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ETIP PV SECRETARIAT

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SET Plan**

Deliverable 2.5 Proceedings of the Annual PV Conference 2023

"PV Innovation: Assuring Europe's Energy Independent Future with Photovoltaics"

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1. Conference Data

1.1 Location and Set up

The annual ETIP PV conference took place from 10th to 11th May 2023 at the Federation of Enterprises in Belgium (FEB) in Brussels. This year's conference titled "PV Innovation: Assuring Europe's Energy Independent Future with Photovoltaics" brought together key stakeholders and experts from the photovoltaic industry, research institutions and policy makers to delve into the critical aspects of PV manufacturing. The conference featured high-level keynote speeches and panel discussions. With its central location in Brussels, the conference provided a conducive environment for networking, knowledge exchange, and collaboration among attendees.

1.2 Participants

The ETIP PV Conference garnered significant attention with 299 registrations and a diverse participation of 121 attendees. The event brought together professionals, experts, and stakeholders from the PV industry, research institutions, and policy bodies. The high registration number and active participation demonstrated the strong interest and commitment towards driving innovation and sustainability in the PV sector.

2. Highlights of the Conference

R&I and industrialization must go hand in hand for successful PV "Made in EU". The ETIP PV conference „PV Innovation: Assuring Europe's Energy Independent Future with Photovoltaics" took place on 10th and 11th of May in Brussels, Belgium. With speakers from the European Commission, PV research and industry, it focused on discussing how policy, supply chain factors, research and innovation, international trade, economic growth and environmental and climate concerns can deliver the resurgence of a European solar supply chain. Here is a summary of the main messages presented by the Speakers of the 2023 Annual ETIP PV Conference.

The EU is and will continue to be one of the leading markets for PV globally thanks to clearly defined ambitious renewable energy deployment targets (42.5% by 2030) and regulatory framework. As the PV production deployment globally grows towards more than 1TW annual PV installations by 2030 and as EU aims at meeting a rapidly-increasing demand for PV across the world, the EU has set a 30 GWp/year target for domestic solar PV production by 2025.

As part of an emerging European industrial policy towards the PV sector, and achieving the objectives set in the European Solar Strategy, the European Commission has temporarily lifted state-aid guidelines with its Net Zero Industry Act, facilitating the allocation of direct support to PV projects by the European Member States. Additionally, the European Commission has stated that research and innovation (R&I) should be developed in parallel and that efforts to bring results of European R&I onto the market should be strengthened. This could be achieved for instance via an Innovation Fund as well as a better involvement of the ETIP PV and the PV industry in R&I programmes designed via possible co-programmed partnerships.

The PV sector is highly appreciative of all these policy steps; however, more work on the policy side is necessary to attract further investments and to create the right conditions for European and international players. In particular, greater clarity, visibility, and predictability for investors and project developers, for instance with a clear set of guidelines on which CAPEX and OPEX support is available and where and how one can obtain such support (as provided by DOE in the USA to assist with IRA) are missing.

There was a general consensus at the conference that R&I will remain the backbone of the European efforts to create a competitive PV supply chain, as investing in PV manufacturing cannot be conceived without innovation. Rebuilding an EU-based PV value chain requires establishing a strong industrial base of today's best available technologies, as Europe cannot transition directly into the next generation of PV technologies without catching up first. However, the PV field is developing quickly and the industry is undergoing rapid structural changes. Industrial policy and investment programmes must be implemented hand-in-hand with innovation to prevent the risk of investing only in technologies that might soon become outdated and/or obsolete.

In line with the rapidly growing deployment rate and industrial investments in Europe and globally, the EU should ensure that there is very strong and increased funding to maintain its PV R&I field and keep up its progress in this very dynamic and competitive field. The European Innovation in PV can be capitalized on if Europe aims at ensuring that it is innovative at the GW scale and that it is keeping on filling the pipeline in a technology-open way.

