PV Policy Group

Summary and Conclusions

Summary and conclusions of the PV Policy Group project

Supported by

Intelligent Energy Europe

IMPRINT

This text has been prepared in the frame of the PV POLICY GROUP project with the support of the "Intelligent Europe" programme (EIE/04/058/S07.38564). It complements the project deliverable "Designing Photovoltaic Policies in Europe: Joint Position Paper and Action Plan of the PV Policy Group on Photovoltaic Policies in Europe". It summarizes the project results and draws conclusions of the project running from January 2005 to April 2007.

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Print and Layout:
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April 2007

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I. CONTEXT, SET-UP AND PUBLICATIONS OF THE PV POLICY GROUP

The photovoltaic (PV) sector currently is one of the fastest growing industries worldwide. On the surface, Europe – with an installed capacity of 1.79 GW[1] (2006: 2.9 GW[2]) – contributes significantly to this development. Closer examination, however, reveals that considerable PV market deployment takes place only in a few EU Member States: Germany accounted for 85 % of the European PV capacity in 2005 followed by only eight countries in which the installed capacity exceeded 10 MW, in 2006 this market situation hasn't changed significantly. In some countries an originally promising development even nearly stopped because of deteriorating conditions. However, thanks to political action in a few countries, especially Spain, Italy, Greece and France, considerable growth can already be observed or is expected in the near future.

The PV Policy Group is composed of eight energy agencies from key „solar nations" (Austria, France, Germany, Greece, the Netherlands, Portugal, Slovenia and Spain), the European Photovoltaic Industry Association (EPIA), and a recognised consultant, WIP, with a long standing expertise in the renewable energy sector. The Group has been constituted with the objective to stimulate political action throughout Europe for the improvement of political-legal conditions for PV. The Group has been active in defining common recommendations and actions for the improvement and alignment of national and European PV policies.

The project aims to overcome political-legal barriers that are currently preventing investments in the majority of European PV markets:

- Lack of political commitment, effective incentive schemes and straightforward undiscriminating administrative framework conditions;
- Insufficient and disparate monitoring systems;
- Lack of co-operation between key actors in the definition of political action, especially on cross-national level.

Against the background of an overall PV strategy the group dealt with three major policy areas:

- Regulatory frameworks for PV
- Financial support schemes for PV
- Monitoring systems for PV

In all these policy fields, there is high potential for improvement, which was explored by joint efforts of the PV Policy Group, in terms of assessment, exchange, policy proposals and, last but not least, own action proposals.

Main Results

The main results of the project are the following:

- **European Best Practice Report**
  Comprehensive study aiming at comparing, assessing and informing about the existing legal and political framework for the promotion of photovoltaics in 12 countries:
  - **Country Analysis** in order to inform on 12 national markets and political frameworks;
  - **Benchmark Analysis of the 12 national frameworks** in order to assess and compare their effectiveness and efficiency;
  - **Information on best practices** by presenting complex research findings in user-friendly way and disseminating the report to target groups across Europe.

- **National Position Papers and Action Plans**
  Political action on national level is crucial for the market introduction of PV. Therefore, each of the eight partner countries has presented recommendations and action plans to national policy makers and target groups. The National Position Papers and Action Plans have been elaborated in accordance with the national context, the level of market development and existing legislation.

- **Joint European Position Paper and Action Plan**
  Following the analysis of existing policies concrete recommendations for PV policy design on national and EU level were elaborated in a Joint European Position Paper. In addition, the members of the PV Policy Group propose own actions to actively contribute to the solution of the most important tasks in PV policies that derive from the recommendations of the Position Paper

All **documents can be downloaded** for free from the project website www.pvpolicy.org.

The summaries of the aforementioned publications are presented hereafter followed by overall conclusions on the project.

1 Photovoltaic Energy Barometer; EurObserv'ER; April 2006

2 Estimation by the European Photovoltaic Industry Association (EPIA)

II. EUROPEAN BEST PRACTICE REPORT

Published in May 2006, the European Best Practice Report is a comprehensive study aiming at comparing and assessing the existing political-legal framework for the promotion of photovoltaics in 12 countries. The report served as an important basis for the development of the PV Policy Group's recommendations later in the project.

The Report

Thematically the report focuses on policies for PV market promotion on the national level: demand-side measures defined by governments to improve the attractiveness and security of PV investments for market actors (incl. financial institutions), and therefore to leverage PV market deployment.

Main target groups are political decision-makers on EU, national and regional levels, but also European PV investors (demand side) and the PV industry (supply side).

The objectives and structure of the report can be summarised as follows:

- **Information**: compilation of a detailed inventory of key information on 12 national markets and political frameworks ("Country analysis")
- **Analysis**: unbiased assessment and comparison of 12 national frameworks with regard to effectiveness and efficiency ("Benchmark analysis")
- **Dissemination**: user-friendly presentation of complex research findings for publication and dissemination to target groups across Europe ("Best Practice analysis")

Country Analysis

This section of the study is providing a synthesized overview of the research findings from a comprehensive survey which was conducted in 12 countries (Austria, France, Germany, Greece, Italy, Japan, the Netherlands, Portugal, Slovenia, Spain, Sweden and United Kingdom).

