



Outcomes and Conclusions

International Workshop
Photovoltaic Solar Power in European Cities
sun21, Basel - Switzerland
21st September 2001

prepared by the project team
“Photovoltaic City Guide”

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Framework

The international workshop “Photovoltaic Solar Power in European Cities” was organised as part of the EU project “Photovoltaic (PV) City Guide” and held on September 21st, 2001, within the 4th International Energy Forum **sun21** in Basel, Switzerland. The project “PV City Guide” addresses the application of photovoltaics in the urban environment and seeks to provide concise and simple-to-use approaches to this energy topic of growing importance. More detailed information, references and links to websites can be found on the PV City Guide website (<http://pvcityguide.energyprojects.net>).

The main sponsors of the project and the workshop are the European Commission (DG TREN) and the Swiss Federal Office of Education and Science; the workshop was also supported by the Canton of Basel Region as well as the multi-utility of the City of Basel.



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Kanton Basel-Landschaft
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Objectives

The international workshop “Photovoltaic Solar Power in European Cities” had the objective of being a forum for exchange of information and experience between different stakeholders regarding applications of photovoltaics in the urban environment. At the same time, it was intended to be an occasion of active dissemination and feedback for the PV City Guide which is in its final phase.

Following presentations from different perspectives in the morning, the workshop sessions in the afternoon aimed at developing further ideas for the subject of photovoltaics in the urban environment. Starting from the three main subjects:

- City policies, legislation and framework,
- Urban and building design,
- Project management and implementation,

the topic was to be addressed in an integrated way, allowing critical factors to be identified. Acknowledging the present situation, a central question to be discussed was how to proceed from individual projects to programmes of photovoltaics in the urban environment.

Finally, the workshop also intended to serve as a platform to initiate or contribute to possible new projects of a similar kind.

Participants

The main target audience of the workshop were building and energy professionals within urban planning and design, energy planning and public authorities having an interest or experience in the application of photovoltaics in the urban environment. Further targeted sectors were photovoltaic project developers and architects.

The workshop was attended by almost 50 professionals from all over Europe with a good mix between the different actors involved. Attendance covered both experienced professionals in photovoltaics in the urban context and newcomers to the topic. This broad mix allowed for fruitful discussions and an understanding of the different stakes at hand.

Workshop programme

When	What		
09.00 - 09.30	Registration and welcome coffee		
09.30 – 10.00	Introductions		
10.00 - 11.00	Session 1: City policies, legislation and framework		
11.00 - 11.30	Refreshments and coffee break		
11.30 - 12.10	Session 2: Urban and building design		
12.10 - 13.10	Session 3: Project management and implementation		
13.10 - 14.15	Lunch break & coffee		
14.15 – 16.15	Parallel sessions		
	Session A City policies, legis- lation and framework	Session B Urban and building design	Session C Project manage- ment and implementation
16.15 - 16.45	Conclusions		
16.45 - 18.00	Apéro together with Swiss Solar Prize Awards		

Parallel exhibition, events and infrastructure

- Presentations and exhibition in the hall (exchange forum)
- Information and documentation on topics presented
- Photovoltaic City Guide desk
- Swiss Solar Prize Awards

Summary of the plenary session

Introductions:

- **Stefan Nowak**, NET, Switzerland, member of the project team “PV City Guide” and Chairman of the IEA PVPS Programme welcomed the participants to the workshop and stressed the objectives and expected outcomes of the workshop.
- **Peter Gloor**, Vice chairman of the Council of the Region TriRhena addressed a welcome speech from the regional perspective of the Trinational Organisation in the Upper Rhine Area.
- **Eckart Würzner**, Vice Chairman of Energie-Cités and Deputy Mayor of Heidelberg addressed a welcome speech on behalf of the network Energie-Cités and stressed the perspective from a city policy point of view.
- **William Gillett**, European Commission, DG TREN, presented recent EU policies related to the subject of the day and indicated the general interest for new ideas in this area.

Session 1 – City policies, legislation and framework

- **Mike Barker**, Institut Cerdà, Barcelona, presented the experience of the City of Barcelona with the realisation of PV projects, emphasising the importance of political commitment in overcoming the many barriers to the first projects and also in capitalising on these demonstration projects to produce policy and ultimately more rational energy use including the use of renewable energy sources.
- **Zeno Winkels**, Energy Agency, Delft, presented the approaches of the City of Delft including the Blue Roof Programme.
- **Hartmut Murschall**, Ministry of Housing and Construction, North Rhine Westphalia, presented the concept of 50 solar energy housing estates, highlighting four realised case studies.

