



D2.3: Report on Market Potential & Relevant Consumers for Solar Combi+

Assessment & Compilation by
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1 Current Status

According to the results of the EU survey "Attitudes on issues related to EU Energy Policy" of the EU DG Communication, 80% of EU citizens say energy efficiency influences their decision when buying households appliances (figure 1). Less than two in ten EU citizens say they do not pay attention to the energy consumption of household appliances they buy, while almost half of the EU citizens reportedly pay a lot of attention to such concerns.

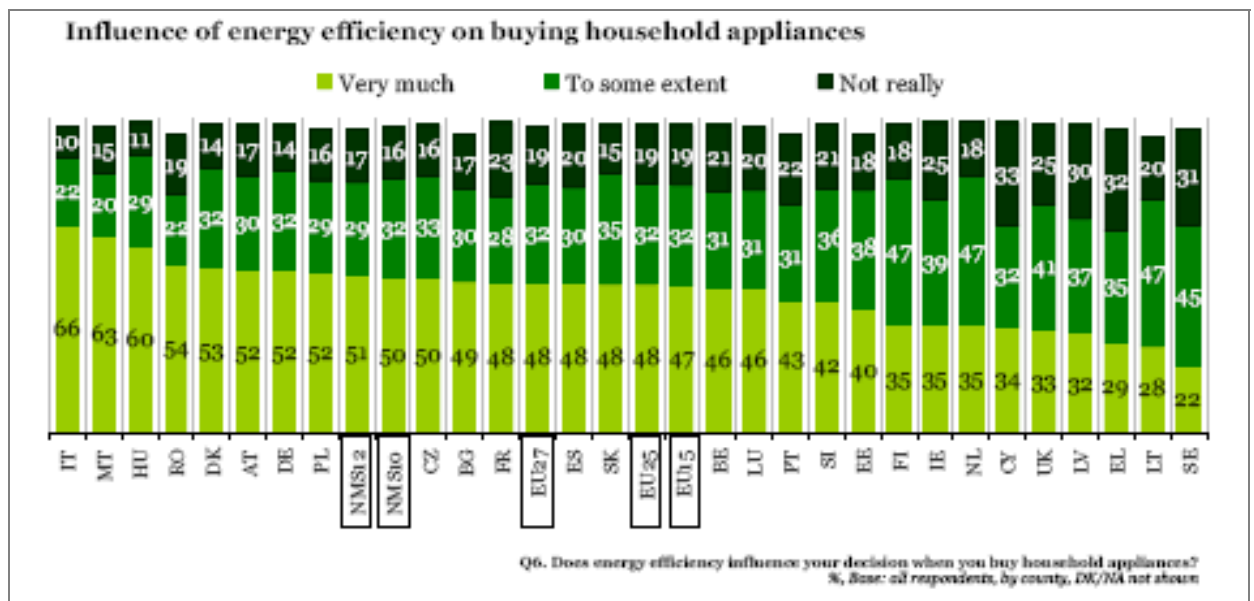


Figure 1: EUROBAROMETER Series #206 ¹. Survey question 6 "Does energy efficiency influence your decision when you buy households appliances?"

The EU Citizens are convinced that several things are going to change in the near future with regard to their energy consuming habits. EU citizens are quite certain that energy prices will increase significantly over the next decade. More than seven out of ten Europeans feel that they will need to change their everyday energy consumption habits in the next decade, and that they will need to install energy-saving heating, lighting, cooling etc. equipment to keep up with rising prices and to comply with regulations (figure 2). Both propositions that regard the changing ways that people consume energy met with the highest level of agreement in Ireland, Cyprus, Malta, Spain and Luxembourg. About nine out of ten citizens in these countries agree that they will need to change their daily behaviour to use less energy, and more than eight out of ten also admit that they will most probably have to change the technology they are using to make their living space comfortable. Significantly increased prices are most anticipated in Germany and Austria, and by far the lowest level of anticipation is manifested in Greece and Cyprus. ¹

¹ Flash Eurobarometer Series #206, "Attitudes on issues related to EU Energy Policy-Analytical Report", April 2007

The effects of climate change on energy consumption in 10 years time

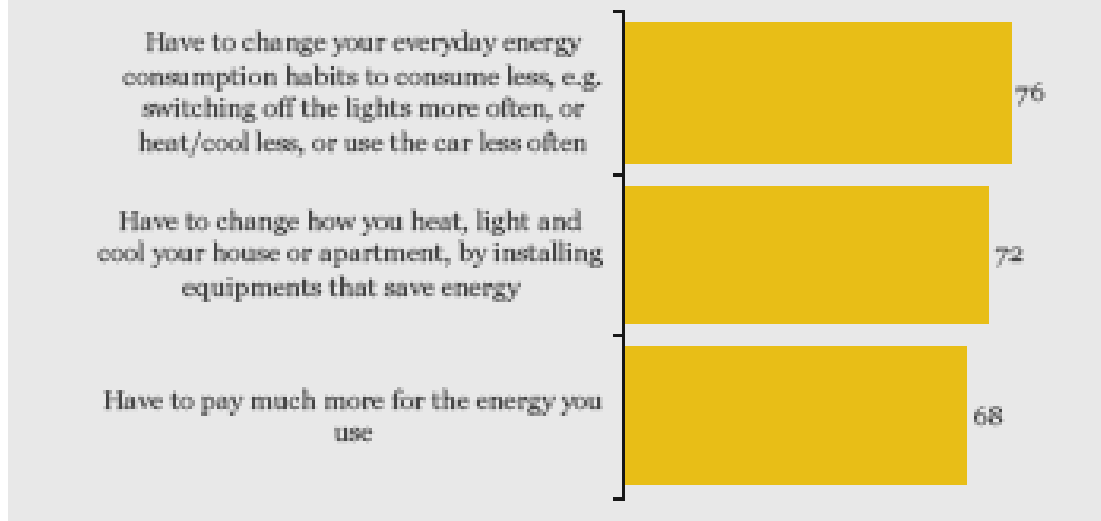


Figure 2: EUROBAROMETER Series #206. Survey question 3 "What effects do you think the ongoing climate change will have on the way you consume energy in 10 years time? Do you think you will" Base: all respondents, % of Yes