For each country the survey is covering the following topics:

- National PV market
- National PV industry
- National PV strategy and regulatory framework (overview)
- Key PV legislations (esp. feed-in-tariff system)
- Key PV support schemes
- PV monitoring systems

Benchmark Analysis

This section of the study sets a benchmark analysis in order to compare the respective national PV policy frameworks with regard to their overall effectiveness, but also to the efficiency of the implementation of single instruments in practice. In different assessment areas the policies of outstanding countries ("benchmarks") are analysed in greater detail in order to draw conclusions for the other countries lagging behind ("gap analysis"). Overall, the following assessment areas are covered in the benchmark analysis:

- General effectiveness of the national PV policy framework
- Efficiency of single PV policy instruments: PV regulatory framework (legislation)
- Efficiency of single PV policy instruments: PV support schemes (financial support)
- Efficiency of single PV policy instruments: PV monitoring systems

Conclusions and Recommendations

From the comparative analysis of the 12 countries surveyed, the following conclusions can be drawn:

- A consistent PV strategy based on ambitious and long-term targets, a clearly defined implementation programme and a well-conceived mix of instruments becomes the groundwork for success. The basic requirement for each PV policy framework is its longevity and stability. Only under secure conditions will respective target groups (customers and industry) be willing to invest in PV.
- The PV policy framework needs to be carefully designed in accordance with country-specific preconditions.
- Procedures to apply for support and to install a grid-connected PV system should be simple and clear.
- PV policy and market monitoring is crucial on the National and European level.

III. SUMMARIES OF THE NATIONAL POSITION PAPERS AND ACTION PLANS

1. AUSTRIA

Position Paper of the Austrian PV Policy Group

The Austrian PV market is comparatively small since its general conditions are severely affected by the 15 MW-cap restricting the feeding-in of electric power generated through PV. By the end of 2005, Austria's PV capacity installed amounted to 24 MW, thereof 2,9 MW off-grid. In 2005, the electric power generation of nearly 2.000 PV installations with a total capacity of 15.4 MW was financed by feed-in tariffs.
The approval of green electricity facilities is under the responsibility of federal states which often leads to significant differences in approval procedures and requirements. The Green Electricity Act passed in 2003 managed to create standardized conditions with comparatively high and guaranteed feed-in rates and the 15 MW-cap. The amendment of the Green Electricity Act in 2006 removed this absolute cap but claims a yearly cap for available subsidies for each energy resource from 2006 onwards until 2011.
Austrian production companies, well known for the outstanding competences and strengths they have developed in the field of PV in recent years, mostly operate in niche markets for the export market. They have shown a high level of R&D-competence – however, there is still need for improving the co-ordination, cooperation and networking between research activities in general. In the field of facility planning and erection few but very well trained electrical engineering technicians established themselves with outstanding know-how in integrating PV in buildings. The PV Policy Group realizes, that a save home market for PV products is very essential for businesses in the PV sector.
The monitoring of the effects is an essential element of any kind of subsidising system. The mechanism of monitoring the Green Electricity Act is an effective and transparent instrument which provides consistent data for tariff financed facilities. For market monitoring only a minimum system is implemented.

The PV Policy Group concludes that Austria has already developed various competences and strengths in the field of PV components as well as PV applications and therefore fulfils the qualifications to position itself on the PV market in a successful way, not just on a national and on an international level, but especially in niche markets. For this reason PV might have a technological and economic impact in Austria. The biggest dissemination barrier within the Austrian market at the moment is the discontinuity of the subsidy circumstances, which results in a backlog of authorised but not erected facilities. Furthermore the group has formulated recommendations for strengthening the role of PV in the future.

These recommendations include the setting of clear and measurable long-term goals for PV, based on a broad political consensus, the reinforced integration of PV in the building sector, the harmonisation of approval requirements for PV facilities, the development of educational concepts especially for professionals such as architects, planers, electrical engineering technicians and the building industry as well as specific information on PV for the broad public and for experts. Furthermore, the definition and differentiation of adequate feed-in tariffs within a foreseeable long-term promotion scheme is essential while avoiding a cap-scheme completely. Access to subsidies should be made easier and more transparent and market monitoring should be improved by stronger including the market participants.

Action Plan of the Austrian PV Policy Group

This national Action Plan has been developed by the Austrian PV Policy Group, and its eleven members. The national action plan is based on the Group's recommendations formulated in the Position paper. It presents seven concrete steps for actions for the years 2007/2008:

1. *Development of Long-term Goals*
2. *Further Development of the Subsidy System*
3. *The Examination, Possibility and Awareness of PV-Integration in Building envelopes*
4. *Information Offensive for the Knowledgeable Public*
5. *Training activities for professionals and target groups*
6. *Development of a Standardised Austrian Manual of Authorization for PV Installations*
7. *Further Development of Monitoring Activities Through the Participation of the PV Industry.*

2. FRANCE

Several recent measures decided by the French Government, especially the significant increase of the feed-in-tariff and of the tax credit for private individuals, but also the trends in related fields such as the new R&D policy or the recently up-graded thermal regulation in buildings, clearly pave the way of a successful national strategy for PV with two main axis :

- To actually contribute to the development of a strong and cost-effective European PV industry, able to compete at global level
- To orientate this development in priority towards built-integrated PV thanks to the BIPV premium of 25 c€/kWh on top of the 30 c€/kWh basic tariff.

The French PV Community welcomes and supports this orientation, which is consistent with the historical, geographical and social characteristics of France and of the French PV industry.