Session 2 – Urban and building design

- **Randall Thomas**, Max Fordham & Partners, London, presented recent approaches to the application of photovoltaics in the urban context, highlighting a number of projects and studies in the UK.
- **Marco Sala**, University of Florence, discussed the application of photovoltaics in buildings in contrast with urban conservation in historical cities, presenting some recent projects in Florence.

Session 3 – Project management and implementation

- **Klaus Heidler**, Solar Consulting, Freiburg, emphasised the important role of solar marketing and presented concrete approaches to this topic in Southwest Germany.
- **Michael Sillén**, City of Malmö, presented the project Bo01 City of Tomorrow in Malmö which includes different solar projects, both PV and solar thermal applications.
- **Murray Cameron**, European Photovoltaic Industry Association, addressed the topic from the PV industry's perspective highlighting the impressive targets of the PV industry for 2010 and beyond.

Conclusions for parallel session A: City policies, legislation and framework

On the topic of PV policy 5 introductions were made. The essence of these introductions were:

Mike Barker: From demonstration projects to strategic policies and specific targets - the experience of Barcelona City with photovoltaics

The results in Barcelona (Spain) show the importance of political dedication towards solar energy and a (beautiful) demonstration project. During the demonstration project, lots of barriers within the municipality had to be overcome, but with the right political support and persistence they succeeded. As a result important follow-up projects stand in line, for example the goal to integrate PV in an area to be developed for the event 'Forum Universal de las Culturas-2004'. Also important is the directive; all new and renovated building projects are obliged to use solar energy to produce 60% of their running hot water requirements.

Zeno Winkels: Delft's Blue Roof Programme

The case of Delft (The Netherlands) shows the importance of an extra stimulating player. The Delft Energy Agency (DEA), together with the local utility and the municipality succeeded in the set up of a PV project where different building integration techniques will be shown to the public. Also, the DEA contributed to a large response to a PV campaign for citizens (400 PV modules sold).

Hartmut Murschall: 50 Solar Energy Housing Estates in North Rhine-Westphalia

In North Rhine-Westphalia (Germany), a state support for PV has been arranged (50 Solar Houses Estate). The results of the arrangement and the realisation of the 20 PV projects show some important points to note. First, man has to be aware of the conventional building demands of developers and architects. Not everyone is instantly in favor of the use of PV. Second, the integration of PV must not result in higher building costs. The challenge must be to minimise the extra costs, otherwise complex and lasting discussions will occur. Third, the integration of PV is closely related to matters of urban development. An integrated process is necessary to guarantee sustainable but also attractive housing. This is an important responsibility of municipalities.

Peter Schilken: Critical factors for photovoltaic policy and projects - experience from Energie-Cités members

In the promotion of PV project development on the local level, Energie Cités developed a number of PV Case Cards. In this Case Cards examples are given of:

- How to go from one project to structural policy
- Organizing the urban development process in favour of PV integration
- Marketing campaigns

Michael Bächlin: Solar electricity in the City of Basel - Urban energy policy and approach of the multi-utility of Basel

An example of the Solar Stock Exchange (SSE) in Basel shows the importance of combining the different available instruments.

- Legal measures: the SSE was implemented by local law.
- Financial measures: the solar electricity was subsidised by 40%, partly by a small electricity levy for everyone.
- Marketing: a large marketing campaign supported the SSE. Within the frame of the SSE, 600 kWp of solar power has been installed.

Topics during the discussion:

1. The availability of a non-commercial specialised project agency is important to stimulate renewable energies on a local level. Reasons are:
 - They are easy to contact for questions
 - Free support
 - Long term scopeAn active network of all project agencies - exchanging information and experience - could be of great help.
2. About the instruments on the local level
 - financial support (either in form of subsidies or discounts of 'groundprices') remains important.
 - the importance of good marketing is underestimated; PV is a product without direct financial revenue that simply has to be sold.
3. Knowing that a lot of PV policies are mainly driven and supported by the local utility, the liberalised energy market (merges between utilities) can be a threat. Otherwise, it can also be an opportunity; stimulating PV can be part of an image campaign of utilities.

Conclusions for parallel Session B: Urban and building design

Three speakers made the introductory contributions to the session B.

Christian Meier: Photovoltaics in the City of Zurich - realisation of projects and opportunities

A key point was a search for synergies. He explained a new concept: photovoltaic modules that are as big as a bear. 3 m high, 1.3 m wide which were used on a Zurich office building. The synergies were the various functions PV modules performed on a atrium roof:

- weather protection
- daylight use
- thermal insulation
- shadowing
- glare protection
- solar electricity
- architectural design.

The electricity prices that resulted were very competitive in the renewables market.

