

<b>Title of the measure:</b>	POR2 - Solar Hot Water Programme for Portugal (IP- AQSpP)
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### **General description**

Portugal is one of the European countries with more solar radiation available and a potential market for 15 million m<sup>2</sup> of solar panels. The domestic sector is a particularly interesting market for this technology because solar water heating can supply nearly 50% of the energy consumption of an average Portuguese family. However, market development has not been up to this potential and lacks one or more driving forces. One of the most important is quality, proving consumers that solar technology is reliable. Another is economics: showing potential users that solar energy can be cost effective.

These factors have been acknowledged by the Government and addressed first in the E4 Programme (Council of Ministers Resolution 154/2001) and, more recently, in the Council of Ministers Resolution 63/2003. Both provided the necessary political framework for “Solar Hot Water” Programme (AQSpP – Água Quente Solar para Portugal).

The objective of AQSpP is to reach 1 million m<sup>2</sup> of installed solar collector capacity until 2010. This involves increasing the annual solar collectors sales 30-fold.

This Programme started in 2001 and was concluded in 2004. It was a public initiative performed by the Directorate General for Geology and Energy (DGGE), in co-operation with ADENE (National Energy Agency), INETI (National Engineering and Industrial Technology Institute), SPES (Portuguese Society of Solar Energy) and APISOLAR (Portuguese Association of Solar Industry). The total budget for this Initiative development was of 861.000 EUR (2001-2004).

It follows three major lines of action, each one integrating a set of activities to be developed:

- promotion of the image of solar thermal and the economic and social interest of this technology for water heating; the idea is to pass on a message enhancing the benefits for consumer. This has been accomplished by: a) campaigns to the general public and to the professionals of the sector; b) establishment of a reduced cost information telephone line; c) creation of a dedicated website ([www.aguaquentesolar.com](http://www.aguaquentesolar.com)) and; d) making available lists of certified installers and equipment
- dynamization of the quality certification process for solar systems and certification of qualified designers and installers; the key aspects in what respects quality have been: a) the mandatory certification of collectors and solar systems; b) training and certification of professionals, making access to government funds and fiscal incentives dependent on the use of certified installers and; c) a 6 years minimum guarantee on equipment.
- Creation of an Observatory for Solar Thermal in Portugal; the primary task of the Observatory is to follow the implementation of the AQSpP programme, tracking what is being done in the field.

