

Sustainable Energy Solutions in Barcelona

Barcelona Energy Agency

Summary

The goals of Barcelona City Council’s Plan for Energy Improvement in Barcelona (2002-2010) are to increase the use of renewable energy (especially solar energy), reduce the use of non-renewable energy sources and lower the emissions produced by energy consumption in order to meet Barcelona City Council’s international protection commitments. This integrated plan includes a quantification of the energy used and emissions produced in the city and provide scope for municipal action to promote an environmentally sustainable city, reducing air pollution and the consumption of fossil fuels in the process. As part of its plan a Solar Thermal Ordinance has been introduced. The aim of the ordinance is to regulate, through local legislation, the implementation of low-temperature systems for collecting and using active solar energy for the production of hot water for buildings. New buildings and buildings undergoing major refurbishment are required to use solar energy to supply 60% of their running hot water requirements. Since its enforcement licenses for the installation of a total of 14,028 square meters of solar panels have been requested with annual savings of 11,222 Megawatt hours and a corresponding reduction in eCO₂ emissions of 1,973 tonnes per year.

End-user area		Target Audience		Technical	
<input type="checkbox"/>	New buildings	<input type="checkbox"/>	Citizens	<input type="checkbox"/>	Energy efficiency
<input type="checkbox"/>	Refurbishment of buildings	<input type="checkbox"/>	Households	<input checked="" type="checkbox"/>	Heating
<input type="checkbox"/>	Transport and mobility	<input type="checkbox"/>	Property owners	<input type="checkbox"/>	Cooling
<input type="checkbox"/>	Financial instruments	<input type="checkbox"/>	Schools and universities	<input type="checkbox"/>	Appliances
<input type="checkbox"/>	Industry	<input type="checkbox"/>	Decision makers	<input type="checkbox"/>	Lighting
<input checked="" type="checkbox"/>	Legal initiatives (municipal regulations, directives, etc)	<input checked="" type="checkbox"/>	Local and regional authorities	<input type="checkbox"/>	CHP
<input checked="" type="checkbox"/>	Planning issues	<input type="checkbox"/>	Transport companies	<input type="checkbox"/>	District Heating
<input checked="" type="checkbox"/>	Sustainable communities	<input type="checkbox"/>	Utilities	<input checked="" type="checkbox"/>	Solar energy
<input type="checkbox"/>	User behaviour	<input type="checkbox"/>	ESCOs	<input type="checkbox"/>	Biomass
<input type="checkbox"/>	Education	<input type="checkbox"/>	Architects and engineers	<input type="checkbox"/>	Wind
<input type="checkbox"/>	Other	<input type="checkbox"/>	Financial institutions	<input type="checkbox"/>	Geothermal
		<input type="checkbox"/>	Other	<input type="checkbox"/>	Hydro power
				<input type="checkbox"/>	Other

Context

In Barcelona it has been recognised that a shift towards sustainable energy systems in the cities is urgently required. The development of renewable energy strategies is a clear priority in the City of Barcelona. Although the strategies are fully interconnected, they could be divided into the following groups:

- Promotion policies;
- Demonstration projects;
- Legal instruments;
- Management instruments;
- Integration of sustainable energy measures in urban developments.

For each of these categories examples have shown that proactive policies in cities can substantially increase the share of Renewable Energy Sources (RES).

Objectives

The goals of Barcelona City Council's Plan for Energy Improvement in Barcelona (2002-2010) are to increase the use of renewable energy (especially solar energy), reduce the use of non-renewable energy sources, and lower the emissions produced by energy consumption in order to meet Barcelona City Council's international climate protection commitments.

Specifically, by 2010 Barcelona aims to:

- reduce carbon dioxide (CO₂) emissions by 20% compared to 1999 levels;
- maximize the use of the city's renewable energy sources (up to 188,848,440 kilowatt hours/year of renewable energy, which represents 1.1% of the city's total energy consumption);
- emit less than 3.15 tonnes of equivalent CO₂ (eCO₂) per capita.

Process

Barcelona City Council has developed a Plan for Energy Improvement in Barcelona that includes an Action Plan to Conserve Energy along with projects and recommendations to reduce CO₂ emissions. This integrated plan includes a quantification of the energy used and emissions produced in the city and provides scope for municipal action to promote an environmentally sustainable city, reducing air pollution and the consumption of fossil fuels in the process.

The energy improvement plan was approved in February 2002 and has been implemented by the Energy Agency of Barcelona since May 2002. The action plan consists of four areas as follows:

Management strategies

- Outline Barcelona Council's crucial leadership role;
- Structure the Plan into manageable units;
- Promote co-ordination and co-operation with other public bodies;
- Promote partnership with business and professionals;
- Develop energy information systems.

Supply and consumption strategies

- Promote a sustainable energy consumption model for Barcelona;
- Promote the use of green and/or renewable energy;
- Improve the quality of energy products and services in Barcelona;
- Improve electricity generation and distribution;
- Foster the production of renewable energy;
- Update the plan and creating measurement and control tools;
- Reduce Barcelona City Council's energy consumption;
- Commit to the use of renewable energy sources.