The choice to favour BIPV adds two advantages to the basic features of decentralised PV:

- the possibility to take benefit from a large range of multi-functional designs such as roofing, water-tightness, sun protection, daylight management or noise protection, a way for reducing the real cost of PV and to offer building designers and architects new opportunities to express their creativity.
- an essential contribution to the concept of « Energy Plus Buildings » which is claimed to be the future standard in the construction sector, complementarily to the low-energy design of the building exterior and of heating and electric devices

Based on this affirmative strategy aiming at making PV commonplace in the built environment, the challenge now will be for the PV industry to form deep and long-lasting bonds with the building industry, both upstream with building component manufacturers and downstream with building designers and constructors.

With the current Silicon feedstock shortage as background, the public and private R&D efforts must considerably increase in quantity and be oriented with three priorities:

- to decrease the costs of Silicon-based industry through cheaper processes in ingot purification (metallurgical channel) and in wafer and cells manufacturing (thinner and larger cells)
- to support the development and the further industrialization of new technologies such as thin films on the short term, organic cells on the mid-term and new concepts on the long term
- to increase the usual life time of PV modules and to favor their design for an easy and harmless recycling as part of a comprehensive approach towards environmental quality and life-cycle analysis.

In addition to the challenges for the industry to increase performance and to decrease costs of PV, the technical, legal, financial and human environments within which PV has to develop are generally unsuited to its characteristics and therefore create many barriers that have to be removed one by one.

Constant and affirmative efforts must be put for overcoming the reluctance from powerful pre-existing competitors of PV and the resistance to change observed on the ground in many more or less directly-related fields.

The main topics to be urgently addressed are:

- the completion of the regulatory framework for grid access, especially for those facilities between 36 and 250 kW connected to the low-voltage grid
- the simplification of procedures, as stressed by the article 5 of the RES-e Directive 2001-77
- the clarification of the tax regime both for the investment and for the power sales that actually apply to the different categories of producers
- the adaptation of insurance and financing products to the technical and economic features of PV
- the adaptation of electric and building norms and standards to PV
- the development and implementation of educational and training courses in all related curricula, form architects and engineers to electricians and roofers.
- the design and implementation of an accurate and efficient monitoring system, addressing both the PV market itself (modules and system sales) and the electricity production mix with view to evaluate and fine tune the French PV support policy.

Most of these issues are already being addressed by official or informal working groups, which must now be reinforced and complemented so as to obtain concrete results within a reasonable time frame.

Thus, the participants of the French PV-policy National Core Group recommend the creation of a French think tank dedicated to medium and long term strategy to develop PV in France.

3. GERMANY

The fast and extremely successful development of the German PV market predominantly is the result of an effective political framework and the Renewable Energy Sources Act (EEG) in particular. Within a short period of time a versatile photovoltaic industry with high-quality jobs and an international technologically leading position have been achieved.

Recommendations for German PV policies

1. Financial PV market support

The establishment of the EEG at the beginning of the year 2000 has lead to increasing production capacities and high output figures resulting in lower production costs and system prices. Between 2004 and 2006 however, a price increase could be observed, that was mainly due to procurement bottlenecks for solar-grade silicon and increasing profit margins in the PV industry. These price increases are only temporary, since the annual decrease of the feed-in-tariff for new PV installations forces the industry to continuously reduce prices. Price reductions since the end of 2006, mainly due to lower demand and a gradual improvement of the procurement situation for solar silicon, confirm this assumption. The continuation of the financial PV market support mechanism according to the principles of the current EEG is therefore recommended.

2. PV market monitoring

Reliable information about the market and its development is an important basis for the further design of PV policies. Despite stricter reporting and publication obligations for grid operators, the implementation of an even more comprehensive monitoring system, which includes a regular and independent evaluation of national PV policies, is recommended. The consideration of different information needs is important for the definition of the data to be collected and the methods applied for data processing and evaluation. The implementation of a monitoring system in Germany should be closely aligned to an EU-wide approach.

3. Regulatory framework conditions

Although the legal complexity of planning procedures is low, especially for small systems, there are some minor issues when applying the EEG. These concern grid connection and access, as well as the determination of the correct feed-in-tariffs for different types of installations. Possible conflicts because of grid overloads caused by renewable power producers and their impact on PV system operation should be legally clarified as well. In order to minimise the conflict potential between system and grid operators, it is recommended to partially concretise the EEG, for instance by providing more exact legal definitions. In addition, the set-up of a database is recommended by which PV system operators have access to a collection of acknowledged administrative codes of practice by grid operators and to PV-related court decisions. The establishment of an independent clearing authority for disputes related to the EEG is also recommended.
To integrate photovoltaics in buildings (BIPV) is often complicated as special permits are required that are very difficult to obtain. The acknowledgement of PV as integrated part of premises in building regulations should be promoted.

4. PV research & development policies

Besides demand-side policy measures, intensive PV research & development is necessary in order to reduce system costs. A large number of publications of several networks and institutions reveals that critical PV research issues are well-known. Although the German Federal Government is already supporting PV research in a targeted way, a further optimisation of PV research policies is feasible. Despite many recommendations on PV research & development issues, a coherent medium- to long-term strategy is missing and should be elaborated by the relevant actors and proposed to the government as a basis for designing future PV research & development policies.

5. Improving the transfer of PV market introduction know how to other EU member states

The examinations made by the European working groups of the „PV Policy Group" have revealed that policy measures for the market introduction of PV - if they exist at all - are widely ineffective in many countries. Due to the success of its own PV policies Germany should offer its know-how to other EU member states but also world-wide, in order to help to create appropriate political framework conditions.

