

# On the Best Practice Implementation of Solar Thermal Obligations The ProSTO EU Project and the Portuguese Experience

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## 1. Introduction

Based on the work that it is running within the ProSTO EU project (<http://www.solarordinances.eu/>), this paper presents a tentative approach to the best way for a successful implementation of a solar thermal obligation (STO) in a community. The EU framework, and base line assessment – including success factors and performance indicators were presented by the ProSTO coordinator elsewhere [1]. The Portuguese case was presented elsewhere too [2].

Here, all the complete set of measures that must be taken to succeed, will be presented. The experience shows that it is necessary to get an integrated “policy package” in the way of “zero building emissions”, around the kernel key point of clear requirements, aiming energy savings, namely for energy demand limitation, and energy efficiency of thermal installations.

A parent kernel key point of this “policy package” is quality: certification of thermal solar system and components – solar collectors, factory made systems, and custom built systems; planner, designer and installer certification; technical impositions in the regulations (supported by a very consistent manual of actual good practices for solar thermal applications, with a flexible method to follow new developments); guarantee impositions (maintenance contract). All relevant documents of these quality items must be integrated in the Building Use Manual for easy management.

Another kernel key point, this with focus on overcoming barriers, is that of public awareness, aiming to create an understanding that the implementation of a STO is not another awful bureaucratic burden, throughout on-line information (lists of certified equipments, installers, technical description of the equipments, manual of good practices, scholar materials (class notes, computer codes, homework assignments, etc.), etc.), and the implementation of training courses for all stakeholders.

## 2. The Portuguese case framework

During 2001 the Forum “Renewable Energies in Portugal” took place, with several groups responsible for studying each area [3]. One of them was the group for the “Solar Thermal”.

The conclusions of the Forum were integrated in the Program E4 (Energy Efficiency and Endogenous Energies) [3]. In the framework of E4, a sub-program was launched, called “SWH - Solar Water Heating for Portugal”.

Considering a maximum possible of 15 millions of m<sup>2</sup> of solar collectors (52% in the domestic sector and 48% in the Industry) it was considered reasonable to install 1 million m<sup>2</sup> until 2010, with an annual rate of 150 000 m<sup>2</sup> for the last years.

The emerging sector was supposed to correspond to 600 MEuro of business and 1500 direct jobs.

The main measures considered to be implemented were:

- Image Promotion of Solar Thermal Energy:
  - ❖ Implementation of promotional campaigns of information for installers, entrepreneurs, and users.
  - ❖ Creation of information Green Line.
- Development of two structural ways of development for the solar thermal market: selling solar hot water (via ESCOs – Energy Service Companies) and selling/installation of SWH systems.
- Quality Certification:
  - ❖ Certification of products.
  - ❖ Certification of installers and designers.
- Incentives and subsidies:
  - ❖ Reinforcement of fiscal incentives.
  - ❖ Reformulation of the financial support in force (at that time, the so-called MAPE (Support Measure of Energy Production within the Portuguese Economy Operational Program)).
- Complementary measures:
  - ❖ Promotion of active solar thermal within the revision of the building’s thermal regulations.

- ❖ Promotion of solar thermal complementarily with gas and electricity.
- ❖ Promotion of solar thermal into financing institutions, especially those responsible for housing promotion.
- ❖ Support of the R&D activities.
- ❖ Promotion of the Good Practices.
- ❖ Constitution of a Solar Thermal Observatory.

Taking into account these proposed measures,

- i) it was developed within a sub-task of the European project QUALISOL [4] a complete proposal to be presented to a technical committee within, for the case, Portuguese National System of Professional Certification, defining the solar thermal installer professional profile, with their activity global goal, specific activities, knowledge's, skills – skills-to do and skills-to be, and thematic areas of training;
- ii) it was created (Portaria n.º 1484/2002 (2.ª série) and Despacho n.º 21 871/2002 (2.ª série), in D.R. – II Série N.º 234 — 10 de Outubro de 2002) a Sub-Commission to propose the new energy efficiency in buildings regulation; and
- iii) it was approved by the Portuguese government the public initiative called Solar Hot Water to Portugal [5], within the so-called E4 – Efficiency Energy and Endogenous Energies programme (approved by Council Ministers Resolution n.º 154/2001, D.R. - I Série - B N.º 243 — 19 de Outubro de 2001), implementing all the above referred measures.

