EUROPEAN PHOTOVOLTAIC ACTIONS AND PROGRAMMES-2010

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ABSTRACT: The EU has continued to provide support for photovoltaic research, technological development and demonstration together with market development and transformation with the 7th Framework Programme for research and the 2nd IEE Programme. Technological development and innovation remain fundamental to delivering the more competitive PV systems, which are needed in the rapidly expanding renewable energy markets. At the same time, the new renewable energy directive is playing an increasing role to stimulate to a large extent also the PV sector. Europe's ambitious combination of a new Directive, targeted financing and well focused EU programmes is designed to deliver simplified legal frameworks, more attractive financial support schemes, and more competitive PV systems. The Solar Europe Industrial Initiative is a timely opportunity for the European companies to increase their innovation base and improve their competitiveness.

Keywords: Photovoltaic R&D and Demonstration Programmes; Dissemination, Strategy; Market transformation.

1 INTRODUCTION

The European Photovoltaic sector is currently confronting a reduction of the incentive schemes in different European countries and the opportunities offered by an expanding market development. In this context, the Presidency of the European Union, the European Commission and the industry representatives have launched the Solar European Industrial Initiative (SEII) of the Strategic Energy Technology Plan (SET-Plan) on 3rd of June 2010, in Madrid. The SEII and its Implementation Plan seize the opportunity of the relevant expansion of the European PV market to ensure European technology leadership while supporting a photovoltaic contribution of up to 12% of the EU electricity demand by 2020 [1].

The financial and economic difficulties have not stopped ambitious European policy commitments concerning energy and climate for the next decade. The challenges of security of energy supply, climate change, and competitiveness remain there and the current financial and economic environment only stress the need to rethink and redesign our vision about our energy production and consumption patterns and their sustainability. The European 2020 targets are confirmed and, with the adoption of the new renewable energy directive, the European legal framework has been established [2]. The PV sector is expected to be a significant contributor to reach our RES target because the new renewable energy directive provides a favourable legal framework and demonstrates strong political commitment. This is expected to attract more PV activities in EU markets, also in those Member States which have not yet started to use this technology.

Photovoltaics is currently one of the fastest growing sectors of the economy and creates additional economic value, generates growth and provides jobs. Notably, the expansion of the solar photovoltaic energy production does not leave behind any burden for coming generations that they will have to pay off as a result of how we are currently securing our standard of living.

From the market demand point of view, there is no doubt that Europe is world leader. According to the estimates reported in a recent publication, the cumulated installed photovoltaic capacity in Europe, by the end of the year 2009, is more than 15.800 MW (it was slightly more than 10.000 MW at the end of 2008) [3]. The expected slow down in the Spanish market, had a reduced impact on the EU growth. In the year 2009, about 5500 MW of new photovoltaic installations were deployed in Europe. This is more than 78% of the world's new photovoltaic power. However, the European market remains very heterogeneous. Most of the European photovoltaic power capacity has been installed in Germany (3.800 MW). Italy (600 MW), Czech Republic (400 MW), Belgium (300 MW) and France (200 MW) which also had a record year in terms of installations, are still far from the German volumes.

Despite the reduction of the feed-in tariff, Germany's photovoltaic sector is expected to keep growing at a steady rhythm, with rooftop systems continuing to dominate the market. As said, Germany installed a record 3.800 MW of photovoltaics capacity in 2009 and industry observers speculate that Germany could install even more capacity in 2010.

Italy, representing now the second largest market in Europe, has decided to cut its incentive scheme (*Conto energia*) by 18%, from 2011. The reduction will continue in 2012 and 2013 by 6% per year. However, even with these reductions of the incentives the demand for the future years should be assured. In fact, the decrease in the average selling price of the modules, which mostly reflects reduction in cost, should allow a sufficient margin for system integrators. From the supply side point of view, Europe is a net importer of photovoltaic devices and the trend will likely continue as the recent rapid growth of PV production capacity in Asia brings new challenges to EU players. However, Europe (mostly Germany) maintains its predominant role as manufacturing equipment supplier and European know-how in the current wafer-Silicon based photovoltaic remains competitive.