Proposed activities in the German Action plan

- Action 1. Increasing the legal security for the installation and operation of PV systems
- Action 2. Strengthening PV in the built environment
- Action 3. Design and implementation of a PV market and policy monitoring system
- Action 4. Development of a strategic PV research agenda for Germany
- Action 5. Continuation of the „PV Policy Group" project

4. GREECE

Recommendations

In the recently announced programme for PV applications in the mainland and in the islands not connected to the mainland grid, specific targets of 80 MW_p and 120 MW_p respectively until 2010 are required. The programme must support small systems.

The Energy Production Licence should be discontinued for RES plants of less than 50 MW capacity in the mainland grid and less than 10 MW in the island grid. Licenses for the installation and operation of PV systems and from the Town Planning Authority in all these cases should also be abolished with a few exceptions. Installation license must be discontinued for stand-alone PV systems. Licensing concerning forestry usage and adjacency with monuments should be required from a local Prefecture for systems over 500 kW and below 5 MW, or from a District Authority for the ones over 5 MW.

The enactment of the DSO responsible for arranging grid access and connection issues, and the issuing of the relevant grid codes are first priority matters. Grid connection of PV systems installed in the household sector should be straightforward after approval of an application duly submitted in a standard form by the owner. This application must be accompanied by a certification for the technical characteristics of the inverter from a licensed electrician who will perform the installation.

The Building Directive 2002/91/EC, has to be incorporated in national legislation.

No distinction between “self-producers” and “independent power producers” should be put in place, i.e. the proposed tariffs should be valid for the total energy production at the output of the inverter. In addition, it is suggested that for utility customers in low-voltage connection, i.e. for households, the produced energy is deducted from the consumption figure (net metering). Contracts with the utility should be increased from 10 years today to 20 years with a constant tariff throughout the years of a contract.

Soft loans must be provisioned for off-grid PV systems that are far away from the grid. Specifically, for installations with capacity up to 5 kW_p, a zero interest loan up to 30,000 € must be granted for a 5–8 year term.

The research activities and the demonstration and pilot projects must be part of a national research programme for PV. Technical guides should be composed for the connection of PV systems to the grid and international standards should be applied, in cooperation with the industry, the utility etc. Educational activities and campaigns should be planned along with training and certification of electricians as installers and composition of syllabus and guides that should include other RES too.

According to the new law for RES, systematic registration of all RES installations will be officially kept by the Ministry of Development (MoD) which should provide an annual report and make the data publicly available on MoD’s website. For operational systems, data processing, analysis and statistics should additionally be undertaken. PV policy performance is required and could be performed by MoD. A cross checking mechanism is recommended.

Action plan

The Greek National Core Group members will assist in the implementation of the new law. Specifically, the Institute of Energy for South-Eastern Europe (IENE) and CRES can compile, upon request by the government, the necessary technical annexes in the legislative instruments that will be issued to support the new law. Also they have the ability to provide technical support in the critical initial phase of the new legislation and in the evaluation of its performance. Moreover, the members of the National Core Group will make propositions for the optimal enforcement of this new law. IENE could form up again the same working group of volunteers that worked out a policy proposal in December 2004 to participate in these actions.

CRES plans to assist the Greek Standardization Organization (GSO) in the formation of a technical committee for PV that will implement relative European and international standards at national level, if funding from the GSO is provided.

Project outcomes will be disseminated towards key actors by CRES. The actions for the dissemination of the project results are foreseen in the PV Policy Group project plan and therefore will be funded accordingly.

5. THE NETHERLANDS

Solar electricity in energy transition

As part of the Dutch energy transition policy a platform has been established to initiate the transition to a sustainable electrical energy supply.
Representatives of the Dutch ministry for Economic Affairs, the Dutch RTD institutes, and the Dutch PV industry participate in this platform.
The platform formulates recommendations for the government concerning the development of key sustainable energy technologies. The so called transition document for PV gives an brief description of the importance of PV for the future electricity supply in the Netherlands and gives a strategy for creating a sustainable market growth for PV. An official acceptation by the ministry is expected in the next months (April 2007).

Summary of the document:
Main Economic factors and the Dutch PV position:

- With growth rates of 35–40% per year, the world PV market is growing rapidly.
- Due to a lack of market support instruments there is no Dutch PV market.
- The Dutch PV market will always be small and export will thus always be important for the Dutch industry.
- The Dutch RTD institutes and universities have a very good international knowledge position.

Development strategy

The last years the Dutch policy focused on Research, while the PV market decreased from almost 20 MW in 2003 to less 0,5 MW_p/year in 2006.
The platform therefore advices to set up a support mechanism to prevent The Netherlands from loosing connection with the international PV developments and avoids a further collapse of the Dutch PV sector. Only by doing, the effort and money spent on research will become profitable for the Dutch industry and energy sector and The Netherlands in general. The focus should rather be on developing a strong PV-sector instead of volume growth. For this reason the platform recommends a controlled PV growth aiming at clear targets for the next years:

	2015	2030	2050
PV electricity price	0,25 €/kWh	0,10 €/kWh	0,06 €/kWh
Market volume	15.000 roofs/year	100.000 roofs/year	200.000 roofs/year
Employment	3000 jobs	10.000 jobs	60.000 jobs
Installed power	0,50 GW_p	6 GW_p	75 GW_p