Meanwhile, it was approved

- a) The novel solar thermal installer certification scheme (by Portaria n.º 1451/2004, de 26 de Novembro, D.R. - I Série - B N.º 278 — 26 de Novembro de 2004);
- b) The novel set of standards on thermal solar systems and components, concerning solar collector (EN 12975-1&2: 2000 and 2006) and factory made systems (EN 12976-1&2: 2000 and 2006), and, within both Portuguese Quality System and Solar Keymark, a certification scheme for both solar thermal collectors and factory made systems; and
- c) The novel building thermal energy efficiency regulation, transposing EU Directive 2002/91/CE on the energy performance of buildings, but also in the sense now given by Directive 2009/28/EC on the promotion of the use of energy from renewable sources, establishing as mandatory for all buildings comprised by Thermal Performance Building Regulation (RCCTE) (Decreto-Lei n.º 80/2006, de 24 de Abril) the usage of solar thermal collectors for hot water production if there is favourable conditions for exposure (if the roof or cover runs between SE and SW without significant obstructions) in a base of 1m<sup>2</sup> per person (the total can be reduced up to 50% if space is necessary for other important usages of the building); and that
  - 1) the annual energy production of the solar system must be calculated with a programme developed by INETI (SOLTERM programme),
  - 2) for performance calculation of such systems, the collector certification according to the European Standards is needed,
  - 3) the installers of these systems must also be certified installers,
  - 4) the solar system must have a six year guarantee of maintenance.

It must be underlined that this regulation is a part of the new Portuguese regulations for buildings arising from EU Directive 2002/91/CE. The other parts are the Building Certification National System on Energy and Interior Air Quality (SCE) (Decreto-Lei n.º 78/2006, de 24 de Abril), and the Air Conditioning Energy Systems Regulation (RSECE) (Decreto-Lei n.º 79/2006, de 24 de Abril).

Within the SCE it was implemented a working group as a consultant of the SCE manager, which prepare the answers for all relevant questions.

- d) The novel National Action Plan on Energy Efficiency (Resolução do Conselho de Ministros n.º 80/2008, de 20 de Maio), with specific programmes for:
  - 1) Energy efficiency in buildings, with specific measures for micro-production (giving an incentive to micro-power production ((PV, wind, hydro, biomass, ...) with the mandatory installation of at least 2 m<sup>2</sup> (on a basis of 1 m<sup>2</sup> per 1 kW installed) of solar thermal to access a bonus on the kWh tariff, with exemption of the municipal licensing for small installations), and for Service Buildings (implementing both solar thermal and micro-production in schools);

- 2) Renewables in the moment, with specific measures for solar thermal, to get a solar thermal market of 175,000 m<sup>2</sup>/year (dissemination campaigns, incentives programme for the installation of new solar thermal (fiscal benefit up to 30% of the investment within the Income Tax of Natural Persons, with a limit of €777), mandatory installation of solar thermal in new buildings, oriented programmes for specific segments (social dwellings, swimming-pools and showers, solar condominium));
- 3) Energy efficiency in the public sector, with a specific measure for buildings to get state buildings energetic certification (covering 100% of the state buildings until 2015), solar thermal in swimming pools and balnearies (covering 285 swimming-pools (property of both the state and the private sector) until 2015, including 100% of public swimming-pools and balnearies), and solar thermal in sport parks (covering 80% of the actual balnearies until 2015).
- e) A lot of municipalities are approving updates on their edification regulation including well defined requirements concerning building energy efficiency and renewable energy integration as well the existence of one Building Energetic Dossier for each one of the buildings, including copies of all relevant documents, namely Building Energy Performance Certificate, Building Energy Performance Certification Process, Solar Thermal System Design, Installation, Operation and Maintenance Processes, contracts with energy service suppliers, and so on.

### 3. Discussion

It is well known that the first STO was adopted in Israel in 1980, and that, after Berlin failed to get one in the 1980s, it was Barcelona that adopted in 1999 the first STO in Europe [6]. So, during last decade, we have assisted to a permanent spreading of this measure, firstly, along municipalities in Spain, Italy and Ireland, and in a second step after the approval of the European Directive 2002/91/EC (EPBD), at national level, to be applied for all types of housing (Portugal (2006), Spain (2006), Ireland (2007) and Germany(2009)<sup>1</sup>). And now, the adoption of STO is spreading in America's. Recently, S. Paulo (Brasil) and Mexico City (Mexico) have approved their STO.