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2 LEGAL INSTRUMENTS

So far, European legislation has proven to be an important driver for the development of renewables, including photovoltaics. However this development has been uneven in the different EU Member States. The new renewable energy directive has to be transposed by December 2010. However, before that date, there was already another important transposition measure, the adoption and notification of the National Renewable Energy Action Plans (NREAPs).

By the end of August 2010, 19 Member States had notified their action plans to the Commission. The NREAPs contain elements which are relevant for future PV development, such as the sectoral targets for electricity, the planned measures for authorisation procedures, support schemes and grid connection, and the estimates of the contribution provided by the different renewable energy technologies.

The 19 Member States that have already notified their NREAP, estimate that, by 2020, PV electricity will cover a share larger than 7% of their renewable electricity consumption. This would mean 15% of these countries renewable electricity plant capacity. There are however huge differences between the roles of PV in the different Member States. While some countries are not counting on this technology at all (Finland, Ireland, Sweden), others estimate to produce with PV about 10% of their renewable electricity (Greece, Italy, Luxembourg, Malta and Spain). The PV contribution reaches about 20% for Germany and more than 26% for Cyprus. In absolute terms, Germany expects to play an outstanding role for both PV installed capacity and overall electricity generation. Considerable further investments by 2020 could be expected not only in Italy and Spain, but also in Portugal, the UK, and the Netherlands.

Another important element of national renewable energy strategies is the measures to be applied to reach the renewable energy target. The objective of the regulatory framework set up by the directive and of the detailed strategies described in the NREAPs is to ensure a stable and attractive investment environment for the different renewable energy technologies. Well designed, foreseeable and easy to adjust schemes are vital for the further growth of the sector, while the lessons learned show that frequently changed and stop-and-go kind of support schemes should be avoided.

The growing amount of variable energy installations in the electricity system poses certain challenges to the electricity grid and raises new requirements for the electricity infrastructure. It is necessary to envisage new lines, reinforcements, intelligent solutions, storage and increase the overall flexibility of the system. The Energy Infrastructure Package to be adopted by the Commission later this year will address the challenges that energy infrastructure development faces today in Europe.

3 SUPPORTING PV DEPLOYMENT

Many are skeptical about technology policy because it is wrong for bureaucrats to “pick winners”. There is some truth in this position. However it is also naïve or dogmatic to assume that markets work perfectly unless distorted by governments. In the case of renewable technologies, history has shown that markets do not work well, unless assisted. The processes of creating new technologies and learning from their use (*learning by doing* but also *learning by watching*) benefit others. In other words, there is a gain arising from the actions of those who create, develop and deploy these new technologies. In the early stages of their development, the market does not reward new ideas, and without public sector support, many potentially valuable new technologies risk to be left under-exploited..

Although photovoltaic currently appears to be a more costly option for producing electricity compared with some other energy sources, this technology is supported because of its promising potential and its additional benefits, besides generating electricity.

4. EUROPEAN ENERGY PROGRAMME FOR RECOVERY

The European Energy Programme for Recovery (EEPR) is a financial instrument whose overall objective is to stimulate recovery from the downturn affecting the EU economy while bringing the EU closer to meeting its energy and climate policy objectives, namely the security and diversification of energy supply, the operation of the internal energy market and the reduction of greenhouse gas emissions [4].

The EEPR Regulation does not concern directly photovoltaics. Nevertheless, we shortly address it here because for the first time, a significant Community financial contribution is allocated to specific energy projects by means of a dedicated financing instrument. The Regulation allocates EUR 2.365 million to gas and electricity infrastructure projects; EUR 565 million to offshore wind electricity (OWE) projects; and EUR 1.050 million to carbon capture and storage (CCS) projects. The contribution is awarded in the form of grants. On 19 May 2009 the Commission launched a single call for proposals covering the three sub-programmes, inviting potential project promoters to submit proposals by 15 July 2009. The evaluation for the OWE and the CCS proposals was completed in September, while the evaluation of the gas and energy infrastructure projects was finalised in November 2009.

