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**SET Plan Secretariat**



## SET-Plan - Declaration on Strategic Targets in the context of an Initiative for Global Leadership in Photovoltaics (PV)

### Purpose of this document

This document<sup>1</sup> is intended to record the agreement reached between representatives of the European Commission services, representatives of the EU Member States, Iceland, Norway, Turkey and Switzerland, (i.e. the SET-Plan Steering Group) and representatives of the SET-Plan stakeholders most directly involved in PV<sup>2</sup>, on the implementation of the actions<sup>3</sup> contained in the SET-Plan Communication<sup>3</sup>, and specifically the strategic targets for the priority "Number 1 in renewable energy" for what concerns PV energy.

This agreement follows consultations with industry represented by the European Photovoltaic Technology Platform (PVTP) and the European Construction Technology Platform (ECTP), with the research community represented by the EERA Joint Programme on Photovoltaics (EERA JP-PV), and with academia via the European Platform of Universities in Energy Research & Education (EUA-EPUE), as well as a public consultation via the SETIS website<sup>4</sup> on an Issues Paper prepared by the Commission services<sup>5</sup>. It takes into consideration the corresponding input papers and public comments available on SETIS (<https://setis.ec.europa.eu/towards-an-integrated-SET-Plan>) and discussions in the SET-Plan Steering Group on 9 December 2015 with the participation of the relevant SET-Plan stakeholders mentioned previously.

The stakeholders agree to highly ambitious targets in an endeavor to maintain global leadership in the sector, to put forward their best efforts in a coordinated way between public and private sectors, and to jointly address all relevant issues in order to attain the agreed targets.

Brussels, 20 January 2016

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<sup>1</sup> This document has no legally binding character, and does not prejudice the process or final form of any future decisions by the European Commission.

<sup>2</sup> The European Photovoltaic Technology Platform (PVTP), the European Construction Technology Platform (ECTP) and the EERA Joint Programme on Photovoltaics (EERA JP-PV).

<sup>3</sup> Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation" (C(2015)6317).

<sup>4</sup> Strategic Energy Technology Information System website <https://setis.ec.europa.eu/>

<sup>5</sup> [https://setis.ec.europa.eu/system/files/SET\\_Plan\\_Issues\\_Paper\\_Photovoltaics.pdf](https://setis.ec.europa.eu/system/files/SET_Plan_Issues_Paper_Photovoltaics.pdf)

## **Introduction – Photovoltaic solar energy**

All major future energy scenarios forecast a key role for photovoltaic solar energy (PV). PV has a huge global and European potential, making it an important building block for a secure and sustainable energy system. In several European countries PV already provides more than 5% of the annual electricity demand, a level originally anticipated to occur only after 2020. Based on current market trends, it is estimated that PV has the potential to meet 8% of the EU electricity demand in 2020 and 15% in 2030. If achieved, this would result in a considerable contribution to the reduction of CO<sub>2</sub> emissions, since the carbon footprint of PV systems is at least 10 times lower than that of fossil fuel-based electricity, with no CO<sub>2</sub> emissions during operation. However, PV has just reached 1% of global electricity supply and has harnessed only a small fraction of its vast potential. PV deployment could be accelerated by further enhancing light-to-power conversion efficiency, and reducing module and system prices as well as grid-integration bottlenecks. With innovations in these areas, the volume of modules manufactured in the coming decades could eclipse the figures of today's production.

The PV industry has changed dramatically over the last few years. In Europe, the rapid growth of the PV market has not resulted in a similar growth of the production capacity of solar cells and modules. Following an initial globally strong position, the EU PV industry has dramatically lost market share in 4-5 years and currently supplies around 5% of the total MWp produced<sup>6</sup>, exposed to a strong competition.

Despite all these difficulties, the EU PV industry is still well positioned along the value chain, especially in the sectors of equipment manufacturing, inverter manufacturing, project business and installation. In addition, Europe still has research institutes on PV that maintain scientific leadership roles. Nevertheless, developing a strategy to build on the existing PV industrial and R&I base in Europe, with a view to re-launching cell and module manufacturing, is an extremely urgent need. Worldwide growth projections for PV are very high, with the cumulative installed capacity expected to triple over the next five years. In this context, Europe must continue to invest in Research and Innovation to be able to play an active role and ensure again a strong industrial position. Managing innovation efficiently, maintaining technology leadership and ensuring a full commitment of industrial stakeholders require a coordinated approach at the European level.