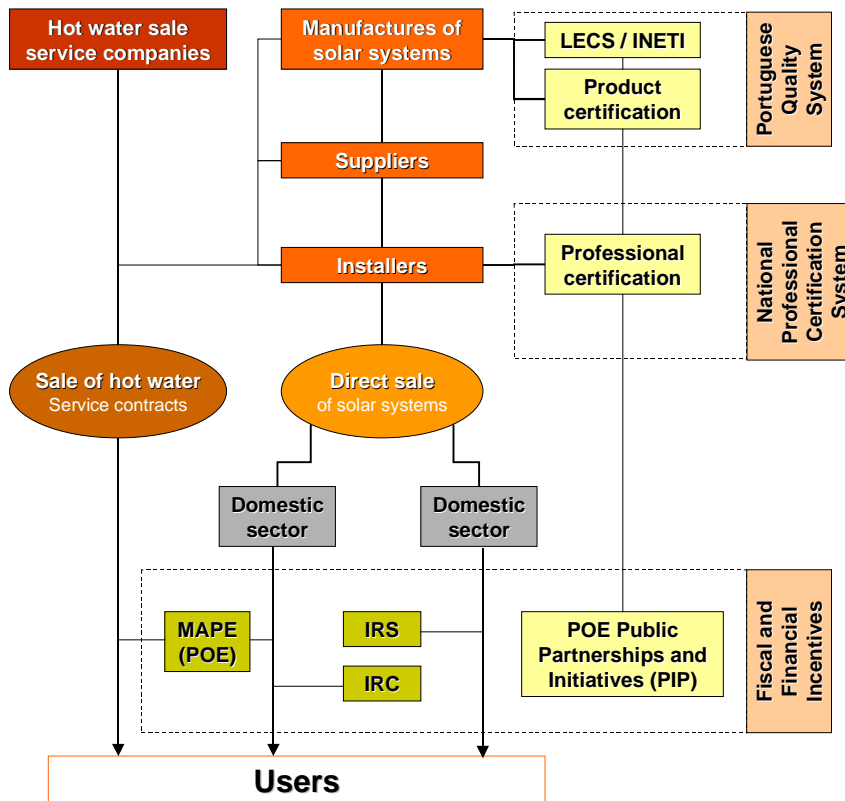


Figure 1- Schematic of the “Solar Hot Water” programme

## ***Impact evaluation (methods and results)***

### ***Methods***

The impact evaluation of the implementation of AQSpP programme, was achieved by the Observatory for Solar thermal, that will continue on going. A methodology based on a permanent evaluation of installers, installations, system components and user’s demand on this product has been put to practice and allowed to monitor the market progress and the identification of corrective actions that need to be introduced.

In order to follow the impact of this initiative, every year it was performed an enquire targeting the companies working in the solar thermal business. This action was directed to about 200 companies in 2003 and to 21 companies in 2004 (in this case directed only to manufactures and distributors). Based on the enquire results, it was made an assessment of those companies activities in terms of main market area, business progress and future prospects, marketing options and training level of the national technicians.

Under the AQSpP workprogramme the following was achieved:

- Several workshops took place;
  - Quality + Sun, Lisbon, November 2002
  - Solar collectors in Municipal Equipment’s, Porto, April 2003 (69 attendants)
  - Solar collectors in Municipal Equipment’s, Lisbon, May 2003 (89 attendants)
  - Solar collectors installers, Fátima, March 2004 (135 attendants)
  - Solar collectors installers, Grândola, March 2004 (167 attendants)
  - Solar collectors utilisation in touristic infrastructures, Lisbon, January 2004 (45 attendants)
  - Solar collectors utilisation in touristic infrastructures, Montechouro, April 2004 (52 attendants)
- Creation of the website with the address [www.aguaquentesolar.com](http://www.aguaquentesolar.com).

- Edition of several technical brochures;  
 DGGE/IP- AQSpP(2003), “Utilisation of solar collectors for water heating in the household sector”.  
 DGGE/IP- AQSpP(2003), “Solar collectors for water heating – sportive pavilion’s and swimming pools”  
 DGGE/IP- AQSpP, (2004), “Application of solar technology in industry”  
 DGGE/IP-AQSpP (2004), “Manual for solar thermal Installers”
- Edition of two information leaflets in scope of the Observatory activities.
- Distribution and dissemination of several information related with this programme in specialised press and in organised events related with AQSpP.
- Implementation of a professional capability certificate to be attributed to solar collectors installers.
- 6 training courses for solar thermal installers certification (over 100 professionals were trained) and two training courses for solar thermal projectors.
- Certification products process start; about a dozen solar collectors were qualified to start up the certification process

### Results

Solar thermal technology has had a steady, yet slow, growth from 1998 to 2001, usually in the range of 2,5 to 3% increase per year in terms of energy generated by solar panels. It is estimated that 225.000m<sup>2</sup> of solar collectors are already installed in the country, a figure that has been growing at a rate of about 5000 m<sup>2</sup> per year. Overall, it contributed with 1,5% to the thermal energy produced from renewables.

In the scope of AQSpP this sector has showed increasing signs of development, with more qualified installers and designer operating in the market. The inquire responses, mentioned before, revealed the installation of about 9.210m<sup>2</sup> solar collectors in 2003 and about 16.100 m<sup>2</sup> in 2004. The main solar market, expressed in terms of installation type implemented, was in the domestic sector, more specifically the sanitary water heating systems in residences. Next, were the solar collectors installations in swimming pools and in senior homes. Most companies verified a positive balance, in terms of sales, regarding the year before. Almost all companies were aware of the AQSpP Programme and half of the inquired refered that this initiative had a positive impact on their business.

On the other hand, it was stated by manufactures and suppliers that the increase in sales was not as noticeable as they were predicting. This may be explained, as a consequence of a not so favourable economic situation in Portugal, with families holding back on investment. The hot water sale service didn’t kick-off and there are not yet companies operating in this area. Utilities and other potential players are late in putting to action its potential interest in this new form of energy market. Financial and fiscal incentives are considered not attractive enough by most potential consumers. Private consumers can only deduct up to 700 EUR of investment on their taxes, and that is considered insufficient by most people.

