipment quality, by utilising national procedures partly based on European text (European testing standards adopted in 2001).

4.5.7 Special characteristics of the French market

First, there exists in fact two markets, due to our particular geographical situation with one side mainland and on the other side overseas departments and territories. In overseas departments, we find specific equipment, with manufacturers generally not present in the mainland, except in two important ones.

Second, people in France are particularly sensitive to the costs of solar equipment as observed in several enquiries carried out since the beginning of our national program. And even if they became more and more sensitised to environmental questions, this point could be an important bottleneck.

At last, we should add that in the mainland, the different equipment (SWH and solar-combi systems) are really considered separately, they are not distributed and installed in the same conditions and by same ways.

4.6 France – Rhône-Alpes Region

(Author: Reinhard Six, Christine Joder, RAEE, France)

4.6.1 The solar heating market

Before 2000, the solar heating market in the Rhône-Alpes region has developed mainly in two directions: installations for collective domestic water heating and solar floor heating systems for single-family dwellings. But now the market for individual solar water heating is also growing because these installations also benefit from subsidies since 2000.

The total area of thermal solar panels installed was about 27 300 m² at the end of 2001, divided as follows:

- ☀ 17 600 m² in collective

- ☀ 7 800 m² for individual heating
- ☀ 1 900 m² for domestic solar water heating

In 2001 about 500 m² of collective thermal solar panels were installed, 1 500 m² for combined solar systems (about one hundred installations), and 1 300 m² for domestic solar water heating (280 installations). These figures should increase in a noticeable way.

4.6.2 Demand side

Individual: The market for domestic solar water heating is divided between existing and under construction buildings, whereas the combined solar systems are usually installed in new buildings.

Consumers come generally from a mature and rather favoured population.

Collective buildings: Collective buildings equipped with solar water heating are mainly public buildings like swimming pools and gymnasiums, social housing and tourism industry (hotels, holiday apartments and campsites)

4.6.3 Supply side

More and more trademarks for solar materials are present in the French market. In order to benefit from public subsidies, installations have to be chosen among a list authorised by the French agency for Environment and Energy Management, ADEME and the installers have to be signatory of the « Qualisol Chart ». In the Rhône-Alpes region, the number of these installers went from about 10 in 2000 to 335 in 2002.

4.6.4 Policy

The State and the Regional Council of Rhône-Alpes support the owners for studies and investments in thermal solar energy. To these subsidies may be added to subsidies from « Départements » and even from towns. The total amount of subsidies available can add up to a sizeable amount, depending on the “Département” and municipalities, but the lack of consultation between the different financing bodies makes obtaining this assistance appear complicated, and this may be putting off some of the people building new houses.

4.6.5 Campaigns actions

The advertising initiatives carried out in 2000 and 2001 as part of the regional ‘Plan Solaire’ were:

- ☀ a national toll-free number (‘Numéro Vert’)
- ☀ a TV advertisement
- ☀ a 12-page document distributed in a newspaper, or directly to homes in targeted areas
- ☀ visits to domestic and collective solar installations organised by associations
- ☀ opportunity appraisals for solar installations carried out free of charge by associations
- ☀ training courses for installers on solar energy equipment

4.6.6 Specific aspects of the campaign in the Rhône-Alpes Region

The campaign of the Regional Solar Plan is characterised by:

- ☀ An important number of subsidy levels (national, regional, sometimes from the Département and even from the municipalities). An application has to be done for each level, which is what makes the process complicated.
- ☀ The involvement of one or two associations for the development of renewable energies in each Département. These associations advise freely the owners and are able to give assistance for the mounting of a dossier.
- ☀ The application of a plan which was national at the beginning and was not able to take into account all the regional characteristics of this sector.

4.7 Germany

(Author: Olivier Drücke, Gerhard Stryi-Hipp, DFS/BSi, Germany)

4.7.1 General market characteristics

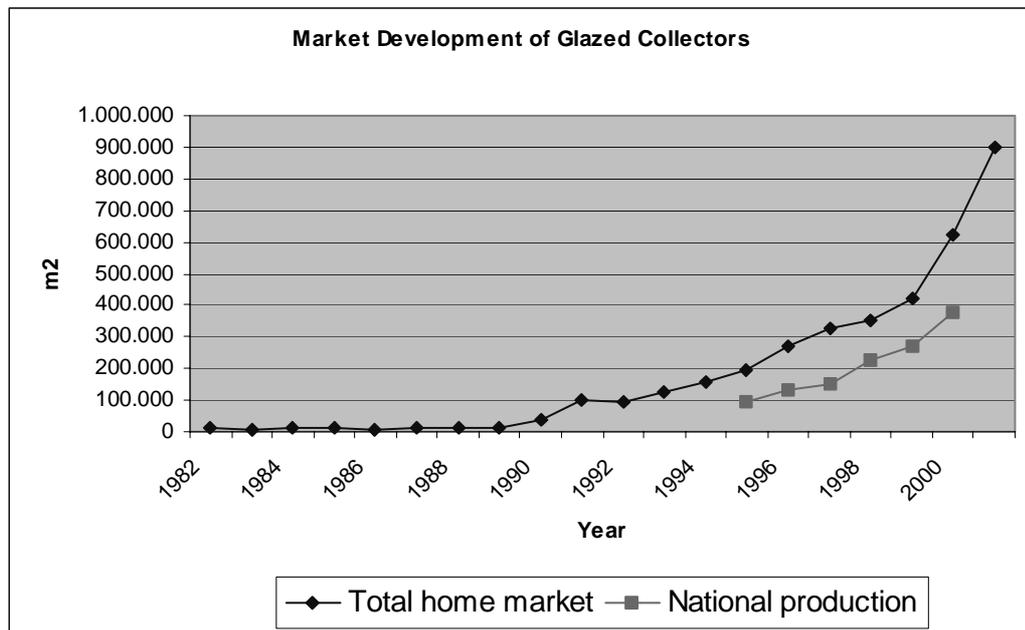
The sustained and persistent environmental debate since the early seventies and the progressive establishment of green politics in Germany's society helped the development of a solar thermal niche market in the early eighties. Germany was certainly not among the European pioneers of solar thermal heat, and the market development began a decade later than in Mediterranean countries, like Greece, France and Spain. Nevertheless, it is Europe's biggest solar thermal market in volume today, with a share of more than 50% of the whole European solar thermal market volume in 2001.

The German solar thermal market made a singular development in the recent years. On the basis of positive surroundings, it left the status as a niche market and became an important part of modern heating technology. The professionalism of the solar branch significantly grew and firms of reputation entered into the solar thermal market.

In 2001, home market sales of 750.000 m² for flat plate collectors, 150.000 m² for vacuum collectors and 50,000 m² of unglazed collectors are estimated. The total area installed at the end of 2001 is 3,700,000 m² glazed collectors and 665,000 m² of unglazed collectors. At the end of 2000, 2.79 Mio m² glazed solar collectors were installed in Germany, e.g. 34 m² per 1.000 inhabitants. The market of unglazed collectors is estimated since 1995. Half of the absorbers are used in public swimming pools, the other half in private swimming pools.

GERMANY	
☀	82 million inhabitants
☀	4,365,000 m² cumulative (2001)
☀	0.045 m² per inhabitant
☀	900,000 m² installed in 2001
☀	Market trend: -

The Market growth of the past 10 years is 25% average per year. The growth of 2000 and 2001 was superior to 45%. The expected growth until 2010 is 30% average per year



Source of data: DFS

In recent years, the production of solar collectors and solar systems was extended and automated. Factories for modern, ‘sputtered’ absorber coatings were built and factories for prefabricated parts of collectors were founded. Due to the high quality standard of the systems, the production of collectors moved from abroad back to Germany. The established solar companies as well as companies from the heating branch, the branch of roofing, tiles and skylights and from the facade branch entered the market and started to produce solar collectors. There is a lot of investment being done from the companies at the moment.

