



Case 16: Barcelona Solar Ordinance

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Cultural Influences on *Renewable Energy Acceptance* and *Tools* for the development of communication strategies to promote *E ACCEPTANCE* among key actor groups

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1. Introduction

In August 2000, Barcelona was the first European municipality to implement, the so called ‘Solar Ordinance’, a regulation which makes the installation of solar thermal energy systems mandatory for most new buildings and those undergoing major renovation.

As pioneer experience, the process of implementation was large and initially there was a lot of resistance inside the City Council and from various actors related with the building sector. The acceptance of the ordinance has grown continually within the society and also among professionals of the building sector. Similar ordinances have been adopted in the following years in a great number of municipalities in Catalonia and all over Spain. In 2006 the obligation to install solar thermal panels in new buildings has been introduced in Catalanian and Spanish legislation. The weak points of the appliance of Barcelona’s solar ordinance have been corrected in the 2005 revision.

In the year 2000, only 1,650 m² of solar thermal surface existed in Barcelona (1.1 m²/1,000 inhabitants), so far it has been required the licence for 24,513 m² of surface (16.4 m²/1,000 inhabitants). This paper describes the ordinance origins and its implementation process.

2. Country overview

Although Spain could use the sun as main energy source, the solar energy use has been very limited until recent years. Spain depends for 75% (for energy production) on imported fossil fuels. The average solar radiation is between 11.5 MJ/m² day (3.2 kWh/m² day) in the North of Spain and 18.7 MJ/m² day (5.2 kWh/m² day) in the south. The solar radiation received during one year is equivalent to 525 times the total primary energy consumption or 800 times de final energy consumption.

In the seventies and early eighties the installation rate of solar water systems was 30,000 m²/year, falling down to less than 10,000 m²/year in the late eighties. In the early nineties the installation rate was less than 4,000 m²/year. Since 1997 the rate is growing, and currently equals 50,000 m²/year. The yearly installed surface is growing fast in Andalusia, Canary Island, Catalonia and Valencia. The Spanish average of installed capacity per inhabitant is about 18 m²/1,000 inhabitants. The Balearic Islands is the region with the highest average (103 m²/100 inhabitants).

The Spanish Promotion Plan of Renewable Energies 2000-2010 (adopted at the end of 1999) fixes the goal to reach nearly 5,000,000 m² of solar thermal energy by 2010, a goal that is impossible to reach, as described in the 2005¹ Plan evaluation. In 2005 a new Renewable Energy Plan was adopted and the financing and subsidies at national level were increased (ICO-IDAE Program, Spanish Energy Agency), providing 120 millions for financing solar energy and 7 M€ for subsidies for Solar thermal energy.

The Catalanian Energy Plan 2010 (adopted in 2002) aims to realise 500,000 m² of solar thermal energy by 2010. During the last years the sector of solar thermal energy has re-emerged, with a substantial increase of solar energy enterprises and an increase of the surface installed, but without reaching the plan aim.

¹ IDAE, Institute for Energy Diversification and Saving (Spanish Energy Agency): Balance del Plan de Fomento de las Energías Renovables en España durante el Periodo 1999-2004. Madrid, 2005.

In Barcelona, the Barcelona Energy Improvement Plan (PMEB) forms the general framework for the work of the Barcelona City Council in matters of energy efficiency and promotion of renewable energy. The Plan sets local actions, comprising a total of 55 projects, addressed to increase the use of renewable energy and energy efficiency. The Solar Ordinance is the most emblematic of these projects and the most important in terms of human resources of Barcelona's Energy Agency allocated to the project.

The official explanation regarding the poor evolution of the solar thermal market (during the eighties and the first part of nineties) was, beside other reasons, the lack of equipment quality and the poor installation works:

“Main reasons for this weak market penetration were supposed to be the low environmental consciousness of society, lack of interesting subsidy mechanisms, and missing confidence in a technology that during a first boom in the 1980s, revealed severe quality deficiencies in equipment and human resources.”²

The level of installation of solar thermal panels in Barcelona was very low in the year 2000 (1.1 m²/1000 inhabitants), compared with the Spanish average (8.7 m²/1000 inhabitants) or with the European average (19.9 m²/1000 inhabitants).

Solar thermal energy was perceived as a technology for the rural context with individual installations, and not as collective units for a group of various owners. As most residential buildings in Barcelona are owner communities, the local market penetration was very difficult and the results poor.

3. Summary of the solar ordinance legislation

In 1999 the Barcelona City Council adopted the so-called 'Solar Ordinance', as annex to the general environmental ordinance of the city, in order to stimulate using the solar energy.

The overall aim of the solar ordinance is to locally promote and regulate the installation of low-temperature systems for collecting and using active solar energy for the production of hot water for buildings. According to this law all new buildings and buildings undergoing major refurbishment are obliged to use solar energy to supply 60% of their hot water demand, starting from August 1st, 2000.

