PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

SET Plan
Strategic Targets for Photovoltaics

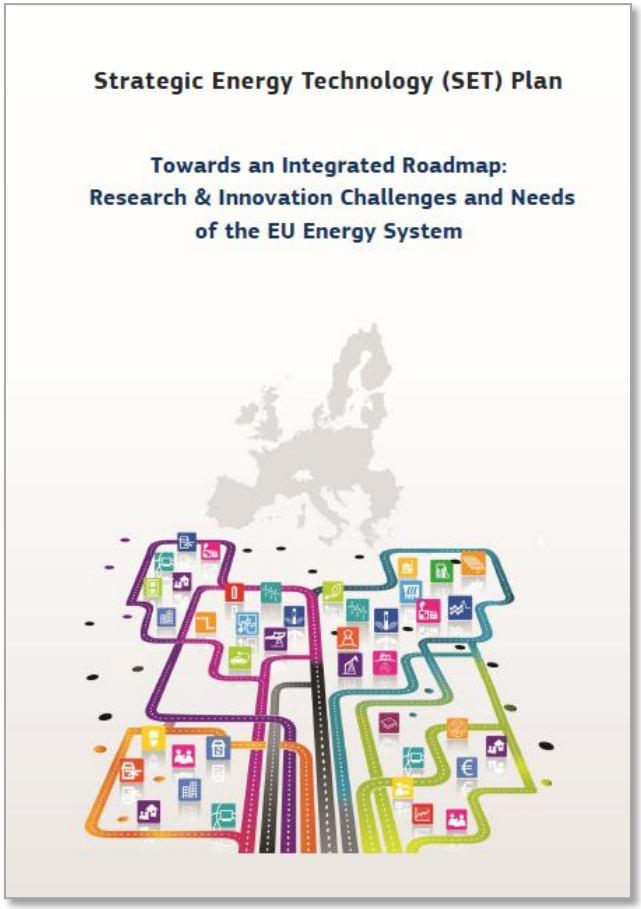
Wim Sinke
on behalf of the ETIP PV Steering Committee

SOLAR-ERA.NET Event
Düsseldorf, DE
24 02 2016

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

EU SET Plan: what's new?

- EU prepared a document *'Towards an Integrated Roadmap: Research & Innovation Challenges and Needs of the EU Energy System' (December 2014),* based on input from all energy stakeholder groups



PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

The Integrated Roadmap

Table of Contents

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

The Integrated Roadmap

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

The Integrated Roadmap

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Actions identified in the Integrated Roadmap

Photovoltaic Energy

Advanced research:

- Develop novel low cost and/or high efficiency PV technologies; enhanced PV module and system conversion efficiencies with extended lifetime, increased sustainability throughout the whole lifecycle and lowered materials consumption.

Industrial research and demonstration:

- Develop and demonstrate new pilot production lines to validate advanced/automated manufacturing processes; new multi-functional PV solutions (incorporating new technologies, system designs and system integration) to reduce cost; operational strategies for effectively and sustainably integrating PV in the energy system and in the built environment at reasonable cost.

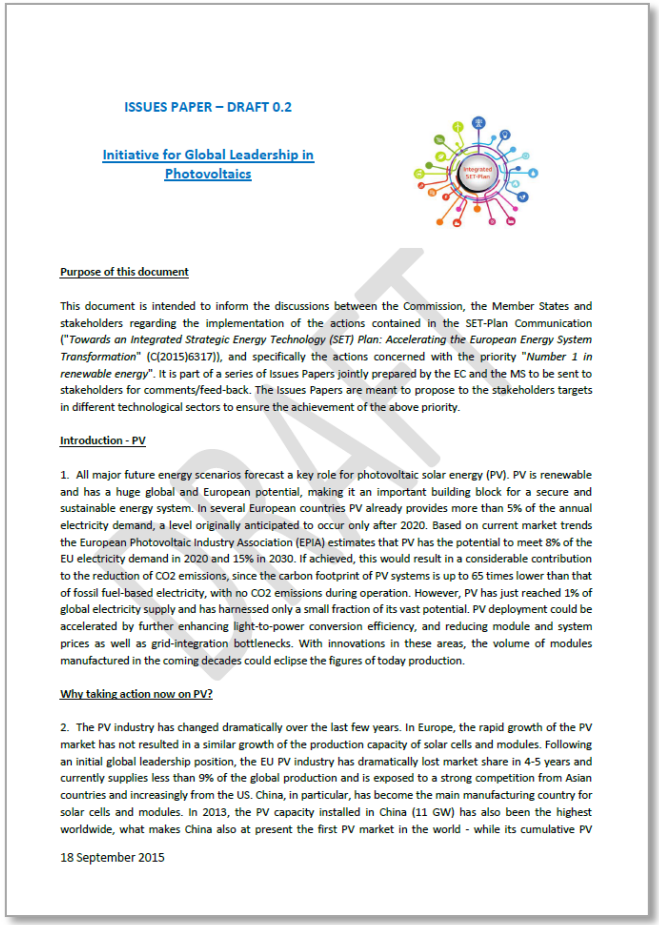
Innovation and market uptake:

- Develop financing and risk mitigation options for large-scale manufacturing plants, to address regulatory, financing and societal solutions for mass-deployment and market-based exploitation of PV investments accounting for the status and future perspectives of the EU PV industry; support training and education for photovoltaics.