Enterprises significantly developed solar technology further with regard to the efficiency of the components, system integration, ease of installation and operation and design. New products were developed for example new kinds of vacuum tubes, stores for combined systems for water and room heating or systems for solar cooling.

New developments were also made by other components like the selective coatings of absorbers, regulation systems or anti-freeze liquids. This trend of the last years shows that the potential for development for solar systems is much higher than expected and further potential still remains. New developments are necessary to achieve lower costs.

The craft more and more recognise solar thermal systems as an important market. They have professional training and distribute solar systems actively. Solar systems are recognised to be a mature technology. Most of the house owners are open-minded for solar thermal technology. In cases that they are not applied, it is so because people wait for the price of solar systems becoming cheaper – or the prices for oil and gas more expensive.

For the future it is of importance to open up market segments beside the one-family house market like multifamily residences, solar district heating, public buildings (e.g.

hospitals), trade (e.g. hotels) and industrial utilisation (e.g. high temperature applications). Solar cooling is to become an important application, too. To open up this market an initial support by the government will be necessary with subsidy programs, demonstrational projects and information campaigns. On this base the aim of a market size of 10 Mio m² in 2010 will be achieved.

4.7.2 Demand side

The main solar thermal segments in Germany are:

- ☀ 80% Single-family solar water heaters without space heating (SWH)
- ☀ 15% Single-family solar combined water and space heaters
- ☀ < 5% Collective solar water heaters and others

Today, customers are interested and motivated to purchase solar heat systems mainly by means of mouth-to-mouth propaganda, press and media work as well as advertising. Interested customers search for qualified installers. Those installers are found by means of yellow pages, solar companies, fairs and exhibitions, campaigns and direct contact to known installing companies in the vicinity. The contacted installing companies provide technical and financial advice (subsidies) and submit an offer. Once the subsidy has been granted, the order is put in hand with the chosen installing company. The installing company typically belongs to the heating and sanitary craft.

Reasons to purchase solar

The main target group for a solar thermal system are the owners of one- and two-family-houses, who refit solar collectors to an existing heating system or do so in the process of the renewal of an old boiler, typically after 15 to 25 years. A second target group are private house builders.

Typical consumer motivation

Most of the consumers are currently owners/inhabitants of one or two family houses. Most of the systems are installed in elder buildings. In new buildings the cost of a solar system would be a bit lower but the investment is often postponed, although the later installation is made possible by considering the piping from roof to cellar for the solar circuit.

The main factors that influence consumer motivation are:

- ☀ The awareness for environmental problems and of the finiteness of fossil fuel.
- ☀ The increasing costs of fossil fuel.
- ☀ The subsidies for solar thermal systems.
- ☀ The advertisement for solar thermal systems.
- ☀ The modernity of solar thermal systems.
- ☀ The maturity and technical reliability of the solar thermal systems.

According to a recent survey of 2001 environmental friendliness is the main reason for the installation of a solar system, followed by savings in energy cost. One further reason for the interest in solar energy is the growing discussion about the danger of the climatic change and the end of fossil energy resources. The public sees solar energy as one indispensable energy resource in the future. However, the most important point is the feeling that they can contribute something to the protection of the environment and a further point is their higher independence of oil or gas. Most of the people would use solar energy, if it were not more expensive as oil or gas.

4.7.3 Supply side

There are about 100 small and medium sized manufacturing companies of solar thermal systems in Germany offering standard solar thermal systems (mainly SWH, space heating combinations and process heat).

There are about 45,000 heating and sanitary installers in Germany. About 10,000 of those (corresponding to about 20%) are installing solar systems. The general attitude of installers regarding solar heating products is that an increasing number is considering solar heating systems as an important business field in the future.

Knowledge of installers

Today, solar thermal knowledge is merely or virtually not transferred within regular installers formation and education programs. Active installers get rather basic technical training with the solar thermal manufacturers and installer organisations. Since 2 years an infrastructure of certified professional training centres for continued education has been established by the national heating and sanitary installers organisation.

Other market players

Heating and sanitary grossists are normally involved in the distribution chain with their functions (Logistics, marketing, Information, permanent exhibitions and prospective clients)

4.7.4 Policy

The German energy policy did change a lot since the start of the socialdemocratic-green Government in 1998. The Government aspires to make the energy supply sustainable and has thus in the last years following measures – amongst others - taken:

In 2000 the termination of the use of nuclear energy was decided. In average the power stations have to be stopped working in 12 years time, new reactors will not be built anymore.

The introduction of renewable energies is subsidised much stronger now. In the ‘Erneuerbare-Energien-Gesetz’ (EEG) from 1. April 2000 the reward for the feeding in of electricity from renewables into the integrated network has been improved; e.g. owners of photovoltaic systems get 20 years 51 cent/kWh for solar electricity fed in. In 2002 this amount was lowered to 48,1 cent/kWh for 20 years.

The funds for the 'Markanreizprogramm' for solar thermal systems were raised noticeably. Photovoltaic systems are subsidised in the 100.000 Dächer-Programm by credits with reduced interest rates.

The eco-tax is raised annually since 1999 and will be up to 2003. It is supposed to lead towards a more efficient use of energy. The proceeds are used for the pension insurance scheme, so that the contributions can be kept low.

The 'Klimaschutzprogramm' passed in 2001 in order to achieve the aim of a reduction of CO₂-Emissions of 25% until 2005 compared to the year 1990.

In 2002 the 'Energieeinsparverordnung' (Energy feed in law) became effective, that leads to further reductions of energy consumed by new buildings.

In 2000 renewable energies have a share of about 2% of the whole primary energy produced and 5% of the whole electricity produced. The government decided to double the share up to 2010. The ministry for environment tries to achieve an increase of 10% per decade to reach a share of 50% in 2050 of the energy supply by renewable sources. Several studies were launched that prove the possibility of these plans.

The seriousness of the energy policy gets obvious regarding the commission of the Lower House of German Parliament occupied with "Nachhaltige Energieversorgung" (Sustainable energy). In addition the 'Rat für Nachhaltige Entwicklung' (council for sustainable development) was established by the government in order to integrate the different points into a sustainable concept and back these plans and work on a national strategy.

4.7.5 Most important campaigns / market actions

The first nation-wide solar thermal campaign realised was "Solar – na klar!" from 1999-2001. A more detailed description and evaluation of "Solar – na klar!" will be provided on www.soltherm.org under "Campaign Guidelines". In 2002, the solar campaigning is being continued by the Initiative Solarwärme +.

There are/were several regional and local campaigns such as:

- ☀ Berliner Solarkampagne
- ☀ Hannover Region Solar
- ☀ Hamburger Solarkampagne

A more detailed description and evaluation of the regional/local campaign "Solarenergie kommt!" of the marketing network Hannover Region Solar will be provided on www.soltherm.org under "Campaign Guidelines".

General information on "Solar – na klar!"

In order to increase public awareness, the solar thermal campaign, 'Solar, na klar!' ('Solar – that's clear!') was launched in 1999. Under the management of the environmental organisation of the industry, B.A.U.M., the organisations of the plumbers (ZVSHK), the solar thermal branch (BSE and DFS), the public solar organisation (DGS), the architects

(BDA) and the environmental association DNR developed and realised the campaign from 1999 up to 2001. The environment foundation DBU financed 40% of the budget of 10 Mio DM (5,1 Mio €) over the 3 years. The campaign stood under the auspices of the German chancellor Gerhard Schröder and the minister of environment Jürgen Trittin.

The concept of “Solar, na klar!” was based on three pillars:

The installer/expert campaign aimed at providing information, motivation and marketing & sales support to sanitary and heating installers. The campaign activated and motivated 20% of German heating and sanitary installers. It provided them with technical and marketing support helping them to practically develop their sales activities in the solar thermal segment.