Additionally, the conference highlighted that when it comes to R&I, Europe can and should learn from the past: R&I is the sole reason why PV is so cheap today and will continue to be the reason for decreasing costs in the future. In particular, the potential of the industry to do R&I has doubled since 2018 with a doubling of turnover, much of which is currently not located in Europe, threatening the EU's capacity to maintain its leadership in this area. Moreover, Europe can become cost competitive as the currently higher prices for PV manufacturing are primarily due to higher energy costs and lack of a local value chain for PV and not because of lack of R&I (see ETIP PV White paper on PV manufacturing in the EU). Therefore, the first and most important step is quick and robust scale-up and then, quickly ensuring that there is a continuous collaboration between R&I and industry.

Finally, Europe's 30GW/a production in the EU target is a promising one, but it represents only a 3% contribution from the global TW market and a marginal share of the rapidly growing European PV deployments. Nevertheless, this TW scale offers many opportunities for commercially-viable innovations, especially as the World will transition into a more circular industry. Europe is confident that it is at the start of a very promising European PV expansion and that with strong European PV industrial policy, better "lab to fab" programmes, and fast and agile translations of EU actions at national levels, the EU will not only reach, but also surpass its solar PV manufacturing and installations goals by 2030 and beyond.

3. Summary of the Sessions and Presentations

3.1 Opening Speech Day 1: Rutger Schlatmann (HZB-Institute PVcomB and ETIP PV Chair)

Rutger Schlatmann, ETIP PV Chair, emphasised in his presentation ([available here](#)) that innovation in the PV industry is closely tied to a thriving industry and academic environment and highlighted the importance of European objectives as guidelines for the future evolution of the PV sector.

Furthermore, he presented the ETIP PV White paper on PV Manufacturing in Europe outlines key priorities for the PV sector in the coming years. These priorities include the need to build upstream capacity, expand and train a skilled workforce, address the challenge of energy costs for operational expenses (OPEX), and prevent Europe from losing its research and innovation (R&I) leadership to regions with stronger industrial bases for PV. Schlatmann pointed out the necessity of improving the European framework for bringing innovation to market, highlighting that regions with robust industrial bases have greater capacity to innovate, posing a risk to Europe's R&I leadership.

Scaling up European PV



Need to build up **UPSTREAM CAPACITY** in the PV sector (raw material production, machine manufacturing...)



WORKERS are a condition for all parts of a successful EU PV sector



ENERGY COSTS continue to be the main OPEX competitiveness barrier



Europe is at risk of **LOSING** its **R&I** leadership without **INTENSIFYING INVESTMENTS** and a stronger industry/research integration



3.2 Key Note: Lukasz Kolinski, Head of Unit of the renewable energy unit, DG ENER, European Commission

Lukasz Kolinski provided an overview of the benefits of renewable energy sources and emphasised the need for their increased deployment and production in Europe. He highlighted that renewables protect consumers against price spikes and the weaponisation of energy, which is why the European Commission (EC) supports the transition to renewable energy sources comprehensively, including renewables deployment, hydrogen (H₂), heat pumps, and electric vehicles (EVs).

The Renewable Energy Directive is the centrepiece of the European policy framework for the energy transition. It set a provisional target of 42.5% renewable energy by 2030 (45% non-binding), providing direction and predictability for project developers and investors. The directive also focused on innovative renewable energy technologies and heating and cooling targets. The Renewable Energy Directive is expected to enter into force in 2023 and aimed to double the current renewable energy share by 2030.

In his presentation Kolinski drew attention to the Solar Strategy, particularly the European rooftop initiative, which is now being negotiated to become official legislation and is considered revolutionary within the EC. Above, he highlighted the need to streamline permit granting processes to address the long lead times for solar PV project development.

Regarding manufacturing, Kolinski highlighted various initiatives such as the Solar Strategy, the Green Deal Industrial Plan, and the National Zero Industrial Associations. The focus was on improving competitiveness, facilitating permitting for manufacturing, accessing markets and public procurement, and providing provisions related to finance and human resources for PV manufacturing.

Kolinski mentioned the availability of funding for renewable energy sources and PV manufacturing through state aid revision and EU funds. OPEX support is also possible for PV manufacturing in Europe, aligning with the EC president's emphasis on funding critical and emerging energy transition technologies.

Lukasz Kolinski concluded that Innovation is a key element to achieve policy objectives, meet manufacturing targets, and ensure affordability. Overall, closing the technology gap through innovation will be crucial to achieving Net Zero Industrial Associations (NZIA) objectives.