Social and communication strategies

- Foster a new pattern of energy consumption;
- Explain the need to change energy use and the benefits of doing so;
- Create a high profile energy certification scheme;
- Foster the application of new technology;
- Stimulate measures in the educational field;
- Seize the opportunity presented by large projects underway in Barcelona.

Economic and legal strategies

- Maintain Barcelona's economic growth and development;
- Foster competitiveness and quality in energy supply;
- Help companies in the industry pursue their activities and set up at new sites in Barcelona;
- Seek co-operation with third parties by sponsoring appropriate projects;
- Study the general economic impact of measures;

- Ensure measures reflect changes in the legal framework;
- Change municipal standards and bylaws to meet the Plan's proposals.

As part of its Plan for Energy Improvement, Barcelona City Council introduced a Solar Thermal Ordinance, which entered into force in August 2000. The aim of the ordinance is to regulate, through local legislation, the implementation of low-temperature systems for collecting and using active solar energy for the production of hot water for buildings. New buildings and buildings undergoing major refurbishment are required to use solar energy to supply 60% of their running hot water requirements.

The Barcelona Energy Agency's evaluation program monitors and further promotes the effective implementation of the Solar Thermal Ordinance. Since its enforcement licenses for the installation of a total of 14,028 square meters of solar panels have been requested, compared to a total of 1,650 square meters of panels before the ordinance was in place. This increase in the installation of solar panels has resulted in annual energy savings of 11,222 Megawatt hours and a corresponding reduction in eCO₂ emissions of 1,973 tonnes per year.

In order to promote the ordinance and its acceptance, the City of Barcelona has implemented a broad communications program. The city has published an explanatory guide to the ordinance in several languages, held periodic round tables and meetings with stakeholders (contractors' associations, engineers, architects, environmental organizations, neighbourhood associations, citizens), promoted the ordinance in neighbouring cities, implemented demonstration projects (such as solar thermal installations at swimming pools), and organized a "Solar Day" in Barcelona. The Barcelona Solar Thermal Ordinance has been a model for other municipalities. Since its approval, other municipalities in Catalonia have adopted similar (and sometimes even more stringent) local regulations.

Financial resources and partners

There was no specific project budget for the ordinance as it involved the approval of a legal text. The funds for Barcelona's Plan for Energy Improvement are negotiated each year. The plan is financed mainly from public administration funds.

Results

The strategies named *promotion policies and demonstration projects* have been present in the city for several years, with different examples such as the installation of solar systems in schools, sports centres (solar thermal installation in the Olympics Swimming Pool) or in some other public buildings (solar photovoltaic installation in the Town Hall building).

Concerning *legal instruments*, Barcelona is the first European city to have a *Solar thermal ordinance*. According to this bylaw all new buildings and buildings undergoing major refurbishment are obligated to use solar energy to supply 60% of their running hot water requirements. This solar ordinance was approved by the Barcelona City Council in July 1999 and entered into force in August 2000. This new policy has brought Barcelona to multiply per more than 10 the surface of solar thermal square metres (licenses requested), moving from 1,1 sqm /1.000 inhabitants (in 2000) to 13 sqm/1.000 inhabitants [as of march 2004, the licenses requested for the installation of solar panels made up a total of: 19.543 sqm of solar panels (before: 1650 sqm)]. We are happy to see these results and specially to see that more than 20 Spanish cities are now "replicating" this initiative taking Barcelona as a model.

The Barcelona Energy Improvement Plan (PMEB), a 10 year plan adopted in 2002, and the Barcelona Energy Agency, are two major *management instruments* that ensure the commitment of the City to further promote these energy measures in a planned and structured manner. The Barcelona Energy Improvement Plan proposes a series of measures and 55 projects for local action up to the year 2010, these being centred on energy savings and in the use of renewable energies.

The municipal action promoting a sustainable energy city also works towards the integration of *sustainable energy measures in urban developments*, an example of this integration are the

sustainable energy measures in the Forum Barcelona 2004 area. The major Sustainable Energy measures in the Forum 2004 area are the following:

- ❑ Urban solar FV power station (10.700 sqm, 1,3 MWpic)
- ❑ District heating & cooling system, and
- ❑ Energy efficient buildings.

Lessons learned and repeatability

A communications program was crucial in order to encourage adoption of the Solar Thermal Ordinance by contractors. The Barcelona Solar Thermal Ordinance has been a model for other municipalities. Since its approval, other municipalities in Catalonia have adopted similar (and sometimes even more stringent) local regulations. We are happy to see these results and specially to see that more than 20 Spanish cities are now “replicating” this initiative taking Barcelona as a model.

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Printed reports or other literature available:

Title:

Barcelona City Council. 1999. *Barcelona Solar Thermal Ordinance* (available in English, Spanish, French, and German).
Barcelona City Council. 2000. *Plan for Energy Improvement in Barcelona* (summary available in English).