The consumer campaign aimed at interesting, involving and activating the targeted private house owners and builders by means of PR work, mainly with articles in magazines and newspapers, reports from radio stations and presentations on TV. Due to the limited budget, only small advertisements in house building magazines were placed. The interested persons could request a brochure with information about the reasons for the use of solar thermal energy, the technique of the different systems, the requirements for its use and the subsidies available. A list of the 50 solar companies, which were engaged in the campaign was included and gave the readers the option to contact them. An additional list with plumbers offering solar systems in the vicinity of the interested party gave them any information needed to do the next step and ask for an offer of a solar system. More than 7.500 plumbers were registered during the campaign. The brochure also could and still can be ordered via Internet on www.solar-na-klar.de. Over the 3 campaigning years, 200.000 brochures were ordered this way.

The multiplicator campaign directed core messages to policy, industry multiplicators and public opinion leaders by means of PR work.

In parallel to the campaign, solar companies increased and synchronised their own advertisement activities for solar thermal energy systems and their media coverage by means of systematic PR work. Only the bigger companies of the heating branch are able to place advertisements nation-wide. Due to the growing number of buildings with solar systems integrated on their roof, solar systems are now accepted more and more as the mature and reliable technology that they are.

A more detailed description and evaluation of “Solar – na klar!” will be provided on www.soltherm.org under “Campaign Guidelines”.

4.7.6 Most important quality structures

Quality / durability of products, guarantees

The warranty on collectors and solar systems in Germany is now regulated by law to minimum two years. But many Manufacturers and Distributors have raised their warranty on collectors voluntarily to 5 or even 10 years. The warranty on storage devices is 2-5 years. All peripheral instrumentation and equipment are guaranteed for 2 years (accord-

ing to newly set European standards requiring 2 years minimum warranties). There is no manufacturer warranty on the whole solar thermal system.

Installers are bound to give a warranty on the correct function of the (solar) heating system on the basis an acceptance test provided upon completion of the installation. If contracts are made according to the German civil code (BGB - Bürgerliches Gesetzbuch) guarantee period is 5 years for system errors inherent to the installation and following acceptance test. If contracts are made according to the contracting rules for the award of construction performance contracts (VOB - Verdingungsverordnung für Bauleistungen) guarantee period is 4 years for system errors inherent to the installation and following acceptance test.

The German “Solarthermie 2000” national subsidy programme for big solar thermal systems demands that solar water heating systems bigger than 100 m² provide ‘Guaranteed Solar Results’.

In Berlin and Brandenburg the DGS (Deutsche Gesellschaft für Sonnenenergie) has initiated a ‘GSR-Program’ for the housing industry interested in the operation of solar thermal systems. Up to now, 7 systems between 30 - 220 m² are providing ‘GSR’ in Berlin and Brandenburg.

Test centres, testing

In Germany there are five institutes, which have the certification of the DIN and are allowed to undertake collector tests (Fraunhofer ISE in Freiburg, ISFH in Emmertal, ITW in Stuttgart, TÜV-Bayern-Sachsen in München and TZSB in Saarbrücken). Some test centres provide overviews on their testing results. Manufacturers are namely quoted upon release.

Certification: obligatory / voluntary / needed for incentives

For collectors used in the private sector, there is no obligation for them to be tested or certified. However, almost every collector is tested on the DIN standard, since 2001 on the European harmonised standard DIN EN 12975, before on DIN V 4757.

But in order to get a subsidy from the government, a certificate is necessary that the collector has a minimum yield of 350 kWh per year. The certificate is made out by an institute that is approved by the DIN after the collector was tested.

In addition, up to 2002, flat plate collectors mostly have the “Bauartzulassung” (permission for the type of construction), which certifies its safety for high pressures. In 2002 the national ‘regulation for steam boilers’ will be substituted by the European pressure equipment directive (PED) 97/23/EG, therefore the Bauartzulassung will not exist any longer.

Knowledge of installers

Today, solar thermal knowledge is merely or virtually not transferred within regular installers formation and education programs. Active installers get rather basic technical training with the solar thermal manufacturers and installer organisations.

Since 2 years an infrastructure of certified professional training centres for continued education has been established by the national heating and sanitary installers organisation.

The individual qualification degree therefore depends on interest, motivation and the type of formation chosen. Especially the further education offer is sufficient and adequate. The education of sanitary and heating installers will soon put more emphasis on solar thermal energy and other renewable housing technologies. Generally speaking, the solar thermal training offer covers a wide range from 1-day-courses to several months' high quality courses.

Certification schemes for installers

There is no binding certification system for solar installers in Germany (in comparison to French Qualisol certification for example).

4.7.7 Success / failure factors

Positive factors that have played important positive roles

- ☀ Intensified subsidy support by the federal government
- ☀ Entry of the traditional heating industry to the solar thermal market
- ☀ Improvement of the installers' acceptance of solar thermal systems

Innovation

The innovation process in Germany focuses on:

- ☀ Standardisation and cost reduction
- ☀ Improvements on longevity and reliability of solar thermal technologies
- ☀ Adaptation of solar technologies to housing technologies (Hot water and heating)
- ☀ Integration of solar technologies into heating technologies
- ☀ Integration of solar technologies into the building envelope (roof or façade)
- ☀ Further development to achieve higher conversion efficiencies
- ☀ Technological development of new applications for solar heat, e.g. solar cooling

Bottlenecks on the supply side

There is a wide-ranging and mature solar thermal offer on the German market. Despite big progress in the past 5 years there still is a challenge to involve, win and motivate the installers and traditional distribution structures (e.g. grossists)

Bottlenecks on the demand side

Despite progress in recent years with "Solar, na klar!" there still are important information deficits on the demand side that need to be consequently addressed in the long term.

New market segments need to be opened up: hotels and restaurants, business enterprises, multi-storey residential buildings, collective and district heating systems, solar cooling and process heat.

A market segment which is definitely underdeveloped today are multi-storey residential buildings. There are only few building companies that regularly use solar systems in their buildings with several floors. Still some buildings are being realised. That is why guaranteed solar results contracts are only in few projects of importance.

4.8 Greece

(Author: George Markogiannakis, CRES, Greece)

The Greek Solar Thermal (ST) Systems market after almost 20 years of development and fluctuations could be considered as a developed market, at least regarding the residential sector.

At the end of the year 2000 the surface area of the solar collectors in operation in Greece amounts to 2.96 million m². During the last years sales were stabilised at about 300,000 m² annually where almost 50% of them are exports.

Despite the success of the solar thermal systems in the residential sector, there is still area for more applications, especially in the industrial and tertiary sector where their penetration is minimal.

During the last few years there is an increase of solar thermal applications in the industrial and tertiary sector mainly due to subsidies coming from the National Development Law and the Operational Program for Energy.

In order to achieve further penetration of solar thermal applications in the industrial and building sector Greek key players have to:

- ☀ Further advertise the products
- ☀ Raise environmental awareness
- ☀ Improve installation and product quality
- ☀ Implement promotion campaigns to engineers, architects, installers
- ☀ Implement promotion campaigns for large systems
- ☀ Further penetrate solar systems in the public sector
- ☀ Continue subsidisation and incentives
- ☀ Introduce green taxes

GREECE	
☀	10.5 million inhabitants
☀	2,960,000 m² cumulative (2000)
☀	0.28 m² per inhabitant (2000)
☀	150,000 m² installed in 2001
☀	Market trend: =

Regarding the use of solar systems, 99% of them are small scale systems for domestic hot water, 0.75% are large scale systems for hot water in the tertiary sector (hotels, hospitals and swimming pools) and 0.17 % (5,118 m²) are large systems for hot water, air-conditioning space heating and desalination in industry [3].