The European Commission has presented a report on the implementation of the EEPR Regulation to the Council and the European Parliament on 27 April 2010 [5].

5. PV RTD AND DEMONSTRATION PROGRAMME

Through a series of RTD framework programmes, the Commission has maintained long-term support for research, development and demonstration in the PV sector, providing a framework within which researchers and industrialists can work together to develop PV technology and applications.

During the **6th Framework Programme**, FP6 (2003-2006), the European Commission committed EUR 105,6 million for supporting research and demonstration on PV, thus continuing a 30-year tradition of co-financing the development of solar electricity in Europe. All the PV projects funded under FP6 are collected in a synopsis published by the European Commission [6].

The **7th Framework Programme,** FP7 (2007-2013) has a significantly increased budget compared to the previous programme, and runs for seven years. Calls for proposals based on topics identified in the *work programme* are being launched on an annual basis. FP7 has begun with less emphasis on the development of traditional wafer-based silicon photovoltaics, which is the focus of increasing R&D investment by companies and national programmes. Material development for longer-term applications, concentration PV and manufacturing process development have attracted relevant European funding. Furthermore, significant funding has been made available for thin-film technology.

Five calls for proposals have been already launched for the years 2007, 2008, 2009, 2010 and 2011. The photovoltaic projects granted under the FP7 2007 and 2008 calls have been described previously [7].

The projects which received grants under FP7 2009 call have already begun their work. Among these projects, *PolySiMode*, aiming at improving the efficiency and the cost-effectiveness of thin-film polysilicon solar modules, completed on glass substrates. Thin-film polysilicon solar cells have recently emerged as a promising thin-film alternative to bulk crystalline Si. The efficiency of polysilicon modules will be enhanced in this project by improvement of the crystallographic and electronic quality of the polysilicon material and by the development of advanced new methods for light confinement. By in-depth characterization of the polysilicon material, a better understanding of the relationship between the processing parameters, the electrical and optical properties of the material and the resulting device properties will be obtained. The main goals are to have large-area polysilicon modules with an efficiency of 12% and with a cost of 0,7 EUR/W at the end of the project. The expected impact of the proposed project is to enhance the efficiency of polysilicon modules, thereby increasing their cost-effectiveness. Since all the main European institutes working on thin-film polysilicon solar cells are joining forces within this project, a substantial acceleration in the improvement of the cost-effectiveness of polysilicon modules is expected. The total budget of the project, coordinated by IMEC, is more than EUR 6 million. The maximum EU contribution is about EUR 4,5 million, for a project duration of 36 months. The general technological objectives of the project *SILICON Light* are the development of better materials and enhanced interfaces for thin film silicon solar cells, and the transfer of the developed processes to an industrial production line. The most important goals of the project are: the reduction of optical reflection and parasitic absorption losses; the reduction of recombination losses, and the reduction of electric losses. The project, coordinated by ECN, has a total budget of about EUR 8,9 million and has been granted a maximum EU contribution of about EUR 5,8 million, for a project duration of 36 months. The *ThinSi* project will develop a solar cell processing chain for high throughput, cost-effective manufacturing of thin film silicon based solar cells, on low-cost silicon substrates. The new silicon based substrates, made on the basis of an innovative powder-to-substrate concept, will use state-of-the-art ceramics technologies. Cost effective processes for the formation of the thin film silicon base and the complete solar cell structure will be developed. New methods for optical confinement will be investigated. The project will develop innovative technologies and equipment prototypes that can easily be scaled up and transferred to production lines by the end of the project. The project, coordinated by SINTEF, has a total budget of about EUR 6,2 million and has been granted a maximum EU contribution of EUR 4,4 million, for a project duration of 36 months. The project *HELATHIS* identifies optical light confinement as a key point to increase the efficiency of a-Si modules. The optimization of the properties of both the Transparent Conductive Oxide (TCO) layers at the front contact and the back reflector is to be achieved for large area deposition. Additionally, methods for the reduction of reflection losses at the front glass will be developed. This optimization has to be done, on the one hand, for single-junction a-Si cell modules and, on the other hand, for modules with a-Si/ microcrystalline-Si tandem structures. In the latter case, also an intermediate reflector has to be considered. Objective of the project is to push the implementation of optical layers as part of adapted thin film silicon solar cells into large scale production facilities. The project, coordinated by T-Solar Global S.A., has a total budget of about EUR 3,1 million and has been granted a maximum EU contribution of EUR 2,1 million, for a project duration of 36 months. New concepts for high efficiency and low cost in-line manufactured flexible CIGS solar cells are developed within the project *hipoCIGS*. The $Cu(In,Ga)Se_2$ (CIGS) on glass technology is already heading towards industrial maturity, but the development of highly efficient flexible modules is an attractive option to meet the target production cost of 0,6 EUR/W in mid-term and 0,4 EUR/W in long-term. The ultimate advantage of thin-film technology is the possibility of monolithically connected flexible modules produced with high speed roll-to-roll manufacturing systems. The main goal of the project is to develop innovative flexible substrates and deposition processes suitable for the in-line and/or roll-to-roll production of highly efficient solar modules using thinner CIGS absorbers. The objective will be achieved by developing novel concepts in growth of “high quality” layers and interfaces for efficiency improvement, aiming at a new world record efficiency of 16% on polyimide and low-cost metal (mild steel and Al-based) foils. Also, the implementation of in-line compatible buffers, improvements in interconnect technologies and application of multifunctional top layers will lead to an advancement towards roll-to-roll manufacturability of integrated solar modules. The project, coordinated by ZSW, has total budget of about EUR 5 million and has been granted a maximum EU contribution of EUR 3,6 million, for a project duration of 36 months.

