



Best Practice Implementation of Solar Thermal Ordinances

A STO Developer's Blueprint

Supported by



This developer's blueprint on hand is intended as practical workbook for all those, who are entrusted with developing a solar thermal ordinance for their community.



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Preface

About STOs

Solar Thermal Ordinances (STO) are legal provisions requiring the installation of solar thermal systems in buildings.

The obligation is typically tied to the construction of new buildings or major renovation. Then, the owner must ensure that a solar thermal system is installed, which meets the specific requirements.

Many of the existing STOs are related to national or regional energy laws and implemented through the municipal building codes.

A growing number of municipalities, regions and countries are already making use of solar thermal obligations. Already today, more than 150 million people in Europe are living in regions covered by a STO.

The STO Developer's Blueprint on hand is intended as a practical handbook for all those, who are entrusted with developing a Solar Thermal Ordinance for their town, region or country. Practical, because it is based on the experience of the five ProSTO communities which actually implemented a STO, but also because this document is setup as a sort of handbook guiding the STO developer step-by-step through the process for developing and implementing a STO at local level.

Chapter 1 of this handbook 'A STO in your Community' gives background information on STOs and makes a good case for a STO in your community. It explains the phases of a STO process and names the parties to be involved. Chapter 2 'Getting the STO started' supports you in analysing the initial situation and the potential of a STO, also for convincing your local stakeholders and decision makers. In Chapter 3 'Drafting the STO' you find tools and instruments for drafting an efficient STO. Recommendations for flanking measures, which boost the impact of your STO are presented in Chapter 4. Last not least you find instruments for implementing, monitoring and evaluating your STO in Chapter 5.

Each clause of this handbook discusses one specific STO topic, subdivided in four elements:

- introduction to the topic presented in this clause
- valuable advices from experts
- references related to the topic
- related practical examples from the local ProSTO partners and from other STO experiences in Europe

We hope that this STO Developer's Blueprint contributes to successful STOs in numerous communities in Europe.

December 2009

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Disclaimer

This publication is a combined effort of the participating partners of the European project 'ProSTO - Best Practice Implementation of Solar Thermal Ordinances'. ProSTO is cofunded by the European Commission through the Intelligent Energy Europe program. The sole responsibility for the content of this publication lies with the authors. It does not represent the opinion of the European Community. The European Commission is not responsible for any use that may be made of the information contained herein.

The ProSTO project

Boosting the use of solar thermal systems in the European countries is the prime objective of the ProSTO project in promoting an efficient implementation of solar thermal ordinances and supporting European local authorities in planning, developing, introducing and managing efficient solar thermal ordinances (STOs).

The region of Lazio (IT), the cities of Lisbon (PT), Murcia (ES), Stuttgart (DE) and Giurgiu (RO) are participating in this joint action to showcase best practice STOs. The aim is to implement optimized STOs, consisting of model regulations, tuned criteria, efficient administrative procedures and flanking measures.

A large number of practical tools are already available on the website www.solarordinances.eu, such as the STO database, the STO toolbox and the STO helpdesk. The dissemination of information on project results through the authorities' networks will also target and persuade new potential communities to adopt STOs.

Project website:
www.solarordinances.eu



1. A STO in your community

By Solites and ESTIF



Solar thermal - emission-free heat on site!

Solar thermal can play a key role for reducing CO₂ emissions and improving quality of life in your community. More than the half of the energy consumed in Europe is used for providing heat and cold for buildings and industry applications, whereas already today, an established industry produces reliable solutions for sustainable heating and cooling: Solar thermal plants are a proven cost-effective technology, widely used for domestic hot water and space heating in many countries. Promising applications such as solar cooling, solar process heat and solar district heating presently find their way into the market. Convincing arguments for solar thermal are:

- Solar energy is inexhaustible and readily available all over Europe.
- Heat and cold is produced emission-free and on site.
- Solar collectors are aesthetically integrated into buildings.
- Solar energy creates security in energy supply, new jobs and economical growth.

1.1. No new building without solar!

Heating with fossil fuels is becoming more expensive and impose an economical risk for citizens and enterprises. Stricter building insulation standards and higher efficiency of heat and cold supply are necessary and urgent, but alone will not be enough to satisfy the energy demand. In the long term all the energy needed for heating and cooling of buildings has to be covered by renewable energies. There are enough reasons to accelerate the necessary transition to sustainable heat and cold supply already today.

STOs proved to be a very powerful support measure for boosting the introduction of solar thermal in national markets or at community level.

The City of Barcelona enacted in 1999 its first STO later replicated by many Spanish Municipalities and Regions. This paved the way for having the STO included in the national building code, approved in 2006. In Israel, a solar obligation has been in force since 1980. As a result, Israel is the world leader in solar thermal usage.

More and more countries are introducing similar STOs. The ball will soon be with the EC Member States' governments, who have to transpose the requirement on Renewable Heat Ordinances of the new so called Renewable Energy Directive into national legislation.

DIRECTIVE 2009/28/EC positively encourages the use of obligations as a means of increasing the share of renewables as an energy source in buildings.

According to article 13.4: "Member States shall introduce in their building regulations and codes appropriate measures in order to increase the share of all kinds of energy from renewable sources in the building sector."

1.2. Benefits of a STO for your community

A key benefit of STOs is their effectiveness combined with very low costs for the public administrations. As part of the building permission process, the check on the renewable energy requirement is minimal and thus this support measure is not much dependent on the public budget.

The introduction of a STO prevents the typical stop-and-go markets caused by unsteady incentive programs. It gives planning security to market actors and investors, creating local economical growth and new working places in this sector. It is estimated that about 75 % of the value of solar heat is created at local and regional level.

Building the future today! The building stock in your community is prepared for the post-oil and -gas era challenge. Buildings constructed today will use energy for decades to come. By the way, STOs have positive effects beyond their direct scope, by promoting the voluntary use of solar beyond required levels.

In the context of future fossil free energy economies, solar thermal has the potential to contribute at high shares to the heat and cold supply. Broadly introducing this technology today will enable your community to reach ambitious climate protection goals.

The image of your solar community will win through this modern, future-oriented and ecological energy policy!

1.3. STO Step-by-Step Process

A STO process ... this sounds like theory! However, it is worth to derive from the existing STOs a kind of generalised procedure for implementing a STO in a community. It is rather helpful to understand beforehand about the phases of the process, the stakeholders to be involved and their roles, in order to implement the ordinance in a successful way. The development of a STO is a 90 % political and only 10 % technical issue. However, the technical specifications need to be of good quality either in order to avoid overregulation, bureaucracy and replication of usual errors. Often the STO is developed as participated process involving local stakeholders, market actors and citizens. For sure this process needs to be adapted to the very individual boundary conditions of the community in question.



Solar Cities Neckarsulm and Crailsheim in Germany - no new building without solar!

1.4. Parties involved in a STO process

STOs are developed as participated process involving local stakeholders, market actors and citizens

Ideally the following parties should be involved in the process of developing and implementing a STO:

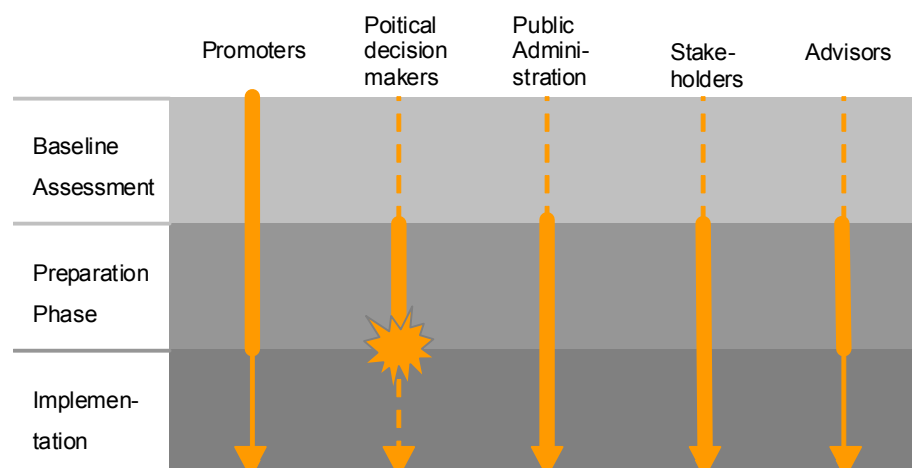
The **promoter** is a person, an organisation or a group taking the initiative and the role of the leading force for bringing forward the STO. Ideally such a group should already at an early stage include representatives of the following parties.

Political decision makers need to be involved for adjusting the STO with the political goals and for ensuring the enacting of the STO. The STO should have, as much as possible, a multilateral support, so that the continuity of its development and implementation could be assured.

