

## **Solar Strategies of a European Capital: The example of the city of Berlin**

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### 1. INTRODUCTION

The Berlin Energy policy is aiming at a sustainable and climate protecting utilisation of energy. In accordance with national goals the city government's objective is a substantial reduction of CO<sub>2</sub>-emissions by one quarter within the period 1990-2010.

After benefiting in the first decade of this time frame from the political and economic change in the eastern part of Berlin, after large investments in the substitution of coal by natural gas and after targeting the waste of energy in all consumption sectors the city now has to look increasingly for other CO<sub>2</sub> mitigation potentials.

Due to Berlin's geographical and topological situation and its urban nature only solar energy out of the different renewable options can be exploited locally and in significant quantities (maybe with the exception of liquid biofuels).

Based on the Energy Saving Law 1990 and the Energy Plan 1994 Berlin has made various efforts in recent years to demonstrate and promote the active use of solar energy. In combination with national programmes local measures have contributed significantly to reach the estimated number of 2,400 solar thermal applications (mainly for water heating) and the volume of about 1.5 MW in PV installations of today.

Some of the strategic instruments that helped to approach this success story were

- A voluntary agreement with industry and housing associations to apply solar thermal installations, following a fierce debate around the proposed enforcement of an obligatory commitment for solar water heating on new buildings.
- Co-operation agreements with the local gas and electricity utilities to finance solar funding programmes under their own flag.
- National and local state funding programmes, e.g. the new 100.000-roofs PV-programme of the federal government.

- Targeted financial support for accompanying measures, like promotion campaigns, training courses, information for public and professionals, etc.
- Self-obligation of the federal government for solar energy use on its new parliamentary and ministerial buildings to act as pilot models and best-practice examples.

The efforts of recent years have resulted in a reduction of CO<sub>2</sub>-emissions by 16.9 % per capita. Besides the decrease in the industrial sector, the implementation of energy saving technologies, especially in the heating sector, the improved heat insulation of existing buildings, the rational generation of electricity and heat with small-scale cogeneration schemes and the various solar activities have contributed to this positive development.

## 2. SOLAR STRATEGIES

### 2.1 Background and objectives

The **Berlin Energy Saving Law**, enacted in 1990, obliges the city government to support the increased use of solar energy. This commitment was confirmed with various measures and according budgets, listed in the **Energy Plan** of 1994.

Already in the early 90's a study had proved, that more than one quarter of the city's power needs could be covered just by placing PV modules on roofs and open spaces, like parking lots. The target to start into the solar era with 1 MW of solar modules seemed very distant and ambitious at a time when a 10-kW installation was regarded as a technical attraction (in 1990 only 14 small PV installations existed).

The **Berlin Energy Report 1990-96** stated that even though manifold barriers, especially in the non-technical sector, had to be overcome, the different activities by a number of actors involved showed positive and encouraging signs.

The draft of the new **Berlin Energy Programme** for the years ahead sets the targets at 30.000 m<sup>2</sup> additional solar collectors and a total of 10 MW PV until the year 2002. Like in previous years the Berlin government will support solar investments on existing buildings with 2 m €/a. Additionally it is planned to cover 15 % of the energy demand of public buildings from renewable energy sources. But due to the lack of (municipal) public financial resources most of the impulses for solar energy will have to come from the private sector, like utilities, housing associations and individual investors or from national budgets based on specific tax incomes or certain innovation programmes.

## 2.2 Strategic Instruments

### 2.2.1 Solar Collector Ordinance and Voluntary Agreement

An amendment to the Berlin Energy Law mandated the Berlin Government to enact a **Solar Collector Ordinance**. The draft of this regulation contained the commitment to cover a minimum of 60 % of all hot water needs in new buildings by solar energy. After a long period of discussions between the different administration sectors and debates with housing associations and various lobby groups the resistance against such an obligation grew so strong that the proposal was withdrawn.

As compensational (and interim) measure the city government accepted a **voluntary agreement** signed by the industry, housing associations, the chamber of architects and other entities in 1997. The commitment covers climate protecting measures as a whole including clear targets for the application of solar thermal schemes in the building sector. The 5-year programme (1997-2002) is evaluated by a continuous monitoring process giving the government an informative basis for further decisions (including the still possible enactment of the Solar Ordinance) in case the targets are not met.

Additional measures of the agreement include local district heating schemes with cogeneration plants, the implementation of energy services and energy saving contracting, the construction of low-energy buildings and accompanying information and promotion campaigns and activities.

A first monitoring report has been published recently showing that the agreement for itself has stimulated a large number of activities with the involvement of different actor groups and given new momentum to the solar idea.