Before the final adoption of the Solar Ordinance in 1999, a long participation and negotiation process took place. In the process first phase, the main actors were individual local NGOs and a federation of NGOs such as 'Barcelona Estalvia Energia' ('Barcelona Saves Energy'), which was in contact with the Barcelona City Council to put energy efficiency measures and the promotion of renewable energies on the local agenda. Later on the Catalan Association of Renewable Energy Professionals became involved. And also the Office of the Councillor for Sustainable City was a key actor from 1995 until the adoption in 1999.

In the negotiation process for the first version of the Solar Ordinance also different city council departments, the Associations of Architects, engineers, property agents, building promoters and installers, and the Regional Energy Agency (Institut Català de l'Energia) participated. From 2002 onwards the Barcelona Energy Agency is carrying out all actions related to the Solar Ordinance. A Working Group for Solar Energy has been formed with the aim to achieve the maximum consensus on the Solar Ordinance. All stakeholders interested in the legislation appli-

² Christoph Peters, Institut Català d'Energia: Roadway of solar legislation in Spain. From Barcelona Solar Ordinance to Spanish Technical Building Code. in SHADA Issue 3, April 2006.

cation and in the implementation process are represented in this body and were involved in a revision of the ordinance in 2005.

In the first phase (1992-1995), the main obstacle was to convince the Barcelona City Council to take into consideration a specific legislation that obliges to install solar energy.

The solar ordinance was approved unanimously by the City Council in July 1999. Due to different institutions fears - especially architects and building promoters - the city council granted an 18 month moratorium in order to enable the sector to adjust to the new obligations. Building promoters feared that there was limited capacity of specialized installers and they also expected a buildings prices increase.

The main difficulties identified in this initial stage are a lack of information and experience of all involved sectors and an initial lack of clarity about the responsibility of the involved sectors such as, architects, buildings promoters, and users. Issues were mostly related to the unavailability of adequate information or adequate contact persons. There was also uncertainty regarding the proceedings for subsidy application.

The Barcelona Energy Agency's experience during the first years following the ordinance entered into force showed some weak points. These will be corrected in a revised version (2006), for example the lack of qualified installation contractors to cover the complete demand. The installations maintenance was also not guaranteed and represents certain difficulties. Therefore a quality certification for installations and the obligation to have a maintenance contract have been introduced in the revision. The Agency also made agreement with federations of building professionals in order to improve specific training courses in solar energy.

4. STEP ONE: Possible futures?

The idea of promoting solar thermal installations in the city of Barcelona came from environmental NGOs. The idea started in the early 1990s, influenced by the Conference of Rio in 1992. The inspiration of 'Think globally - act locally' was the starting point for the development of a vision of a more sustainable city and the first studies about urban ecology. Calculating that Barcelona has 2,477 hours of sunshine/year receiving a solar radiation of 1,502 kwh/m² (flat surface), the hours of sunshine of Barcelona are equal to 10 times the total energy consumption, and 28 times the total electric consumption. With a surface of only 20 m² per residential building, all domestic hot water demand could be supplied by solar panels.

From 1992 onwards the platform 'Barcelona Estalvia Energia' proposed a wide range of actions on the basis of the vision to make Barcelona more sustainable, which covered all environmental action fields, as water, waste, urban green, transport and energy. One of their proposals was to create an ordinance for new buildings. The origin of the platform was the antinuclear movement; therefore the proposals on energy efficiency and renewable energies were the most important for them.

The 'Civic Table for Energy', composed by technicians from the City Council and one representative of the platform 'Barcelona Estalvia Energia', was created in 1994 with the objective to propose measures to increase energy efficiency in the city, and to reduce CO₂ emissions. They proposed the elaboration of an Energy Plan for the City, and specifically the elaboration of local legislation for the building sector. Since 1995 Barcelona has a Councillor for Sustainable City. In 1995, Barcelona's city Council resolved, with the unanimous vote of all political groups, to become a signatory of the Aalborg Charter, a commitment of local authorities to promote sustainability, and started working on the Local Agenda 21. 13 Working groups that involve experts from Universities, representatives of service companies, NGOs and staff from the City

Council made a diagnostic on the urban environment situation and come out with some proposals for the future.

In 1995 only 700 m² of solar thermal surface were installed in the municipality (public and private buildings). As it seemed clear that promotion and awareness raising campaigns only did not result in a significant increase in the installed surface, the idea of proposing a mandatory legislation was discussed in the 'Barcelona Estalvia Energia' platform meetings. After learning about the initiative of the Berlin City Council to create a similar legislation at local level, the councillor for Sustainable City took the Berlin document as reference.