1.1 Competition of SolarCombi+ systems

Deliverables D2.1 & D2.2 represented the market situation in the project's participating countries concerning small-scaled chillers and solar thermal applications respectively. This section refers to the obstacles met against a wider penetration of SolarCombi+ systems in the European market. More specifically, competitive technologies in all three functions of a SC+ system (i.e. cooling, heating and DWH), that have earned wide approval in the relevant markets during the past years are denoted as one of the most significant barriers in the opening of the market. The following table summarizes the most common technologies currently used in European countries for cooling, heating and DWH.

Table 1: Competitive technologies to SC+ systems

	Common technology	Energy source / Fuel	Fluid	Distribution systems
Space heating	boilers CHP	Gas Oil Wood / pellets / biomass	Water	radiant systems radiators radiant floor radiant ceiling fan coils
	district heating	Thermal energy		
	central systems heat pumps	Electricity	Air Water	
	room air conditioners (split, multisplit)	Electricity	Air	None
Space cooling	central systems heat pumps	Gas Oil Electricity	Air Water Other refrigerant	radiant systems radiators radiant floor radiant ceiling fan coils
	room air conditioners (split, multisplit)	Electricity	Air Water	None

DWH	boilers	Gas Oil Electricity	Water	DWH network
	CHP	Gas Oil Wood / pellets / biomass		
	district heating	Thermal energy		

2 Methodology Adopted

The EU project SOLARCOMBI+ serves for identification of the most promising markets and the promotion of standardised system configurations for the entry of small scale combined solar heating & cooling applications.

Small scale sorption chillers ($\leq 20\text{kW}$) have to compete and earn a significant share from a well structured and mature market like the one of the conventional Air Conditioning (AC). In order to estimate the market potential of these systems, a market survey regarding the conventional AC systems retailers was conducted.

The target group was the consumers but the source to collect and analyze the necessary data were the retailers, the ones that represent AC systems firms, holding the biggest market shares in each participating country and who could also provide data not only on volume of sales but also on consumers' attitude. The approach through the retailers also acts complementary to the overall targets of the project (information on innovative products), because of their role as key-players in the structure and segmentation of the market through the direct and personal contact with the consumers. As a result they influence the market, guide in some extent the buying instinct and promote or not EE products.

This quantitative & qualitative approach of the AC systems market, gave the opportunity to gather as much records & data as possible in the given time frame, by a market-influencing source as the relevant market actors are.

2.1 Conducting the survey

CRES elaborated a questionnaire template (Appendix I) and distributed it to the institutional partners of the project. The basic structure of the questionnaire was divided in 3 distinguished sections.

Section A: General Info of retailer

- firms represented by the retailer,
- sales allocation (region, sector)
- type of system (central, semi-central, split units)
- volume of sales

Section B: Consumers Attitude

- Market share of: energy efficient products, nominal power & operation mode (*quantitative parameters*)

- Product selection based on qualitative parameters such as trademark & energy label
- Awareness on environmental protection, rational use of energy & energy efficiency
- Williness to pay for more efficient, reliable or elegant products

Section C: General info

- Classification of products selection

The partners distributed the questionnaire to the target group by e-mail or personal meetings. The participating countries were Italy, Spain, Greece, Germany, Sweden, France & Austria and the total number of filled questionnaire were 14. There was a deviation from the above mentioned work plan, since it was not possible for the project partners from Sweden and Germany to gather filled questionnaires for their regions. In general, all partners faced up significant difficulties, except EURAC, to approach the retailers and to extract the relevant information.

The market actors either showed low interest on the survey or they were reluctant to give out information regarding financial issues (volume of sales etc) mostly because of the company's policy.

2.2 End user profile, according to the AC systems retailers' opinion

2.2.1 Results by participating country

The respective section of SolarCombi+ questionnaire brought out the non economic criteria of consumers' choice when they buy a conventional AC system. Consumers in all participating countries, except Austria, select their system by its trademark. 80% of Spanish consumers are influenced by AC firm when they buying a system and 55% of the French costumers select a product by its energy label (**Figure 3**). Noticeably the EE related criteria on average are rather low (about 46% energy label, 21% COP) and do not seem to self-drive a choice, but rather be complementary / secondary with other more generic criteria (trademark, systems technical features etc).

The retailers believe that the consumers are aware of the link between the use of ac system and rational use of energy and how their "energy" habits influence the climate. However, in figure 4, it is revealed that their knowledge on technical details such as maintenance and installation of an AC system is better than the one concerning the energy efficiency of the product. Austrian consumers seem to be more sensitive about energy consumption and efficiency and their selection is more "environmentally friendly" (**Figure 3 & Figure 4**), while the least aware are the consumers in Greece and Spain.