Reviewing the projects of the same 2009 FP7 call with a relevant demonstration component, we note the

project *PEPPER*, which tackles major factors relating to micromorph module efficiency and production cost by assessing the influences of glass, TCO and silicon deposition. On the one hand, the project bridges the gap between research and industrial application by executing new developments and improvements in the field of TCO and PECVD reactors and processes and transferring them to production plants where the full impact on module efficiency and costs can be evaluated. On the other hand, the project also takes some innovations already used in other applications, like different glass types and F_2 as cleaning gas, and transfers these improvements into the photovoltaic application. While different glass types have a high impact on the production cost of solar modules, the utilization of F_2 as cleaning gas also has a high impact on cost by increasing cleaning rates and decreasing gas cost and also has a strong environmental impact by replacing those cleaning gases with a high global warming potential. All these approaches will not only be developed in parallel but this project will ensure a strong interlink between these activities, eg. the impact of narrow gap reactors on the F_2 cleaning rate. The joint goal of the different work packages is the demonstration of a 157 W micromorph module with a cost of ownership reduced to 0,5 EUR/W. The project, coordinated by Oerlikon Solar AG, has a total budget of about EUR 16,7 million and has been granted a maximum EU contribution of about EUR 9,4 million, for a project duration of 36 months. The project *PV-GUM* aims at developing new manufacturing technologies and equipments which will produce a low cost highly efficient flexibly BIPV solar cell on a bituminous roofing membrane, predominantly used for waterproofing flat roofs. The full integration of the flexible PV modules in the membrane will be performed at the manufacturing stage by a new standardized roll-to-roll encapsulation process to produce PV-laminates followed by a roll-to-roll bitumen impregnation of the PV-laminates. In parallel, a new standardized PECVD reactor and process will be implemented to increase the PV cells efficiency to 8%, and to achieve technology superiority over main market suppliers. The *PV-GUM* project targets a PV-laminates production capacity of 20 MW. The high degree of integration of the PV modules and the roll-to-roll lamination allowing process automation are expected to decrease the specific costs. Furthermore, sustainability, quality procedures and monitoring in line, compliance to BIPV standards, as well as fully recyclability of the whole product are associated priorities of the project. The project, coordinated by Imperbel, has a total budget of about EUR 11,1 million and has been granted a maximum EU contribution of about EUR 6,2 million, for a project duration of 36 months.