Later on, in 1998, the Municipal Council for the Environment and Sustainability was created, and it developed the 'People's Commitment toward Sustainability'. The vision developed in the document is a vision of Barcelona as a very dense city (more than 15,000 inhabitants/km²), which has to maintain its complexity and increase efficiency in the use of natural resources. In the field of energy, the document plans the installation of 500,000 m² of solar thermal energy systems in the city.

The councillor for Sustainable City, Josep Puig, can be seen as the founding father of the Solar Ordinance. He has a Ph.d. degree in Industrial Engineering, he is specialised in Energy and he is one of the pioneers of the environmental movement in Catalonia. In his function as councillor he started working on energy efficiency and renewable energies by introducing efficiency measures in the old City Hall, and also installing a photovoltaic rooftop to convince the technical staff of the council and the politicians, including the Mayor that renewable energy works well.

His vision was to use the enormous potential of solar energy in Barcelona, installing decentralised units of production of electricity and hot water in all buildings of the city. He worked closely with environmental organisations, the local solar energy businesses and technicians.

The vision of the solar ordinance was shared by environmental organisations and the Councillor for the Sustainable City, motivated by the interest to realize some concrete steps towards a more sustainable urban environment, reducing the consumption of natural resources and internalizing part of the energy production.

5. STEP TWO: What were the various expectations of the case?

The installation of solar thermal panels at the end of the 1990s was not a radical innovation in Europe anymore, but it was so for the Barcelona building sector.

In the case study of Barcelona's solar ordinance, we can differentiate between two process phases: the first phase started in 1992, and goes from the early visions to the approval of the ordinance in 1999. The second phase goes from 1999 until 2006 and the revision of the ordinance. Between the years 1999 and 2000, the structures and actors changed significantly, as with the municipal elections in 1999 new structures were created or got new roles, such as the Barcelona Energy Agency and the Municipal Council for the Environment and Sustainability.

From 1992 to 1999:

The federation '*Barcelona Estalvia Energia*' (BEE) was the key player in putting under pressure the Barcelona City Council. The federation, created by a large number of environmental NGOs, like *Acció Ecologista*, Friends Of Earth Catalonia, other local based environmental NGOs, the Trade Union *Comissions Obreres*, the Federation of Residents Associations, prepared the way for new forms of participation in the Council. The City Council, following a period of huge investments in urban infrastructures based on public-private-partnership without

citizens' participation until the Olympic Games in 1992, accepted for the first time a public audience about urban environment and a dialogue with environmental NGOs.

The association 'Barnamil', established by BEE, the first energy agency Barnagel, the renewable energy professionals association APERCA, was created in 1997 to promote the installation of solar energy systems in Barcelona buildings. Their expectation was to reach 1,000 m² of solar panels in the year 2000. They did not succeed, but the failure of the initiative made clear that from a technical point of view installations of solar thermal panels for individual households were not possible due to the lack of physical space and specific local regulations regarding esthetical aspects of the urban landscapes. They learned that the only realistic way to install solar panels in the city of Barcelona was to do it for the whole community of a building.

The Energy Civic Table (involving municipal technicians and one representative of BEE) worked on a more technical level on energy efficiency and renewable energies. Their official function was to inform and propose priority actions in the field of energy. As a result of this work, the Barcelona Energy Improvement Plan was created as a general framework for the Barcelona City Council work in relation to the city energy policy and its environmental impact on the city.

The Councillor for the Sustainable City acted from 1995 to 1999 as a link between the environmental organisations, the solar energy enterprises, politicians and technicians of the Barcelona City Council. The Councillor also promoted the creation of the first local energy agency in Barcelona 'Barnagel', funded by the EU's energy programme SAVE.

From 1999 to 2006:

After 1999, when a first draft of the ordinance was sent out to potentially affected professionals such as the Architects, the Industrial Engineers and the Building Promoters Associations. They had a critical view on the ordinance and its future effects. Therefore the city council granted an 18 months moratorium in order to enable the sector to adjust to the new obligations.

In the first two years of application of the solar ordinance, the municipal technicians responsible for granting licences were in charge as well of verifying the compliance of the ordinance. Due to the lack of technical knowledge, this task was transferred to the Area of Urban Services and Environment, and later on to the Barcelona Local Energy Agency.

Since 2002 the new Barcelona Local Energy Agency has taken the role of coordinating all the activities related to the Solar Ordinance. The Agency is a Consortium and it is formed by the various Administrative local bodies directly involved in the energy and environmental management, including the Catalanian and the Spanish Institutes for Energy. The Agency purpose is "to promote Barcelona as an exemplary city in handling energy matters and their impacts on the environment". The general task of the Barcelona Local Energy Agency is the management of the Barcelona Energy Improvement Plan; the Solar Ordinance is the most important of the 55 actions included in the Plan as described before in terms of impact.

In this phase, new expectations were created: to widespread the Solar Ordinance, first of all in Catalonia, and later all over Spain.