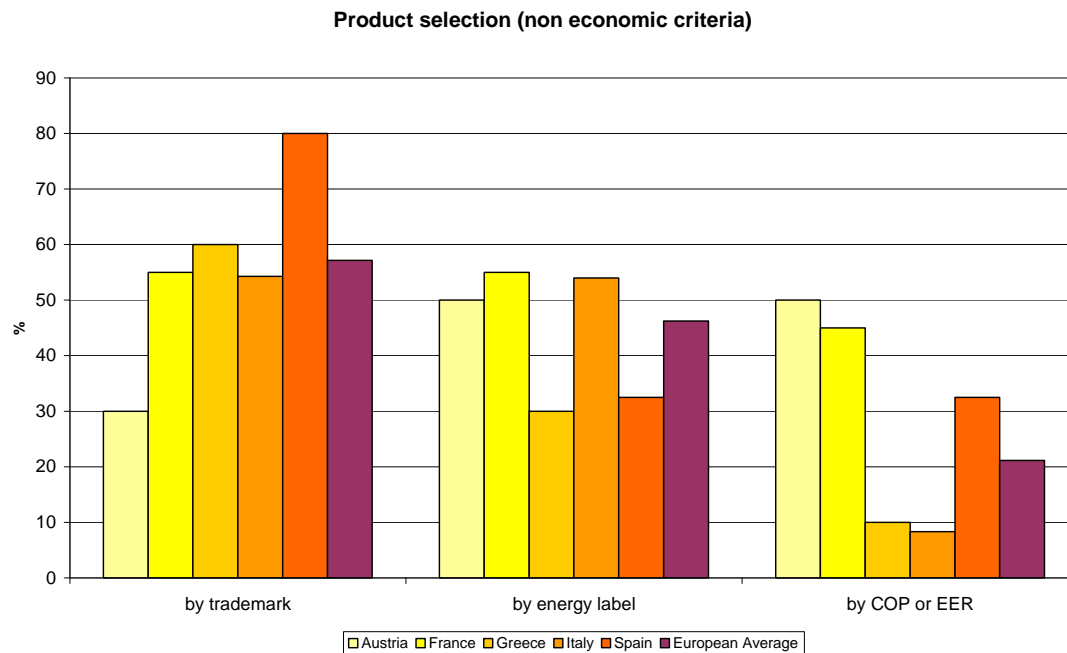


Figure 3: Question “What is your opinion of consumers’ attitude on products selection: By trademark? By energy label? By COP or EER?”

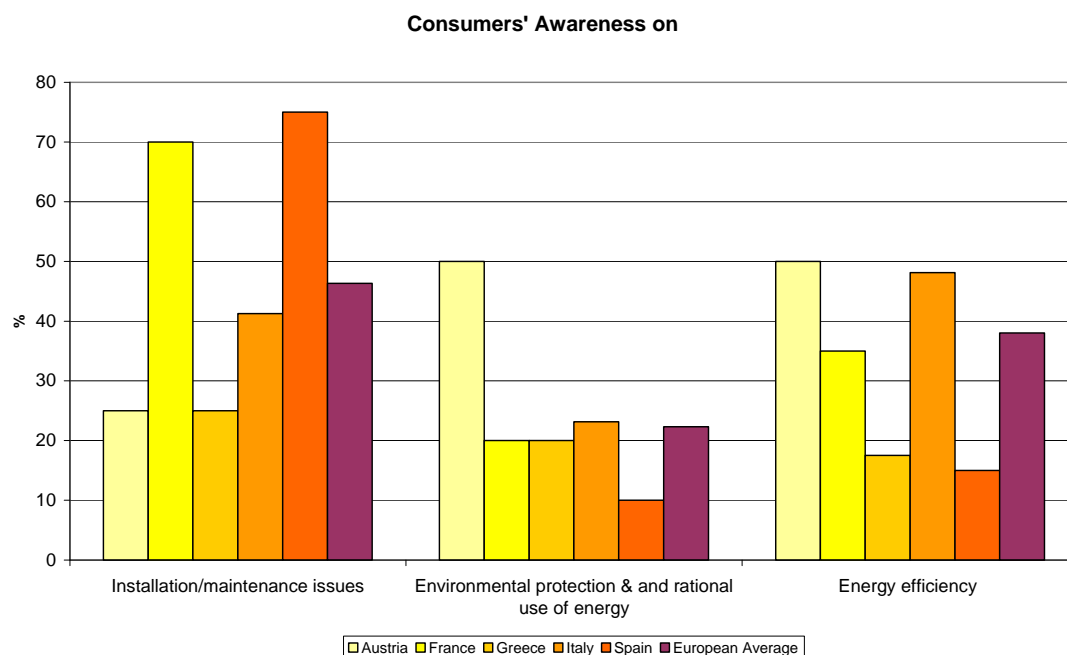


Figure 4: Question “What is your opinion on consumers’ awareness on Installation/maintenance issues, Environmental protection & and rational use of energy, Energy efficiency”

The customers of the Italian retailers seem to be well aware and convinced about the relation of their energy consumption habits with the energy-bills they pay and over 70% of them ask about the product’s energy consumption before purchasing. In contrary, only 25% of the Greek and Spanish customers ask for further information about the energy efficiency of the system (Figure 5).

On average, the level of awareness by the consumers themselves is still quite low, roughly over 50% and it seems that the retailers are still a critical factor that influences the consumers on their choice to buy or not EE products.