Astrid Schneider: Photovoltaics between governmental installations and artistic expression - the power of photovoltaics

She spoke about a solar supplied Governmental quarter in Berlin which had 10 000m² of photovoltaics (800kWp). The systems were mainly put in areas on the roof where they could not be seen which is what the architects wanted! Another issue she pointed out was the use of photovoltaics on façades. Their advantage is high visibility. Their disadvantage is 25% more expensive and 25% less effective. Thus it is double the price. Her presentation concluded with a delightful display of coloured glass and coloured photovoltaics on a façade for a library demonstrating that the scope for innovative photovoltaic design is limited only by the imagination.

John Mardaljevic: Irradiation and illuminance in urban settings - modelling and prerequisites for solar urban design

He talked about modelling for solar urban design in real situations with lots of shading. The key features of the modelling included:

- Accurate prediction of the annual solar irradiation using hourly data
- His images were astonishing and varied from a block in Leicester to most of San Francisco. You could clearly see by different colours which areas were most suitable for PVs.
- Because the views are from above you could also see the extremely important issue of rights to light.

The group discussion was productive and wide-ranging. The group felt that an attempt had been made to address all the design issues of the PV industry in the course of 2 hours and that the success had been in highlighting the wide range of this subjects as much as in addressing specific issues. A table was distributed to all those present summarising key issues to be considered in urban and building design (see below).

	Solar urban design	Solar building design
Opportunities	<ul style="list-style-type: none"> Active contribution to urban energy needs, pollution reduction and sustainable development Design criteria coherent with improvements in the quality of urban life Innovative design focus Publicity and promotion value Educational value for present and future generations 	<ul style="list-style-type: none"> Improved / innovative appearance Multifunctionality Integration There is the possibility of developing modular components that allow for easy upgrading over time Solar can be linked to efficient heating and ventilating systems employing heat recovery
Barriers	<ul style="list-style-type: none"> Conflicts with other urban design requirements Lack of awareness in both private and public sector Lack of education, educational material and professional training Cost 	<ul style="list-style-type: none"> Lack of professional awareness Lack of client sensitivity/interest Cost Lack of knowledge by individual contractors so the price is driven up Appearance can be a barrier
Prerequisites	<ul style="list-style-type: none"> Right to natural light Lack of topographical obstacles / impediments Lack of historical, cultural or legislative barriers Commitment by client and design team Evaluation techniques to determine the contribution photovoltaics will make 	<ul style="list-style-type: none"> Consideration from earliest pre-design discussions onwards Inseparable integration in total building budget Good design which allows for maintenance and is simple
Key factors	<ul style="list-style-type: none"> Density of development Orientation Obstruction heights Reflectance etc. Monotony in PV forms must be avoided The urban design must be viewed as a whole. Photovoltaics, vegetation, transport routes need to work together Clarity in what the design is setting out to do e.g. is it photovoltaics to reduce overall CO₂ production, or to reduce on-site cost of electricity Reduction in demand 	<ul style="list-style-type: none"> Specification of architectural requisites Specification of energy production requisites and criteria Agreement of relative importance of design and electricity production External conditioning factors such as: available financing, urban and building regulations, etc.

Conclusions for parallel session C: Project management and implementation

The leading question of session C has been “How to manage network, interaction, process and key factors for a successful solar project management and implementation in the urban context?” Twelve delegates attended this session trying to give an answer to this crucial question; three oral presentations were held, followed by an in-depth debate with active contributions from the audience.

Christoph Tanner: Interaction processes between city authorities and building investors

The presentation dealt with the successful implementation of PV projects achieved in the Canton of Basel thanks to the financing mechanism of the “Solar Stock Exchange”.

Isabell Michel: HIP HIP – House Integrated Photovoltaics Hightech in Public

The project - supported by the EC within the Fifth Framework Program – aims at realising in six European countries BIPV plants for a overall capacity of 3 MW_{peak} by reducing the price to 5 €/ W_{peak}.

Peter Toggweiler: International networks for photovoltaics in buildings

The presentation dealt with the project Enerbuild, aimed at creating a European Thematic Network for Energy in Buildings and supported by the EC within the Fifth Framework Program (further information on www.enerbuild.net) and the IEA PVPS Task 7 initiative “Demosite” (information on www.demosite.ch), an exhibition center for PV integration in the urban environment.