The FP7 2010 call topic addressing *Further development of very thin wafer based c-Si photovoltaics* has resulted in two projects which are currently under negotiations, with an estimated total EU contribution of EUR 8,5 million. From the FP7 2010 call topic on *Future Emerging Technologies* two projects are under negotiations, with an estimated EU contribution of EUR 6,0 million. Furthermore, the EU-India topics, launched under the same call, resulted in the selection of three projects which are under negotiations, with an estimated EU contribution of EUR 5,0 million.

Finally, the work programme 2010 for the Specific Programme "Capacities" launched the call topic INFRA-2010-1.1.22: Research Infrastructures for Solar Energy: Photovoltaic to integrate the key research infrastructures in Europe for all aspects of photovoltaic research. This call topic has resulted in the selection of a proposal currently under negotiation with an estimated EU contribution of about EUR 9,0 million. The work programme for the **FP7 2011** calls was published on 20 July 2010. The general call describes the topic *Development and up-scaling of innovative photovoltaic cell processes and architectures to pilot-line scale for industrial application*, which has a submission deadline on 16 November 2010. Furthermore, two topics for collaborative projects with a predominant demonstration component are included in the same FP7 2011 call, namely: *Productivity and cost optimization issues for the manufacturing of photovoltaic systems based on concentration*, and *Development and demonstration of standardized building components based on photovoltaics*. The submission deadline for these two topics is the 7th April 2011.

Finally, a EU-Japan Coordinated Call addressing *Ultra-high efficiency concentration photovoltaics (CPV) cells, modules and systems* has been also published. The submission deadline for this call is 25th November 2010.

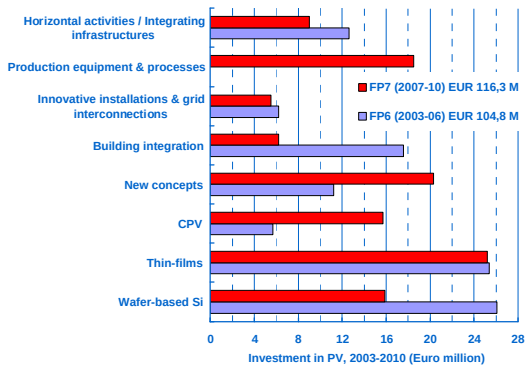

Fig 1: Investments in Photovoltaics under FP6 and the first four calls of FP7.

5. INTELLIGENT ENERGY – EUROPE

The Intelligent Energy – Europe (IEE) programme helps to achieve the EU's 2020 targets by supporting collaborative actions in which organisations from at least three different EU Member States cooperate to reduce non-technological barriers hindering the growth of sustainable energy markets. IEE projects contribute to the development and implementation of EU policies and legal frameworks, and help to create more favorable market conditions for the uptake of renewable technologies, including photovoltaics.

The first IEE programme ran from 2003 to 2006, with a total budget of EUR 250 million, leading to more than 400 projects and more than 60 local/regional energy agencies being funded [7].

The second IEE programme (2007-2013) has a budget of EUR 730 million, which is on average double the annual budget of first IEE. Four annual calls for proposals have been already launched, and a number of projects addressing PV technology are being funded within the first three calls.