3.3 Session 1: Global Solar manufacturing development

Keynote speeches:

Christian Staudt (McKinsey & Company)
Markus Beck (US DOE)

Panellists:

Christian Staudt (McKinsey & Company)
Markus Beck (US DOE) – Video available [here](#)
Gulnara Abdullina (LONGiSolar),
Cosimo Gerardi (Enel Green Power)
Johan Lindahl (ESMC)

Moderators: Peter Fath (RCT Solution), Delfina Munoz (CEA)

Christian Staudt from McKinsey and Company stressed that there is a notable shift occurring in PV manufacturing and supply chains, indicating a transformation within the Western PV industry. This transformation is driven by various factors and is poised to reshape the industry. The European Union (EU) is expected to remain a core market for PV, potentially surpassing the United States post Inflation Reduction Act (IRA). Staudt highlighted the changing dynamics in various regions. In India, incentives and tariffs are driving investments in the solar industry, making it an appealing market for PV manufacturing. On the other hand, in China, where the PV industry has already achieved significant scale, the incentives for PV manufacturing investments have diminished. The IRA in the United States has stimulated investments in the module assembly segment of the PV supply chain. This policy has attracted investments and fostered growth in PV manufacturing activities in the country. In summary, Staudt's insights shed light on the ongoing transformation in PV manufacturing and supply chains, underlining the significance of solar power in the energy transition.

Markus Beck, the Department of Energy (DOE) representative, highlighted in his keynote video message, the existing gaps in the US supply chain for PV technology. The United States is not solely focused on achieving self-sufficiency but aims to establish resilience with the IRA by strengthening its clean energy technology supply chains. The objective is to collaborate with reliable allies in order to address these challenges. One important avenue for collaboration is the Clean Energy Ministerial, specifically the Transforming Solar Workstream. Within this framework, a dedicated subgroup focuses on improving the supply chain for solar energy, acknowledging its significance in the overall clean energy transition. By working together with trusted partners, the US seeks to enhance the reliability and efficiency of PV supply chains and ensure a sustainable and resilient future for clean energy technologies.

Cosimo Gerardi, representing Enel, provided valuable insights on their upcoming production site in Catania, named 3Sun, as well as their plans for a new site in the USA with a capacity of 6GW. 3Sun emphasises innovation and traceability as key focus areas. Regarding the supply chain challenges, Cosimo highlighted the complexity of achieving sovereignty in silicon (Si) production. Si is a strategic component of the photovoltaic (PV) supply chain, and it is imperative to establish Si production capabilities within Europe to ensure supply security. Currently, Enel procures all its Si from China. Equipment manufacturing emerged as another significant topic, with most of the equipment for new PV technologies manufactured in China. While such equipment is available in the EU, it often comes at a higher cost or with greater supply challenges. However, cheaper tools may raise concerns about intellectual property infringement and potentially compromise the quality and compliance with EU standards throughout the manufacturing process. Hence, ensuring high-quality standards and effective quality control and management are critical conditions for a successful PV manufacturing program. Enel's insights underscore the importance of addressing supply chain vulnerabilities in the PV industry, particularly regarding Si production and equipment manufacturing. Establishing domestic capabilities and ensuring quality control are crucial steps toward building a resilient and sustainable PV sector in Europe and the USA.

Gulnara Abdullina, from LONGi outlined two critical conditions for establishing PV production in Europe: market demand and competitiveness. The European Union (EU) possesses a robust distributed market that can support higher production costs associated with domestic PV manufacturing. To create an investment-friendly environment for PV manufacturing, it is essential to develop an industrial cluster centered around PV production. While the EU currently has sufficient silicon (Si) capacity in the short term, there is a shortage of other auxiliary materials in the European value chain, such as silver and PV glass. For instance, a 30 GW PV plant would require approximately 30 million tons of PV glass per year. Energy prices play a crucial role in investment decisions for establishing production facilities. A 3 GW cell factory, for instance, would need approximately 86 GWh of electricity per year. Therefore, favorable energy pricing is a significant factor in attracting investments in PV manufacturing. Gulnara emphasised the importance of member state support to mitigate investment risks. Collaboration and support from government entities and regulatory bodies are vital to create a favourable investment climate and encourage the establishment of domestic PV production in Europe.