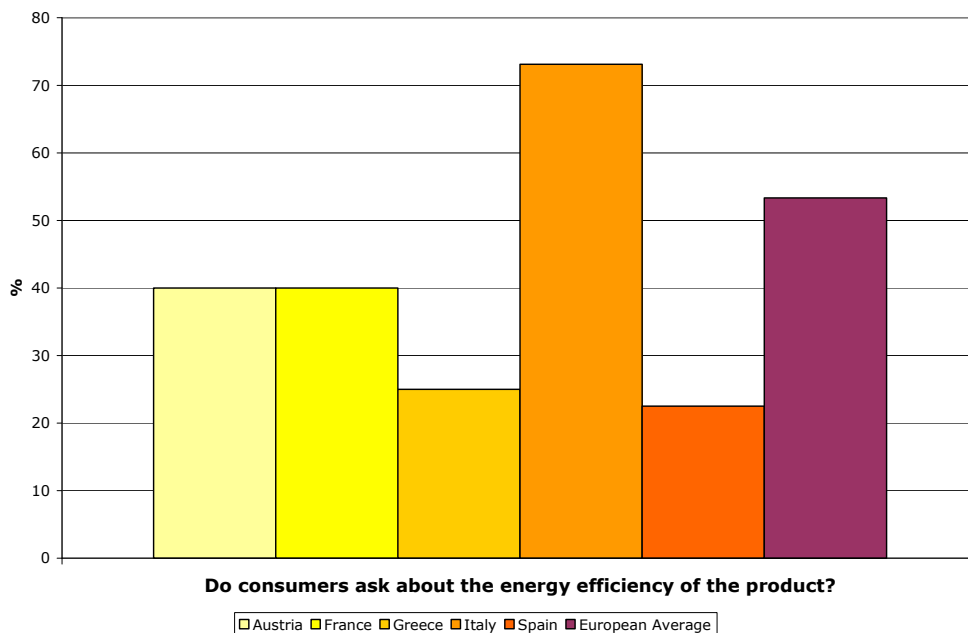


Figure 5: Awareness on product's energy efficiency

As far as split units are concerned, there is a clear picture on the volume of the sales at the participating countries that favours the high efficient products (with the exception of Greece). In Italy 99% of the products sold are of energy class A, in contrary to Greece where the percentage of non energy efficient (class C or lower) products sold, is almost 55% (Figure 6).

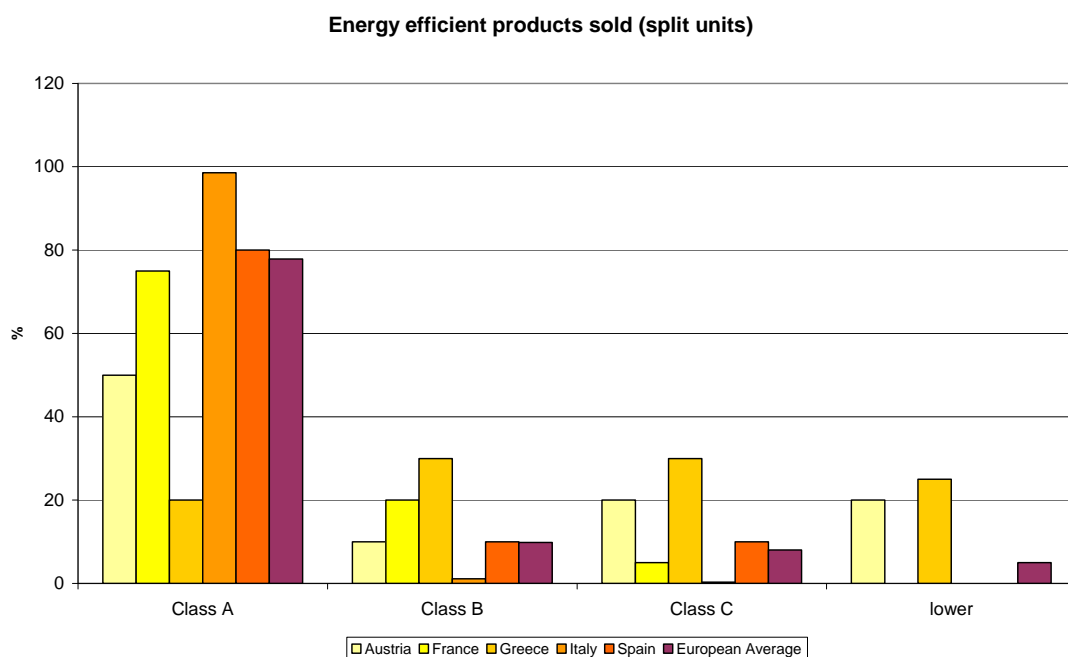


Figure 6: Split units sold, sorted by energy class

The latter gives a clear indication of a market driven by terms of absolute initial budget criteria, where other issues (performance criteria) play secondary role for the product choice.