This can happen only through the achievement of ambitious system, cost and performance targets, as well as, regulatory and market design measures. System cost and performance are to a considerable extent interdependent and represent the actual drivers for the development of the sector. Indeed, increasing the efficiency of PV modules opens one path for reducing costs and allows for new industrial and market opportunities when accompanied by large scale manufacturing (at least 1 GW/year). As module costs account for around 50% of system costs, efforts need to be directed also at reducing the costs of Balance of System (BoS) technologies while introducing new functionalities for grid services. Furthermore, manufacturing of PV modules as building materials can develop to a world-wide market with huge opportunities for the European industry. Driven by policies towards Zero-Energy Buildings and subsequently Plus Energy Buildings (PEB), design and innovation with new Building Integrated Photovoltaic (BIPV) materials and concepts and combinations of energy efficient building materials with BIPV become essential parts of the development strategies of both the PV sector and the building sector. This calls for a multidisciplinary research and development programme involving, among others, the PV manufacturing

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<sup>6</sup> Fraunhofer ISE "Photovoltaics Report", August 26, 2015

industry and the building materials industry as well as certification bodies. Breakthroughs in technology, applications and business models are required to transform today's BIPV niche market into a future mass market.

The combination of localised PV electricity, storage and local supply and demand management makes buildings the smallest unit of a smart grid of its own. Once the necessary technology and control mechanisms are developed, the step of linking multiple smart buildings will contribute to the widespread deployment of the smart grid technology. This requires the development of control systems for grid-feeding, self-consumption and local storage and standardisation of the interoperability of such control systems.

The achievement of the targets will depend not only on technological advances, but also on non-technological factors such as economies of scale (i.e. resulting from an increase in produced and installed capacity), risk-finance for first-of-a-kind manufacturing pilot lines and demonstration of small, commercial-scale PV power plants, the ability to take full advantage of the European Single Market, regulatory conditions, standards etc. In this context, international cooperation in energy research can also bring substantial benefits. These non-technological issues will have to be specifically examined at the subsequent stage of defining how to achieve the agreed targets.

### **Strategic Targets**

Building on the Integrated Roadmap (IR) of the SET-Plan, public (EC and Member States/Regions) and private investment must focus on targeted R&I actions to achieve the following goals in terms of PV system performance, cost reduction, sustainability and innovations in BIPV products by joint efforts between the PV and the building sectors:

## Agreed Strategic Targets in photovoltaic (PV) solar energy

*Overarching goals:* re-build EU technological leadership in the sector by pursuing high-performance PV technologies and their integration in the EU energy system; bring down the levelised cost of electricity from PV rapidly and in a sustainable manner to allow competition in electricity markets all over Europe. This will be achieved by:

1. Major advances in efficiency of established technologies (Crystalline Silicon and Thin Films- c-Si and TFs) and new concepts:
  - **Increase PV module efficiency by at least 20% by 2020** compared to 2015 levels;
  - **Increase PV module efficiency by at least 35% by 2030** compared to 2015, including with the introduction of novel PV technologies;
2. Reduction of the cost of key technologies:
  - **Reduce turn-key system costs by at least 20% by 2020** as compared to 2015;
  - **Reduce turn-key system costs by at least 50% by 2030** compared to 2015 with the introduction of novel, potentially very-high-efficiency PV technologies manufactured at large scale;
3. Further enhancement of lifetime, quality and sustainability:
  - **Increase module lifetime** to a guaranteed power output time (at 80% of initial power) to **30 years by 2020** and **35 years by 2025**;
  - **Minimize life-cycle environmental impact** along the whole value chain of PV electricity generation, **increase recyclability** of module components;
4. Enabling mass realisation of "(near) Zero Energy Buildings" by Building-Integrated PV (BIPV) through the establishment of structural collaborative innovation efforts between the PV sector and key sectors from the building industry:
  - **Develop BIPV elements**, which at least include thermal insulation and water protection, to entirely replace roofs or facades **and reduce their additional cost by 50% by 2020, and by 75% by 2030** compared to 2015 levels, **including with flexibility in the production process**, (table in *Annex I*);
5. Major advances in manufacturing and installation:
  - Increase large scale manufacturing concepts and capabilities by **demonstrating PV production capabilities of at least 20 m<sup>2</sup> per minute by 2020**;
  - **Develop PV module and system design concepts that enable fast and highly automated installation**, to reduce the installation costs of both ground-mounted arrays and PV building renovation solutions, **by 2020**.

## Next steps

The stakeholders agree to develop within 6 months a detailed implementation plan for the delivery of these targets, determine joint and/or coordinated actions, identify the ways in which the EU and national research and innovation programs could most usefully contribute, identify the contributions of the private sector, research organizations, and universities, identify all issues of a technological, socio-economic, regulatory or other nature that may be of relevance in achieving the targets, and report regularly on the progress with the purpose to monitor the realisation of the targets and take rectifying action where and whenever necessary.

The stakeholders intend to use the European Technology and Innovation Platform on Photovoltaics as the main vehicle for discussing and agreeing on the implementation plan.

## Annex I. BIPV detailed targets

		<i>BIPV's main applications</i>		
		<i>Roof integration</i>	<i>Façade-integration</i>	
			<i>semi-transparent</i>	<i>opaque</i>
Additional cost[1]  (€ / sq. m)	today (end 2015)	80-120  (roof-integrated modules)	150-350	130-250
		130-200  (tiles, membranes)		
	2020	50% reduction with regard to end 2015		
	2030	75% reduction with regard to end 2015		