The **public administration** is the party responsible for developing and executing the STO and thus the main player in the process. Ideally all sectors of the administration concerned by the STO should participate in the process (e.g. building, environment, energy sectors).

Stakeholders representing the housing and the heating systems sector, but also citizens. Stakeholders need to be consulted in order to reach broad acceptance for the STO.

Advisors are experts for consulting on juridical, economical, technical and social issues related to the STO.



STO process versus process phases and stakeholder groups

1.5. Phases of a STO process

A STO is developed and implemented in three phases:

A **baseline assessment** is carried out by an initial promoter group in order to assess the framework for developing a STO on the territory in question. What are the effects you can achieve with the broad introduction of solar thermal? Are there a sound legal base and sufficient support of stakeholders for an ordinance in your community?

In the **STO preparation** phase the process becomes 'public' foreseeing consultations with political decision makers, stakeholders and expert advisors in order to reach a broad support for the STO to be implemented. In this phase the STO is drafted: keep it simple and smart!

The **implementation phase** starts with the enacting of the STO. Even the best ordinances should be accompanied by flanking measures, e.g. information campaigns targeted at raising quality and awareness amongst consumers and installers. Ensure a good efficiency of the STO and monitor its impact!

The following chapters discuss the main steps for developing and implementing a STO based on the process as described in this clause and referring to more detailed information, which you as a STO developer can find in the ProSTO toolbox.

Title	Description	Source
Best practice regulations for solar thermal	Guideline for implementing STOs	www.estif.org
ProSTO State of the Art Report	State of the art of STOs including a STO process model	STO Toolbox section of www.solarordinances.eu

References

2. Getting the STO started

By Solites

Introduction

2.1. Baseline Assessment

Usually the baseline assessment is carried out by a limited promoter group in order to assess the framework for developing a STO initiative on the territory in question. The objective of the assessment is to create a reliable base for decision making and for convincing stakeholders right at the beginning. Key points are often the legal base for an ordinance and the competences and roles of the various authorities. Analyse the already existing solar thermal market in your community in order to identify opportunities, barriers, stakeholders and also the effects you can achieve with a STO. But also look at the macro level: Which are national or even international initiatives supporting your local work? Use lessons learned from other communities that tried or succeeded in implementing a STO.

Our Advice

The result of your baseline assessment can be a compact and concise report of good quality, which you can use as 'identity card' of your initiative. Use it for convincing the relevant stakeholders in your community. Try to identify as early as possible the potential barriers for a STO in your community and focus on these in your assessment. Key issues are often legal issues, costs for the administration and the economical burden for building owners. Avoid an academic approach of your assessment as well as too high efforts and too long preparation times.

References

Title	Description	Source
STO Database	Online database of existing STOs including lessons learned	www.solarordinances.eu
STO Baseline Assessment Checklist	Checklist of issues to be assessed	STO Toolbox section of www.solarordinances.eu
Baseline Assessments of the ProSTO Communities	Practical baseline assessment reports	ProSTO Project section of www.solarordinances.eu

Example

All of the communities involved in the ProSTO project carried out a baseline assessment. Their reports are available on the project website (see references). Learn from these cases and the broad variety of hot topics identified in the ProSTO communities:

- Building integrations, aesthetics and a proper system operation are key issues in Murcia, Spain.
- Priority has been given to ordinance and improved energy standards for the high number of protected buildings in Lisbon, Portugal.
- For Stuttgart, the key issues have been the economical burden for citizens and enterprises as well as the most suitable legal instrument for the STO.
- Giurgiu, Romania needs to develop measures considering that so far the local solar thermal market has not reached a 'critical mass'.
- The initiative in Region of Lazio, Italy addresses municipalities within the region, which need information and support for implementing STOs.



The Italian Region of Lazio transfers know-how about STOs to its municipalities.

By Solites

Introduction

2.2. Legal Base for a STO

The division of powers concerning energy legislation varies significantly in the EC member states. Competences are allocated at national, regional or municipal level. But also within one community administration, competences can be split among different authorities (e.g. environment or construction authority). Further, other authorities might be relevant for your STO initiative (e.g. authority for protection of buildings, finances or economics). Existing and upcoming laws and regulations at national or EU level build the framework of your STO. A STO extension of an existing local or national regulation can often be the easier way than the implementation of a new ordinance. A detailed analysis, accomplished by an expert on administrative law, provides you with a good base for developing your initiative in the right direction and with the competent authorities.

The importance of a solid legal base of the STO is emphasized. It shall also withstand an eventual juridical rescission by an objector of your STO. In cases where the legal base is not sufficient for enacting a full ordinance, various alternative ways are possible and were already successfully implemented in other communities. For instance an obligation can be also linked to ground sales contracts, development plans or incentive programs for house building or renovation. Check also how analog ordinances (e.g. improved building standards) were developed in your community or in communities with similar background and which lessons were learned.

Our Advice

References

Title	Description	Source
Directive 2009/28/EC on the use of energy from renewable sources	New European Directive on renewable energies (see § 13.4 on Res-Heat-Ordinances)	www.eur-lex.europa.eu
Proposal for EPBD recast	Directive of the European Parliament and of the Council on the energy performance of buildings (recast)	Doc. St16082.en09.pdf, circulated by General Secretariat of the Council http://www.eceee.org/buildings/EPBD_Recast/

Example

Indirect STO concept in Stuttgart

Building owners of Stuttgart need to comply with two Renewable-Heat-Laws: A national law covers new buildings and the regional law covers existing buildings. In both cases the law is often satisfied by installing solar thermal plants. Also other renewable energy sources (RES) heat technologies are possible.

Since the regional and national law still leave certain 'escape possibilities' for not installing RES heat technologies, the City of Stuttgart intends to implement additional administrative measures, in order to promote the installation of solar thermal in Stuttgart. However, an additional specific third ordinance for the territory of Stuttgart would face difficulties of acceptance by stakeholders due to the situation described above. And, in addition, the legal situation for ordinances of German cities is rather limited.

Therefore the City of Stuttgart intends to use the following administrative measures within the ProSTO project:

1. a self-obligation 'Stuttgarter Solarerklärung' by the City of Stuttgart itself and by important stakeholders
2. an obligation of house owners and builders through private contracts through the City of Stuttgart in those cases, where the city has an influence. This is for example the case when the ground is sold by the city to builders or developers or when new development plans are made. This instrument is already successfully applied by the city for introducing elevated energy standards in the building sector (40 % below the national standard).

These actions will be flanked by promotion and incentive measures.

Seven Austrian Regions chose an alternative way of indirect STOs: Building owners can only benefit from the favourable incentive programme for house building or retrofit when a solar heating system is installed.

2.3. Potential of Solar Thermal in your Community

The motivations for STO initiatives can be manifold. In many cases a sound contribution of solar thermal to the reduction of CO₂-emissions and thus to the communities climate protection goals will be relevant. Beyond this, cities benefit from reduced emissions, reduced summer overheating of the city and avoided logistics and traffic for supplying fuels to the city centres. Related to the desired effects, the potential of solar thermal can be estimated and quantified, in order to demonstrate the expected mid and long term impact of a STO. One main advantage of the technology is based on the fact, that solar energy is a free, unlimited energy source available on site. Today solar thermal can be broadly rolled out as domestic hot water and so called combisystems, contributing partly to the building space heating. Through this, usually a midterm reduction of the CO₂ emissions around 5 % can be achieved. In many places STOs turned out to be an effective measure for this first step. In the context of future fossil free energy economies, solar thermal has the potential to contribute at high shares to the heat supply by means of district heating connected solutions.

Introduction

Distinguish the potential of today and the potential on a long term view. At present many promising applications such as solar cooling, solar process heat and solar district heating are realised in demonstration projects and will find their way into the market. However, it is necessary to accelerate the market with a STO now, in order to be able to explore the full potential on long term. Discuss in your community how energy supply will look like in the post-fossil age.

Present also the positive side effects of a flourishing solar thermal market in your community:

- *Positive image of your solar community*
- *Economical growth and working places in this sector*
- *Solar thermal creates independence from increases of fuel prices and reduces the economical risk of citizens and enterprises.*
- *Solar thermal is a mature technology and can be architecturally well integrated into buildings.*

Our Advice

References

Title	Description	Source
Potential of Solar Thermal in Europe	This 2009 report presents how solar thermal can contribute to the heat supply in Europe	European Solar Thermal Industry Federation ESTIF, www.estif.org
Solar Thermal Action Plan	Image Brochure presenting the broad possibilities of solar thermal and their potential	European Solar Thermal Industry Federation ESTIF, www.estif.org
Sun Area Location Analysis	Analysis of available roof surfaces based on laser scanning data	www.al.fh-osnabrueck.de/sun-area.html

Example

Potential of Solar Thermal in Europe

The above mentioned ESTIF study demonstrates in detail the potential of solar thermal and the related economic and environmental benefits for whole Europe and more in detail for five selected countries. On the long term the solar thermal contribution to the European Union's (EU-27) low temperature heat demand is determined to 8 % to 47 % depending on the policy scenarios chosen in this study.

