

## TASK 10 – URBAN SCALE PV APPLICATIONS



Fig. 1 - Task 10 2nd Technical Experts Meeting, Florence, Italy, October 2004.

### OBJECTIVE

The objective of Task 10 is to enhance the opportunities for wide-scale, solution-oriented application of PV in the urban environment as part of an integrated approach that maximizes building energy efficiency and solar thermal and photovoltaics usage. Value analysis, policy incentives, analysis tools as well as system design and integration that have proven successful in the participating countries will be developed to the extent possible into a uniform international set of tools for the global market. This will be accomplished through:

- making connections between the building design and development industry;
- deriving recommendations for stakeholders to remove barriers to mass market uptake of photovoltaics;
- developing system components, design and applications with the largest global market penetration potential, including aesthetic values as well as the mechanical and energy related values;
- expanding successful tools (models, roadmaps, guides, system integration, etc.) and analysis relevant to the needs of the emerging global markets;
- identifying gaps in currently available information and developing products to fill those gaps;
- developing materials and holding events targeted at meeting the needs of specific groups of stakeholders; and
- providing continuous communication, promotion and education throughout the period of the task.

In line with the objectives, the short term goal (5 years post) of the Task is to have a clear definition of the global market and all associated values, resulting in stakeholders considering urban scale

PV in their respective spheres of activities. The Task's long term goal (10 years post) is for urban-scale PV to be a desirable and commonplace feature of the urban environment in IEA PVPS member countries.

Task 10 work initiated in January 2004. The task will require a 5 year period to complete.

### APPROACH

There will be four subtasks in Task 10. The total range of deliverables has been designed comprehensively to include and meet the various needs of the stakeholders who have been identified as having value systems which contribute to urban-scale PV. The deliverables are designed to optimise usefulness to the stakeholders and have multiple communication and promotion scenarios. Although each of the deliverables is a separate product which can be developed independently from all the other deliverables, the relationship between deliverables will be cross-referenced or data based as appropriate. Through developing and producing these deliverables, Task 10 will contribute to achieving the vision of mainstreaming urban-scale PV. The comprehensive list of targeted stakeholders is:

- **Building Sector:** builders and developers, urban planners, architects, engineers, permit and code authorities;
- **End-Users:** residential and commercial building owners;
- **Government:** supporting, regulatory and housing agencies;
- **Finance and Insurance Sector:** banks, insurance companies, loan for houses
- **PV Industry:** system manufacturers, PV system supply chain, retail sector;
- **Electricity Sector:** network and retail utilities; and
- **Education Sector.**

### SUBTASK 1: Economics and Institutional Factors

This subtask seeks to provide opportunities for stakeholders to look beyond a single-ownership scenario to the larger multiple stakeholder value. In this way, utility tariffs, community policy, and industry deployment strategy can be used to create scenarios which combine all stakeholder values to the PV system investor through sustained policy-related market drivers. Australia leads this subtask. Activities will include:

#### Activity 1.1: Value Analysis

This activity will develop a value matrix of stakeholders by the extended value stream beyond the economic market drivers (the market drivers will be included), allowing individual stakeholders to realise a full set of values. Australia leads this activity.

**Progress** includes a stakeholder value survey developed and implemented with the participating technical experts as well as other interested countries. The results of the survey will be presented in a paper at the PVSEC conference in Barcelona, Spain in June 2005. Additionally, the US has developed analysis on government stakeholder economic values such as emissions, health care cost and water consumption reductions, jobs, gross regional product, and household incomes.

#### Activity 1.2: Barriers Resolution

Recommendations to stakeholders will be developed for removing barriers to mass market uptake of PV. Australia leads this activity.

**Progress** includes the development of a barriers survey which will be implemented in 2005.

#### Activity 1.3: Market Drivers

Building upon existing lessons learned with financing, policy, environmental and rate structure issues this activity will analyse the economic contribution of these market drivers and developing best practice scenarios. Australia leads this activity.

**Progress** includes the collection of individual country's analysis. The surveys in activities 1.1 and 1.2 will be used to determine priorities for the global analysis.

#### Activity 1.4: Market Roadmaps

Using participating country industry roadmaps, either a global market roadmap or a roadmap of global markets will be developed. Either product will serve as a guide for roadmap development. The United States leads this activity.

**Progress** on this activity includes analysis of the European Industries Association Roadmap, the US Industry Roadmap and the Australian Industry Roadmap.

### SUBTASK 2: Urban Planning, Design and Development

This subtask focuses on infrastructure planning and design issues needed to achieve the vision of a significantly increased uptake of PV in the urban environment. The subtask will integrate PV with standard community building practices.