Instrument:
The working group proposes an implementation program that is stable for a long period and makes use of a well balanced feed-in-tariff. The proposed instrument has to meet the criteria formulated by the PV Policy Group:

- long term, with a fixed tariff, which provides an internal rate of return equal to the weighted average cost of capital (IRR = WACC)
- an annual decrease of the tariff for new projects, following the expected price reduction in PV (now 5% per year)
- a system size dependent tariff ensuring equal internal rate of return (IRR) for different systems
- additional support for preferred market segments, such as building integrated PV
- an additional variable investment subsidy to fine-tune the PV market development

Action plan

The Dutch Action Plan consists of 2 groups of actions:

1. Actions related to the integration into the electrical infrastructure
2. Actions related to the integration into the build environment

For the first category, focusing on the electrical infrastructure, a number of actions has been identified. In the following table the most important actions are categorised in relation to the time frame and the actor:

Integration in energy infrastructure	Actions towards 2015	Actions towards 2015–2030	Actions towards 2030–2050
Government	Take away barriers for grid connection	Stimulate R&D for energy storage	Formulate Masterplan Renewable Energy NL
PV solar energy sector	Realise standardisation, quality, and reliability	Formulate research topics related to energy storage	Define PV -working area for the sector
Other sectors	E-sector: Solve barriers for grid connection	E-sector: power electronics and energy management systems	

Actions related to spatial planning are given in the following table:

	Action
Government	Integrate PV in the structural planning; Develop a master plan renewable energy NL, including spatial requirements of all options.
PV solar sector	Develop products for the built environment; Take care of quality of components and systems.
Building corporations	Use PV in renovation and maintenance.
Financial institutions	Develop financial products for PV investments.

6. PORTUGAL

Presently the Portuguese PV market is at a stall as a consequence of policy-originated barriers. This however, is considered to be an opportunity for setting up a stronger strategic orientation, as several governmental actions are at quest to unblock the situation. Also important is to define which strategic orientations should be followed to maximise overall present and future value of PV-electricity to the Portuguese society, including its contribution to fostering a PV innovation system.

The market for large and very-large scale ground-mounted systems can presently be considered a global one, and as such Portugal should be competing with other countries in the quest for interested developers and for financial resources. It follows directly that market deployment incentives should be put against those from competing countries, notably Spain, the strongest competitor when it comes to attractiveness of investment.

Moreover, it is apparent that the added-value for the Portuguese economy that can be brought by large and very-large scale systems has varying degrees of importance depending on the structure of investment. If, however, global trends of investment in RE market are followed by Portuguese investors, it seems obvious that this value should be mostly restricted to that of the electricity generated and of the associated reduction of CO_2 emissions. Other factors such as the potential for embedment of national competencies, industrial development and learning effects do not impact significantly on the overall PV-electricity value. This situation could eventually be at least partially reverted with a tendering system asking for counterparts from the tenders, as has been done with the wind market in Portugal.

Small and medium-scale building-mounted/integrated systems in turn are expected to be the type of applications that deliver the highest PV-electricity value for the Portuguese society. Not only are the aforementioned factors contributing intrinsically to this higher value, but also the potential to incrementally reduce the amount of public investment for the same deployment rate, given the building-related added-values at the several user levels (e.g. end-user, building promoter, architect). Moreover, private investment barriers may somehow be overcome as investors are expected to be originated in non-traditional sectors, such as construction and tourism, as well as in building end-users.

Large and very-large ground-mounted systems have the potential for considerably higher diffusion rates than small/medium scale building-mounted systems. When compared over time, however, the potential for longer diffusion paths – and long-term market sustainability – of small/medium scale building-mounted systems is far more reaching. Market sustainability can be measured in terms of evolution of surface area available. While it is expectable that the available land for large and very-large scale ground-mounted systems will attain saturation, the area available in building surfaces increases as new buildings are built and the existing building stock is renovated.

This longer diffusion process may be beneficial in Portugal as it gives more time for the establishment of a Portuguese PV-based innovation system – while the market learns how to use the technology, competences are meanwhile being created in the industry and R&D spheres.

Within the EU project “PV Policy Group” it was proposed a policy framework along the core design vectors of capacity cap, feed-in tariff and licensing framework and authorisation procedure. It is believed that this policy framework will provide the market with adequate signals both towards building applications and small scale systems. It is also expected that the combination of the recommendations on feed-in tariff and licensing framework will bias the market towards building-mounted medium to large scale systems, instead of ground-mounted systems.

Finally, with respect to capacity caps a transition period is recommended in which the commitments with present capacity target are met, while a system of indicative targets is set for the medium term. In the short term, only systems in the medium to large scale will be subjected to these transitional dispositions, while small scale systems are exempted from any capacity cap associated actions. In order to avoid capacity-caps stop-and-go effects, the indicative target system must be decoupled from financial incentives, especially from feed-in tariffs. For the short term, and regarding small scale systems, indicative targets of 1 and 2 MW_p annual installed capacity are recommended for 2007 and 2008 respectively.

In addition, to these core policy actions, the following accompanying measures are recommended:

- develop a continuous communication strategy to overcome barriers of lack of information and of biased perceptions. Several stakeholders should be targeted;
- create the conditions for the provision of training and certification of installers, as well as, training of architects, engineers and eventually of financing and insurance experts;
- develop the conditions for accreditation of training courses;
- establish a framework for product certification.