After 2000, APERCA, the Renewable Energy Professionals Association of Catalonia, which was also part of the process took the role of 'technical assistant' for other Catalanian Municipalities that wanted to copy the Barcelona experience and to approve their own Solar Ordinance³.

³ The expression 'Solar ordinance' in Spain stands for a local legislation which obliges to install solar thermal panels in new construction or rehabilitated buildings. The thresholds of the obligation are expressed in minimum number of dwellings or surface interested and minimum % of hot water produced by the installations.

In July 2006, 46 municipalities in the Barcelona province, 5 in the rest of Catalonia, and 7 provincial capitals in the rest of Spain (Madrid, Seville, Granada, Burgos, Pamplona and Valencia) have approved their own Solar Ordinances.

This chain reaction is related to the involvement of APERCA, the Catalanian (ICAEN) and the Spanish Institute for Energy (IDAE). Based on Barcelona's Solar Ordinance, IDAE produced a standardized model of ordinance for Spanish municipalities, with the expectation to get strong local contributions to the national solar thermal objectives. There was an important gap between the objectives fixed for solar thermal installations in the national renewable energies promotion plan (1999) and the status quo. The national renewable promotion plan fixed that at least 75% of all solar thermal installations should be for domestic hot water usage in residential buildings.

Table 5.1 *Actor - expectation - speaking for publics*

Actor	Expectations	Speaking for publics
Platform 'Barcelona Estalvia Energia'	To start a debate about internalisation of environmental costs in the functioning and policies of the city of Barcelona	Promotion of the health of the planet and global justice
Councillor for Sustainable City	Realise an impulse for the use of solar energy in the cities	Benefits for publics as increasing the quality of life for Barcelona's citizens, and importance to promote renewable energy enterprises
Buildings Professional Associations	Environmental technologies increase the cost of building promotions	Building professionals: architects, promoters, engineers
Barcelona Local Energy Agency	Support of initiatives which allow increase of energy efficiency	General concern for promoting the cultural change in the society, promotion of Barcelona as an exemplary city in the handling of energy matters and their repercussion on the environment
APERCA	New installations, perspective of short and long term growing of the sector of renewable energy installers all over Catalonia, more commercial and formative activities	Enterprises in the sector of renewable energies
ICAEN / IDAE (regional and National Energy Agency)	Fulfil the objectives of the Catalanian and the Spanish Energy Plan, solar ordinances as impulse, which moves the whole market	General environmental objectives, improvement of quality of life

6. STEP THREE: Understanding 'participatory' decision making:

Barcelona Estalvia Energia

In terms of the creation of social acceptance of technological innovation, the major change in the relationship between the administration, the Barcelona City Council, and the civil society happened in the early 1990s, after the Olympic Games in Barcelona 1992. This new relationship consists in a new form of participation and interaction, which has been consolidated in Barcelona during the last ten years. Enric Tello, professor of Economic History and founding member of the environmental NGO 'Acció Ecologista' and the platform 'Barcelona Estalvia Energia', believes that nobody can suppose that the civil society is informed, shows solidarity with and is willing to take part in saving the planet. From his point of view, 3 types of mediation are necessary:

- the development of a common vision

- the elaboration of projects according to the vision
- the construction of a subject able to carry out this vision.

With this background, BEE was the main actor in the first phase of interaction towards a new democratic model of active participation in Barcelona.

Barcelona Estalvia Energia had its origins in the antinuclear movement, the idea of this federation of environmental NGOs and community-based associations was to find ways to realise their vision of a more sustainable city. BEE developed a broad range of concrete proposals, not only in the field of energy efficiency and renewable energy. In order to influence the decision making process of the City Council they used the 'citizens initiative'. In the regulation of Citizens Participation in Barcelona the 'citizens initiative' is foreseen as an instrument to present a motion to the city council. Therefore, a minimum of 10,000 signatures are necessary. All the organisations forming up BEE sum up more than 100,000 associated members.

A motion elaborated by BEE with 28 proposals in the field of energy, waste, mobility, water, urban planning and taxation reform was presented to the city council in November 1992, signed by more than 100.000 citizens. The first public assembly focused on environmental issues was held in April 1993 attracting significant press attention. As one of the direct results, the city council undertook to elaborate the first 'environmental programme' for the City. Enric Tello sees this as the first step to Local Agenda 21 and to new forms of participation:

“This type of partnership was very different to that of 'urbanismo concertado' of previous times. In the speech made by the platform, they said that the sheer fact that the council was holding a public assembly on such issues was a profound democratic step and especially that it contrasted with and challenged those private bodies which put the pressure on the local government from the shadows. The platform went on to say that they could now recognise that it was not only the citizen body that would enable the advance towards an environmentally sustainable Barcelona, but that it could be a joint effort.”