The three presentations were the starting point for an interesting discussion on what is important in order to successfully implement PV systems integrated in urban buildings. During the debate it was pointed out that different actors are involved in the implementation of PV applications in the urban context; among these actors, a crucial and central role is surely played by municipalities and local authorities. Municipalities in fact are responsible or have competencies for:

- Regulations of building construction and renovation
- Urban planning
- Energy planning
- Dissemination of information to the public
- Motivating citizens and other potential actors

The main results of the session can be summarised as follows:

- It is important to build a “bridge” between the authorities, investors and experts
- Technical problems in general can be solved but other barriers, mainly financial and administrative, can definitely hinder PV projects . In this sense, the economic barrier – that is the higher cost of the electricity produced by means of photovoltaic generators – can be removed if the real cost of the energy produced from conventional energies was taken into account
- In general, the conditions for the implementation of BIPV projects are different according to the country; for example, while in Switzerland in general the interest rates of loans for PV projects are higher than common rates, in the Netherlands they are in general 1-2% below the interest rate used for financing the purchase of houses. Another example is the different “awareness” and “sensitivity” to this kind of projects perceived in some countries (e.g. Germany, the Netherlands, Switzerland) in comparison with others (e.g. Italy)

Some recommendations were given to answer the initial question:

- Solar marketing can be an important instrument for the promotion of photovoltaic projects
- On-going education of young people is crucial to achieve improved awareness of photovoltaics in the long term.
- Training activities of the relevant actors (architects, installers, technicians of municipalities, etc.)
- It is important to present photovoltaic projects to municipalities in a simple and professional way, as well as highlight the prestige of photovoltaic projects, the social and environmental benefits.

Conclusions of the workshop

Context

The importance of the development of renewable energy sources is now internationally recognised at the highest level as evidenced not only by European and national policy documents but also by declarations from the recent G8 conference in Genoa.

At the European level, ambitious targets have been set for the development of solar, photovoltaic, electricity (3 GW by 2010). A key question is how the relatively small amount of European funding available can be best spent to stimulate activity to achieve and surpass this target.

The European photovoltaic industry is confident that these targets will be met and is eager for them to be more ambitious.

To summarise these contextual conclusions, the future for solar electricity is bright in the mid-term but there is uncertainty regarding the route that will be taken in the immediate future in order to get there.

Challenges

Costs continue to be a preoccupation

Ultimately costs will be reduced by industrial investment to increase the scale of solar cell production and annual output. To encourage such investment, financial support and incentive programmes must provide some stability. They must not be here this financial year and maybe gone the next but ideally would last for at least two investment cycles (about seven years).

Cultural factors are of key importance in relation to the adoption of innovative technology and building practice. This is important to remember when we are trying to exchange experiences and best practice at the European level.

Promotion of projects

Only about one in ten of the initial ideas and expressions of interest in urban, building related, solar electricity projects, actually get built. This indicates that either many expressions of interest come from people with very little or misguided understanding of the technology or that it is difficult to successfully take a project from initial design to reality. Either way, the following conclusions are all relevant:

To focus promotional and commercialisation activities, whether for public support schemes or private businesses, it is vital to identify the key actors and then convince them of the value of solar energy. For example in Delft (The Netherlands) more than half the housing stock is owned by four housing associations. Talking to the chief executives of these four companies has ensured the success of programmes there.

Political commitment at a local or regional level is essential for promotional measures to be effective. Good marketing: identification and targeting of specific market for specific products is the key to capitalising on promotional opportunities.

Whilst photovoltaics remains relatively expensive compared to other energy sources, it is important to identify and communicate the added value of, particularly building integrated, photovoltaic systems.

Conclusions for the workshop and the project “Photovoltaic City Guide”

The scope of the workshop is very ambitious: one day is very little time to address all the issues presented. In terms of the range of people who have attended the workshop, the information contained in the presentations and proceedings and the inter-exchange of know-how achieved in the workshops, the event is considered a success by the organisers. Whether this opinion is shared by those who have attended remains to be seen (any feedback is welcome).

The workshop has been part of an European Commission supported project that is also producing a guide for urban photovoltaic development. The guide is aimed primarily at municipalities though also at building professionals. A draft copy forms part of the proceedings and it is hoped that participants will review this draft and provide feedback by e-mail or fax (a feedback form is also included).

Those who have attended represent a wide range of companies, institutions and networks with common interests in sustainable development. It is hoped that this workshop will serve to stimulate new initiatives amongst these entities to promote the use of photovoltaics in urban areas.

Finally, thanks to the European Commission for their support of the project, to Energie-Cités for their collaboration and, in particular, to Marcel Gutschner of NET Ltd, for leading the preparation work for this workshop.

For further information

Further information on the “PV City Guide” Project and the international workshop “Photovoltaic Solar Power in European Cities” can be obtained from the members of the project team:

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or from the project website: <http://pvcityguide.energyprojects.net>