A monitoring system not exclusively PV-oriented is recommended, as some synergies exist with the already established “Observatory for Buildings” related with the implementation of EPBD directive in Portugal.

7. SLOVENIA

In the view to support the project, a Slovenian expert group was set in line with the Slovenian PV platform (www.pv-platforma.si). The expert group includes the following organisations: the Faculty for electrical engineering, the Ministry of economy, the Ministry for environment, the Ministry for high education, science and technology, Kontiki Solar, Bisol and ApE.
All the experts were and are still very actively involved in the preparation of political frameworks for the development of the PV sector. The main goal of Slovenian expert group was to overview and analyse legal and regulatory instruments concerning PV power plants, support schemes and monitoring systems.
Addressed issues were legal regulation, financial supports, monitoring of the market and optimization of initiatives. Existing groundwork for the development of PV was analysed, weak points were pointed out and some urgent optimizations were proposed.

Current framework
The Slovenian PV market started a real boost in 2005. Since the purchase price for electricity was increased to 37,4 c€/kWh, Slovenia has experienced several implementations of bigger PV power plants and substantial rise of information inquiring by potential investors. According to estimations there were around 100 kW of PV systems installed up to the end of 2004 and only in 2005 more than 200 kW. Growth of the installed capacities in 2005 was so 100%. According to the expressed interest this kind of growth is expected also in the next following years.
A big step was achieved with the introduction of a feed-in tariff system, where the current price for electricity produced from PV power plants is 37,4 c€/kWh. This higher price was limited only for small plants up to 36 kW. On the base of active involvement of the national expert group this limit has been removed in 2006. According to the new governmental decree, approved in July 2006, the price is now the same for all PV plants. Additional positive possibilities for investors are soft loans for PV power plants from the Ecological Fund.
This legal framework in Slovenia has proved to be an efficient instrument to stimulate investments in PV plants.

Role of the national expert group on PV
The national expert group is considered as very important for Slovenia, to foresee and allocate much more financial sources for supporting the industry, in collaboration with the research institutions, for production of equipment for PV plants, according to the requirements of the rising Slovenian and international market.

PV's potential in Slovenia
As mentioned the PV market was very small in Slovenia up to the end of 2004. From 2005 there is a significant increase. Following the expressed interest of investors and relatively still small market we estimate that a range of 100% growth will be kept at least by the year 2010. With such a market deployment we could expect to reach the installed capacity of 5 MW with a yearly electricity production of 6,5 GWh by 2010. With annual electricity consumption in the range of 12.000 GWh, PV plants production would represent 0,05% of the electricity consumption in Slovenia. Such a share is from the energy point of view very small, however at this level of development the most important task is to keep a stable and relatively high PV market growth.
The group estimates that between 2010 and 2020 the market growth will most probably be stabilized at a lower growth level. Two options have been taken into account: (a) 50% growth per year and (b) 30% per year. The estimation is that the marked deployment will continue at a rather high growth level. Anyhow, we expect that after the level of installations will overcome the 10 MW/year, the absolute size of PV plants installations will not grow so quickly.
With a 50% annual market deployment between 2010 and 2020, the cumulative installed capacity could be 550 MW in 2020. The PV plants would produce 550 GWh of electricity per year, representing **4,6%** of 12.000 GWh, (today's electricity consumption in Slovenia)
With a 30% annual market the installed capacity could reach 184 MW, yearly production 184 GWh and **1,5%** share. By 2020 the electricity consumption in Slovenia will very probably also increase, nevertheless the share of PV plants at that time will not be negligible.

Recommendations from the expert group:

To ensure a proper development of the Slovenian PV market, the expert group proposes the **following main actions in the short and medium term:**

1) Revision of the existing set of governmental decrees and increasing the legal security for PV.
2) Preparation and approval of a special law for renewable energy sources.
3) Design and standardise the connection to the electrical grid.
4) Regulation of appropriate status for physical persons regarding VAT and incomes.
5) Development of a strategic PV research and industry support agenda.
6) Continuation and strengthening of awareness, promotion and education activities.

8. SPAIN

The main barriers to the development of solar-photovoltaic power have been economic. Moreover, the modifications in the feed in tariffs system introduced by Royal Decree 436/2004 have represented an improvement to the development of the area. Nowadays, some technical and administrative barriers are still in force.

The reasons to overcome these barriers and promote the development of the sector include:

- The existence of excellent solar resources for the development of this technology in Spain.
- The interest of large numbers of developers.
- The existence of Spanish technology and manufacturing capacity, with Spain being among the world leaders in the field.
- Exploitation by the national industry of the highly favorable prospects for technical and economic development, enabling significant improvements to be envisaged in the medium term.

The Spanish Renewable Energy Plan identifies a new target for a total in photovoltaic potential of 400 MW_p before 2010, assuming the measures proposed in it are implemented.

Regulatory framework

The main objective of an appropriate and sustainable PV Policy is to increase the number of installed PV plants and the installed capacity, contribute to the development of a competitive European industry and achieve a continuous reduction of costs of the equipment, PV plants and operational costs over the time.

In Spain the Royal Decree 314/2006 tries to incorporate the Building Directive 2002/91/EC. By RD 314/2006, photovoltaic systems will be installed in given buildings for private use or to be delivered to the grid. It took force in September 2006.