PVs in BLOOM (www.pvsinbloom.eu) started in Oct 2008 and is coordinated by Union of Veneto Chambers of Commerce. It promotes the installation of small and medium sized PV plants (50 kW up to 3 MW) on marginal or degraded land (landfills, quarries, abandoned industrial areas, etc) in six EU countries. In the first phase of the project, over 1600 municipalities were sensitized towards the concept promoted by PVs in BLOOM, and eventually over 60 municipalities interested to recover marginal areas on their territories through PV have been actively engaged. Thanks to the action, over 5 MW of PV plants on marginal terrains have been triggered, with a forecast of achieving 16,5 MW by the end of the action.

PV-NMS-NET (www.pv-nms.net), which started in October 2008, is a network of 12 organizations in the EU New Member States (NMS) coordinated by Warsaw University of Technology. The principal objective of the action is to create a series of tools to monitor and evaluate the impact of the measures adopted by the NMS in PV and to contribute to the development of an appropriate and effective legal framework for PV. The document "Status of Photovoltaics in EU NMS" is published each year (2008 and 2009 are already available), allowing market actors like decision makers, regulators and utilities to get up-to-date information on the latest development of the PV market in the 12 NMS.

PV LEGAL (http://www.pvlegal.eu/), which started in July 2009 and is coordinated by the German Solar Industry Association, aims to improve the legal and administrative frameworks of the 12 participating EU countries (BG, CZ, DE, EL, ES, FR, IT, NL, PO, PT, SI, UK) resulting in reduced lead times for the development and construction of PV installations; less burdensome and more streamlined authorization procedures for smaller PV projects; and reduced workloads for authorization bodies at national and regional levels. Since May 2010, a comprehensive database (http://www.pvlegal.eu/database.html) is on line showing the administrative processes that need to be fulfilled in order to install a PV system in each of the participating countries. The database contains practical experiences of industry stakeholders with regards to labour, cost and time to comply with administrative procedures, while highlighting legal-administrative barriers that PV project developers face during these processes.

IEE is funding also a number of projects on training and certification of installers of small scale RES systems in buildings, including photovoltaics.

QUALICERT (www.qualicert-project.eu) started in July 2009 and is coordinated by ADEME and EREC; the project aims at helping to implement the 2009 RES Directive's requirements (article 14 and Annex IV) [2] concerning certification schemes for installers of small-scale RES systems in buildings, including PV.

The main objective of **PVTRIN** (started in June 2010 and coordinated by the Technical University of Crete) is to develop a training scheme for technicians/electricians, on the installation and maintenance of PV systems in buildings in 6 countries (ES, EL, CY, BG, RO, and HR). Finally **Install+RES** (started in June 2010 and coordinated by WIP, Germany) aims at establishing institutionalized training courses for the qualification of installers of RE systems (biomass, solar, PV and heat pumps) in buildings in several European countries (BG, EL, IT, PL and SI).

The next IEE call will be published in early 2011. For further information on the IEE programme, on-going IEE projects and future calls for proposals, see http://ec.europa.eu/energy/intelligent/index_en.html.

6 EUROPEAN SOLAR INDUSTRIAL INITIATIVE OF THE SET PLAN

The EU has endorsed the European Strategic Energy Technology Plan (SET-Plan) to accelerate the development and large scale deployment of low carbon technologies. The SET-Plan proposes a collective approach to research, development and demonstration planning and joint implementation of focused large scale programmes [8]. The SET-Plan has started being implemented and is currently working towards the establishment of large scale programmes such as the European Industrial Initiatives (EIIs) that bring together the industry, the research community, the Member States and the Commission in risk-sharing public-private partnerships aiming at the rapid development of key energy technologies at the European level. The first four European Industrial Initiatives on solar, wind, carbon capture and storage, and electricity grids were officially launched at the SET-Plan conference in Madrid, on 3 June 2010. The launch was marked by a joint statement by Member States, European Commission and industry representatives and by the endorsement of the Implementation Plans for the Initiatives (2010 – 2012).