Johan Lindahl, representing the European Solar Manufacturing Council (ESMC), identified scaling-up across the value chain as the primary challenge for the PV industry in Europe. While the European Union (EU) is a complex entity, the European Commission has made significant changes to the State Aid Rules for PV, potentially having a substantial impact. It is now the responsibility of European countries to take action and make progress. Lindahl highlighted the need for the EU Commission to increase funding through programs to support the PV industry. Regarding the time limit on state aid rules, he pointed out that it is not as negative as initially anticipated. Instead, it refers to a time limit for member states to prepare their support programs. This indicates that there is an opportunity for member states to develop and implement effective support measures within a specified timeframe.

During the discussion on auxiliary materials in the PV supply chain, it was noted that these segments typically follow the establishment of the primary material/production value chain. Glass, in particular, was identified as a component with high logistical costs, and bottlenecks were also observed in equipment and machinery, calling for new investments in those areas. The role of innovation in achieving competitiveness was discussed, with various perspectives shared. Cosimo Gerardi emphasised the importance of continuous innovation, highlighting how 3Sun's choice of heterojunction technology was a competitive decision. Johan Lindahl noted that Europe has a competitive advantage when it comes to PV efficiency, while Gulnara Abdullina pointed out the need for a balanced approach, stating that capacity/scale and innovation are both necessary. Overall the discussion highlighted the importance of innovation for competitiveness, the need for a balanced approach that combines capacity/scale and innovation, and the recognition that both domestic and foreign players can contribute to the growth and success of the PV industry. It was also underlined that while innovation is valuable, it should be complemented by scale and collective efforts to address industry challenges effectively.



3.4 Session 2: Competitiveness of European production, supply chain for overall PV ecosystem

Keynote speeches:

Peter Fath (RCT Solutions) - Presentation available [here](#)

Bianca Lim (ISFH) - presentation available [here](#)

Panellists:

Peter Fath (RCT Solutions)

Ozer Ergul (Aquila Capital) – Presentation available [here](#)

Wolfgang Storm (Wacker Chemie) – Presentation available [here](#)

Goran Bye (Norwegian Crystals)

Christoph Podewils (Meyer Burger) – Presentation available [here](#)

Lucas Weiss (Voltec Solar)

Moderators: David Moser (EURAC Research), Bianca Lim (ISFH)

In his keynote speech, Peter Fath reiterated the importance of local manufacturing and integrated production in the EU's pursuit of sustainable energy solutions. Local manufacturing would offer numerous advantages such as supply chain independency, reliable module supply, and cost efficiency. Additionally, the declining cost of energy storage systems is enhancing their competitiveness against traditional power generation. To bolster the EU's manufacturing industry, attracting global talent and investing in robust training programs and employee well-being initiatives are critical. Manufacturing operations should also prioritize CO₂-neutral energy consumption, social responsibility, and green manufacturing practices. Fath underscored that the EU's commitment to CO₂-neutral energy consumption and green manufacturing practices will not only reduce environmental impact but also position the region as a leader in sustainable manufacturing solutions.

Bianca Lim from Institute for Solar Energy Research in Hamelin shed light on Europe's dependence on imports, risks associated with concentration in the value chain, and challenges related to skills availability.

She stressed that Europe relies heavily on imports to achieve its deployment objectives in the PV industry. This highlights the vulnerability of the European market to disruptions in the global supply chain and underlines the need to establish domestic production capabilities to enhance supply security. She also pointed out the risks associated with a high concentration of several crucial components of the PV value chain in a single country. Dependence on a single country for these components increases the risk of supply chain disruptions, geopolitical tensions, and market uncertainties. Diversification and decentralization of the value chain are therefore key to mitigate these risks and establish a resilient PV industry in Europe. Additionally, despite having a strong research and innovation base, the EU faces challenges in terms of skills availability in the PV sector. Adequate human resources and skilled labor are crucial for the development, manufacturing, and maintenance of PV technologies. Addressing the skills gap through targeted training programs and educational initiatives is vital to ensure a capable workforce that can support the growth and competitiveness of the PV industry in Europe.