Five main industrial applications for solar hot water can be identified, which promise acceptance of large solar thermal systems. These are industries with relatively low temperature energy consumption where there can be quite a significant fraction of energy provided by the ST system to the industry's energy load. ST systems are particularly effective in industries that require water temperatures in the range 40 – 80 °C. These industrial sectors are [4]:

- ☀ Food industry (dairy products, meat factories, pastry and cake confectioneries, olive oil refineries, tinned goods)
- ☀ Agro-industries (Solar drying, greenhouses, livestock landings)
- ☀ Textiles (Tanneries, textile treatment workshops)
- ☀ Chemical industry (Cosmetics, detergents, pharmaceuticals, wax)
- ☀ Drink and beverage industry (Wineries, liquor and wine distilleries, breweries, soft drinks)

Solar industry represents a well-developed manufacturing sector in Greece. The Greek Solar Industry Association counts 18 members, which represent the larger manufacturers. Besides, about 50 smaller enterprises are active on a local or regional level. Greece is the largest exporter of solar systems in Europe. The Greek production of the sector covers about 30 % of the European market.

The great majority (more than 95 %) of solar sanitary hot water systems installed in Greece are compact thermosiphonic units, providing hot water to individual dwellings. A typical configuration of such a system comprises a simple flat plate collector (single- or double-glazed) and a storage tank attached above the collector. Usually, the heat is transferred from the collector to the storage through a closed circuit, filled with antifreeze fluid, and a heat exchanger. The storage tank is equipped with an electrical heating element.

The Greek State realising the significance of the solar thermal systems has introduced various measures for their support. Efforts for the incorporation of RES appliances and systems in the building sector in Greece date as far back as 1978, when Law 814/1978 included a provision for a significant tax deduction granted to all households purchasing and installing a hot water solar heater. This important tax-related incentive decisively boosted the local manufacturing of solar heaters and promoted the rapid and widespread installation of domestic solar water heating systems in Greece.

Since then, a significant number of actions, both administrative and financial, have been taken in order to further support the solar thermal market. These actions include provisions for their incorporation in the building envelope, their positive contribution in the building's energy rating, tax exemptions for their purchase and installation and grants and

subsidies related to the financing of the comparatively high capital cost of RES investments.

Solar energy system parameters are subject to design and material quality standards in order to ensure durability of the product, reliability, safety and thermal performance. These CEN standards regard solar collectors, factory and custom-made systems. The design standards include the drinking water standards, freeze resistance of the panels, overheating protection for materials, reverse flow prevention, pressure resistance and electrical safety of the system. The material quality standards include the solar collectors, supporting frame, circulation pumps, expansion vessels, heat exchangers, storage tanks, piping, thermal insulation, control system and safety equipment.

In Greece, for the moment, the only certified test centre for Solar Thermal Systems is the "Solar & Other Energy Systems Laboratory". The Laboratory is organised according to EN 45001 and provides test reports for solar collectors according to the Standards ISO 9806 –1, ISO 9806 –2 and DIN 4757 – Part 4. Also it provides test reports for solar domestic hot water systems according to the Standard ISO 9459-2: Solar heating - Domestic water heating systems - Part 2.

For the dissemination and the further promotion of the solar thermal systems in Greece, a satisfying number of activities have already taken place, such as mass media campaigns, advertising, implementation of business oriented workshops, web and journal publications, technical brochures productions, etc.

The greatest one was a large TV promotion campaign undertaken by EBHE (the Greek Solar Industry Association) with financial support by the State in 1984 and 1986. This contributed to increased sales. Another campaign in two phases over the period 1994-1995 was co-financed by EU OPET Programme and manufacturers, included a TV campaign and direct mailing through the bills of the Public Power Corporation (PPC). This Campaign was a collaboration between CRES, EBHE and PPC and it has achieved encouraging results.

Nevertheless, experience has shown that solar thermal systems need continuous support and advertisement targeting not only the residential sector for domestic hot water applications but also other applications such as large installations for hot water and cooling production in the tertiary and the industrial sectors.

Concluding, the most important reasons of the success of Solar Thermal Systems in Greece are summarised below:

- ☀ High solar radiation, climatic conditions and morphology of the country.
- ☀ Positive timing in the 70's oil crisis
- ☀ Successful marketing campaigns.
- ☀ Legislative support and incentives at an early stage.
- ☀ Broad dissemination of the technology (advertisements, information brochures, demonstration projects, etc.).

- ☀ Public acceptance.
- ☀ Continuous effort from the manufacturers for better and cheaper products.
- ☀ Easy access to solar thermal products.

*** For the reference numbers [3] and [4], if necessary, please refer to the Greek country report**

4.9 Italy

(Author: Martin Ménard, Ambiente Italia, Italy)

4.9.1 General market characteristics

After a first boom in the late 70's and the early 80's, the Italian solar heating market almost collapsed in 1987 after the phasing out of a subsidy programme managed by ENEL, the national electricity utility. For the following decade, annual collector sales remained below 15 000 m². The large number of malfunctioning plants installed during the first boom is largely responsible for the solar heating industry's lingering poor image in Italy. The new reality of solar thermal products though is beginning to correct these remaining misconceptions.

A considerable yearly market growth of about 25% could be observed in average over the past 5 years, most probably based on an increased appearance of 'solar' and related subsidy programs in the mass media. It is estimated that in 2002 approximately 60 000 m² of solar collectors will be installed in Italy. Prospects for the coming years are encouraging: the Ministry of Environment has approved in September 2002 a national subsidy programme which should generate in 2003, combined with other available programmes and incentives, a market volume of at least 100 000 m².

4.9.2 Demand side

The main target group for solar water and space heating are private households. Of the 20 million dwellings in Italy more than 70% are situated in large apartment buildings. Almost 90% of all dwellings are in private ownership and about 25% of them are rented. The number of single family houses in Italy is, compared to central and northern European countries, low.

ITALY	
☀	58 million inhabitants
☀	271,000 m ² cumulative (2000)
☀	0.005 m ² per inhabitant (2000)
☀	55,000 m ² installed in 2001
☀	Market trend: ++

4.9.3 Supply side

There are about 60 suppliers of solar heating systems in Italy. Some 20 national manufacturers cover about 20% of the domestic market. The sector directly employs about 300 people and generated in the year 2000 a turnover of 24 million Euro.

The majority (> 90%) of solar heating plants installed in Italy are small systems used for residential hot water supply. In northern Italy, there is a certain trend towards combined solar systems that provide both hot water and space heating. In central and southern Italy mostly compact thermosyphon systems are used. These work exclusively as solar water heaters.

So far, only suppliers of solar heating systems and a few installers are actively marketing this technology. In order to achieve a strong market growth, it seems to be very important that solar heating systems will be integrated in the product catalogue of suppliers of conventional heating plants. This should occur on all levels of the distribution chain, from manufacturing over large resellers down to retail shops and installers.

Missing knowledge of installers is a major bottleneck for solar heating in Italy. Thereby, vocational training is generally a weak point of the Italian installer sector, which is based on thousands of very small and weakly structured family businesses. Several institutions are now starting vocational training programmes for installers of solar heating systems and within the next few years the number of qualified installers will probably increase significantly.

4.9.4 Policy

The Italian state as well as the federal regions made numerous commitments related to the reduction of CO₂ emissions and the development of the renewable energy sector. Among them the approval of the Italian White Book for the use of RES in 1999, which foresees in general to double the RES share and in particular to install 3,000,000 m² of solar thermal collectors until 2010.

The situation of public subsidies for solar thermal has been much improved the last years. Especially the role of the Ministry of the Environment has been decisive for this improvement. However, the solar industry still complains about heterogeneous and sometimes discouraging admission procedures for subsidy programmes on the regional level. The good examples of regions that have improved their subsidy programmes, for instance the Region Lombardia, should be followed now by others. Another big progress would be a simplified procedure for the application of tax cuts, at least for small solar heating systems.