By Bionet

Introduction

2.4. Economical Tenability

The use of solar energy by the population for heat generation in homes and buildings is presented as an option to consider to reduce dependence on fossil fuels and to curb climate change threat. Whether a STO will be accepted by citizens depends ultimately on the financial burden on the citizens and the cost-benefit-ratio of their investment.

Today, the cost-benefit analysis is the most common way in the decision-making processes, which allows an assessment of the profitability of renewable energy to private investors, and also an ideal tool for the investor's decisions on the various energy alternatives.

Our Advice

The cost-benefit analysis includes costs associated with the activity of heat generation such as investment costs and operating costs.

With regard to benefits, solar thermal leads to savings in terms of fossil fuel and electricity costs as well as social benefits at community level.

The cost-benefit analysis should take into account:

- *the investment time horizon*
- *inflation and interests*
- *costs and benefits*

The costs and benefits of a solar thermal installation will depend on its proper sizing related to the actual heat demand. Note that a short pay-back period does not always ensure the best cost-benefit ratio.

Title	Description	Source
National reports on the economical tenability of STOs	Technical reports on the cost-benefit-analyses of Murcia, Lisbon and Stuttgart	ProSTO project area of www.solarordinances.eu

References

Study on extra cost by a STO for Stuttgart

Example

Solites and the City of Stuttgart prepared a detailed study of the expected financial burden for citizens and the social tenability of the STO. Beside the legal aspects, this is considered as the most important issue for achieving acceptance for a STO in Stuttgart. The study is used as base document for discussing the STO with stakeholders.

Already today the city of Stuttgart requires ambitious energy efficiency levels for new buildings (60 kWh of primary energy consumption per year and per square meter of living area).

An economic comparison (incentives excluded) of active measures needed for reaching the required level (solar thermal, air exchange system with heat recovery, wood pellet heating system) leads to following results:

- For single-family-houses, solar hot water systems are the economically most feasible option among the listed.
- For multi-family houses, solar thermal systems lead to even lower heat cost. They complement in an optimal way wood or wood pellet heating systems, which are economically very feasible.

The study is available on the project area of www.solarordinances.eu.

2.5. Hearings with Stakeholders and Society Groups

Introduction

The stakeholder's involvement is an essential point when drafting the STO. Different stakeholders can give their opinion when redacting the text. Hearings serve also for reaching a better acceptance, overcoming resistances. Key points are often extra costs for enterprises of the housing sector and extra financial burden for the citizens.

Our Advice

Our advice is to circulate the STO draft to stakeholders representing different sectors with interest on it. Technicians, NGOs, Citizens and Entrepreneurs are the main stakeholders. For each category a minimum of two organizations should be selected.

The main stakeholders will be those of a technical profile, which can give an input about the proper technical clauses. This way you can adjust the technical requirements to foster the technicians into making a good design capable of using the most of the potential energy and applying energy efficiency measures. Also address questions to the associations of engineers and architects that are dealing with the systems and their layout within the building.

Entrepreneurs are also very important: The economical point of view is important when you are making compulsory to install solar heating systems. Citizens, usually represented by consumers associations should be asked about their opinion and also contacted to show them the benefits of solar thermal.

Universities, Energy Agencies, Technology Centers are important for giving ideas about new materials, new designs, the application of IT for monitoring the market etc..

Title	Description	Source
Renewable Heat Law Baden-Württemberg	Hearings input and process	STO Database on www.solarordinances.eu
Ordinance on energy efficiency in the city of Roma	Attitude of the Association of Building companies	STO Database on www.solarordinances.eu
Portuguese Regulation on Thermal Performance of Buildings (RCCTE)	Process, development and implementation	STO Database on www.solarordinances.eu
Solar thermal ordinances, State of the art in Europe	Birth: cooperation among actors	STO Toolbox on www.solarordinances.eu

Effective Hearing Process in Murcia

In Murcia the draft was circulated to almost 30 organizations. In Spain, official associations of industrial engineers or official association of architects are important stakeholders. These associations are usually intermediary between universities, technological centres, entrepreneurs, technicians and citizens. They represent the interest of the technicians and warrant their work is done correctly.

The most important input was the one coming from the official associations of technicians. In this case, they detected some problems and additional regulation requirements. At present some technicians are asking for a more demanding regulation, because they have detected that some solar thermal systems, installed some years ago, were not working properly due to several aspects, ranging from the adequacy of the planning, to the quality of the system and of the installations.

At present in Murcia, the responsibility of the correct design of the system depends on the designer technician and not on the administration. But with this scheme, the administration should enforce some supervision and revision in order to ensure a proper implementation.

Example



“Our common target is to tackle all the challenges and take advantage of the opportunities to achieve a real sustainability, both for the municipal administration and the neighbors of our municipality. In this point, Solar Thermal Energy is a very important potential for our municipality. The Solar Thermal Obligation will contribute to regulate, guide and enhance the development of these systems, increasing the use of energy coming from renewable resources and reducing CO₂ emissions”

Adela Martínez Cachá
Deputy Mayor for Environment and Urban Quality at the City Council of Murcia (SP), Vice-President of the Local Agency for Energy and Climate Change of Murcia

3. Drafting the STO

By Ambiente Italia

Introduction

3.1. General Recommendations

We see, in many field of application, too many laws which, although theoretically perfect, do not work as foreseen. Very often this is due to a too high degree of complexity, which makes the law not easily applicable. Complexity of the law, therefore, acts as a universal barrier for its fruitful implementation. This is particularly true when the law deals with 'new issues', such as solar thermal or other renewable energy technologies.

Our Advice

The regulation should be simple and clear, since therefore:

- *it would be easier to be applied (meaning also low costs for managing the STO)*
- *it would be easier to convince stakeholders and to have the law applied*

The regulation should foresee clear and straight-forward timing and deadlines (e.g. starting date for the implementation, deadlines for complying and reporting, dates for checks, etc.).

Example

Baden-Württemberg's Renewable-Heat-Law

The Renewable-Heat-Law of the German Region of Baden-Württemberg regulates the obligation criteria and requirements for five renewable heat technologies on only four pages of law text. Only really necessary additional technical and quality requirements are included, since they are already well covered by existing market regulations and incentive schemes. The simplicity of the law led also to a very efficient hearing process and a high acceptance by stakeholders. The law is presented with interesting background information on the STO data base.



Tanja Gönner
Minister for the Environment of the
State of Baden-Württemberg (DE)

“Our justifiably ambitious climate protection goals are reachable. However, this needs active combatants. With the provided regulations we found a passable way for on one hand making an effective contribution to reducing CO₂-emissions and on the other hand not overburden the single citizen. People do follow, because they feel, that we have to act for protecting the climate.”

3.2. Embedding the STO into EC policy

At the European Union level, the first legal measure with interest to the solar thermal market was taken throughout Directive 2002/91/CE (the so called EPBD), imposing the consideration of decentralized energy supply systems based on renewable energy for new buildings with a total useful floor area over 1000 m². This imposition was consolidated throughout Directive 2009/28/EC (the so called renewable energies directive), establishing a common framework for the promotion of energy from renewable sources, imposing the implementation of a national renewable energy action plan by each Member state, to ensure that the share of energy from renewable sources is at least as established by the Directive. Meanwhile, Directive 2005/32/EC was approved, establishing a framework for the setting of ecodesign requirements for energy-using products, which points out energy efficiency improvement as a substantial legal measure to be adopted. By other hand, in the EPBD recast, for which political agreement was reached on 17 November 2009, to be applied to all new buildings and major renovation of existing buildings, it is well established the link between legal measures and 'energy-efficient technologies', 'energy efficiency services', 'efficient energy systems', 'energy-efficient equipment', 'energy efficiency issues' and 'standards for energy efficiency'.

Introduction

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 at 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; planner, designer and installer certification; technical impositions in the regulations; 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 one with focus on overcoming barriers, is that of public awareness, throughout online information (lists of certified equipments, installers, technical description of the equipments, manual of good practices, scholar materials and the implementation of training courses for all stakeholders).