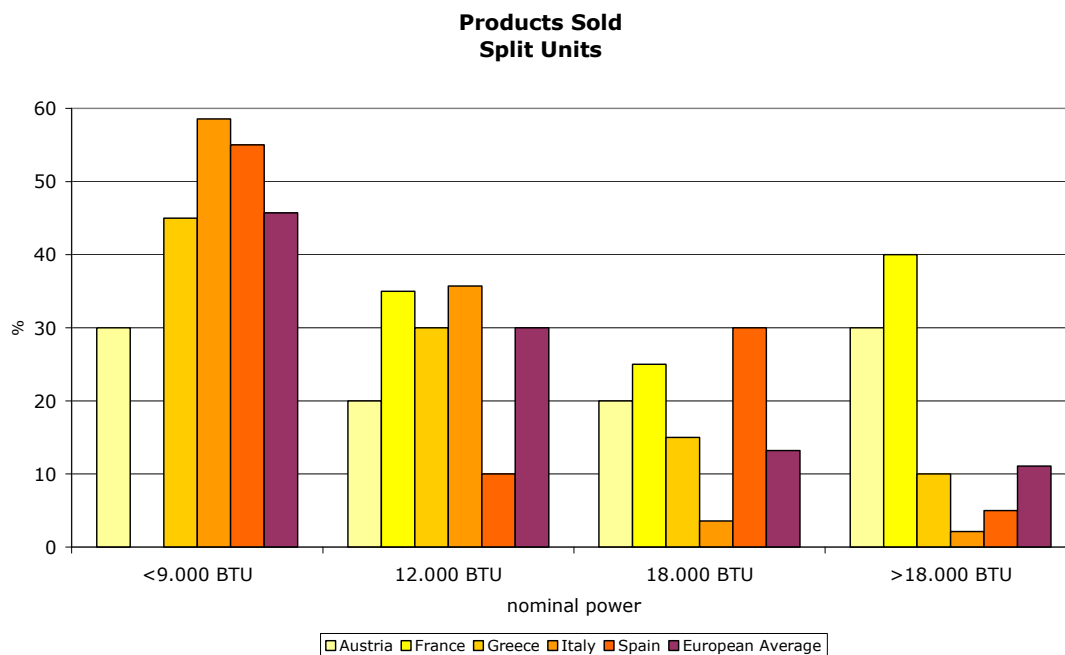


Figure 7: Split units sold, sorted by nominal power

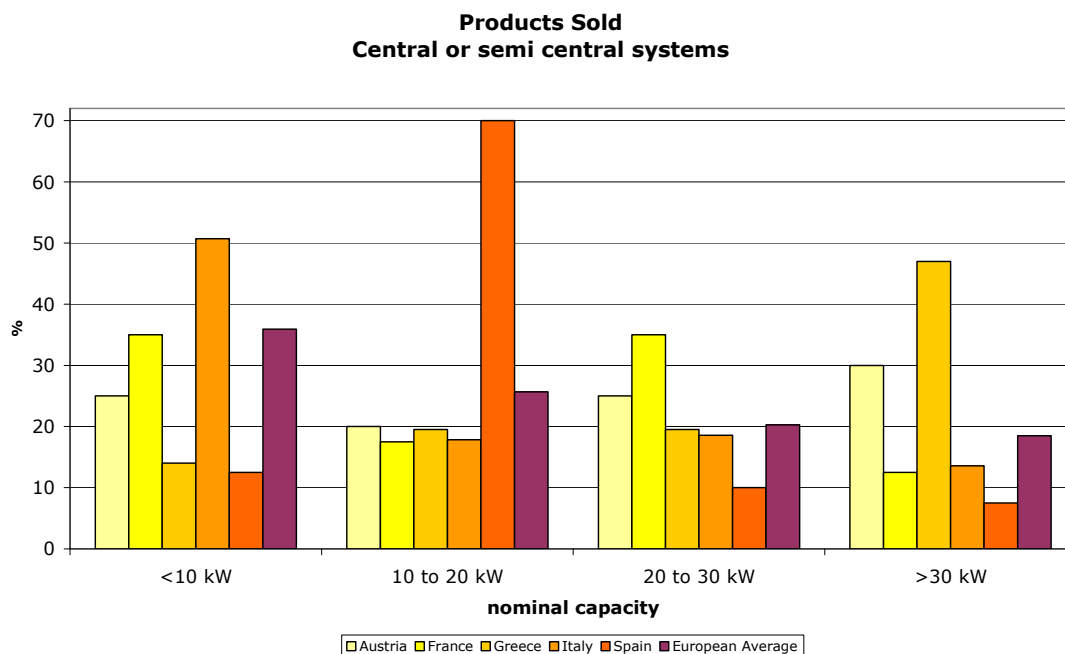


Figure 8: Central or semi central systems sold, sorted by nominal capacity

SolarCombi+ project is targeted to strengthen the penetration of systems up to 20 kW so the competition against the conventional systems is extremely high, taking into account the variety of the available systems. According to the retailers involved in the survey, the biggest share of their volume of sales hold systems of

small or medium capacity; more than 50% are central or semi central systems up to 20kW and more than 60% are split units up to 12.000 BTU (Figure 7 & Figure 8). More specifically, in Greece and Italy the market of split units is mainly located lower than the threshold of the 12000 BTU, while in Spain and France the market favours larger split unit systems. One should also notice the Spanish situation concerning the central and semi central systems, where 70% of the market is between 10-20 kW. This highlights a market-parameter that is highly important for the targets of this project and crucial for the penetration of the mentioned market with given SC+ products.