...

“Following the historic public assembly in 1993, and the consequent publication of the First Environmental Programme, various initiatives based on the idea of partnerships between community and council were set up to tackle the issues that were raised.”

One example of this new partnership between community and city council was the creation of the a **Round Table for Energy** in March 1995, composed by all council departments with responsibilities in energy related issues and a representative of **BEE**.

Regarding the Solar Ordinance, at this time *“The platform's calls for new laws, and for legal standards to include heat insulation and introduction of the use of renewable energy in new buildings, have however not been addressed.”*⁴

Councillor Office for Sustainable City

When in 1995 the first Councillor for Sustainable City was elected, he started working on Local Agenda 21 and the improvement of energy efficiency and renewable energies. He also established participatory structures, as with the creation of the Municipal Council for the Environment and Sustainability or in the work with the Civic Table of Energy. At the same time, due to his close relationship with the environmental movement and the renewable energy enterprises, he also used informal structures in order to develop and put into practice the vision of a more sustainable city.

⁴ A democratic proposal for changing the city model: the case of Barcelona *Enric Tello* Professor of Economic History, University of Barcelona *Phillippa Warner* Both Members of 'Acció Ecologista', Barcelona, Noviembre 1996, <http://habitat.aq.upm.es/boletin/n3/a2etel.html>.

From the point of view of the Councillor for Sustainable City, Josep Puig, three preconditions were necessary for the success of the Solar Ordinance: the political will and commitment, technical ability of the staff, and involvement of citizens organisation, working in a partnership. The Councillor used two key elements to implement energy policies in the municipality, i.e. the Civic Table on Energy and the first Energy Agency Barnagel. Josep Puig's main objective was:

*“to build complicities on energy from all people in different departments of the city council and between local actors, ranging from companies to NGOs, in order to develop energy projects”.*⁵

Beside the work on the Solar Ordinance, during 1995 and 1999, different activities to promote energy efficiency and renewable energies in the building sector were carried out, as e.g. the Sustainable City Resources Centre as information point and a permanent exhibition of energy efficient devices and appliances and renewable energy devices. At technical level, solar thermal water systems were introduced in municipal sports facilities, and a PV Solar Roof at the two main buildings of the City Hall (1,000 m², 100 kWp, EC Thermie Project) was installed.

Barcelona City Council

The building of commitment and confidence inside the City Council was one of the major achievements carried out by the platform BEE and the Civic Table on Energy and by the Councillors Office for Sustainable City. In the first years, the adoption of a Solar Ordinance was considered impossible by some politicians and the technical staff at the Barcelona city council. They had to be convinced not only of the technical possibility to install solar thermal facilities in residential building blocks, but also of the legal possibility to adopt a local ordinance that would make the use of solar energy mandatory.

The fact that Barcelona, as second largest city in Spain, pioneers in many other fields could be considered as an element which facilitated finally the willingness of the city councils technical staff to work on the solar ordinance.

1999 - 2002

From the municipal elections in 1999 on the office of the new third Deputy Major and Chair of the Barcelona City Council's Commission for Sustainability, Urban Services and the Environment, Imma Mayol, assumes the process of implementation of the Solar Ordinance. Due to reservations of different institutions, architects and especially building promoters the regulation did not come into force before one year of respite, till August 2000.

After the initial reactions of architects and building promoters the need of a consensus period was evident. In formal and informal meetings the most important stakeholders were involved: - Property developers, Construction companies, the Architects association and the Union of Installation contractors.

“The approval of Solar Ordinances has been accepted positively by all affected entities, from promoters to consumers. The key for the success has been the implication of the different actors in the project, from the beginning of the initial redaction of the draft.

It is important to underline the task of information and consensus building assumed by the Barcelona City Council in the period from March 1999 until the ordinance came into force nearly one and a half years later. Additionally to the meetings with enterprises and affected entities, technical seminars and conferences were prepared, with the participation and collaboration of other entities, as APERCA, the Association of Architects, the Association of Industrial Engineers, the Catalan Energy Agency, the Association of

⁵ Josep Puig: THE BARCELONA SOLAR ORDINANCE. A case study about how the impossible became reality, Johannesburg, 2002.

Building Promoters and the Association of Professionals of Renewable Energy of Catalonia."⁶

During the same period, the Municipal Housing Company (Patronat Municipal de l'Habitatge) applied the requirements of the solar ordinance in their promotions of residential buildings (in the first phase 6 buildings with 441 flats), this experience served as pilot project, which provided technical and economical arguments for the discussion with the actors of the building sector.