Our Advice

References

Title	Description	Source
Proposal for EPBD recast	Directive of the European Parliament and of the Council on the energy performance of buildings (recast)	Doc. St16082.en09.pdf, circulated by General Secretariat of the Council http://www.eceee.org/buildings/EPBD_Recast/
Certificação Energética e Ar Interior de Edifícios	Portuguese thermal building certification (which includes STO) info point	http://www.adene.pt/ADENE/Canais/SubPortais/SCE/Introducao/Apresenta%c3%a7%c3%a3o.htm
Água quente solar	Solar thermal certification manual, lists of certified both solar thermal installers and equipments, training entities, etc.	http://www.aguaquentesolar.com/
Casa Certificada	On-line platform which promotes and manages the relationship between demand and supply of Energetic Certificates	http://www.casacertificada.pt/
Financial Incentives for the Adoption of Residential Energy Efficient Products	An analysis of European programme and best practices	by Dionis Arvanitakis, Manchester Business School, edited by ADENE, http://www.adene.pt/NR/rdonlyres/D25AD380-35C9-4548-8367-7EB5EB7FF793/1214/Financiallncntives.pdf

Example



“Solar energy will be the ‘sun of energy!’”

Professor Eduardo de Oliveira Fernandes

Secretary of State for the Environment (Portuguese Government, 1984-1985) and Secretary of State to the Minister of Economy for Energy and Innovation (Portuguese Government, 2001-2002), former Chairman of the Commission for Buildings Thermal Regulations (Portuguese Ministry of Public Works, 2002-2006)

Comprehensive energy efficiency policy package for the Portuguese building sector

We present here a good example of a partnership between the Portuguese Energetic Certification System Manager and a private enterprise of the sector, for the implementation of a platform ‘Casa Certificada’, where any citizen can find suggestions to get his house certified, including suggestions about renewable energy (including solar thermal).

This type of public awareness information can be seen as an inverse approach of the official information given on the Portuguese official sites, like those of Solar Hot Water, with the identification of all certified installers and equipment, and a lot of publications and news (see reference ‘Água Quente Solar’) and of Buildings Energetic Certification, where any citizen can find all information available about the Portuguese Energy Performance of Buildings Regulation, which covers the Portuguese STO, namely the identification of all qualified experts, and all certified buildings, as well as the legislation and FAQs, interesting technical documents, highlights, links, and so on, both managed by the Energetic Certification System Manager (see references ADENE).

Year Range	High Efficiency Dwellings	Low Efficiency Dwellings
1950-1959	4.64 %	95.33 %
1960-1969	5.62 %	94.38 %
1970-1979	5.00 %	95.00 %
1980-1989	5.98 %	94.02 %
1990-1999	16.26 %	83.74 %
2000-2005	46.08 %	53.92 %
2006-2009	62.83 %	37.17 %

Impact of the 2006 Portuguese STO regulation: Distribution of level of energy efficient class of Portuguese dwellings per year of construction, source see reference 'Financial Incentives for the Adoption of Residential Energy Efficient Products'.

3.3. Scope of the STO

Solar obligations usually apply to new buildings, those undergoing major renovation and sometimes in the case of replacement of the heating system. Often, they are in fact renewable heat obligations, as the legal requirement can be fulfilled also with other renewable heating sources.

While it is generally desirable to include almost all buildings in a Solar Thermal Ordinance, a local authority will have to ask itself where it wants to set the limits. The first STO ever, an Israeli law of 1980, covered only residential buildings up to a height of no more than 27 meters. Higher buildings and non-residential buildings did not fall under that law.

By ESTIF

Introduction

The following should help local authorities specify the scope of its STO. It may be desirable to start with only a part of the total building market and foresee stepwise extensions to eventually cover every building.

Following criteria can be used to determine the scope of buildings covered by the solar thermal ordinance:

- *Type of use (residential, non-residential)*
- *Age (newly built, existing buildings)*
- *Size (e.g. square meter of usable floor area, height, number of apartments,...)*
- *Energy use (e.g. only buildings that use at least x kWh of primary energy per year, or whose carbon-footprint is at least ...)*

Other parameters or possible exemptions can exist for buildings used as places of worship and for religious activities, temporary buildings, monument protected

Our Advice

buildings, shading etc. These exemptions should be as closely defined as possible in order to not undermine the intention of the STO.

Flanking measures are needed to address buildings which are not covered by the STO and to encourage the use of solar thermal energy on a voluntary basis, e.g. through awareness-raising campaigns, the availability of independent advice on the purchase of solar thermal solutions, and through financial incentives.

References

Title	Description	Source
Ordinance components (Tool 3.1.1): Scope of a STO (2009)	This document discusses various approaches of how the scope of the STO can be set, i.e. the definition of which type of buildings should be covered under the STO.	STO Toolbox area: www.solarordinances.eu
Best Practice regulations for solar thermal (2007)	This survey presents how solar obligations can be the single most important means to promote the use of solar thermal energy	European Solar Thermal Industry Federation ESTIF, www.estif.org
Solar Thermal Action Plan (2007)	Image Brochure presenting the broad possibilities of solar thermal and their potential	European Solar Thermal Industry Federation ESTIF, www.estif.org
The Spanish Technical Building Code (Royal Decree 314/2006 of 17 March 2006)	This document is the translation of the Spanish CTE most relevant sections to solar thermal	European Solar Thermal Industry Federation ESTIF, www.estif.org

Example

Scope of the Spanish Technical Building Code (CTE)

The Spanish government adopted a new Technical Building Code (CTE, Código Técnico de la Edificación) in March 2006 which includes an obligation (since September 2006) to cover part of the domestic hot water (DHW) demand with solar thermal energy. This obligation applies to all new buildings and to those undergoing major refurbishments.

The required solar contribution varies between 30 and 70 % depending on three main factors:

- domestic hot water demand of the building (liters/day)
- climate zone
- conventional fuel to be replaced (only for refurbishments)

Some exceptions are defined in the law, mainly in the case of buildings that either satisfy their DHW demand by other renewables or by cogeneration or for shaded buildings.

It is important to point out that the municipal solar obligations, approved in the last few years in dozens of Spanish municipalities, including Barcelona in

2000 and Madrid in 2003, remained in force as long as they were stronger than the national obligation included in the CTE.

The effects on the market have been partially offset by the unexpected slowdown in the Spanish construction market in 2008 and 2009. However, solar obligations became a driver in the Spanish solar thermal market since estimates show that over 80 % of installations were motivated by CTE or municipal ordinances.

For more information, read the English text of the CTE sections most relevant to solar thermal.

3.4. Quantitative Obligation

The 'heart' of a STO is the provision that solar thermal should cover at least a minimum share of the hot water or total heat consumption of the building.

STOs shall therefore include:

- the qualitative and quantitative definition of the obligation
- the description of the calculation procedure

Several approaches are possible, e.g.:

- obligation to cover a minimum share of the domestic hot water demand by solar thermal (e.g. from 40 % to 80 %). This minimum share could have different values, depending on several parameters (e.g. building use, hot water demand, availability of solar resource and of roof area).
- linking the minimum area of solar thermal to be installed to figures well known and standardised in the building sector, e.g. the square meters of floor area or the number of occupants. Also, a set of values could be required, taking into account the climate, the solar collector technology, etc.

Both the quantitative obligation and the calculation method should be defined at an early stage, together with the issuing of the STO, otherwise, there will be a 'limbo' period, when the obligation cannot be really operative.

The quantitative obligation should:

- *be unambiguous*
- *not mixing different kinds of energy (for instance, keep different obligations for domestic hot water and space heating)*
- *be reasonable (for instance, do not ask for a solar contribution of 80 % in a northern Europe country)*

By Ambiente Italia

Introduction

Our Advice

The calculation method should:

- *be understandable, not time-consuming and easy to apply also by non-experts*
- *refer, when possible, to existing standards or figures designers are familiar with (e.g. link the minimum m² of solar required to the m² floor area of the building)*
- *include a simplified tool (e.g. an excel file) for stakeholders (designers, building companies and personnel of the municipalities)*

References

Title	Description	Source
EN 15316-4-3	Standard for calculating the heat generation of a solar thermal system	European Committee for Standardization (CEN): www.cen.eu
UNI TS 11300-1 and UNI TS 11300-2 (in Italian only)	Italian standards for the determination of the heat demand for space heating, hot water and air conditioning of buildings	Ente Nazionale Italiano di Unificazione (UNI): www.uni.com

Example

Various approaches in Europe for defining the required surface of the solar collector

The Portuguese national law requires 1 m² of solar collector per building occupant, whereas the Murcia regulation requires that the solar heating system covers 60 - 70 % of the heat demand for domestic hot water. The national German renewable heat law and the regional renewable heat law of Baden-Württemberg require that for existing buildings and for new buildings respectively 10 and 20 % of the total heat demand are covered by renewable energy sources. This is fulfilled when 0.04 m² solar collector per m² living area of the building are installed.

By Ambiente Italia and ESTIF

Introduction

3.5. Quality Requirements

The introduction of a solar obligation fundamentally changes the way the solar thermal market functions. Without appropriate quality assurance measures, low quality solar installations may occur frequently, leading to a loss of solar energy gains and to a reduced acceptance of the obligation itself and of the solar technology in general. Therefore, the regulations must be designed in a way to make sure that products, planning, installation and maintenance of the system are state-of-the-art.