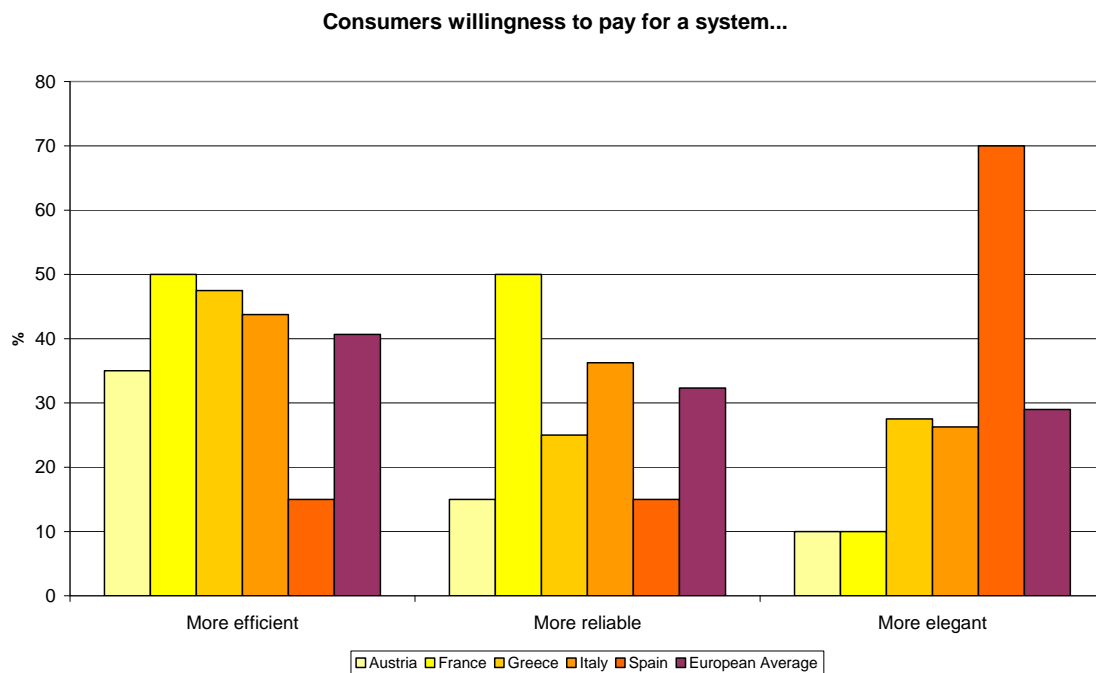


Figure 9: Question “What is your opinion about consumers’ willingness to pay more for a product that is: More efficient? More reliable? More elegant?”

The answers in the question “What is your opinion about consumers’ willingness to pay for a product that is: More efficient? More reliable? More elegant?” describe the consumers’ willingness to buy products based on various parameters even if they are more expensive than the conventional ones. The Spanish retailers describe a much more different behaviour of their clients, who prefer to buy a more expensive product when this is accompanied by a more elegant design (Figure 9). The EE parameter could drive on average over 40% of the consumers to pay more but one should state here that the “pay more” parameter translates to a max 10-20% higher price, so one must be very careful with the extrapolation of the results to specific price categories.

2.2.2 Overview

While the majority of the consumers, in the participating countries, are in favour of the energy efficient products and they would pay more for purchasing them (41%), 57% will select a product by its trademark/ firm and would also pay more if the product is of higher aesthetic (29%) and if they are convinced of its reliability (highly related with trademark).

A very important group of data concerning the consumers behaviour resulted through a specific question addressed to the retailers, where they were asked to

rate the basic parameters of product selection by the consumers, based on their gained experience (Figure 10).

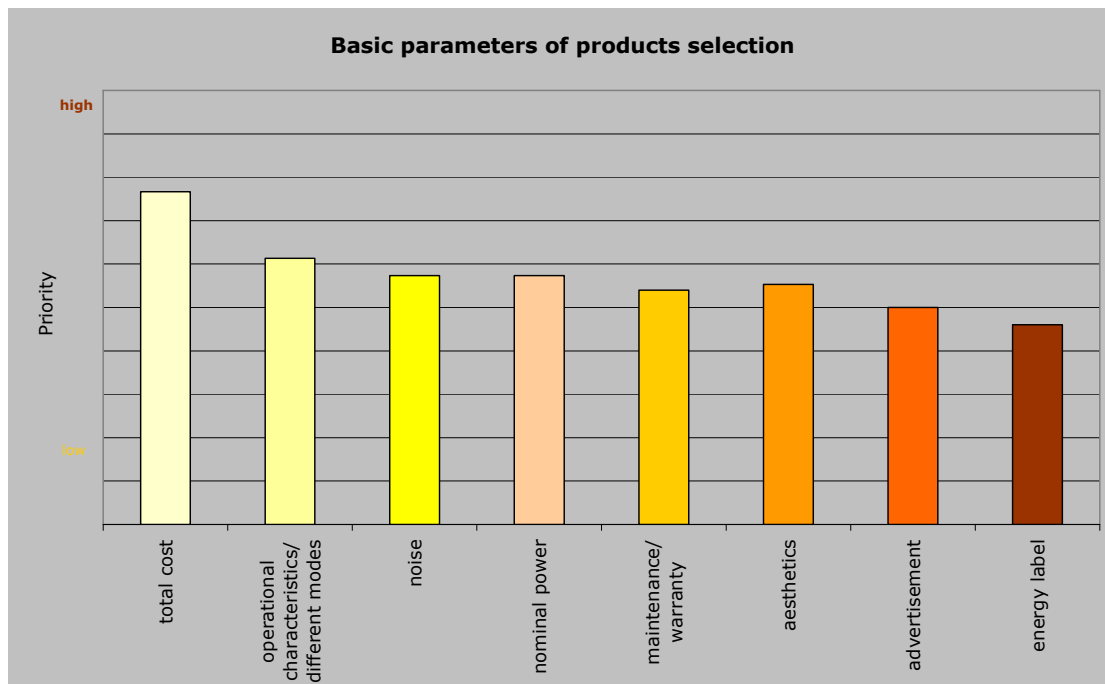


Figure 10: How consumers select a conventional AC system (in participating countries)

A simple presentation of the results reveals that priority is given to the total cost of the system and then to its operational characteristics. A number of the consumers are also highly influenced by the level of noise and the nominal power of the system. Maintenance / warranty, aesthetics and advertisement are considered a less significant parameter for the consumers, whereas energy label is roughly considered a priority in their choice of system.

If one tries to perform pattern recognition to the presented results, he will conclude to 4 distinct clusters of criteria, where two of them are mono-populated. More specifically, the total cost criteria is clearly a cluster by itself and because of the volume and type of the other replies one should consider a high-correlation of the final choice with this one, even for consumers that fall to other clusters. The second and third clusters consist first by the technological features (technical characteristics, noise, nominal power, warranty and maintenance) and the marketing ones (aesthetics, and advertisement).

These clusters reveal the importance for new products to be inline with these attitudes and to consider an equally balanced market strategy as even the pure marketing criteria influence rather noteworthy a consumer's choice.