About grid connection, a specific Royal Decree for high voltage installations is necessary, in the same way it exists in low voltage grid RD 1663/2000.

In 2007, a review of feed in tariffs system (RD 436/2004) will be done. This is the key action to design the legal framework for the following years.

Support schemes

The main objective of this action plan is the formulation of the steps necessary to improve the national support schemes, which enable PV to achieve the target of 400 MW installed in 2010 and give the expected contribution to the long term European and national energy goals.

In Spain we have had direct subsidies and soft loans for the investment by IDAE. Nowadays, it is easy to find soft loans in private banking, so in Spain direct subsidies for grid connected plants are not necessary.

The main support scheme is the feed in tariff system, with periodical revisions. The main characteristics of the Spanish feed in tariff are the following:

- The tariff should be such that the internal rate of return is > 7% (in 2006).
- Long term, with a fixed tariff for the full duration of the contract, providing an internal rate of return > 7% (in 2007).
- Revision every 4 years to evaluate the market progress and review the tariffs and the internal rate of return for the coming years.
- A simple system, without differences between regions with differences of irradiation, or differences between the place where the system is installed.
- A scheme, which does not depend on the government budget.

Monitoring systems

In Spain, like in other EU countries, there is not updated information and a reliable system on-line, available to the citizens, to know what exactly has been installed. There are data from the National Energy Commission and from IDAE together with the bodies and agencies in the Autonomous Regions.

The ER Database is physically located in the offices of the IDAE in Madrid and is in permanent communication with the computers at each of the Autonomous Regions of Spain. By means of this system the information on RE installations in Spain, at both the national and regional level, can be updated rapidly and retrieved or processed by any BDFER user by means of his or her access code, depending on his/her user profile.

IV. SUMMARY OF THE JOINT EUROPEAN POSITION PAPER AND ACTION PLAN

Following a detailed assessment of existing PV political frameworks the PV Policy Group has elaborated a Joint European Position Paper and Action Plan. It addresses politicians on national and EU level as well as other stakeholders involved in the political decision-making process. The Position Paper and Action Plan are summarized in the following.

Joint European Position Paper

Main recommendations for PV policies on national level:

1. A coherent, long-term strategic approach for the promotion of PV must be adopted

In most EU countries PV promotion is undertaken by a patchwork of political initiatives rather than a coherent, long-term strategic approach. The basis for the design of national policy frameworks, however, should be a clear vision of PV development in the long run manifested by ambitious but realistic targets and transferred into coherent policies adapted to local circumstances. Whilst policy frameworks should evolve over time in line with market development and national targets, they must be simultaneously stable enough to convey reliability to market actors.

2. Simplified administrative procedures, guaranteed grid access and the promotion of PV as building components are crucial

Throughout Europe complex administrative procedures, insufficient grid access and missing or restrictive building sector regulations frequently deter potential PV operators from investing in proprietary systems. Administrative procedures must be clear-cut and avoid any unnecessary burden. As required from RES-E Directive 2001/77/EC, free, non-discriminatory grid access has to be guaranteed in national legislation. Technical requirements for safe and grid-compatible plant commissioning and operation should be differentiated according to power categories and not impose any inappropriate demands on operators. Unsubstantiated restrictions discouraging the installation of PV systems on roofs or in building integrated application must also be removed. Even more, when transposing EU Building Directive 2002/91/CE into national law, PV should be highlighted as an option for fulfilling the Directive. Finally, in order to ease the use of PV components as integral parts of buildings, efforts in the production of standardization and official certification should be intensified.

3. Financial support measures are necessary to pull demand

Besides research and development, high industrial production is essential for cost reduction of PV systems and per extension of the cost reduction of PV electricity (economies of scale). Financial support in the form of market development mechanisms triggers consumer demand which in turn leads to increased capital investment from industry to construct adequate production capacity to meet increased demand, that, in the end, also leads to lower costs. As current cost levels render the technology uncompetitive with conventional power pricing structures such financial support for this type of renewable energy technology is fundamental.

Feed-in-tariff schemes have proven to be the most effective and efficient incentive, if designed appropriately: the tariffs must allow for rates of return that are at least equal to alternative investments with similar risk and duration and be differentiated for different plant types and sizes (e.g. differentiation between open-land and building integration). Decrease of the tariffs for new plants over time is important to stimulate cost reduction efforts in the industry. Long-term stability, reliability, coherence and the avoidance of “stop-and-go” disruptions are other important aspects in the design of feed-in-tariffs.

In addition to feed-in-tariff schemes a large variety of other financial support measures exists across Europe (direct subsidies, soft loans or tax reductions etc.). In isolated application such mechanisms have demonstrated limited and marginal effect. In combination with a strong feed-in-tariff scheme, however, an initial or intermediate temporary acceleration of a fledgling PV market can be achieved.

4. A sound and steadily updated information basis is required to provide accurate data for political decisions

The implementation of effective political support schemes has triggered off considerable market growth of PV applications in some EU countries. The growing impact of PV on economy, industry and society increases the relevance of political decision-making in this area. Although good monitoring practice exists for certain market areas, a comprehensive approach is missing in most countries. As a result, a scientific-technically sound and regularly updated information data base is becoming an increasingly urgent necessity for the facilitation of political decision making. Besides mere market data collection the monitoring system should comprise routines for evaluating the efficiency of the policy framework for PV. Monitoring systems should further on be designed in a way that the collected data can be used in a common European database.