Our Advice

Do not include too many technical requirements, since:

- *it is not possible to check all of them*
- *it does not necessarily assure quality*
- *it prevents technological innovation and development from being applied*

Quality rules should be:

- *clear*
- *applicable (e.g. if product certification is required, a reasonable amount of certified products should already be available on the market; if it is not the case, allow a time delay for complying with the certification requirements included in the STO)*
- *comprehensive (include requirements on design and planning, products, installation, operation and maintenance)*
- *for products: referring to European standards is advisable (e.g. Solar Keymark)*
- *for installation: you could ask for one or more requirements (e.g. certified installers, maintenance contract, etc.)*
- *for operation and maintenance: you could ask for one or more requirements (e.g. Guaranteed Solar Results scheme, system monitoring, random checks, maintenance contract, etc.)*
- *on the other hand, ask for the same quality requirements as for other domestic appliances and not much stricter ones!*

National or local authorities designing support measures, including solar obligations, should avoid setting product requirements not strictly based on existing European standards and certification schemes. If additional or divergent requirements are created, the markets become fragmented, the competition is reduced, the certification costs increase and in the end the users loose in terms of choice, quality and prices.



“Today, energy is a part of everyday life! As leaders in our community, we have the obligation to set an example of good practice in the areas of energy saving and renewable energy use, so that citizens would acknowledge the importance of each gesture intended to contribute to the health of the planet.”

Lucian Iliescu

Mayor of Giurgiu Municipality (RO)

Title	Description	Source
Solar Keymark	Voluntary quality mark at European level	STO Toolbox section of www.solarordinances.eu
Best practice regulations for solar thermal Project “Key issues for Renewable Heat in Europe” (2007)	This survey presents how solar obligations can be the single most important means to promote the use of solar thermal energy	European Solar Thermal Industry Federation ESTIF, www.estif.org

References

Effects of the Spanish solar thermal obligation on demand, products and value chain	This article presents the effects of the Spanish solar thermal obligations on demand, products and value chain in Spain	David Perez Navarro, eclareon in estec2009 Conference Proceedings www.estec2009.org
Qualit'EnR and Qualisol label in France	Description of the French quality scheme for solar and other renewable energy installations	www.qualitenr.fr

Examples

The role of Qualit'EnR and the Qualisol label in France

Qualit'EnR is a French association created by renewable energy industry associations (Enerplan & SER) and three handcraft unions (CAPEB, UCF/FFB, UNCP/FFB). In Qualit'EnR, handcraft unions and renewable energy industry associations work closely for the development of the quality in installation, for solar thermal with Qualisol, extended to wood fuel with QualiBois and to PV with QualiPV.

Qualisol is a qualification of installers including 10 commitments (from advice to after sale, with installation rules). It is a voluntary engagement for three years with annual request. To become 'Qualisol', a company has to prove its solar thermal technical knowledge by previous experience or training certificates. Within the three years of engagement, Qualit'EnR will proceed to one quality audit of one installation made by the installer.

The audit is presented as a pedagogic tool for the installer and a confidence commitment for the final customer. Depending on the number of non-compliance cases, the audit could have four different levels of result from 'perfect service' to 'failing installation'. On the basis of the audit result, the installer keeps or not the right to use the quality trade mark.

In 2008, more than 5000 audits have been done (more than 1 M€ spend) and more than 85 % of the 5 000 audits have been assessed positively.

Spanish Technical Building Code

Certification of collectors and systems: after January 2008, the whole installation must comply with the EN 12975 (solar collectors) or 12976 (prefabricated systems). The required tests for the homologation must be done in accredited laboratories that fulfil the requirements established in the norm UNE-EN-ISO/IEC 17025 and which are accredited.

Installation standards: the installer should be a certified technician in solar thermal installations in buildings; a Solar Design Guide published by ASIT supports installers on the know-how procedures. The installations require a heat meter so the user can always know what his energy consumption is.

Requirements on monitoring of systems: the solar thermal installations may be periodically inspected, to check whether the minimum solar fraction for hot tap water demand and heating is fulfilled.

3.6. Architectural Integration and Handling of Protected Buildings

The issue of architectural integration of solar collectors in buildings is of main importance in a STO, especially if the municipality, region, or country being object of the STO shows a high number of protected buildings or areas.

A good STO should include both, requirements for architectural integration and clear rules on which buildings could be exempted from the law, due to historical issues. Of course, the requirements for architectural integration for new buildings could be stricter than the ones foreseen for existing ones.

Include simple, verifiable and achievable rules, for instance:

- *Installation on flat roofs or terraces: consider the height of existing stringcourses and set this value as the maximum height of the collector field; the visual impact is therefore small. Collector orientation should be completely free. Nevertheless, preferable directions for optimal visual impact and efficiency can be specified.*
- *Installation on inclined roofs: collectors should have the same slope and orientation as the roof.*

Avoid exemptions which are meaningless, which include too wide categories, which are based on too vague criteria.

Standardise as much as possible the typologies of architectural integration (see Italian GSE guide). Higher levels of integration could be required for protected buildings or areas.

Allow for a simplification of the bureaucratic issues in the permitting procedures, as requested in the recent European Directive on Renewables.

By Ambiente Italia

Introduction

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References

Title	Description	Source
GSE Guide for architectural integration	Italian guide by GSE classifying several typologies of architectural integration for PV plants	http://www.gse.it/attivita/ContoEnergiaF/PubbInf/Documents/GuidaIntegrazioneArchitettonica.pdf
Architectural integration of solar thermal systems	This presentation discusses the various aspects and possibilities of architectural integration.	STO Toolbox section of www.solarordinances.eu

Example

Meaningless exemption in Italian law on energy efficiency and use of renewable energies in buildings

Among other provisions, this law requires to cover at least 50 % of the domestic hot water demand in new buildings and refurbishments by renewable energies. This mandatory share lowers to 20 % for buildings located in historical areas. This is a good example of 'meaningless exemptions': If the law states that the visual impact of the solar thermal plant is to be avoided in historical areas, then it does not make sense to allow a smaller solar thermal plant, which is as bad as a larger one. Instead, special requirements for architectural integration could be demanded for in special areas or buildings.

By Lisboa E-Nova



Priority to solar thermal in Lisbon's Baixa Pombalina Area

Solar Systems Integration in the protected historical Lisbon Baixa Pombalina Area

Patrimony heritage buildings are presently seen as exemptions to the Portuguese national legislation on buildings energy performance regarding the obligation for installing solar thermal systems in residential buildings: Although one can easily understand the importance of maintaining the historical patrimony, this exemption, often miss appropriated by investors and real state promoters, incentives heritage buildings to not comply with the actual requirements for energy efficiency and comfort in residential buildings. This is clearly an inducement to the desertification and abandon of these areas, a common situation in several European countries. To overcome this tendency it is important to adapt residential building heritage to modern standards, including the possibility to integrate solar technologies.

In the context of Baixa Pombalina's urban requalification plan, Lisboa E-Nova, in cooperation with the Lisbon Municipality and IGESPAR (the entity responsible for the management of the national archaeological and architectural heritage), promotes the development of the 'Solar Systems Integration Potential in the Lisbon Baixa Pombalina Area'. This information, to be integrated in the area's urban requalification plan, in order to promote the integration of solar systems in the process of buildings refurbishment, according to the cultural heritage requirements. This potential assessment is to be accompanied by an Integration Manual, to be developed according to existing market solutions on solar systems and to the relevant criteria for integrating such systems in heritage buildings. The solutions identified can be adopted in this area but also in other protected historical areas in Europe.

4. Flanking the STO

4.1. Public Relations

When implementing a STO, communication priorities must focus on planners and installers and also to the final consumer, to whom the STO has no background, no legal framework and is received as something completely new and now obligatory.

The first rule on how to communicate a STO to the wide public is keeping it simple. When accessing the public the main goal must be to create a positive idea on solar thermal benefits and advantages, intending not only to raise awareness among final consumers but to create enthusiasts in solar thermal technologies adoption. Technicians and engineers commonly focus on the technical information that, for them, represents the most important characteristics of the collectors. However, the final consumer is interested in knowing whether the collectors will produce enough energy or how much they still will have to pay for conventional water heating solutions.

The STO must be clear and easy to present. Set clear rules and eligibility criteria for the STO in order to avoid lacks of understanding and miss appropriations of exemptions. Analyze the market and identify best practice communication campaigns. Set a communication strategy with an easy message to memorize and direct deliverables like flyers and help desk website that contains all the relevant and comprehensive information. Do not forget to include technology basics and advantages, because the main message is the positive effect of the STO and not the burden of being an obligation.