#### Activity 2.1: Integrating PV Development and Design Practices

This activity will develop guidance for integrating PV into standard whole building design models, rating tools, and building development practices. Emphasis will be placed on the building integration properties of PV for efficiency gains.

#### Activity 2.2: Urban Planning

A guide will be developed for integrating PV and the whole community energy infrastructure element into urban planning practices through a guide providing processes and approach for setting quantifiable urban-PV goals and objectives in the planning process. Architectural considerations such as building aesthetics, land use, shading, and urban renewal opportunities for BIPV will be included as planning elements. Additionally, community energy use forecast and planning impacts related to the whole building approach and coordinated utility or community system load control to increase demand reduction and increase PV capacity value. The US leads this activity.

**Progress** on this activity includes analysis of 12 US communities that have taken steps to renewable and efficiency technologies into urban planning. The analysis will be presented at the PVSEC in Barcelona Spain, June 2005, and is developing an input template for the other participating countries to collect similar data.

### SUBTASK 3: Technical Factors

This subtask concentrates on technical development factors for mainstream urban-scale PV. Large-scaled urban integration of BIPV systems faces technical challenges related to synergetic use as building material and for energy supply purposes. Other challenges involve the potentially negative impact on the grid and obstacles posed by the regulatory framework. The aim of this subtask is to demonstrate best practices and to advocate overcoming those barriers associated with extensive penetration of BIPV systems on urban scale. The deliverables focus on the broad set of stakeholders required to achieve the vision such as the building product industry, builders, utilities and PV industry.

#### Activity 3.1: Building Industry/BIPV Products and Projects

By identifying the building material and energy use synergies of PV and of BOS as well as updating the existing Task 7 database of products and projects for BIPV, guidance will be developed for mainstreaming these products in the building industry. A major aspect of the building integration will be building energy management integration and coordinating energy use with lighting and HVAC systems to assure demand reduction and capacity value. Canada is the lead for this activity.

**Progress** includes the development of a detailed workplan entitled "Residential Urban BIPV in the Mainstream Building Industry" presented at the October technical experts meeting for critique and input. Additionally, Malaysia presented the Country's BIPV development program plan, which could potentially serve as a guide for other countries as well as communities program development.

### Activity 3.2: Codes and Standards

Existing codes and standards applicable to urban scale PV and the needs for developing new codes and standards will be evaluated. Both electrical and structural codes will be evaluated as related to buildings. Network codes and standards will be evaluated in a separate activity. This work will build upon work initiated in Tasks 5 & 7.

### Activity 3.3: Electricity Networks

This activity will analyse electricity network effects, benefits, impacts, and issues. Interconnection, operational effects, and market issues will be included.

**Progress** includes the collection of analysis of PV's contribution to peak load reduction in both Australia and the US.

### Activity 3.4: Market Driven Approach

The US developed systems driven approach to research and development will be expanded to the global market by i) establishing a benchmark of current system component cost and market penetration relationships; ii) testing benchmark relationships with existing and potential future system designs, applications, building integration and operational economics; and iii) documenting relationship between research investment in system component development and market penetration.

**Progress** is the initiation of work on a Canadian contribution focusing on the Mass Customising Photovoltaic Solar Homes in Subdivision Development.

### Activity 3.5: Certification Practices

Certification practices will be reviewed and standard test procedures harmonized and transferred to the relevant stakeholders and standard committees.

### SUBTASK 4: Targeted Information Development and Dissemination

This subtask will carry out the information dissemination of all deliverables produced in Task 10. As activities develop in other subtasks, subtask 4 will review to assure the results are useful to the targeted stakeholders. Participating countries will be encouraged to translate documents and workshop materials. This task will also organise countries to host technical development and education workshops. The subtask will also prepare mass/multi-market promotional material about urban-scale PV and will update existing