Detailing the Roadmap

- EC published 'Issues Paper PV: Initiative for Global Leadership in Photovoltaics' (September 2015), asking for consolidated comments from the PV sector
- The ETIP PV prepared response to the Issues Paper
- Comments were solicited from:
  - EERA (Joint Programme on PV, 'EERA-PV')
  - ECTP (European Construction Technology Platform)
  - ETP Smart Grids
  - EPUE (European Platform of Universities Engaged in Energy Research)

  (first three provided input)



ISSUES PAPER – DRAFT 0.2

Initiative for Global Leadership in Photovoltaics

Purpose of this document

This document is intended to inform the discussions between the Commission, the Member States and stakeholders regarding the implementation of the actions contained in the SET-Plan Communication ("*Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation*" (C(2015)6317)), and specifically the actions concerned with the priority "*Number 1 in renewable energy*". It is part of a series of Issues Papers jointly prepared by the EC and the MS to be sent to stakeholders for comments/feed-back. The Issues Papers are meant to propose to the stakeholders targets in different technological sectors to ensure the achievement of the above priority.

Introduction - PV

1. All major future energy scenarios forecast a key role for photovoltaic solar energy (PV). PV is renewable and 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 the European Photovoltaic Industry Association (EPIA) estimates 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 CO2 emissions, since the carbon footprint of PV systems is up to 65 times lower than that of fossil fuel-based electricity, with no CO2 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 production.

Why taking action now on PV?

2. 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 global leadership position, the EU PV industry has dramatically lost market share in 4-5 years and currently supplies less than 9% of the global production and is exposed to a strong competition from Asian countries and increasingly from the US. China, in particular, has become the main manufacturing country for solar cells and modules. In 2013, the PV capacity installed in China (11 GW) has also been the highest worldwide, what makes China also at present the first PV market in the world - while its cumulative PV

18 September 2015

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Detailing the Roadmap

- Consolidated response ('Input Paper') presented to EC and MS
- Finetuning of texts and strategic targets (EC + ETIP PV)
- EC sent out the 'Draft Declaration on Strategic Targets in the context of an Initiative for Global Leadership in Photovoltaics (PV)'

EUROPEAN COMMISSION
RTD - Energy
ENER - Renewables, R&I, Energy Efficiency
JRC – Institute for Energy and Transport
SET Plan Secretariat

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

Purpose of this document

This document[1] 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, and representatives of the SET-Plan stakeholders most directly involved in PV[2], on the implementation of the actions contained in the SET-Plan Communication[3], and specifically the strategic targets for the priority "Number 1 in renewable energy" for what concerns PV energy.

This agreement follows consultations with the European Photovoltaic Technology Platform (PVTP), the European Construction Technology Platform (ECTP), the EERA Joint Programme on Photovoltaics (EERA JP-PV), and the European Platform of Universities in Energy Research & Education (EUA-EPUE), as well as a public consultation via the SETIS website[4] on an Issues Paper prepared by the Commission services[5]. It takes into consideration the responding input papers and public comments available on SETIS and discussions in the SET-Plan Steering Group on 9 December 2015 with the participation of the SET-Plan stakeholders most directly involved in PV.

The stakeholders agree to highly ambitious targets in an endeavour 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 these targets.

Brussels, 9 December 2015

1 This document has no legally binding character, and does not prejudge the process or final form of any future decisions by the European Commission.
2 The European Photovoltaic Technology Platform (PVTP), the European Construction Technology Platform (ECTP), the EERA Joint Programme on Photovoltaics (EERA JP-PV), and the European Platform of Universities in Energy Research & Education (EUA-EPUE)
3 Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation" (C(2015)6317).
4 Strategic Energy Technology Information System website https://setis.ec.europa.eu/
5 https://setis.ec.europa.eu/system/files/SET_Plan_Issues_Paper_Photovoltaics.pdf

SET Plan Secretariat – 04 December 2015

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Background

- The EU PV industry sector is still well positioned along the value chain and the EU has leading research institutes on PV
- But: urgent need of a strategy to build on the existing PV industrial and R&I base in Europe, with a view to re-launching cell & module manufacturing
- This calls for the achievement of ambitious technology and manufacturing related targets, as well as for regulatory and market design measures
- PV elements as building materials can develop to a world-wide market with huge opportunities for the European industry

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

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

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

This will be achieved by…

1. Achieve major advances in efficiency of established technologies (c-Si and TFs) and new concepts
2. Reduce the cost of key technologies
3. Further enhance lifetime, quality and sustainability
4. Make mass realisation of "(near) Zero Energy Buildings" possible by Building-Integrated PV (BIPV)
5. Achieve major advances in manufacturing and installation

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Agreed Strategic Targets in PV

1. Achieve major advances in efficiency of established technologies (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 the introduction of novel PV technologies

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Agreed Strategic Targets in PV

2. Reduce 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

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Agreed Strategic Targets in PV

3. Further enhance 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

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Agreed Strategic Targets in PV

4. **Make mass realisation of "(near) Zero Energy Buildings" possible by Building-Integrated PV (BIPV)** through 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 end-2015 levels, including flexibility in the production process

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Agreed Strategic Targets (BIPV detailed targets)

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

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Agreed Strategic Targets in PV

5. Achieve major advances in manufacturing and installation

- Increase large scale manufacturing concepts and capabilities by **demonstrating PV production capabilities of at least 20 m^2 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 building renovation, **by 2020**

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Next steps

Develop a detailed **implementation plan** for the delivery of these targets (within a 6 months time):

- 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;
- report regularly on the progress with the purpose to monitor the realisation of the targets and take rectifying action where and whenever necessary.

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Thank you for your attention

PhotoVoltaic
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

Baackground slide

- **Sustainability**
  - Minimisation of negative environmental impact, e.g. expressed as energy-payback time, GHG-payback time based on the Environmental Footprint of the PV technology, substitution and handling of hazardous substances along the whole production chain.
  - Increase the recyclability of module components, such as for example glass, aluminum and silver, through recycling-friendly design and improved recycling processes to achieve a high-value recycling rate of 85 % by mass at component-level of all collected end-of-life PV panels by 2030.