Promote exhibitions and direct contact from the community with the technology. Organize workshops and information sessions targeting not only stakeholders in the construction market, but the final consumer and interested citizen. If possible prepare a public space where public can go to get more information on the STO, how to adopt, available market partners, rules to comply with, financial incentives available and how to access them.

By Lisboa E-Nova

Introduction

Our Advice

References

Title	Description	Source
Soltherm Europe Campaign Guidelines	Campaign guidelines describing a variety of measures for promoting the solar thermal market	STO Toolbox section on www.solarordinances.eu
Planning and Installing Solar Thermal Systems: A guide for installers, architects and engineers	Ecofys & German Solar Energy Society, 2005 (Chapter 11: Marketing and promotion)	James&James
Key Issues for Renewable Heat in Europe (K4RES-H), Financial Incentives for Solar Thermal	Guidelines on best practice and avoidable problems	Key Issues for Renewable Heat in Europe (K4RES-H), IEE/04/204/S07.38607, www.estif.org

Example



Lisboa E-Nova's Energy and Environment Space in Lisbon

Energy and Environment Information Point

Following the full implementation of the National System for Energy and Indoor Air Quality Certification of Buildings (SCE), that introduces the national obligation for adopting solar thermal system in new buildings and refurbished ones, Lisboa E-Nova opened to the public the energy and environment space of Lisbon in the beginning of 2009, in a straight cooperation with ADENE, the national energy agency and APA, the environment national agency. This space is prepared to receive the citizen and answer all the questions related to the energy certification process. Regarding the national STO the technicians are available to provide information regarding the related procedures and framework in force, the available technologies in the market, companies and installers. There is also information available concerning the local rules for adopting solar thermal systems that go beyond the requirements imposed by the national legislation and the subsidies presently offered by the national and local government. Web access is available and a group of technicians from the partner institutions welcomes the citizen during the conventional opening hours (from 9 am to 6 pm). This first space is the pilot experience that is intended to be widespread by the national entities in cooperation with the local energy agencies.

By Lisboa E-Nova

Introduction

4.2. Local Campaigns

The objective of local campaigns is to promote people's awareness and communicate through different channels to the various actors in order to foster behavioural change towards the adoption of new technologies and solutions. It is important to make people understand the context of the action, the exact objective, what to do and most important, what is in it for them to win is a challenge. When implementing a STO you are definitely

trying to change people's way of addressing domestic hot water needs. To effectively communicate what are the differences and what are the main outcomes and advantages of using solar thermal instead of conventional solutions and fossil fuels, you have to define a local communication strategy that focus on people questions and doubts regarding solar thermal energy and available solutions. The local dimension can be approached from two different sides, on the one hand what can the city offer and how can renewable energy sources be exploited, on the other hand what benefits does that exploration bring to the city and to the local increase on people's life quality. For the latter the most important issue is to present real data and to promote continuous monitoring of the STO and the systems installed in your city. That will allow quantifying how much solar thermal energy can contribute to the city's energy matrix. Having this in mind address your community and identify the questions that need to be answered.

Focusing on the citizen you can draft the baseline to define a communication campaign according to the target groups needs and interests:

- *local information office with available experts and material*
- *workshops and communication sessions*
- *dialogues with solar thermal experts*
- *contact with the market*
- *contact with the technology*

When organizing the communication actions be aware that small actions can be more profitable and personal than large conferences, as people, while in more informal and intimate environments feel more comfortable to ask questions and the dialogue between the public and the experts is more easily engaged. The frequency of the actions is also important and a specific calendar must be defined in the beginning of the actions in order to effectively implement a continuous communication campaign that can access the largest number of people.

In these actions, presenting real data on what is actually the performance and impact of adopting solar thermal systems is very important, helps to clarify questions and helps to get rid of the prejudices that hinder solar thermal development.

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References

Title	Description	Source
Soltherm Europe Campaign Guidelines	Campaign guidelines describing a variety of measures for promoting the solar thermal market	STO Toolbox section on www.solarordinances.eu
European Solar Days	European wide coordinated campaign measures	STO Toolbox section on www.solarordinances.eu

Examples



Portuguese municipality representatives on 'Solar Tour'

Lisbon's 'Solar Tour' attracts representatives of Portuguese municipalities

In Lisbon, the existence of a national solar obligation raised the awareness on solar thermal issues at a wide scale. The national obligation imposes the installation of one square meter of solar thermal collectors per occupant in new or largely refurbished buildings. Since 2006 solar thermal panels are starting to occupy a part of our buildings roofs. Nevertheless citizens still do not understand exactly what solar collectors are, or what are the differences and the real advantages of installing such equipment. Lack of knowledge is seen as one of the main barriers hindering people's adoption of these technologies.

Within this context Lisboa E-Nova promoted a Solar Tour in Lisbon for several solar thermal and photovoltaic installations. The initiative was very well received and within a day inscriptions were full. The visit objective was to present different solar applications from investigation centres to social housing and basic schools, allowing visitors to question the technologies when in direct contact with the equipments and the technical experts. The Tour comprised: an investigation centre where solar thermal technology provides domestic hot water to the building and where a solar thermal field of collectors for building heating and cooling can also be seen; a basic school where a solar thermal system was installed to provide domestic hot water for the kitchen; a services building with solar hot water in the bathrooms and from where several solar photovoltaic systems can be seen in social residential buildings; and an indoor swimming pool where the pool water is heated using solar energy.

Lazio Region's campaign aims at municipalities

Often the laws in Italy do not have the right application because of the lack of flanking measures and the necessary training to prepare the administrative staff to transpose the procedures. The first regional law concerning STO was approved by the regional Council of Lazio in 2004, but due to the lack of operational references such as guidelines for application it failed to be adopted by regional Municipalities. In 2008 the law was amended and merged in a framework law concerning sustainable architecture and bio construction, providing measures to finance technical training on RES and EE for specific target groups. In the case of the STO, the Lazio region organized legal and administrative training for municipal technical staff, attending the courses in classes of 10-15 persons. About 100 Municipalities have joined the initiative out of the 387 municipalities present in Lazio contributing to train over 300 persons. The good practice is represented by the framework law itself, since it aims to tap all the features needed to spread the knowledge on RES and EE among the population, a preliminary step to increase the demand and supply of sustainable energy, also foreseen in the same law through financial incentives on both sides. As a result of this training activity a handbook on the use of solar collectors and energy efficiency was published to be delivered to all the municipalities and agencies interested in providing information on the matter.



“Solar thermal has enormous potential and low costs. Our challenge in Lazio is to convince people of the advantages deriving from its use.”

Filiberto Zaratti
Minister for Environment and
Cooperation among Peoples of the
Lazio Region (IT)

4.3. Stimulating Investments by End-Users and Organizations

This clause discusses measures for increasing the market demand for solar thermal systems and for promoting private investment by house owners, developers, construction companies and other relevant actors. Ultimately the goal is to push final user's demand for solar thermal systems based on solid market offer, awareness raising campaigns and economical incentives that create an environment of trust and motivation to adopt solar thermal solutions. The strategies to adopt and to boost demand targets should be defined at the political level, according to the needs and possible incentives. In this sense the role of public authorities is to create an environment of free competition between suppliers, promoting the development of a solid market, in parallel with a mass awareness programme that assures efficient communication to the wide public. Regarding market strategies it is essential to promote the co-existence of solar thermal solutions and conventional ones to promote these systems inclusion in the consumer shopping list. This allows comparison in loco between conventional hot water supply systems and solar thermal ones, fostering users to look for new solutions.

By Lisboa E-Nova and SPES

Introduction

Our Advice

To increase awareness about solar thermal systems up to the level of conventional hot water supply systems, it is essential to implement clear and specific advertising campaigns in all the media supports (TV, newspapers, outdoors, etc...). These campaigns must have in mind the importance of providing correct information about the solar thermal obligation in force and the effective performance of solar thermal systems, not raising expectations too high, evidencing the need to still use conventional power sources as a backup to solar energy. The misunderstanding of the technologies effective potential may compromise people's trust and willingness to adopt a new product. The consumer should also be aware of the different solutions available and importance of adjusting each solution to the final user needs, outlining the project response to specific requirements and the need to involve users in gathering the relevant data for the project development in order to make a good and suitable sell.

References

Title	Description	Source
Soltherm Europe Campaign Guidelines	Campaign guidelines describing a variety of measures for promoting the solar thermal market	STO Toolbox section on www.solarordinances.eu

Example



Portuguese National Campaign towards the adoption of Solar Thermal

The Portuguese Government launched in 2009 a campaign promoting the installation of solar thermal systems in existing single family houses. The programme, developed within the context of the National Action Plan for Energy Efficiency, presented (in spite of having some shortcomings on its development and implementation) a very interesting combination of support measures, including: direct support, reduced interest rates, possibility of deduction of part of the investment on the income tax declaration, combined with previously existing reduced VAT rates. The direct support amounted to an average of half of the system costs (including guarantee and maintenance during 6 years), allowing the costumers to use the special credit conditions to finance the remainder, in monthly instalments that would be equivalent to the monthly energy savings. This constitutes also an important flanking measure to solar ordinances, as it only applied to existing single family houses, not affected by the solar ordinance in place in Portugal.