During the panel discussion, several speakers underscored the significance of technology, cooperation, and innovation in the PV industry's success and sustainability. Wolfgang Storm from Wacker Chemie (presentation highlighted the industry's progress in efficiency and sustainability, with a significant reduction in energy required to produce 1W of PV capacity over the past two decades. Ozer Ergul, representing Aquila Capital, advocated for the Solar Stewardship Initiative, calling for greater cooperation among industry stakeholders to establish a resilient and sustainable PV supply chain, considering geopolitical factors. Christoph Podewils from Meyer Burger, stressed the role of innovation in driving cost reduction in PV technology, with efficiency gains at the cell level contributing to affordability. However, he also pointed out challenges in the silver supply chain as the PV sector grows. Lucas Weiss from Voltec emphasised the importance of continuous improvement in eco-design principles, aiming for a more circular PV industry. He advocated for promoting local content in production and acknowledged the challenge of achieving high silicon efficiency with secondary crystalline Si. Goran Bye from Norwegian Crystal discussed preparing for capacity extension in ingot and wafer production, adapting project development to enhance cost-effectiveness and address skill availability. During a discussion on innovation, it was mentioned that the Horizon Europe program had varying impacts on PV companies. Smaller companies like Voltec found it beneficial, while challenges existed for others in accessing European innovation programs like the Innovation Fund. The speakers agreed on the importance of innovation for companies' survival and stressed the need for better integration between research and industry, calling for industry scale-up to achieve meaningful progress.



3.5 Opening Speech Day 2: Rosalinde Van der Vlies, Director of the Clean Planet, DG RTD, European Commission

During the opening speech (Video available [here](#)) on Day 2 of the event, Rosalinde Van Der Vlies, EC Director Green Planet, highlighted the increasing importance of solar PV energy in Europe. Three key messages were conveyed to the audience. Firstly, the EU is strongly supporting R&I in PV. The EU sees PV as a crucial policy priority and aims to repower Europe. The goal is to achieve energy independence, rather

than simply replacing one unreliable energy source with another. Notably, in 2022, wind and PV collectively generated more electricity than gas in Europe, indicating the growing significance of renewable energy sources. Secondly, the EU has developed a comprehensive solar strategy, and initiatives like the New Zero-impact Industry Initiative (NZIA) are facilitating innovation and investments in PV manufacturing. The solar strategy focuses on promoting the circularity of the PV value chain, encouraging new production designs that integrate PV technology, and ensuring a quicker transfer from laboratory research to industrial-scale fabrication. The EU aims to demonstrate leadership in R&I efforts in the PV sector. Furthermore, Van Der Vlies stressed that there are synergies between PV R&I and other programs within the EU, such as the Innovation Fund. These synergies foster collaboration and resource sharing, enabling faster progress in low carbon manufacturing. By leveraging these connections, the EU aims to maximize the impact of its initiatives and accelerate the transition to sustainable energy systems. Collaboration within the PV sector is also a priority. The European Solar Industry Association (ESIA) is actively developing a strategic R&I agenda, aiming to enhance cooperation and coordination across the entire PV industry. Additionally, there are considerations for a co-programmed partnership with PV for the upcoming Horizon Europe programming period. Such collaborations and partnerships will be instrumental in driving innovation and achieving shared objectives in the PV sector. The ETIP PV plays a pivotal role in bringing together the PV community, fostering dialogue, and promoting collective action. Lastly, there is a pressing need for massive deployment of the solar PV sector on an unprecedented scale. This highlights the urgency to accelerate the installation of PV systems in order to meet energy demands, combat climate change, and work towards achieving sustainability goals.

3.6 Session 3: Photovoltaics innovative technologies manufacturing and in manufacturing for a TW solar age

Keynote speeches:

Ralf Preu (Fraunhofer ISE)
Raffaella Giardino (Carbon)

Panellists:

Ralf Preu (Fraunhofer ISE) – Presentation available [here](#)
Raffaella Giardino (Carbon) – Presentation available [here](#)
Anis Jouini (CEA Liten)
Stefan Rick (Singulus Technologies) – Presentation available [here](#)

Moderators: Jutta Trube (VDMA), Nabih Cherradi (Desert Technologies)

Summary:

Raffaella Giardino from Carbon presented the Carbon Gigafactory project, highlighting several main challenges and key points to consider. The project identified permitting, supply chain issues, skills and training, financing, and land availability as the primary challenges in the PV industry. The regulatory framework was identified as a hurdle to EU competitiveness. For example, tariffs on raw aluminum rather than on the PV frame were seen as an issue. Ensuring a robust value chain was also pointed out as crucial for industry stability and resilience. The Gigafactory underlines the need for skilled labor in the PV sector, estimating that approximately 3000 people would be required to operate their factory effectively. Collaboration between research institutes and the industry was emphasised as vital for driving innovation in the PV sector.