4.9.5 Most important campaigns / market actions

There is only limited experience with solar promotion campaigns in Italy and most campaigns were addressing only a small number of potential customers. The impact on collector sales has been limited or is not known. However, information and sales campaigns are one of the most important tasks to boost the Italian solar heating market, as the low

level of consumer awareness and confidence prove. Considering the actually improved policy environment, availability of public subsidies and high quality products, professionally managed information and sales campaigns are likely to have a high impact on the solar heating market.

4.9.6 Quality structures

To avoid subsidising low quality products, the Italian Ministry of Environment is eager to introduce more stringent quality standards for solar thermal components and systems. In order to qualify for the upcoming regional subsidy programmes starting in 2003, collectors must be tested by an accredited European testing laboratory. The Italian test centre for solar heating systems, the ENEA institute of Trisaia in Calabria, is actually applying for EC accreditation. Starting in 2004, collectors will have to comply with the European standard EN 12975-1 and will have to be tested according to EN 12975-2 and the manufacturers are required to be ISO 9000 certified.

In parallel to this, Assolterm, the Italian solar industry association, has introduced in 2002 a new quality label for suppliers and installers of solar heating systems, the so-called "Solar Pass". Harmonisation of the Solar Pass scheme with the European Solar Keymark is under discussion.

4.9.7 Success / failure factors

Low technical quality standards in the building sector and lack of awareness of environmental problems are the main reasons for the delayed development of the solar heating market, which produced low quality products and installed and maintained them scarcely. An unknown but certainly high number of solar thermal plants installed between 1975 and 1985 broke during the first years of operation. The result was the almost complete collapse of the market and a persisting poor image of the technology.

As success factors, starting in the second half of the 90's, one may list the strong local market development of the autonomous Provinces of Trento and Bolzano as well as successful subsidy programmes launched by several regional governments and last but not least the important support from the Ministry of Environment. Furthermore, the activity of the Italian industry association Assoltherm has positively influenced co-ordination and visibility of the solar heating sector.

Today, a new consistent boom is expected for the Italian solar heating market. Finally, the very favourable climatic conditions and the enormous technical and economical potential are now ready to be tapped.

4.10 Netherlands

(Author: Maarten de Bruin, Giel Linthorst, Ecofys, the Netherlands)

4.10.1 General market characteristics

The Netherlands has approximately 16 million inhabitants who live in over 6.5 million dwellings. The number of households is expected to increase to 7.2 million households in 2010. The solar domestic water heating market in the Netherlands has experienced a strong growth in the 1990's. However, from 1999 the growth flattened. The market has stabilised at around 30,000 square meters a year.

In new dwellings more than 90 percent of all solar domestic water heating systems are installed on a project basis. In existing buildings the number of SWHs realised in projects is approximately 70 percent (often through solar water heater campaigns). The number of buyers purchasing a SDWH system on an individual basis is still relatively low.

Manufacturers delivered around 8,750 systems in 2001. In total, more than 59,000 households had a SWH system at the end of 2001, accounting for 154,052 m² of collector area. The total collector area installed is about 218,000 m²; the remaining area consists mainly of uncovered swimming pool collectors. The total of installed collector area in 2001 for large SWHs (>6 m²) was 22,136 m².

To reach the set goal of 400,000 solar water heaters in 2010, 1 out of every 18 dwellings should have a SWH by 2010. This means that on average 42,500 SWH per year will have to be sold in order to reach this goal (instead of the 8,750 in 2001).

4.10.2 Demand side

The main market segments for SWH are: existing dwellings (consumer) market, new housing market, social housing market, care sector, commercial (recreation, hotels, swimming pools) sector and industry.

4.10.3 Supply side

In early 2000, there were eighteen companies supplying solar thermal systems in the Netherlands. Nine suppliers produce the entire system or parts thereof. Eleven suppliers have systems for which a yield declaration (necessary for EPR subsidy) has been issued by TNO. The main part of the market is, since long time, in the hand of a few suppliers of SWHs.

As more installers became active in the field of solar domestic water heating systems the Solar Energy Business Group (BZE) was set up within the VNI in 1993. The Solar Energy Business Group supports its members via technical information, support with mar-

NETHERLANDS	
☀	15,9 million inhabitants
☀	218,000 m² cumulative (2001)
☀	0.014 m² per inhabitant (2000)
☀	27,700 m² installed in 2001
☀	Market trend: =

keting, holding talks with such players as Novem (the national energy agency), manufacturers and energy companies and providing information.

In 1999, a number of installers set up the Sol*ID company in conjunction with Ecofys. Sol*ID seeks to support affiliated installers in a cost-effective manner in marketing, sales, purchasing, installation, maintenance and management of sustainable energy projects for the private market countrywide

4.10.4 Sales and marketing

Ecofys developed the concept of the Solar Water Heater Campaign and initiated, developed and co-ordinated most of the campaigns in the Netherlands. Key aspects in a Solar Water Heater Campaign are efficient publicity in selected housing districts followed by a general information campaign and a mailing to the selected district. Shortly after the mailing, an information market is organised.

During the campaigns there is a close collaboration with local authorities, utilities, suppliers and installers. Within this approach solar technology is offered in balanced packages. The utilities and municipalities proved to play the most important role in the SWH campaigns. They were the ones with whom Ecofys initiated, developed and implemented the campaigns. The installers had a vital role to play in sales and installation. The info markets were found to still make an important contribution to the success of a campaign. The Solar Water Heater Campaigns have resulted in 1999 in the establishment of the national solar sales and information centre BELDEZON (Call the Sun, see www.beldezon.nl) and Sol*ID, an organisation in which 30 installation companies and a marketing logistic company participate.

In the project 'Space for Solar', about 50 housing associations and care institutions have indicated 132 locations where they want to install in total 10.000 m² of large solar installations for water heating.

4.10.5 Policy

To encourage sales of solar domestic water heating systems, the Ministry of Economic Affairs set up a number of support schemes in the last 14 years, like subsidy programs, introduction of a quality label, a multi-year agreement on price reductions up to 40% on SWH systems, financial support and market development by industry, ministry of economic affairs, power distribution companies and NOVEM. NOVEM launched a national campaign with the goal to install 300,000 (now set at 400,000) systems in 2010. This ties in with the efforts for the medium term on achieving a contribution of 5 PJ solar thermal energy by the year 2007, as announced in the 'Sustainable Energy on the Rise' Action Programme. The most important elements are:

- EPC (building regulation on energy consumption)
- RET (Regulatory Energy Tax). This tax increase has an energy conservation effect.
- A number of fiscal instruments designed to make investing in sustainable energy fiscally attractive.

- The Fifth Land-use Planning Memorandum lays down the principles for the structuring of the Netherlands and is expected to assign a clear place to sustainable energy.
- Thermal Solar Energy Programme by NOVEM covers the activities for solar domestic water heating systems, is focused on manufacturers, installers and utilities (supply) and local authorities, house construction clients and architects, bureaus and consultancies (demand)
- Subsidy. Together with the EPR, an Energy Efficiency Advice (EPA) was launched. With this EPA homeowners of dwellings built before 1998 can get an advice on which energy-saving measures are the most cost effective for their specific situation. When a homeowner carries out one of these measures, he gets a refund for the costs of the advice, plus 10% extra subsidy on top of the normal EPR subsidy for every measure taken.

4.10.6 Most important campaigns

The most important campaigns are the already discussed Solar water heater campaigns (existing dwellings), Beldezon/Sol*ID, Solar water heater projects for new housing or renovation projects and the 'Space for Solar' platform for large solar water heating systems for housing associations.

4.10.7 Quality / durability of products (collectors, other parts), guarantees

TNO, Department of Energy in the Built Environment does the independent testing in the Netherlands. TNO participates in the development of the Solar Keymark with a new certificate, which is introduced in 2002: the "Zonnekeur" label. This label is based on the European standards.

The Netherlands have played an active role in the development of the CEN standards that have been issued in 2001 and are still playing an active role in improving them and developing other standards.