Portugal's Campaign for promoting solar thermal systems
(Source: www.paineissolares.gov.pt/)

4.4. Support to professionals and quality assurance

Measures for supporting professionals can be both, public and private policies. Public microeconomic policies aim at improving the economic performance of markets and their stakeholders. Private support measures have the same goal throughout voluntary measures. Both types can be seen as a complement of the demand side measures.

The role of public authorities is to create an environment of free competition where all actors flourish being effective with more efficiency. The most common measures are those of quality requirements on the STO, concerning certified equipments, certified installers, and of calculation methods given by standards, maintenance guarantee, and so on.

The most conventional private option and more commonly seen is the existence of specialized stores, which offer technical solutions and support the adoption of solar thermal systems.

For the creation of a sustainable solar thermal market, an advertising campaign is fundamental. It should be associated to an incentive scheme, to a certification schemes (for products, installers, designers, etc.) and to training courses.

A STO shall integrate requirements covering all these measures, namely calculation methods of energy needs to produce solar hot water, certification of designers, installers and equipments, and maintenance guarantee of solar thermal system efficient operation for a defined period after installation.

To be effective, the STO should be integrated on the thermal building behavior characteristics regulation. This regulation must be integrated on the building energy certification national system, with well defined certification procedures and building energy rates. The municipal edification regulation must define precise requirements concerning building energy efficiency and renewable energy integration, including the creation of the Building Energy Manual, providing information on the building's adequate use and maintenance, and including all the relevant documents, namely the Building Energy Performance Certification Process, Solar Thermal System Design, Installation, Operation and Maintenance Processes, contracts with energy service suppliers, and so on.

In order to support all the professionals in the sector, the STO implementation management authority shall implement an institutional STO info point, with all relevant information such as legislation, licensing authorities, qualified training institutions, installer's certification manual, etc.

References

Title	Description	Source
Certificação Energética e Ar Interior de Edifícios	Portuguese thermal building certification (which includes STO) info point	www.adene.pt
Água quente solar	Solar thermal certification manual, lists of certified both solar thermal installers and equipments, training entities, etc.	www.aguaquentesolar.com/
Soltherm Europe Campaign Guidelines	Campaign guidelines describing a variety of measures for promoting the solar thermal market	STO Toolbox section on www.solarordinances.eu

Example

Pulling the market at the national and local level

The Portuguese STO, integrated within RCCTE (Thermal Performance Building Regulation, approved by Decreto-Lei n.º 80/2006, which is a part of the regulation package transposing EU Directive 2002/91/CE), imposes for new and renovated buildings the usage of solar thermal collectors for hot water production if there are favourable conditions for exposure (if the roof or cover runs between SE and SW without significant obstructions) in a base of 1 m² per person (the total can be reduced to 50% if space is necessary for other important usages of the building). For performance calculation of such systems, the certification according to the European Standards is needed. This performance calculation is done using the Solterm programme developed by LNEG/INETI. As for other requirements, solar thermal systems installers must be certified and the system must have a six year guarantee.

In addition, the Lisbon Municipality approved their own planning and edification regulation, RMUEL, which introduced for the first time a chapter dedicated to energy efficiency and renewable energies integration, with specific rules for:

1. Building energy performance improvement and both natural and energy resources rationalization
2. Energy efficiency
3. Controlling of solar gains
4. Natural ventilation gains

5. Renewable energy using, specifically addressing solar thermal collectors need for architectural integration and also the obligation to install centralized systems in new residential buildings

Concerning the STO, all rules approved by RMUEL are complementary of those approved within the referred national regulation.

4.5. Financial Incentives

Usually, when we talk about financial incentives the first idea that occurs is that of subsidies for the installation of solar heating systems in private owned buildings.

Meanwhile, with the advent of the acceptance of the 'polluter pays principle', which makes parties responsible for paying for the damage done to the natural environment, governments, at both regional and national levels, and municipalities are applying a deduction on construction taxes, and higher fiscal incentives, a lower or medium level of VAT for solar thermal products, a partial deduction to the income tax of the acquisition costs of solar thermal systems and a higher allowed depreciation rate of solar thermal equipment for companies.

Moreover, authorities are integrating these measures in the framework of a STO as a vital tool to speed-up the market penetration of solar thermal solutions and as a mean to create jobs.

By LNEG/INETI,
Lisboa E-Nova and ESTIF

Introduction

Give grants or subsidies for the installation of solar thermal collectors and storage tanks in private and public owned buildings within information and awareness raising campaigns.

To promote sustainability on new solar thermal markets, apply at all levels the polluter pays principle throughout the following integrated measures:

- *loans offered at a lower-than-market interest rate*
- *a deduction on building construction taxes;*
- *a deduction on building annual taxes;*
- *a lower or medium level of VAT for solar thermal products*
- *a partial deduction applicable to the income tax*
- *a higher allowed depreciation rate for companies on the acquisition of solar thermal equipment*

Integrate these measures into a financial incentive scheme under the key success criteria of continuity of the scheme, coherence of the parameters, simplicity of

Our Advice

the application and payment procedures, and public relation for the available incentives (until a certain installed capacity is reached) within a self sustainable solar thermal market, providing that the impact and effective returns of such schemes are monitored and communicated.

References

Title	Description	Source
Key Issues for Renewable Heat in Europe (K4RES-H), Financial Incentives for Solar Thermal	Guidelines on best practice and avoidable problems	Key Issues for Renewable Heat in Europe (K4RES-H), IEE/04/204/S07.38607, www.estif.org
STO Tool – Financial Incentives to complement a STO	Recommendations for financial incentive schemes	STO Toolbox section of www.solarordinances.eu
Solar Thermal Action Plan (2007)	Image Brochure presenting the broad possibilities of solar thermal and their potential	European Solar Thermal Industry Federation ESTIF, www.estif.org
dena-Subsidy Overview EU-27 – REN Heat	The dena-Subsidy Overview EU-27 – REN Heat offers the latest information on grant programmes and regulatory frameworks in the EU Member States.	Dena – German energy agency www.dena.de

Example

The Portuguese regulation establishes the following fiscal incentives:

- Income Tax of Natural Persons: It is deductible to the collect 30 % of the acquisition value of new equipments for thermal energy production, with a limit of € 777.
- Income Tax of Collective Persons: The solar energy equipment useful life is defined as 4 years. So, it is deductible to the collect for each one of the 4 years 25 % of the acquisition value of new equipments for thermal energy production.
- Added Value Tax: The added value tax applicable to solar energy equipment has the intermediate value of 12 %.

Between 2002 and 2008 the Portuguese total installed area of solar thermal collectors growth was of about 116 %, from 180,000 m² of operational solar thermal collectors in 2002 to 390,000 m² in 2008. A collector area of 86,820 m² was installed in 2008.

Experience with direct support to investment for solar thermal is heterogeneous: In numerical terms, the German 'Marktanreizprogramm' (Market Stimulation Programme) is the most successful programme ever. And there are many excellent examples of solar thermal grant schemes at regional or local level. However, there are also a number of bad examples where the concrete design or implementation of the scheme has led to market disruptions and sometimes did more harm than benefits on the long run.

4.6. Training of Staff

It is well known that the first barrier to product market penetration is awareness. Awareness about how the product works, what technologies are used, how it must be installed, what must be done to maintain their best performance, what is the economic cost of their usage, how to compare market products to satisfy the same need, and so on.

As presented in clause 6.7 of ISO/DIS 9004:2008, 'The organization's management should establish, implement and maintain processes to manage knowledge, information and technology as essential resources. The processes should address how to identify, obtain, maintain, protect, use and evaluate the need for these resources. The organization's management should share such knowledge, information and technology with its interested parties, as appropriate. ...'.

One of these processes is to share knowledge with all interested parties, throughout the promotion of training courses, with the availability of online pedagogic materials, for both best product knowledge and good practices dissemination about product installation, usage and maintenance.

To overcome the above referred lack of awareness, provide community staff with training courses on best practices and updated data, and allow free access to all stakeholders to all course materials on your website. All community staff dealing with solar thermal systems must have knowledge about 1) national, regional and local legal framework 2) solar radiation and their use 3) components of solar thermal systems 4) systems for both single and multi-family housing 5) renewable energy services providers 6) solar marketing and promotion 7) solar thermal installations simulation programmes 8) quality qualification. Include all these relevant matters and a technical visit on a three full day's course. Involve qualified stakeholders as course trainers.