Ralf Preu from Fraunhofer ISE presented a comprehensive analysis of sustainable PV production in Europe, shedding light on various critical aspects of the industry. One of the primary concerns addressed was the security of the PV value chain, which currently faces challenges due to its heavy concentration in China and the weight of Xinjiang. This concentration raises apprehensions regarding the reliability and stability of the supply chain. To mitigate this risk, it is essential to diversify production locations and reduce dependence on a single region, thereby ensuring a more secure and resilient value chain. The PV industry has experienced remarkable growth, with a doubling of turnover between 2018 and 2022, indicating its

potential for further expansion. This growth signifies the industry's capacity to engage in research and development (R&D) activities. By investing in R&D, companies can drive technological advancements, improve efficiency, and enhance the competitiveness of European PV manufacturers. Furthermore, even without extensive PV production in Europe, there are significant benefits to be gained from research and innovation (R&I) efforts. R&I can lead to cost savings, even if manufacturing is outsourced. By focusing on R&I, European companies can develop and implement more efficient technologies and processes, resulting in reduced production costs. Module efficiency and production yield were identified as crucial factors impacting the cost of PV systems. Higher module efficiency means that a greater amount of sunlight is converted into electricity, reducing the number of modules required and lowering associated costs. Similarly, an improved production yield minimizes waste and enhances the cost-effectiveness of the manufacturing process. To further incentivize investments in PV R&D, intellectual property rights protection needs to be strengthened. Robust protection of intellectual property rights creates an environment conducive to innovation and encourages companies to invest in the development of new technologies and processes. By improving IP rights protection, the PV industry can attract more investments, leading to accelerated advancements and increased competitiveness in the global market.

During the panel discussion, Anis Jouini (CEA Liten), expressed that aiming for 30GW of PV capacity is not a sufficient ambition level, as it does not align with the market expectations for 2030. Stefan Rick (Singulus Technologies), from a machine manufacturing perspective, stated that scaling beyond 30GW should not be a problem, but pointed out the need for private and public finance, as well as relevant policy support. Raffaella Giardino (Carbon) highlighted China's experience in creating a market for PV manufacturing and emphasised the current strong demand for local panels with low carbon content. While Europe is strong in research and innovation (R&I), there is still a lack of manufacturing at the necessary scale. She also stressed the importance of a strong initial push to attract investors to bridge this gap. Several factors were identified as blocking developments in PV manufacturing. These include the lack of visibility on energy prices, the competition from unethical products and the need for public funding for worker training. Anis Jouini (CEA Liten), stressed that innovation in PV is happening worldwide and not limited to Europe. There is a need for a long-term vision for PV and a shift from a reactive to an active approach. Stefan Rick (Singulus Technologies), added that while Europe has made progress in financing R&I, there is still room for improvement in terms of industrial policy support for PV. The comparison was made to how the PV industry is supported in China, India, and the US, and the need for Europe to be more proactive. Anis Jouini (CEA Liten), mentioned the establishment of the ESIA WG on finance, which aims to direct financing towards PV manufacturing. The decision to allocate funds in this direction rests with the EU countries.