In solar water heating campaigns/projects quality guidelines are set on both the hardware and the installers.

4.10.8 Success and failure factors

Major success factors in The Netherlands have been:

- ☀ The solar campaigns and projects for property development.
- ☀ Large new housing market in NL, which largely takes place in large projects.
- ☀ The good involvement of utilities and local governments in the 90's.
- ☀ Subsidies for solar water heaters.
- ☀ Government budget for marketing activities.
- ☀ Little significant problems with the quality of solar water heaters.

On the other hand, the stabilisation of the market in the last years may partly be connected to the following factors:

- ☀ Most of the more progressive municipalities already had one or more campaigns
- ☀ Installers give priority to other work, possibly connected to the higher margins they can make there.
- ☀ New building projects are now being realised at a slower rate than projected.
- ☀ Involved parties like project developers, installers and housing associations are not interested in SWH or lack the know-how to efficiently and cost effectively implement the SWHs.
- ☀ In order to fulfil the present energy saving regulations for new dwellings, other and often cheaper alternatives are available. Building regulations are not tight enough to really force people to consider the option of a solar water heater, to meet with the regulations.
- ☀ Governmental support of the marketing activities decreased.
- ☀ Subsidies have risen but are no longer available for property developers.
- ☀ Subsidies can nowadays only be claimed afterwards. There is no guarantee, when starting to build a house, that subsidy is still available after the solar water heater has been installed.
- ☀ There are no regulations on the subject of energy saving for existing dwellings yet.

4.11 Spain

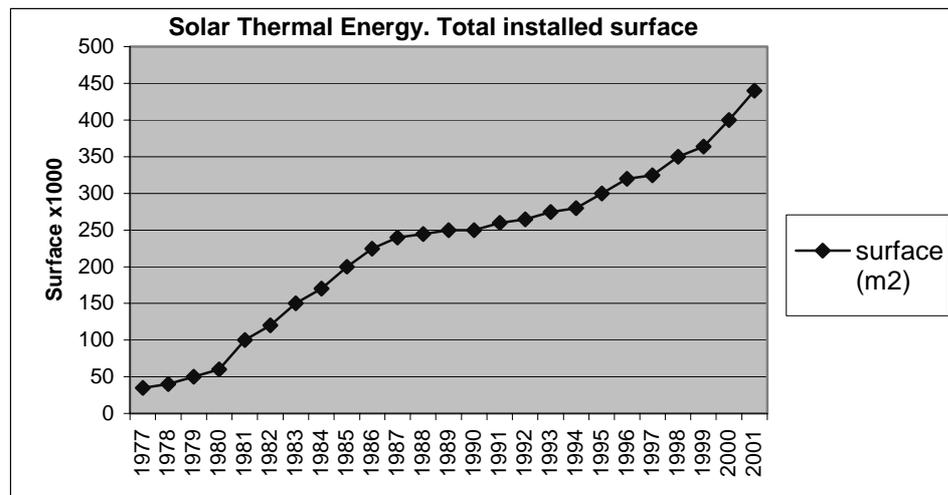
(Author: Jaume Serrasolses, Trama Tecnoambiental, Spain)

4.11.1 General market characteristics

With more than twenty-five years of experience in Spain, at the moment, low temperature solar thermal energy has reached its technological and commercial maturity, but the market is still weak.

At the end of 2000, the accumulated surface of low temperature solar collectors installed in Spain was 400,000 m². The market in the last 5 years has increased from the average 10.000 m² / year during 1990-1995, to 35.000 m² in 2000 and around 50.000 m² in 2001, see the graphic below.

SPAIN	
☀	39 million inhabitants
☀	400,000 m² cumulative (2000)
☀	0.010 m² per inhabitant (2000)
☀	50,000 m² installed in 2001
☀	Market trend: +



The actual accumulated surface of solar modules can generate between 800 to 1.300 MWh annually of Solar Thermal energy.

4.11.2 Demand side

Considering that one of the most elevated solar potential from Europe is Spain, which ratio of collectors surface of solar thermal energy by each 1,000 inhabitants is below the European average (8,7 as opposed to 19,9 m²/1.000 inhabitants in the Europe of the 15), it is foreseeable that with the proposed measures, ratios similar at least like Austria or Greece, could be reached.

Therefore, The IDAE (Spanish Institute for the diversification and energy savings) has considered that the increase of the surface collectors to install in 2010 could reach up to 4,500,000 m². This quantity is very ambitious because imply to increase the actual 35.000- 40.000 m² per year, to a mean 400.000 m²/year, or a mean annual growth of 26%. The applications with the greater future in Spain are the installations designed by elements (forced systems), with the forecast that a 75% of the increase will be made with this kind of projects. The rest 25% would be applied to one-family installations (normally mono-block thermosiphon systems).

The expected distribution of installed solar thermal systems (domestic and services use) will be approximately as show in the next table.

Segment	%
Single-familiar SWH	25
Single-familiar SWH and space heating	5
Collective SWH	55
Others	15

The main reasons for Spanish people who were interested in solar thermal systems and finally didn't purchase any, in a decreasing order of frequency are: (1) too expensive, (2) problems with the installation, (3) no confidence. The difference of frequencies between the first one and the others is very high.

4.11.3 Supply side: Industry, main products, distribution and sales, installation

In Spain, there exist a very reduced number of medium or big scale production solar collector manufacturers and the rest of them work in a smaller scale. Nowadays the production process are not at high level, it is due to, principally, the demand which doesn't reach the manufacturers offer. There are nowadays 14 manufacturers of solar collectors and other accessories in Spain.

The number of distributors and installers is larger and continuously increasing.

It is difficult to estimate the number of companies with a significant activity in the solar thermal sector in Spain, because official registers do not exist. The number of accredited companies (180) by IDAE (the national energy agency) is the most sound figure, but many other hundreds exists, most of them with very small workforces and modest sales figures. The primary consequence is the limited resources allocated by the solar business sector to marketing and communication activities. Moreover, these companies form part of a highly competitive sector (like heating system installations in buildings) in which there are also many other companies unaware of the possibilities of solar energy. In this context, conventional installers can at times effectively deactivate initial customers interested in solar energy, as it may be simpler for them to draw clients towards traditional solutions, with which they are more familiar, than to embark on a new activity field.

In one-family housings, usually occupied by four persons, the cheaper system to obtain solar thermal energy is the use of mono-block equipment (thermosiphonic) for domestic hot water. In order to cover some more than a half of the energy needs of a house of this type requires an equipment formed by a collecting surface around two square meters, whose average cost at the moment is around 2.100 Euro. The prices of this type of equipment are estimated to decrease in general until locating itself in 2010 in a price around 1.000 Eurasia.

An equivalent system with solar collectors and the accumulation tank separated, and a pump for primary circuit circulation, costs near the double. The application type of this kind of installation corresponds to a great installation in a multi-family building with high hot water consumption. The necessary investment by each square meter of collecting surface installed is at the moment around 600 Euro/m².

4.11.4 Policy

There is no a specific law in Spain to favour or compel the introduction of solar systems in the buildings. Nevertheless, a few local authorities and provincial and county councils have already launched new regulations that make obligatory the use of solar energy collector systems in buildings on those cities and towns. These measures are expected to have notable impact on the market development.

On the other had, solar thermal systems installed in Spain may be eligible for subsidies and other public aid from the different authorities.

In the year 2000, the central administration, through the Institute for Energy Diversification and Saving (IDAE), launched a Programme of Aid to Support Solar Thermal Energy under its Renewable Energy Development Plan. This programme is based on the awarding of subsidies for installing solar hot water systems through agreements established with installation companies. A total of 8.2 million Eurasia was awarded in subsidies in the year 2000, whilst the available budget for the year 2001 is 6 million Eurasia. The accreditation process is mandatory for companies that want to receive subsidies for their clients. The subsidy is perceived directly by the installer, who applies it like a discount to the client's bill. The process to achieve the accreditation is not easy and requires to the company a maximum price for each kind of solar installation.