The Property Sector

In the beginning nobody could anticipate the reaction of the building promoters and architects. After the first rejections arguing that building prices would increase, actually architects and building promoters are in favour of the ordinance. (the extra cost for solar thermal installations are around 0,5-1% of building costs)

"Despite initial doubts during the drawn-out drafting phase of Barcelona's ordinance, the national association of construction companies, Asociación de Promotores Constructores de España (APCE), actually pronounced in favour, following the enforcement of the obligation, stating that it brings 'added value' to property and 'responds to growing citizen demand and support for energy efficiency'.

*A major sweetener for property developers lies in interest-free credit arrangements for solar thermal installations available from IDAE, in conjunction with the public credit institute, Instituto de Crédito Oficial (ICO). The IDAE-ICO credit backs up to 70% of total investment. The credit percentage is based on IDAE's own calculation of eligible installation costs, ranging from € 397 to € 481 per square metre of solar collector area installed, depending on economies of scale and the total surface area required for each building project (see Table 3). Furthermore, regional governments provide additional financing arrangements, while local authorities offer tax relief on property developments incorporating renewable energies, as well as reduced municipal housing rates for individual homeowners."*⁷

Barcelona Energy Agency

The Barcelona Local Energy Agency, created in 2002 as a consortium existing of various administrations (Barcelona City Council, Metropolitan Body for Hydraulic Services and Waste Treatment, Catalan Institute for Energy and the Spanish Institute for Energy Diversification and Saving, the Autonomous University of Barcelona and the Catalan University Technical College), takes the role of an intermediary organisation. The implication of universities helps to introduce more innovative approaches in the structures of the Barcelona City Council, although the Energy Agency has the formal responsibility regarding the implementation of the Solar Ordinance.

The general framework for the work of the Barcelona Local Energy Agency is the Barcelona Energy Improvement Plan (PMEB); the boosting of solar energy is one of the basic measures of the Plan. The strategy for the promotion of solar energy in Barcelona includes as accompanying measures 'Participation and Consensus Building' and 'Information and Education'.

The Agency also has established collaboration agreements with the Union of Installers (*Gremio de Instaladores y Mantenedores de Barcelona (FERCA)*) and *Barcelona Activa*, the Local De-

⁶ APERCA: Balanç d'aplicació de les ordenances d'aprofitament de l'energia solar tèrmica a Catalunya, 2004, page 23

⁷ Pamela Stirzaker: Spain's chain reaction - Municipal obligations spur on solar thermal growth. REW, Renewable Heat01/09/2004.

velopment Agency of the Barcelona City Council in order to undertake vocational training on solar energy installations.

In the field of Information and education, the most important actions are the preparation and dissemination of information materials (*User guide for solar thermal installations*), the Infopoint of the Barcelona Energy Agency and the website (www.barcelonaenergia.com), as well as regular participation in European and international conferences.

The Energy Agency also coordinated the discussion about the Solar Ordinance in some of the Sectorial Municipal Councils with citizens representations as the Council of Sustainability and Environment.

Solar Working Group

The Solar Working Group, formally constituted in January 2005, is the consultation body with representation of all major stakeholders involved in the implementation of the Solar ordinance and the development of solar energy within the city of Barcelona. The Members of the solar working group are:

- Regional Energy Agency (Institut Català d'Energia)
- City Council (Ajuntament de Barcelona)
- Building Promoters Ass. (Asociación de Promotores de Edificios de Barcelona)
- Catalan RES Promoters Ass (Asociación de Profesionales EERR, APERCA)
- Spanish RES Promoters Ass (Asociación Española EERR, ASENSA)
- Community based ass. For RES and RUE (BARNAMIL)
- Property Agents Ass.(Colegio de Administradores de Fincas)
- Architects Ass. (Colegio de Arquitectos de Catalunya)
- Engineers Ass. (Colegio de Ingenieros Industriales de Catalunya)
- Union of installers (Gremio de Instaladores de Barcelona, FERCA).

Based on inspections of solar installations during 2004 the ordinance was revised and improved; the modifications were discussed in the Solar Working Group and other Working Groups (as the Municipal Council for the Environment and Sustainability). The most important points are the removal of limits and exemptions (all buildings will be affected, and not only buildings with demand >296 MJ/day= demand of 16 households), the adaptation to new legal framework in Spain, a clear and compulsory certification system and more requirements on maintenance of installations.

Spanish Institute for Energy Diversification and Saving

The Spanish Institute for Energy Diversification and Saving (IDAE), which also participates in the Barcelona Energy Agency, took the role to widespread the Ordinance across Spain. Based on Barcelona experience they developed a standard model for a Solar Ordinance to be used at local level. They see this standard model as one model which has to be supplemented by custom-made participation processes to guarantee the implementation at technical and social level.