### 2.2.2 Cooperation agreement with power and gas utilities

Also in 1997 the city government signed a **cooperation agreement** with the local **power utility Bewag** to develop innovative and sustainable technologies and to support their market introduction. Bewag set up a special support programme "**Energie 2000**" (1997-2000). One of the most prominent elements of this programme is the promotion of solar electricity by the introduction of different activities, like

- **Solar Power Bidding** (or "Solar Auction"), where private investors can offer solar electricity at "real" costs to the utility (including an investment subsidy of up to 50 %);
- A shareholder model "**SolarInvest**", where ownership shares can be purchased that will be bought back by Bewag after 15 years including a relatively low interest rate;
- A green power tariff "**SolarElectricity**" for 100 % renewable electricity that is contractible even in small amounts by all consumers;
- A PV equipment **programme for Schools and Training Centres**.

The first 2 years have shown very positive results mainly for the Solar Power Bidding: the price for complete PV systems has fallen to an average of about 6.300 € / kW, almost 1.5 MW PV-output have so far been approved after 9 bidding dates, more than 300 kW have been realised to date. The average feed-in tariff contracted with Bewag and to be paid for 15 years is now 0.37 €/kWh with an additional investment funding of 3.150 €/kW. For the monitoring process Bewag has contracted the well established and respected World Wildlife Fund (WWF).

The local **gas supplier GASAG** signed a similar cooperation agreement for "**Climate Protection and non-polluted Air**" (1998-2001). The budget of 0.5 mill. € allocated for solar collectors was spent after only half a year due to very attractive and unbureaucratic funding conditions.

### 2.2.3 Municipal Funding Programmes

Due to its legal obligations the city of Berlin has reserved some 2 mill. € within its investment funding programme on "**Modernisation and rehabilitation of apartment buildings**" for solar thermal and PV applications on all existing domestic buildings.

Additional funding budgets, supported by the EU, are available within specific programmes targeting the (ecological) infrastructure of small and medium enterprises (SME) or initial investments of new manufacturing companies (creating employment).

### 2.2.3 National Funding Programmes

After a period of stagnation national funding programmes targeted at renewable energy sources are now playing again a decisive role for the future development of solar applications.

The recently established 5-year programme "**100.000 roofs**" (1999-2004) has the objective to support some 300 MW of PV schemes with no-interest loans or equivalent funding. The total subsidies will amount to about 550 m €.

The budget of the existing federal **Funding Programme for Renewable Energy** will be filled with some 90 m € in 1999 and thereafter originating from the new Eco-tax (since April 1, 1999). Besides bioenergy and hydro power the programme will mainly target the installation of solar thermal collectors.

A 10-year programme "**Solarthermie 2000**" started in 1994 with the objective to support large-scale thermal installations and their monitoring on public buildings, especially in Eastern Germany. Upper limits for the specific hot water costs (about 0.15 €/kWh) have stimulated efforts to plan and install cost-effective schemes.

The existing **Housing Programme** for new 1- and 2-family homes supports solar applications with a general funding rate of 2 % per year of the investment costs (or a maximum of 250 €), to be paid over an 8-year period.

#### 2.2.4 Accompanying Measures

A crucial and fundamental factor of the solar success are the accompanying measures. In the past decade the number of acting groups and persons have multiplied. They now offer a broad spectrum of promotional and disseminating activities with specific expertise and institutionalised structures.

To name just a few of the more recent measures:

- **Training activities**, e.g.
  - SolarSchool for architects etc. (German Solar Society with certificates for long-term training of solar experts)
  - Training for installation firms and other professionals (ADAPT-project)
- **Information material**, e.g.
  - Planning guideline for solar thermal applications
  - Directory of manufacturers and installation firms
- **Seminars and Workshops**, e.g.
  - Seminars for decision-makers in housing companies
  - Scientific Dialogue Forum
- **Exhibitions and Fairs**, e.g.
  - "Solar Energy Berlin 1999"
  - Solar Capital Berlin
- **Information and Promotion Campaigns**, e.g.
  - Internet Presentation (<http://www.solarinfo.de>)
  - Mobil advice service for SME's
  - Berlin Solar Campaign
  - National campaign with installation firms, 1999-2003 ("Solar-of course !", <http://www.solar-na-klar.de>), funded with 2 mill. €. The aim of this campaign is to increase the number of collector area by 6 times. In May 1999 3,500 installation firms had registered for participation.
- **Research and Development**, e.g.
  - Technical University: Long-term effects of PV modules
  - Hahn-Meitner-Institute: New material for PV cells
  - Ecological effects of collector components

- **Participation in EU-projects**
  - ALTENER 1999/2000: "Voluntary agreements and Contracting for solar thermal applications" (Co-ordinator is Berlin Energy Agency with partners from Austria, Spain and Greece)

### 3. RÉSUMÉ

Even in a period of tight budgets on the local and national level a co-ordinated approach and a firm objective to promote the use of solar energy can lead to a road of success. The involvement of private actors that support public ambitions is a necessary, if not even fundamental, prerequisite for the introduction of solar technologies. Pilot projects, even if they are not viable in economic terms, have to be realised to offer a show-case and collect experience in practice. A broad range of accompanying measures, especially training programmes and information campaigns, for different actor groups, have to be implemented to act as the fuel for the "solar motor".