For the year 2002, the IDAE subsidy is 310,35 Euro/m² collector area installed for solar flat plate collectors in separated installations, 240,4 Euro/m² for monoblock termosiphonic systems and 300,5 Euro/m² for evacuated tubes.

On the other hand, most of the autonomic governments have established a line of subsidies for renewable energy actions, with lower budgets than the national campaigns.

Finally, certain local authorities have launched measures for promoting solar thermal energy through subsidies or local tax rebates or relief.

4.11.5 Most important campaigns / market actions

There are nowadays two important regional campaigns in Spain: Procasol in the Canary Isles and Prosol in Andalusia.

Procasol is a promotion and financial system for solar water heating installations of equal or less than 50 m², promoted by the local government of Canarias (Spain). The amount of subsidy supplied is from 120 to 180 Euro/m² of solar collector, which represents a subsidy from 20 to 40 per cent of the global cost of an installation. This project started in 1.997 and will finish in 2.006.

Prosol is a promotion and financial system for renewable energies (thermal, photovoltaic and wind-energy) promoted by the local government of Andalusia (Spain). The prevision of surface installed of solar collectors in 1.999 was 20.000 square meters.

4.11.6 Most important quality structures

There are some regional professional associations like APERCA, in Catalonia, which are very active and their work have been determinant in some important campaigns, like the quality of solar thermal systems, or spreading of solar thermal ordinances in some regions.

The principal legal framework for quality on solar thermal systems in Spain appears in the law on heating systems in Buildings (RITE) in a short and general technical instruction. Regarding solar collectors there is a standard code (UNE 94-101) that makes general reference to the construction characteristics of flat-plate collectors with transparent cover.

4.11.7 Success / failure factors

The main factor which has contributed to the failure or slowness of the industry has been the great number of installations, done those last decades, with a lot of technical problems due to the bad designs of the systems or to the imperfection of the equipment as well as its low efficiency. Another aspect that has contributed to this has been the small importance that has happened to the maintenance of these facilities.

The slow growth in the last 10 years has been caused also for many other factors. The main barriers detected are:

- ☀ There is a general lack of information about the possibilities of solar energy.
- ☀ Installing a solar energy system requires high initial investment.
- ☀ Town planning regulations do not provide for solar energy use in buildings
- ☀ Certification procedure for solar thermal collectors is too slow, making the introduction of new technological developments onto the market more difficult.

After 20-30 years of experience in the solar thermal market, it has been learned that is very important that the installations have to be perfectly designed and all the equipment should be in a high level quality. The maintenance is also very important and it has to be done periodically.

To overcome the lack of confidence in this technology, which is new for the majority of the Spanish population, some campaigns need to be started (advertisements, guaranteed results, professionalisation of the installers, information and good advice to prescriptors, fiscal and subsidy incentives, etc.).

4.12 Spain – Catalonia Region

(Author: Gema Torres i Serra, ICAEN, Spain)

4.12.1 Introduction

Solar energy is an important energy resource in Catalonia, where available solar radiation is amongst the highest in Europe, with annual average daily irradiation of around 14.5 MJ/m².

Nevertheless, despite the enormous experience of companies in the sector in harnessing this clean, renewable energy source, activity in the Catalan solar energy market remains low, far behind that of other countries in northern and central Europe, which some years ago adopted the decision to promote this environmentally-friendly energy solution.

In such a context, to achieve a sufficient level of development to ensure the enduring stability of the market, Catalonia's future energy policy should provide for the necessary measures to give decided impulse to this technology.

4.12.2 Market situation

The first significant installation in Catalonia began in 1975, growing by an annual average of nearly 4,000 m² by the year 1982. In subsequent years, however, the growth rate fell sharply until the late-1990s, when the annual area installed became stabilised at around 500 m², though with oscillations due, fundamentally, to varying availability of subsidies at different times. It was not until 1999 that installed area began to grow spectacularly once more, reaching the present annual figure of 7,000 m². The “Cens d’Instal·lacions Solars”, or Solar System Census (CIS), performed by Institut Català d’Energia, showed that there was a total thermal collector area of 30,000 m² in service at the end of the year 2000.

This pattern, which until the 1990s coincided to a large extent with the growth of the technology in the rest of Europe (reaching a peak in 1980), can be explained by the evolution of conventional energy prices, changes in society—which initially showed its concern for rising energy prices in different areas, but later took on a rising environmental awareness—and by lack of confidence in the good functioning of solar thermal systems, something not recovered until recent years. This mistrust became widespread due to the lack of training of many conventional systems installation companies who began to install solar systems in the 1980s and early-1990s without sufficient knowledge of them. Of the nearly 400 companies that had installed some kind of solar energy system in 1986, almost half had installed just one or two.

Regarding the type of system found in Catalonia, in the field of solar thermal energy, nearly 80% are used for the production of domestic hot water (DHW), whilst the rest are DHW and heating or swimming pool heating systems.

Solar thermal energy use is greater in the more highly populated areas, as well as in such coastal counties as Maresme and Baix Empordà where, due to the importance of the tourist industry, the number of systems in service is above the overall average for Catalonia.

Regarding available solar thermal technology, there are on the Catalan market over 40 different models of solar collector, 16 of them found in Catalonia and 3 of them produced by Catalan manufacturers. In the case of photovoltaic systems, however, there is only one manufacturer with its own technology in Catalonia, as most equipment used here is provided by the three Spanish manufacturers in existence. On the other hand, electronic energy management and control equipment based on technology developed by Catalan companies is available.

The current situation shows increasing activity, both as regards the number of systems installed and the number of companies in the sector. Estimates made by APERCA (Association of Professionals of Renewable Energies in Catalonia) for the year 2000 indicate a solar thermal collector market of around 7,000 m² per year.

The increasing activity of the Catalan solar energy industry has been most notable in the last two years due, principally, to the enactment of specific legal provisions favouring the introduction of the technology (solar by-laws adopted by Barcelona City Council and other townships), a certain increase in demand (favoured by growing environmental awareness) and the entry of new companies onto the Catalan market from central Europe, where markets are much more active.

4.12.3 Prospective of the market analysis for year 2010

Based on estimates of potential made by the sector (APERCA) and on our own analyses, two scenarios have been calculated for the prospective evolution of the solar thermal and photovoltaic market over the 2000-2010 period. The first of these scenarios includes measures and actions by the Catalan administration to help reduce the barriers identified in the sector and is, therefore, the scenario based on the Renewable Energy Plan. The reference scenario is known BASE, and is based on current trends in the energy sector, for which reason there follows a description fundamentally of the criteria used to draw this scenario.

Regarding solar thermal energy, the service sector is the main recipient of this type of facilities, particularly for domestic hot water systems for hotels, hospitals and sports facilities, though the degree of penetration is still very low. The scenario therefore provides for the sector making use of the potential to a similar degree as in other regions with similar profiles to Catalonia, increasing the total collector area to 85,000 m² in 2010.

Moreover, the industrial sector is also expected to begin using solar thermal energy due to the development of new technologies such as vacuum collectors, though economic barriers may limit this penetration greatly, with expected annual area of around 15,000 m² by 2010.

Despite all this, it is in the domestic sector that we find the true potential of solar thermal energy. A key factor in promoting the use of this renewable energy source is to make it compulsory in new buildings. It is estimated that the approval at Generalitat and local authority level of regulations obliging the use of solar thermal energy in new and rehabili-

tated buildings, particularly in housing, and encouraging its application in existing buildings, will lead to the installation of over 400,000 m² by the year 2010.