The Implementation Plan 2010-2012 of the Solar European Industrial Initiative (SEII) announces that during the coming three-year period up to EUR 1,2 billion on RD&D needs to be invested in new production technology and in integration of PV into the grid as well as into the built environment, aiming at achieving cost reduction and enabling large-scale deployment. These are the first steps in the path to reach, within this decade, competitiveness with electricity prices for residential and commercial sectors and even with conventional fossil fuels for industrial applications in locations with high irradiation. Almost 60% of the investment will need to be provided by the private sector whereas the remaining amount should be balanced between the EC and EU MS.

Now the main challenge with the SEII is to step up from a general mobilisation and endorsement, to the effective implementation phase.

There are several financial instruments available at EU and Member States level to carry out the SEII activities. For instance, the EU Framework Programme for Research will continue to focus the topics of the yearly work programme on the priorities of the solar implementation plan. Similarly, the national programmes finance projects that are coherent with the

plan and there is an obvious link between the activities financed with the NER300 and the SET-Plan. To further the scale of the action, joint or coordinated calls between EU Member States and/or Member States and the Commission could become a key instrument for the whole process.

To put this process in motion in a coordinated and consistent way, it is necessary to preliminarily identify the activities where Member States could work together, avoiding duplication and exploiting potential synergies. This could provide a single SET-Plan entry point to drive future activities and projects to their successful accomplishment.

7. CONCLUSIONS AND FUTURE PERSPECTIVES

In 2009 the PV market in the EU has recorded a rapid growth, with PV module supplies dominated by companies from outside the EU. The main markets remain here, notably in Germany, although other EU Member States are becoming more relevant.

Europe (mostly Germany) has consolidated its role as predominant supplier of manufacturing equipment for the global PV industry. European know-how remains competitive for the current wafer-silicon based photovoltaic industry.

Large scale, multi MW PV systems have arrived in several EU countries, attracting different kinds of reactions. One should wonder if there are some new market barriers to address in relation to such developments. Furthermore it seems that, in different Member States, different levels of support are in place for fully building integrated PV and for PV on structures which are not entirely closed (i.e. not normally inhabited buildings). It is likely that, on these issues, useful lessons could be shared and areas for collaboration on the development of such incentives/legislation exist. Such common work and exchange of experiences between public and private sector market actors is not new, as many Intelligent Energy Europe projects have already shown. Public sector decision and policy makers can also benefit from international collaborations as the feed-in tariff cooperation between Germany, Spain and Slovenia has shown. The new Concerted Action on the implementation of the 2009 renewable energy Directive will offer further opportunities for EU Member State authorities to share their experiences.

Many of the recently submitted NREAPs show that Member States count on PV for a significant share of their 2020 renewable electricity contribution, even if ambitions differ to a great extent. Important priorities for the sector are the planned revisions to support schemes and the development of the EU's electricity infrastructure to absorb the electricity produced by these installations.

PV is also an important technology for future renewable energy cooperation with neighbouring countries. However the contribution of this external cooperation to the EU's 2020 target achievement is expected to be rather marginal.

The new installer training initiative, and ensuring quality control of small scale PV installations as the markets expand - avoiding markets being damaged by poorly designed / installed systems - remain crucial, at the current stage of PV market development in the EU.

The possibility of using PV to promote public acceptance of energy efficiency and the use of smart meters, possibly combined with PV/grid interface boxes, should also be explored. The Smart Cities initiative and the possible use of the residual EUR 114 million of unspent fund from the recovery package, could offer opportunities for promoting PV markets in the EU, particularly for more consolidated PV technological approaches.

It is difficult to predict the evolution of the global photovoltaic sector in the coming years. On the one hand, we have already noted that the EU PV market is mostly driven by support schemes which are now under revision, almost every where in Europe. On the other hand, the most cost-effective producers are planning significant increases of their production capacity, although this of course carries a risk that the market may become over-supplied. Those companies, which are not able to achieve competitive cost/price reductions, are at risk of disappearing, either through mergers or through acquisitions by stronger partners.

The SEII offers a timely opportunity for European companies to accelerate their PV development and demonstration activities, to increase their innovation base, and to improve their competitiveness.

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