Table 6.1 *Forms of participation*

Type	Organiser	Involvement	Purpose
Motion	Platform Barcelona Estalvia Energia	<i>Local Environmental NGOs, Federation of Neighbourhood or Residents Associations, trade union of Comisiones Obreras (USCOB, 100,000 signatures)</i>	To discuss about a new city model and sustainable and energy efficiency
Formal Meetings	Councillors Office for Sustainable City	'Round Table for Energy' City Councils technical staff from different Departments, representative from NGO Platform BEE	Propose concrete actions in order to improve energy efficiency and reduce emissions
Formal and informal Meetings	Councillors Office for Sustainable City	Enterprises of the renewable energy sector, NGOs, experts	Discussion of a draft of the Solar Ordinance
Plenary	City Council	Councillors of all political parties	Approval of the solar ordinance
Formal and informal meetings	Barcelona's Energy Agency	Professional Associations of the Building Sector, Promotors, other administrations	Discussion of critical aspects
Sectoral Municipal Councils with citizens representation	City Council	Municipal staff, members of the sectoral Council, representatives from NGOs, experts	Discussion of the Energy Improvement Plan and the Ordinance
Media	Barcelona's Energy Agency	Energy Agency, media representatives	Diffusion of the ordinance and situation of solar energy in Barcelona
Publications	Barcelona's Energy Agency	Energy Agency, energy consultancies	Environmental Education guides, technical information addressed to local residents
Spanish, European and International Conferences	Different networks of municipalities	Representative from Barcelona's Energy Agency	Presentation of the Ordinance and its results
Standard model of solar ordinance	Spanish Institute for Energy Diversification and Saving (IDAE)	IDAE, based on Barcelona's and Sant Joan Despís Solar Ordinances	Technical assistance to implementing the Solar Ordinance within all Spanish municipalities

7. STEP FOUR: From visions to actualities

The initial vision - to 'open the city to solar energy' - has been successfully realized, although during the first years of application of the Solar Ordinance the number of exemptions which were foreseen in the first Ordinance reduced the result in terms of m² surface installed. This has been corrected in later approved solar ordinances in other Spanish municipalities and in the second version of Barcelona's Ordinance.

In terms of local, regional and national objectives regarding the market penetration of solar thermal installation in the domestic sector, the goals for 2010 will not be achieved. The estimations of Aperca, the Catalonian Association of Renewable Energy Professionals, are that currently in Catalonia 20,000 m² of surface are installed, only in buildings affected by solar ordi-

nances. This surface is far below the 70,000 m² of annual solar thermal installations foreseen in the Catalanian Energy Plan.

As one of the major outcomes of a very long negotiation process the prescriptions of Barcelona's Solar Ordinance are since 2006 mandatory for all new constructions, in Catalonia and also in the rest of Spain: the Catalanian Decree on Eco-efficiency (approved in February 2006) introduces solar thermal energy use for domestic hot water as compulsory with a solar fraction between 40% and 70%.

One month later, the Spanish government made mandatory the solar thermal energy use in the legislative transposition of the European Directive on Energy Performance of Buildings, the Código Técnico de la Edificación (CTE), which will get into force in October 2006. The solar thermal part applies to all new buildings and those undergoing a major renovation. It is expected that the solar thermal market in Spain, currently with an annual growth of 15%, will at least be doubled in the next years.

One of the key elements to widespread Solar Thermal Ordinances all over Spain has been the involvement of the National Energy Agency, IDAE, who elaborated in 2005 a standard model for municipalities with the legal and technical bases of a Solar Ordinance. The municipal solar obligations will remain in force as long as they are stronger than the national obligation included in the CTE. From IDAE's point of view, the implementation has to be accompanied in each municipality in order to guarantee the acceptance of the ordinance.

In terms of participation, the process carried out in Barcelona since the early nineties changed the relationship between environmental NGOs and the Barcelona City Council: the participation in local politics has been formalized with the creation of the Municipal Council for the Environment and Sustainability, which has a own working group for energy (open to all council members), and Barcelona's Energy Agency also created formalized participation structures in order to implement the Energy Improvement Plan.

The development of sustainable energy strategies is actually a clear priority in the City of Barcelona. In one of the major costal urban development in the Poble Nou district, they brought out a significant reorganization of the area. The 'Universal Forum of Cultures - Barcelona 2004' took place there between May and September 2004. In this urban renovation, integrating the environmental infrastructures in the city has been one of the main objectives. The major energy related measures in the Forum 2004 area are a urban solar FV power station (10,700 m²), the integration in the first District heating & cooling system in Barcelona and the construction of energy efficient buildings. These measures would have been impossible to implement ten years ago, when the process described in this case study started.