Clearly, the local administration has an important role to play in promoting the installation of private systems. Some local authorities and provincial and county councils have already launched actions aimed at promoting solar energy by installing such systems in municipal buildings and providing economic aid through subsidies or tax relief for those installing solar energy in their homes, businesses or factories. Another important step forward was the approval in 1999 of by-laws on solar thermal energy collection by local authorities in Barcelona, Sant Joan Despí, Montcada i Reixac, Esplugues de Llobregat, Terrassa and Cardedeu. These new regulations make the use of solar energy collector systems obligatory in buildings in these cities and towns.

4.12.4 Measures proposed in The Catalan Energy Plan towards 2010

The Catalan Energy Plan towards 2010 takes an integral view of energy; one aimed at meeting the energy needs of Catalan citizens and businesses. The plan analyses and puts forward proposals in the field of energy efficiency, renewable energy, quality of energy supply service and infrastructure and technology research and innovation.

There follows a summary of the measures proposed to develop the solar market in Catalonia and to achieve the objectives established.

Use of public aid lines for the installation of solar energy systems.

These lines include lines provided by the Generalitat of Catalonia, budgetary provisions earmarked for Catalonia by the central administration and aid and subsidies provided by the European administration and local authorities (provincial councils and local and city councils).

Improved co-ordination mechanisms between the different administrations and the business sector.

Such action will revolve around four key areas: promotion of the Plan's objectives amongst those involved in autonomous and local administrations and other organisations; establishment of a plan monitoring committee; information exchange between business and the autonomous and local administrations and the establishment of a specific agreement with professionals in the Catalan solar energy sector on the technical specifications to be met by all systems installed and on the guarantee, quality and maintenance framework.

Actions for the introduction of solar energy in specific sectors.

- ✱ Provision in the specifications for construction or large-scale rehabilitation of buildings by the Generalitat of Catalonia.
- ✱ Completion, in co-operation with the pertinent sector organisations, of feasibility studies for collective solar thermal systems (hotels, sports centres, and nursing homes...).

- ☀ Consolidation of the existing network of solar demonstrations, with the possibility of site visits and dissemination of results obtained.

Dissemination and training measures.

The aim of this type of action is to increase sector professionals' understanding of solar energy systems and to foster public acceptance of them through promotion and dissemination campaigns.

Legislative measures.

- ☀ Review of proposals for amendment to the central administration for legal provisions in RITE, regulating solar energy system installation.
- ☀ Promotion of municipal by-laws for solar energy use.
- ☀ Publication of the decree on the technical specifications for grid connection of solar photovoltaic facilities in order to simplify procedure and conditions.

4.13 United Kingdom⁴

(Author: Nick Davies, Monika Munzinger, BRE, United Kingdom)

4.13.1 The domestic solar heating market

Most systems are domestic water heaters of 4m² typical size. The market arguably started during the oil crisis of 1973/4, with expansion in the 1970s followed by recession in the early 1980s, partly caused by poor reputation of some badly installed systems. The environmental focus of the early 1990s fuelled a new interest, aided by recognition in a government report of 1994 – Energy paper 62 ‘New and renewable energy: Future prospects for the UK’ (ETSU for DTI).

UNITED KINGDOM	
☀	59 million inhabitants
☀	170,000 m² cumulative (1997)
☀	0.003 m² per inhabitant (2000)
☀	10,000 m² installed in 2001
☀	Market trend: +

4.13.2 The demand side

Estimated total 169,256m² domestic SWH installed at end of 1997. Swimming pool collectors estimated to be 106,884 at 1997. The market was increasing 2.8% per year in 1997 – the recent launch of a grants package and tax incentives for business will increase this. Most is installed by specialist installers, with some Do It Yourself (DIY) and 21 ‘solar clubs’ – bulk buying and training people to install themselves. A 1995 survey showed 96% of SWH was in owner-occupied property. In 2002 SWH was added to the ECA – enhanced capital allowance scheme as a qualifying for corporation tax relief – this should give an approx. 5% discount to business and will put SWH on financial agendas.

⁴ Further information can be found in the country report of the ‘Untapped Opportunities for Solar Water Heating in Europe’ report [9] which is the source of some of the information given here.

4.13.3 The national solar heating industry and products

Around 20 companies specialise in SWH, approx. 30 have SWH as part of their activities. Manufacturers include tube, flat plate, direct systems and importers from other countries. Controllers and storage tanks are also made here. Over 80% of the stock made in UK is exported to over 40 countries. Solar Trade Association was formed in 1978 to raise standards and promote the industry, although not all manufacturers are members. Some (non member) manufacturers will not agree to STA code of practice.

4.13.4 Sales and marketing

Most products are sold directly by the installers. It is difficult to ascertain margins due to commercial confidence. Potential for price reductions exists in overheads and installer marketing costs. Design for solar, such as fitting twin coil cylinders in new heating systems / roof integration at new build will also reduce cost.

4.13.5 Independent testing / publication of product information

8 systems were tested independently under an ETSU contract S/P3/00275/REP/2 for the DTI. This report is in the public domain and should be on the DTI website soon.

BS5918:1989 is a Code of Practice. Its scope includes design considerations, manufacture, handling, installation, operation and maintenance. BS EN12975 part 1 is the standard specifying requirements on collector durability, reliability and safety for the ECA scheme and others.

4.13.6 Costs for solar heating products

For an installed system between €3000 - €9,900 or £2000 - £6000. DIY is in the region of €1650 - €4125 or £1000 - £2500. These costs can be reduced if combined with refurbishment of roof or DHW system. Simple payback depends on fuel displaced and DHW usage, with huge variance from around 8 to 25+ years.

4.13.7 Policy environment for solar heating industry

The 'Clear Skies' community and household renewable energy grants scheme offers a £500 grant toward SWH – launched Jan 2002. This is a result of SWH being portrayed favourably in the PIU Energy Review - advising government to back renewables 'on the ground' to increase public perception and raise awareness.

Enhanced Capital Allowances for business to offset some of the cost of SWH against corporation tax – joint programme with Carbon Trust (who receive climate change levies) and HM Treasury (receiving taxes).

4.13.8 Regulatory framework

Most systems do not need planning approval – except historic buildings and areas of outstanding natural beauty and national parks. Local authority planning officers will advise if consent is required.

4.13.9 Education and dissemination activities

The Centre for Alternative technology (CAT) in mid-Wales runs 2 night residential courses for potential solar water heating installers. Cost is £ 450 including board and lodgings.

18 Solar Clubs exist across the country - not-for-profit community initiative for householders, designed to make solar water heating cheaper and easier to install. Trains members to install professional solar water heating systems as DIY projects, discounts the cost to between one-half and two-thirds of the cost of a commercial system. CSE is the co-ordinator.

IT power and a manufacturer have developed a pilot vocational education course for plumbers.

4.13.10 Information, marketing and sales campaigns / actions

Solar Power for Leisure Centres Conference in Woking in September, organised by ECSC to raise awareness of solar thermal for local council leisure centre projects.

Clear Skies grants programme includes marketing targeted at ‘green consumers’ etc. Many manufacturers run advert campaigns; mainly in selected ‘green’ and ‘DIY’ publications.

4.13.11 Lessons learned

It is essential to have high quality installations and more approved installers to avoid problems of the early 1980s.

The Clear Skies programme has an accreditation list and approval mechanisms.

4.13.12 Opportunities for new market development initiatives

The new building regulations part L puts greater emphasis on heating system efficiency and new homes are assessed for the ‘SAP’ energy rating. SWH has a small positive effect on SAP. Persuading house builders SWH is good for sales will increase the market. IN social housing, some projects are SWH equipped as standard – more dissemination of this is needed to increase uptake.

4.13.13 Opportunities for governmental support

All new boilers must have a seasonal efficiency >78 % - band D on 'SEDBUK' and DHW storage tanks also have minimum requirements and are now sold as 'Part L compliant'. A future mechanism would be to require replacement cylinders to be twin coil and for SWH feasibility to be assessed before roof or DHW heating system refurbishment.