Main recommendations for EU level political support for PV:

1. Any unnecessary barrier for PV deployment at Member State level should be removed
In terms of regulatory frameworks the EU Commission should demand from Member States that especially in the context of transposing RES-E Directive 2001/77/CE into national legislation that any unnecessary barrier for PV is removed and that PV is promoted sufficiently. Also, it should be observed that, with regards to Building Directive 2002/91/CE, PV is explicitly acknowledged in national regulation as means to fulfil the Directive.

2. Feed-in-tariff schemes are the best choice to adequately promote PV
To financially support PV, feed-in-tariff schemes can be considered as best choice and should therefore be promoted accordingly. However, harmonisation of financial incentives should not be a primary short-term aim: the starting point for any national support policy should be overall framework conditions and the development stage of the PV market in each country. At the same time alibi schemes without effect should not be accepted by the European Government.

3. Implementation of a Europe-wide harmonised market and industry monitoring system
To provide entirely reliable information for political decision-making an EU-wide market and industry monitoring system should be installed on the basis of a jointly defined data collection procedure in the single Member States.

Joint European Action Plan

Derived from the recommendations of the Position Paper and further observations the PV Policy Group proposes the implementation of an action plan that is designed to contribute to the optimisation of PV political support throughout Europe. It proposes the following five cross-national joint actions:

Action 1. Continuation of the PV Policy Group project to support the introduction of PV strategies and their implementation on national level

Action 2. PV in the built environment

Action 3. Grid access regulations for small, decentralised PV and renewable energy systems

Action 4. Financial support for PV – Establishing innovative financial instruments for small-scale PV projects

Action 5. Concept for a pan-European monitoring system

V. CONCLUSIONS

The results of the PV Policy Group project are addressing concrete problems and barriers at both European and national level which are preventing or slowing down a more balanced development of the photovoltaic sector in Europe.

The work undertaken during two years by this group of experts has lead to formulate recommendations calling for concrete actions from political decision-makers. These, if applied, could set the appropriate conditions for the development of a true European photovoltaic market.

Adaptations are required both at **national level and European level**.

National level

Summarizing all eight National Position Papers and Action plans the following can be concluded:

- In most countries, the right to access the low-voltage grid still has to be regulated and procedures for grid-connection have to be simplified.
- A sustainable and long-term PV implementation programme and long-term targets are lacking in many countries.
- The right mix of instruments to develop PV markets depends on local conditions and the status of market deployment.
- Any kind of installation cap for PV carries the serious risk of a 'stop-and-go' situation causing uncertainties and therefore preventing the PV market to develop sustainably.
- For building integrated PV (BIPV) standards and norms are missing to develop this application.
- National market and policy monitoring of PV are insufficient in most of the EU countries.
- Still, basic knowledge about PV is lacking in many countries. Attention should be paid for providing education and training in all related curricula.

European level

As far as the European Government is concerned it should further impulse the deployment of PV technology and show its own commitment to motivate Member States to follow the same track. On the one hand, it should exerce a strong policy push on those countries where solar electricity has potential but where no effective instruments are implemented. On the other hand, in order to endorse the establishment of suitable structures for PV market introduction it should further apply its available promotional policies and programmes.

To improve the rules of the game which the EU is setting by providing general frameworks such as RES-E Directive 2001/77/EC, the PV Policy Group recommends the following:

- **A long-term strategic approach should be followed.** In order for investors and actors of the photovoltaic sector to work in more confidence, a long term realistic but ambitious target should be set regularly and followed at both European and National level.
- **Any unnecessary barrier for PV deployment at Member State level should be removed.** Here the European Commission plays a crucial role by making sure that the current legislation in force is properly applied. In particular the Commission should ensure that simplified administrative procedures are established and that grid access is facilitated.
- **Europe-wide stable and coherent financial support systems are necessary for the whole European PV market to sustainably take-off.** In this context feed-in-tariff schemes – if well-designed and sufficiently attractive – have proven to be the most effective and efficient financial incentive.
- **A harmonised European PV market and policy monitoring system needs to be established.** This is crucial to measure the impact of legislative measures put in place, to allow comparison between the development of national markets and to provide a sound basis for political decision-making.

Impact of the project and outlook

- As barriers predominantly persist on national level future activities should strongly focus the actual implementation of favorable conditions in the Member States themselves. Through this project, PV policy networks have been newly established or strengthened. These networks will be maintained and further support the development of the PV sector.
- A very important result is the joint and shared vision on the main characteristics of good PV political practice. The project outcomes can serve all European Member States and the European Government as a guideline to implement effective PV policies. In many cases these findings helped project partners already during the project lifetime to support national PV political decision-making.
- By exchange of know-how between the PV Policy Group partners new or follow-up activities in the partner countries have been triggered off.
- The guaranteed grid access is the most important issue to be worked on as a good PV program is not successful if the access to the grid is not regulated and complex procedures are discouraging potential PV investors.
- Building integrated PV is considered to be one of the most important aspects of the future PV market. Therefore, to set appropriate framework conditions should be a high priority for coming activities.
- In addition, the development of off-grid PV applications and markets are going to play a key role in the future for developing and emerging countries.
- As stated before, professional monitoring systems on the National and European level are very rare. The efficient and accurate monitoring of the increasing PV market and industry development is an important future task.
- Transfer of know-how in all PV related areas still remains a crucial issue in Europe.

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