8. Lessons learned

- The Barcelona Solar Ordinance succeeded in very concrete circumstances. This is related on one side to the international recognition of the importance of the local action to help solving the environmental global problems (Local Agenda 21 at the Rio conference). On the other side it was closely related to the Barcelona circumstances, where following the '92 Olympic Games the social and environmental movements have been claiming new participative methods.
- Without the technical knowledge of the main actor at the beginnings (Councillor for Sustainable City), the vision would not have been transformed into reality. In this sense, the actions carried out inside the City Council in the field of improvement of energy efficiency and installation of solar energy in municipal buildings, and the economic savings related with that, have been essential to convince the technicians and politicians

- The development of the market, legal obligations and awareness raising have to be carried out in parallel; the mis-functioning of one of these issues can produce the failure of social and political acceptance. The lack of knowledge on how to implement innovations at practical level (in this case professionals of the construction sector as architects and craftsmen) should be addressed with specific actions, as awareness raising (technical seminars) and vocational training.
- In this sense the case of the Solar Ordinance legislation is used as an instrument to influence the development of the renewable energies market and to lead to cultural changes in the building sector. In the first phase of the Solar Ordinance implementation the key players that developed the first vision for the future targeted a key group. They worked to create acceptance of the solar energy systems in buildings among the building sector actors. It has been in the second phase (five years after the first solar ordinance) that the ordinance has been used as legal instrument in a strict way (reducing exceptions, making quality certifications mandatory).
- The use of a legislative instrument for the dynamization of the building sector can be considered as a typical approach of the South European culture, that would be difficult to transfer to the Nordic culture.

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Appendix A Chronology of notable events in the Solar Ordinance Case

(adapted from 2 tables by Josep Puig).

Date	Event
1992	Creation of the platform 'Barcelona Estalvia Energia', participated by 12 environmental NGOs; elaboration of a motion
1993	First Public Audience about Urban Environment in Barcelona
October 1994	The 'Civic Table of Energy' is created (municipal technicians and 1 member of the platform BEE)
July 1995	Municipal elections, first Councillor for Sustainable City
September 1995	The Berlin Parliament authorised the Senate by almost unanimous vote to enact an ordinance on the use of solar energy
March 1996 - March 1999	10 work meetings of the Civic Table of Energy.
1997 - 2000	The Campaign 'Barnamil' tries to achieve 1000 m ² of solar panels in Barcelona without notable exit
June 1997	The Sustainable City Councillor's Office translates to Catalan language the Berlin Solar Collector Ordinance Draft and discusses it to interested individual people, organisations (NGO, professionals, etc.) and public officials.
June 1997	The Sustainable City Councillor informs to the Barcelona Mayor and to the Chairman of the Urban Planning Commission about the Berlin Solar Collector Ordinance Draft
January 1998	The Barcelona Civic Table on Energy adopts a resolution to work on developing a Solar Ordinance for the city of Barcelona and to present it to the Plenary Council of the City.
April 1998	The Plenary Session of the City Council adopted a political decision on Energy Sustainability, including promotion of energy efficiency, use of renewable energies, information to the citizens and cooperation with other local energy actors.
January - June 1998	The First Draft of the Barcelona Solar Energy Ordinance is sent to environmental organisations, solar energy business, solar energy technicians, etc., asking them to input suggestions and proposals.
December 1998	The Barcelona Civic Table on Energy starts the discussions on the Barcelona Solar Ordinance First Draft.
January 1999	Working meeting between the Civic Table on Energy and Urban Planning officials of the city in order to agree a Solar Energy Ordinance Draft to be submitted to the City Council's Plenary.
February 19 th , 1999	The Sustainable City Councillor presents to the Plenary Session of the City Council the initial text of the Barcelona Solar Energy Ordinance. The text is adopted.
February - May 1999	It is open a time period for people or organisations to present written proposals to modify the adopted initial text. The City Council receives 10 written pleas and introduces in the new text the main part of them.

Date	Event
July 16 th , 1999	The Vice-Mayor presents to the Plenary Session of the City Council the definitive text of the Barcelona Solar Energy Ordinance to be adopted definitively. The text is adopted. The Mayor asks officials to work during one year period in order to do the necessary steps to make possible the implementation of the Ordinance in the City.
August 1 st , 2000	The Barcelona Solar Energy Ordinance is mandatory.
2002	The Barcelona Local Energy Agency is created and from now on managing the Solar Ordinance
2002	Approval of the Plan for Energy Improvement
2002 - 2006	Barcelona Energy Agency is carrying out accompanying measures
2004	The revision phase of the Ordinance starts
January 2005	The 'Table for Solar Energy' is formally constituted as consultation body
February 14 th , 2006	The Catalanian Government approves a decree on eco-efficiency making solar thermal energy use for domestic hot water compulsory at Catalanian level
February 24 th , 2006	Revision of the Solar Ordinance approved in Plenary Session of the City Council
March 17 th 2006	The Spanish government approves the national transposition of the EC Directive on Energy Performance of Buildings 2002/91/EC, including the obligation to cover 30%-70% of the domestic hot water demand with solar thermal energy
September 14 th , 2006	The revised version of Barcelona's Solar Ordinance will be mandatory