The last cluster clearly consists of the energy performance criteria (while one could also correlate it with the technological one), stating the establishment of a 'new' criterion for selection of AC products, which, although not yet determinant for the final choice, is already independent and consists as 1 out of 4 parameters for the product selection.

3 Conclusions

The survey that was conducted by SolarCombi+ project shows a significant preference on energy efficient AC products, more than three quarters of the customers select A class split units and over 40% show willingness to pay more for efficient systems.

Green credentials and corporate social responsibility are becoming basic competitive issues among the biggest AC firms. They select to point out the efficiency and reliability aspect in combination with the environmental protection through their communication actions. In fact, customers are, relatively often, influenced by the advertising campaigns (the trademark, is the one that mostly affects the customers' choice) and most of them are willing to pay more for those two parameters. However, in any case the total cost of the system remains on the top of customers priorities.

The constant increase of energy cost, due to the higher electricity & oil prices, amplifies the competitiveness of solar cooling systems against the conventional ones, considering, also, the additional environmental benefits (however, the recent fluctuations on fuel prices if becomes a trend also in the future could be a prohibiting factor, when low, to the sc+ systems market growth).

The penetration of small scale solar cooling systems into the AC market requires the fulfilment of the rising comfort standards taking into account that system cost should remain in competitive level.

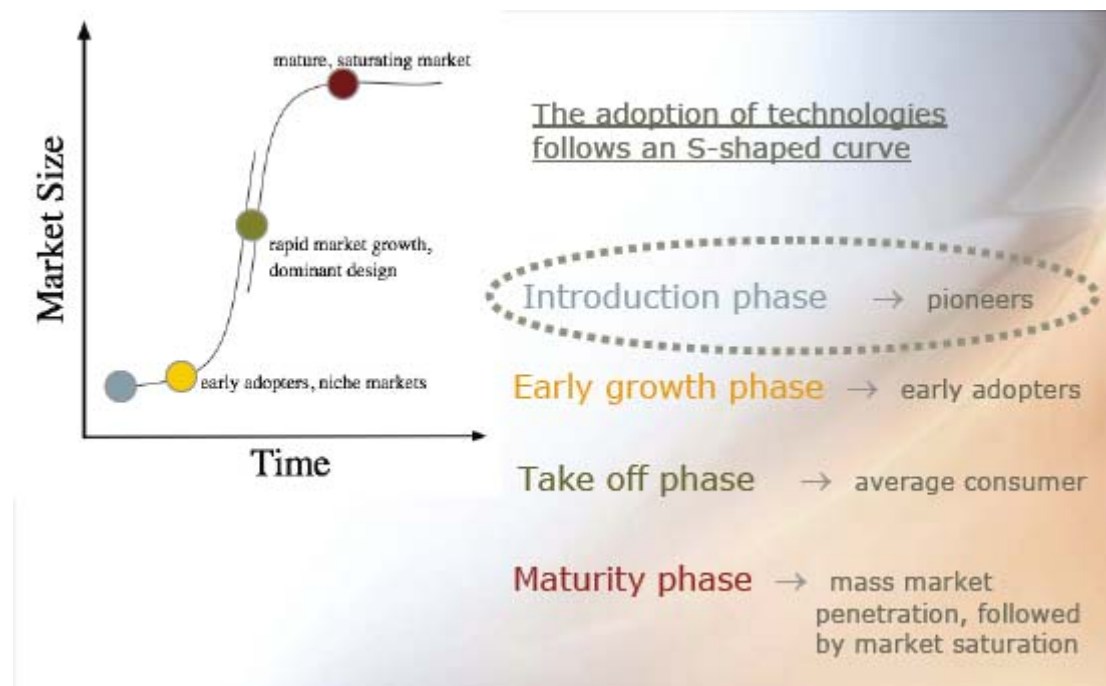


Figure 11: Typical s-shaped curve for the market adaptation of a technology (source: presentation "end user attitudes towards microchip" given at MicroCHP project meeting, Petten, the Netherlands, 2006)

Solar cooling, like any new technological products, should and will follow a rather specific and expected learning curve which all the relative stakeholders should have in mind. Figure 11, presents the exact different phases of a product adaptation by the market in relation with the associated consumer's profile, while Figure 12 illustrates the typical hype cycle as perceived by Gartner Inc., where

the 5 different phases referring to the maturity, adoption and business application of a specific technology are graphically described.