The lessons learned showed that:

- a) At business environment level:
  - A STO must be a part of a “policy package”, including other legal as well as financial and information/training/awareness instruments.
  - A “policy package” in the way of “zero building emissions” must include basic requirements for energy savings, namely, limitation of energy demand, energy efficiency of thermal installations, energy efficiency of lighting, minimal Solar contribution for sanitary hot water, and minimal PV or small wind contribution for electricity.
  - A STO must define clear requirements, as few exceptions as possible (as a means to reduce non-compliance).
  - Quality is key: certification of thermal solar system and components – solar collectors, factory made systems, and custom built systems; planner, designer and installer certification; technical impositions in the regulations (supported by a very consistent manual of actual good practices for solar thermal applications, with a flexible method to follow new developments); guarantee impositions (maintenance contract).
  - Public awareness is key (to create an understanding that this is not another awful bureaucratic burden).
  - Leading by example – public buildings!
- b) It is necessary to avoid the following type of barriers:
  - Complex regulation: Keep it simple! E.g. calculation method, checks.
  - Not clear roles of the actors involved: Separate roles of developing & enacting, operating & monitoring, training, etc.
  - Lack of knowledge of the actors involved: Hearings, training, information campaign from the beginning (before the STO), modification of architecture school curricula.
  - Resistance from “external” sectors: Involve them from the beginning (hearings), offer them enough alternative solutions.

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<sup>1</sup> Italy approved legislation on the subject in 2005, but it is quite generic.

- Architectural barrier: what to do to prepare a building for solar (place for the collectors (and their integration); place for technical rooms)
- c) It is necessary to implement the following type of flanking measures:
  - More targeted actions are needed, e.g. training for Municipality personnel, campaigns towards building companies, training on large scale solar plants for designers, etc.
  - Information & training for suppliers (including planner, designer and installers) and users are key.
  - Communication: STO manager (integral manager or “gestor integral”) aims at clarifying procedures and do some bureaucratic issues on-line; it also acts as a communication tool (several know-how documents addressed to promoters, installers, architects and engineers)

#### 4. Conclusions

As a conclusion of the study carried out within ProSTO Project it will be presented, as a blueprint, a tentative approach for a STO implementation, with focus on:

- a) Preparatory Steps, including a baseline assessment, the legal base for a STO, the potential of solar thermal in a community, the economical tenability, and hearings with stakeholders and society groups;
- b) Drafting the STO, with general recommendations (simple is beautiful), scope of the STO (which buildings included), quantitative obligation, quality requirements, architectural integration / protected buildings, and administration and procedures;
- c) Flanking measures, integrating public relations, local campaigns, demand side measures, supply side measures, financial incentives, and training of staff; and
- d) Monitoring and evaluation, proposing monitoring the market, evaluation as internal procedure, and supervision and penalties.

Of course, this blueprint will present only an introduction and the project team advice for each item, but it must be underlined, as referred in the first project deliverable [7], that a STO need well defined objectives, and well defined processes, with well defined roles and tasks for all actors evolved (promoter, political decision makers, public administration, stakeholders and advisors).

#### 5. References

- [1] M. Calderoni and R. Battisti, Paper 356 – “Solar thermal in buildings in the light of the new EC draft Directive – The “ProSTO” project”, Eurosun 2008, Lisboa, 2008.
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- [3] Forum Energias Renováveis em Portugal, Relatório Síntese, edição ADENE/INETI, 2001 (see [http://www.aguaquentesolar.com/publicacoes/16/FORUM\\_Relatorio-Sintese.pdf](http://www.aguaquentesolar.com/publicacoes/16/FORUM_Relatorio-Sintese.pdf)).
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- [5] Água Quente Solar para Portugal, edição ADENE/DGE/INETI, 2001, [http://www.aguaquentesolar.com/publicacoes/15/Brochura\\_AQS.pdf](http://www.aguaquentesolar.com/publicacoes/15/Brochura_AQS.pdf).
- [6] ESTIF, Best practice regulations for solar thermal Project “Key issues for Renewable Heat in Europe” (K4RES-H), EIE/04/240/S07.38607), August 2007 (see [http://www.estif.org/fileadmin/estif/content/policies/STAP/Best\\_practice\\_solar\\_regulations.pdf](http://www.estif.org/fileadmin/estif/content/policies/STAP/Best_practice_solar_regulations.pdf)).
- [7] ProSTO deliverable entitled “Solar thermal ordinances - State of the art in Europe”, September 2008 (see <http://www.solarordinances.eu/ProSTOProject/Projectoutcomes/tabid/391/Default.aspx>, Technical report on the state of the art analysis).