**TABLE 1 LIST OF PARTICIPANTS AND THEIR ORGANISATIONS**

| COUNTRY     | PARTICIPANT  | ORGANISATION   |
|-------------|--|--|
| Australia   | Mrs. Georgine Duncan                                   | Origin Energy  |
| Austria     | Mr. Reinhard Haas<br>Mrs. Assun Lopez-Polo             | Institute of Power Systems and Energy Economics<br>Energy Economics Group<br>Vienna University of Technology                   |
| Canada      | Mr. David Elzinga<br>Mr. Masa Noguchi                  | Arise Technologies Corporation<br>NRCan/CANMET Energy Technology Centre - Varennes   |
| Denmark     | Mr. Kenn Frederiksen                                   | Energimidt Erhverv A/S   |
| France      | Mr. Marc Jedliczka<br>Mr. Bruno Gaiddon                | HESPUL   |
| Italy       | Mr. Francesco Groppi<br>Mr. Gianluca Tondi             | CESI S.p.A.<br>ETA Renewable Energies  |
| Korea       | Mr. Suk-Hyung Lee                                      | Daegu City Gas Co., Ltd.   |
| Malaysia    | Mr. Ahmad Hadri Harris                                 | Malaysia Energy Center, PTM  |
| Portugal    | Mrs. Maria João Rodrigues                              | Center for Innovation Technology and Policy Research<br>Instituto Superior Técnico (Technical University of Lisbon)            |
| Spain       | Mrs. Estefanía Caamaño Martín<br>Mrs. Ana Rosa Lagunas | INSTITUTO DE ENERGÍA SOLAR E.T.S.I. Telecomunicación, Ciudad Universitaria s/n<br>Centro Nacional de Energías Renovables CENER |
| Sweden      | Mr. Mats Andersson                                     | Energibanken AB  |
| Switzerland | Mr. Peter Toggweiler<br>Mr. Daniel Ruoss               | Enecolo AG<br>Enecolo AG   |
| USA         | Ms. Christy Herig                                      | Segue Energy Consulting/Subcontractor to National Renewable Energy Laboratory  |

PV education tools. An innovative deliverable will involve holding a competition for urban-scale PV with the winner of the competition announced at a forum on PV for the venture capital sector. Market research for the purpose of understanding and targeting stakeholder perceptions will also be part of this subtask. Finally, this task will be responsible for continuous outreach to stakeholders for input and participation in the task.

France is the Subtask leader.

#### Activity 4.1: Educational Tools

Sweden leads this activity.

This activity will include a best practices web site which will include templates for tender documents, sales contracts, consumer guides, as well as best practices, detailed real project development information.

**Progress** has been made through the collection of templates and the Swedish web site Sol Cell.Nu has been identified as the host for this information.

#### Activity 4.2: Competition

**Progress** will occur in March of 2005 when Portugal will launch the Lisbon Ideas Challenge - Designing with Photovoltaics: New Energy Concepts for the Built Environment.

#### Activity 4.5: Continuous Communication

France leads this activity.

**Progress** includes three 2004 workshops, a task 10 brochure and a fully active website.

### INDUSTRY INVOLVEMENT

An integrated multidisciplinary approach involving all stakeholders will be used in carrying out the work in Task 10. The PVPS Programme will be the managing Implementing Agreement for the Task, but to assure the results contribute effectively to wider whole-of-building integrated urban-scale efforts, the Task will actively coordinate with several IEA Implementing Agreements. The approach recognizes that optimising good design and solar thermal and PV potential and maximizing their synergies will require cooperation of a number of the Implementing Agreements (particularly the Photovoltaic Power Systems Programme, the Solar Heating and Cooling Programme, and the Energy Conservation in Buildings and Community Systems Programme). To assure coordination, implementing agreement liaisons will be established in order to participate in Tasks and Subtasks (and potentially activity level endeavours) contained in other implementing agreements.

### KEY DELIVERABLES (PLANNED 2004)

- 2nd International Symposium, Photovoltaic-Electricity From the Sun, February 11, 2004, Vienna - Austria.
- Oral Paper Mainstreaming PV in the Urban Landscape - Activities of the New Task 10 IEA PVPS Implementing Agreement, 19th PVSEC, Paris, France, June 2004.
- Architects and Builders workshop for French stakeholders during the 19th PVSEC, Paris, France, June 2004.
- Brochure/flyer for outreach to stakeholders.
- Task 10 website with front end for stakeholder outreach and Task 10 participants' password accessible working platform.
- Italian Stakeholders Workshop, PV integration in urban areas, October 6, 2004 Florence, Italy.

### (PLANNED 2005)

- Workshop targeted at all building sectors, Photovoltaics in Buildings: Opportunities for Building Product Differentiation, Lisbon, Portugal March 16th, 2005.
- Workshop targeted at government stakeholders, Washington DC, October, 2005.
- 2 abstracts submitted to the ISES conference in Orlando, Florida, USA, August 2005.
- 2 abstracts submitted to the 20th PVSEC, Barcelona Spain, June 2005.
- Best practises website.

TABLE 2 - MEETING SCHEDULE  
(2004 AND 2005 PLANNED)

| TASK 10 MEETING                      | DATE              | PLACE               |
|--------------------------------------|-------------------|---------------------|
| 1st Task 10 Technical Experts        | Feb. 4-5, 2004    | Vienna, Austria     |
| 2nd Task 10 Technical Experts        | Oct. 4-5, 2004    | Florence, Italy     |
| 3rd Task 10 Technical Experts        | March 17-18, 2005 | Lisbon Portugal     |
| Combined 26th Task 1 and 4th Task 10 | June 1-3, 2005    | Lyon, France        |
| 5th Task 10 Technical Experts        | October 6-7, 2005 | Washington, DC, USA |