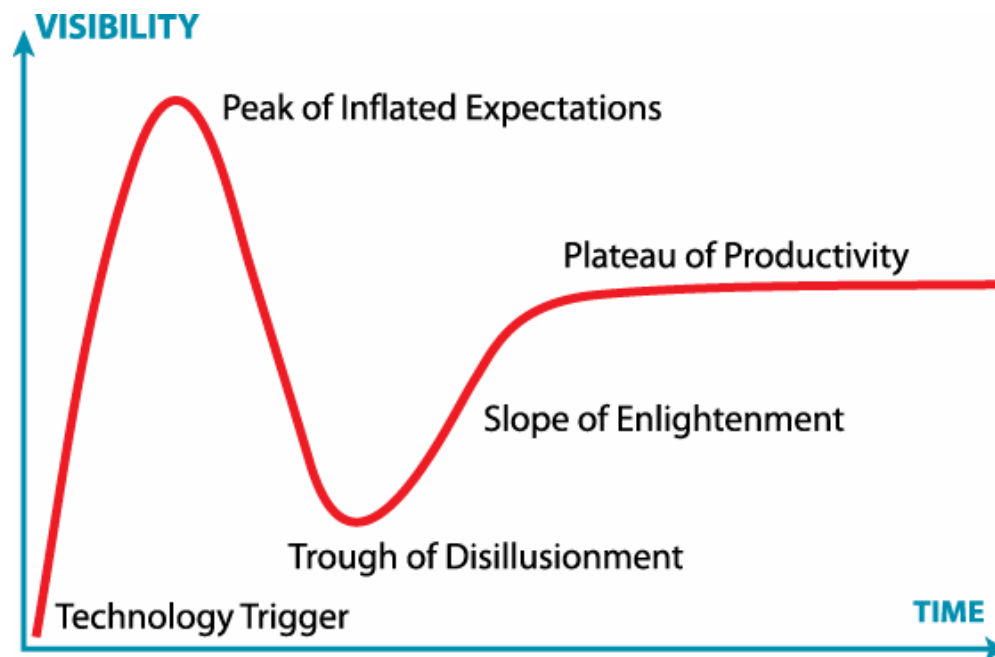


Figure 12: The Gartner hype-cycle for the development of a technology (source Gartnergroup)

SC+ systems are still in the beginning of their development curve and the establishment of a significant market share resulting from the high technological trigger. The previous two figures may lead to a presumption of a subsequent deceleration of its market share development, as well as an increase of the possibilities for market failures. According to market analysis theory, this is often anticipated on the basis of over-enthusiasm and unrealistic expectations (price issues are also considered here) derived from the first phase (peak) of a technology's development.

The role of the participating partners is to understand that factor, to evaluate the appropriate parameters (high-publicity of a not yet fully competitive or even mature technology can lead to market closure) and to target, during these first early stages, the early adopters (to act through best-examples and success replication projects). Furthermore, it is considered necessary to narrow the types of installations (target specific market segments and end-users) avoiding, by this way, the development of either inflated expectations or disillusionment and rather sustaining a steady market growth (develop dominant designs and reliable products) while being competitive with the existing products.

However, it is also clearly manifested from the questionnaire analysis that different aspects, needs and mentalities arise from different countries and the market strategy (even the product configuration) should take into account these overall behavioural issues and develop a more tailor-made market strategy.

Concluding, one should emphasise that while the market interest exists, the awareness on EE issues raises and the type of applications establishes a significant market potential the success of the next steps should not be considered an easy task. The offered products should incorporate a minimum of prerequisite parameters, be price-competitive, reliable and have a visible advantage in relation to the existing / conventional ones. Targeting specific

market segments, even in conjunction with types of use, will ease the development of a dominant design and it will probably result to an economy of scale for the given products. This could finally influence / capture the average consumer, who in any case is the ultimate target for the SC+ products.



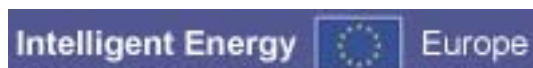
Appendix

Questionnaire for the Consumer's attitudes

Retailers input

SolarCombi+

Questionnaire Distribution & Assessment by CRES



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Section O– Contact details (of retailer)

Company Name			
Address			No
P.C.		country	
url		e-mail	
tel	+	fax	+
Contact Person			
Title/DPT			

Business card

Section A– General Info of retailer

A0-year of establishment in Greece	
Years in air conditioning field	

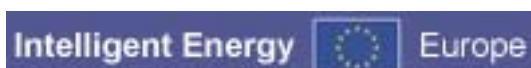
A1-Are you representing more than one firm? (if yes please identify)	
1.	
2.	
3.	
4.	
5.	

A2- Please identify if your activity is			
	yes	no	comments
geographical allocated (i.e northern Greece)			
Sectorial allocated (i.e. touristic sector, hospitals...)			
other			

A3- type of products	Comments
split units	
Semi-central	
central units	
other	

Please use ☒

A4- Volume of sales per product		
type	# of items/yr	Market share (%)
1.		
2.		
3.		
4.		



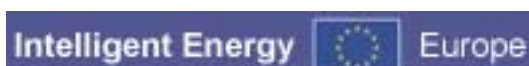
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Section B- Consumers Attitude

B1-Market characteristics (split)					
Products sold	yes	%	no	%	n/a
only for cooling?					
only for heating?					
for heating & cooling?					
Energy efficient products sold	%				
Class A					
Class B					
Class C					
lower					
products sold (nominal power)	%				
<9.000 BTU					
12.000 BTU					
18.000 BTU					
>18.000 BTU					

B2-Market characteristics (central or semi systems)					
Products sold	yes	%	no	%	n/a
only for cooling?					
only for heating?					
for heating & cooling?					
products sold (nominal capacity kW)	%				
<10					
10-20					
20-30					
>30					
products sold (nominal capacity m ³ /h)	%				
<1.500					
1.500-3.000					
3.000-5.000					
>5.000					

B3-What is your opinion of consumers attitude on			
a) Products selection	Yes (%)	No	n/a
by trademark?			
by energy label?			
by COP η EER?			
Do consumers ask about the energy efficiency of the product?			
b) the power selection is based on	Yes(%)	No	n/a
real heating/cooling demand?			
oversized demand estimation?			
c) awareness on	%		
Installation/maintenance issues			



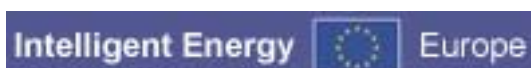
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Environmental protection & and rational use of energy	
Energy efficiency	
willing to pay more for a product that is	%
More efficient	
More reliable	
More elegant	

Section C- General info

C1-Classification of product's selection (in scale from 1 to 10) <i>10 higher-1 lower</i>	
Parameter	level
advertisement	
aesthetics	
energy label	
maintenance/warranty	
noise	
nominal power	
operational characteristics/ different modes	
total cost	

General comments on the market assessment and targets of your company



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