<b>Measure Impact</b>		
<b>low</b>	<b>X medium</b>	<b>high</b>

In terms of a quantitative evaluation, under AQSpP, estimated capital costs to reach the 2010 target of 1.000.000 m<sup>2</sup> of solar collectors are around 600 million EUR (taking in consideration that in 1999 about 225.000 m<sup>2</sup> were already installed). The primary energy savings in that situation would be 6,3 PJ per year, which would allow the displacement of 525 kton CO<sub>2</sub>/year (considering 83,6 kton CO<sub>2</sub>/PJ). Finally, with the development of the solar thermal market, 1.500 new jobs, are expected to be created, distributed among the manufacturing industry and the service actives (including designers, installers and sales) (Source: Renewable Energy Forum, 2002).

<b>Ex-post evaluation</b>	1995	2000		
direct CO <sub>2</sub> (kt)				
Energy (TJ) (Fuels/Electricity)				
<b>Ex-ante evaluation</b>	1995	2000	2010	2020
direct CO <sub>2</sub> (kt)			525 <sup>1)</sup>	
Energy (TJ) (Fuels/Electricity)			6.300 <sup>2)</sup>	

**Notes:**

- 1) In terms of the 525 tons CO<sub>2</sub> (eq.) savings estimated for 2010
- 2) Energy savings are not concern with a base year. Its the energy savings provided, if in 2010 the target 1000.000 m<sup>2</sup> of solar collectors is reached.

The estimates were done in the scope of the “Renewable Energy Forum, 2002”, in which the following assumptions were made:

- Domestic sector encloses only water heating of families. An average family, with 3 people ( Census, 2000) has in average a hot water consumption of 50l /person, representative of a solar system with a store capacity of 150 l and a 2 m<sup>2</sup> of collectors area/family. This kind of system provides in average 1.320 MWh/year.
- Solar energy would replace 70 % gas consumption and 30% electricity in the domestic and tertiary sectors
- In terms of primary energy, it was used a conversion factor per KWh substituted from gas fuel of 0,087kgep and from electricity of 0,29 Kgep.

It was considered a conversion efficiency of gas conventional system of 65% boilers with an efficiency and of the conventional system using electricity (thermoaccumulator) of 0,33%.

### **Interaction of measures**

AQSpP Programme was launched in the scope of E4 National Programme (Energy Efficiency and Endogenous Energies Programme) financial supported by the Incentive Programme to the Modernisation of the Economy (PRIME).

PRIME is the only programme providing financial support to public and private companies who intend to install solar thermal collectors. The financial support can be as high as 40 per cent of eligible costs for the public sector. For private companies the financial support takes up two forms: 20 per cent free of any charge and 20 per cent with a rent, payable in four years period.

However, it is possible that the conclusions of the recently finalised AQSpP initiative might call for a new programme, focusing on specific problems identified during the last two years.

### **Historical data**

The support to solar energy goes back to 1987, with Valoren Programme (Valorisation of National Endogenous Resources). The programme took place during six years. It favoured 73 applications, with a non refundable participation between 50-70%. Valoren was followed by the RUE-RE (Rational Use of Energy – Renewable Energy) area of Measure 3 in the ENERGY Programme. This was made available to support solar projects (among other REs) in the period from 1994 to 2000. After 2000 subsidies were provided under PIME<sup>1</sup> (Former of POE<sup>2</sup>). In the scope of the specific supporting measure MAPE (Measure 3- Support Measure for the Use of Energy Potential and Streamline Consumption), it was provided financial support to public and private companies who intend to install solar thermal collectors. The financial incentive can be as high as 40 per cent of eligible costs for the public sector. For private

<sup>1</sup> Incentives Programme for the Modernisation of Economic Activities

<sup>2</sup> Operational Programme of Economy

companies the financial support takes up two forms: 20 per cent free of any charge and 20 per cent with a rent, payable in four years period.

In the scope of E4 National Programme, it was launched the “Solar Hot Water” Programme (not a financial supporting measure), as an initiative of Ministry of Economics towards a weak market development, at that time, of solar technology in Portugal (one of the countries with more sun hours).

### ***References***

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