By LNEG/INETI

Introduction

Our Advice

References

Title	Description	Source
STO Training for Public Staff	Short guide on training of staff of local authorities	STO Toolbox section of www.solarodinances.eu
Planning and Installing Solar Thermal Systems: A guide for Installers, Architects and Engineers	This guide details solar thermal system design, installation, operation and maintenance. Details on how to market solar thermal technologies, a review of relevant simulation tools.	Ecofys & German Solar Energy Society, 2005, James & James
Solar Thermal Systems – Successful Planning and Construction	Summarizes the theoretical and practical knowledge gained from over 20 years of research, implementation and operation of thermal solar installations.	Felix Peuser, Karl-Heinz Remmers and Martin Schnauss, Solarpraxis 2002, James & James
SRCC Education	Webpage describing the SRCC qualification system	http://www.solar-rating.org/

Example



Solar thermal training course of municipality staff held in Lisbon

Solar thermal training course of municipality staff held in Lisbon

On the 4th of April 2006, the Portuguese Government published the new regulations for energy performance of buildings, which also includes the national solar thermal obligation. At the stage when the obligation is fully in force, it is crucial to provide technical support to the municipality technicians, responsible for assuring the projects compliance with the new obligation, as well as to other professionals working in this area, on the basic concepts of solar thermal systems. This will allow the technicians to gather the necessary competences, not only to respond and verify the present STO, but also to identify the intervention opportunities, especially when it can be used any other renewable energy forms which collect, in an annual basis, equivalent energy to that of solar collectors. Within this sense it is important to organize training courses aimed at covering the legal issues inherent to the process of adopting solar thermal solutions, at the national and local level, as well as the technical requirements associated with the STO.

In the Lisbon case, the focus on the local requirements is especially important, namely regarding architectural integration and the adoption of centralized solar thermal systems in new residential buildings, requirements that are specific to the local law on the Municipal Framework for Urban Edifications in Lisbon. Focusing on the practical details of the STO, the Lisbon trainings were organized in straight cooperation with the market actors, namely utilities, that presented the concept of ESCO companies (Energy Service Companies) and solar thermal manufacturers that authorized a visit to their factory's installations, an enriching experience to analyse the production process, the maintenance requirements and the most common problems in a solar installation.

Courses of STO implementation organised by the Province of Rome

The Province of Rome organised intensive training courses for groups of 10 to 20 persons with two experts as teaching staff: one of them with professional experience on solar technology and the other specialized in building codes and laws. The teaching approach was based on practical examples followed by open discussion about perceived problems. The objective of these courses is to enable municipality and local staff to handle STOs in an efficient and appropriate way and to support projects and flanking measures:

- Visit to best practice solar combisystems
- Technical file about domestic hot water and space heating solar thermal systems
- Information posters to be shown in the municipality offices regarding the solar collector architectural integration
- Workshop with local technicians in order to verify and solve technical issues

For further information please see the STO Tool on Training for Public Staff.



Solar thermal training course for municipality staff held in the Province of Rome

5. Monitoring and Evaluation

By Bionet

Introduction

5.1. Monitoring the Market

The purpose of this point raises the need to determine quantitatively the degree of implementation of solar heating systems in buildings, facilities and activities located in the concerned territory of a STO in order to demonstrate and prove its impact.

Our Advice

Find a reliable source of installation data for the concerned area. At local level data from the building permission procedures can be used or comprehensive data are available from regional or national financial incentive schemes.

The availability of detailed data creates the opportunity to motivate citizens and politicians by challenging other neighbour communities or even neighbour districts within the STO territory.

References

Title	Description	Source
Impact of CTE in the Solar Thermal Sector: Potential vs. Reality and analysis of key aspects in the implementation of the CTE on solar contribution.	Impact study on the Spanish CTE obligation	ASIT: Association Solar Thermal Industry
Solar Thermal Market in Europe	Annual statistics of the national and European solar thermal markets	European Solar Thermal Industry Federation ESTIF, www.estif.org
Solaratlas	Interactive statistical evaluation system for the database of the German incentive scheme	STO Tools section of www.solarordinances.eu

Example

Collector surface development in Murcia

The table presents the development of the collector area in the municipality of Murcia, at national level in Spain and in the EU, based on the IDAE data base.

Solar thermal collector area in m²
cumulatively installed
(Source: IDAE)

Year	Murcia Region	Spain	EU
2004	19.321	700.400	15.361.824
2005	24.290	795.571	17.267.538
2006	25.405	930.238	-

5.2. Evaluation as Internal Procedure

A good way to evaluate the implementation of the ordinance is conducting inspections to check on-site installations and the functioning of the system. This is very important to perform adequate maintenance.

The owner of the facility, regardless of their individual or collective use, should be required to use and perform maintenance operations, including periodic measurements, and the repairs necessary to maintain the facility in good working order, efficiency, safety and health.

Following this inspection and proper maintenance, studies should be developed for energy saving and checking for example what was the percentage of CO₂ emissions avoided.

A good procedure to check the operation of the ordinance is to make a complete checklist for gathering technical information of the facilities. Perform a survey and evaluate the results. Surveys including people and companies involved can also be a good method of evaluation of the ordinance. The surveys can be made via telephone, via the internet or surveys on the street. These surveys should provide data on:

- *The satisfaction of the public on the implementation of the STO*
- *Energy and economic savings achieved through the STO*
- *The possible impact on the cityscape*
- *Experiences related to maintenance of the facilities*
- *The impact on local economy*

Our Advice

Title	Description	Source
Impact of CTE in the Solar Thermal Sector: Potential vs. Reality and analysis of key aspects in the implementation of the CTE on solar contribution.	Impact study on the Spanish CTE obligation	ASIT: Association Solar Thermal Industry

References

Introduction

5.3. Supervision and Penalties

Supervision of the STO implementation shall be performed and penalties shall be introduced for non-fulfilment of the STO requirements. Often it is necessary not only to check the 'if', but also to check 'how' systems are installed, since often in the first phase an obligatory market faces a decline of installation quality.

STOs are often linked to municipal building regulations, however, for introducing penalties often a superior ordinance or state law are necessary.

Our Advice

In the ideal case, the city has a public register of installations through the building licenses in order to supervise the STO but also to verify the environmental benefits achieved through a statistical study of the effects of the ordinance.

Make sure that the ordinance authorizes local authorities to conduct inspections and checks in building facilities for verifying the compliance with the provisions of the Ordinance. These inspections can be carried out by municipal technical services or through the participation of companies or entities duly accredited.

Alternatively a certificate about the proper installation and operation of the system by an authorised organisation can be asked. In some cases of STOs appropriate equipment is required for measuring the proper operation of the system. However, due to the related costs, this should be mainly considered for larger installations.

References

Title	Description	Source
STO City of Barcelona and St. Joan Despi	STO system violations and penalties through the Catalan Law (24/1991)	City Council of Barcelona

Example

In the STO of the city of Murcia, the following categories of infringements, offenses and fines apply:

Very serious infringements (fines between 1500 and 3000 €):

- the solar heating system was not installed when required
- implementation of the facility without necessary planning permission
- the refusal to provide data that may be required by municipal services

Serious infringements (fines between 750 and 1500 €):

- incomplete or insufficient installation of the solar heating system with respect to building characteristics and hot water demand
- non-completed installation or lack of maintenance
- non-operation of the solar heating system
- solar collectors installed in a manner, that they cannot be maintained or not matching the requirements concerning landscape protection
- Absence of a maintenance contract.

Minor offenses (fines up to 750 €):

- complaints due to reflections on adjacent buildings

More Information

The ProSTO project

Boosting the use of solar thermal systems in the European countries is the prime objective of the ProSTO project in promoting an efficient implementation of solar thermal ordinances and supporting European local authorities in planning, developing, introducing and managing efficient solar thermal ordinances (STOs).

The region of Lazio (IT), the cities of Lisbon (PT), Murcia (ES), Stuttgart (DE) and Giurgiu (RO) are participating in this joint action to showcase best practice STOs. The aim is to implement optimized STOs, consisting of model regulations, tuned criteria, efficient administrative procedures and flanking measures.

A large number of practical tools are already available on the website

www.solarordinances.eu, such as the STO database, the STO toolbox and the STO helpdesk. The dissemination of information on project results through the authorities' networks will also target and persuade new potential communities to adopt STOs.

Project website:

www.solarordinances.eu



STO Database

Visit the STO Database on www.solarordinances.eu to find out more about the different approaches and lessons learned of already existing STOs.

STO Developers Toolbox

The STO Developers Toolbox on www.solarordinances.eu provides useful and practical tools to all those who are preparing, implementing or supporting a STO in their community.



ProSTO Project

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