3.7 Session 4: Sustainability and Social impact of Photovoltaics

Keynote speeches:

Karsten Wambach (bifa Umweltinstitute)
Raffaele Rossi (SPE)

Panellists:

Karsten Wambach (bifa Umweltinstitute) – Presentation available [here](#)
Raffaele Rossi (SolarPower Europe) – Presentation available [here](#)
Gernot Oreski (PCCL)
Laura Miranda Perez (Oxford PV) – Presentation available [here](#)
Wolfgang Storm (Wacker Chemie) – Presentation available [here](#)

Moderators: Bonna Newman (Lightyear), Delfina Munoz (CEA)

Karsten Wambach from Bifa Umweltinstitute presented the current status of end-of-life management for PV modules in the European Union (EU) and the associated waste streams. The key takeaways shed light on the growing significance of PV module waste and the need for effective management strategies. One notable conclusion is that the amount of anthropogenic material stock from PV modules is expected to exceed other e-waste streams in the coming decade. This highlights the increasing importance of addressing PV module waste in a responsible and sustainable manner. International efforts in PV recycling were acknowledged, but it was underlined that there are still information gaps that need to be filled. The rapidly expanding variety of PV products poses challenges as well. Newer modules, for example, may have lower recycling values compared to older ones, and there is a constant influx of diverse materials, designs, and formats in the market. To tackle these challenges, the presentation emphasized the need for specific policies and circular economy strategies tailored to PV development. International rules and standards for PV waste management should be adopted to ensure consistency and effectiveness. Furthermore, securing adequate financing for the circular economy is essential. This financial support would enable the implementation of proper PV waste management practices and contribute to the overall sustainability of the industry.

Raffaele Rossi from SolarPower Europe presented in his keynote the regulatory framework of sustainable design in PV. The concept of PV Eco-design was discussed, encompassing a range of provisions aimed at promoting sustainability in the PV industry. The presentation provided an overview of the specific requirements for PV modules and inverters within the PV Eco-design framework. The presentation highlighted the significance of considering the carbon footprint of PV modules.

During the Panel Discussion Laura Miranda Perez (Oxford PV), pointed out the multifaceted nature of sustainability. While environmental impacts are often the focus, sustainability encompasses social impacts, governance, and challenges associated with the PV supply chain. The rapid and exponential growth of the PV industry presents both an opportunity and a responsibility to ensure sustainability across these various dimensions. Wolfgang Storm (Wacker Chemie) stressed the role of PolySi in addressing sustainability aspects of PV systems. He underlined importance of preparing for the recycling and reuse of silicon (Si) from decommissioned modules. Finding applications for the recycled Si in other industries can contribute to overall sustainability. Additionally, the specific carbon footprint of PV modules emerged as a significant topic of concern. The discussion also touched upon the challenge of recycling polymers used in PV modules. Tackling the issue of polymer recycling is crucial to achieve high-quality recycling processes and ensure sustainable practices in the PV industry. Regarding the question of production in Europe for sustainability, the responses varied. While sustainable production can occur elsewhere, Europe was noted to have a competitive advantage in terms of sustainability. Raffaele Rossi (SolarPower Europe), highlighted that Europe can leverage this advantage to foster sustainable production practices. The importance of traceability in the PV supply chain was underscored as a means to ensure proper recycling. Traceability enables the identification of the material content of PV products, which in turn determines the appropriate recycling procedures. Having a transparent and traceable supply chain is crucial for achieving sustainable outcomes in PV production. The panel discussion emphasized the multifaceted nature of sustainability, encompassing environmental, social, and governance aspects. Recycling and reusing Si from decommissioned modules and addressing polymer recycling were recognised as important steps towards sustainability. Europe was seen as having a competitive advantage in sustainable production, while traceability in the supply chain emerged as a critical factor for proper recycling practices. By addressing these aspects, the PV industry can meet the challenges of growth while ensuring responsible and sustainable practices.



4. Conference Conclusion

The ETIP PV Conference on "PV Innovation: Assuring Europe's Energy Independent Future with Photovoltaics" highlighted the importance of research and innovation (R&I) in conjunction with industrialization for successful PV manufacturing in Europe. With ambitious renewable energy targets and supportive policies, the EU aims to become a leading market for PV. The conference emphasized the need for enhanced collaboration between R&I and the PV industry, and increased funding to maintain Europe's progress in this dynamic field. Clarity, predictability, and robust scale-up are crucial, as Europe strives to surpass its PV manufacturing and installations goals by 2030 and beyond, while maintaining cost competitiveness and environmental sustainability.

5. Annex

5.1 Agenda of the ETIP PV Conference 2023

PV Innovation: Assuring Europe's Energy Independent Future with Photovoltaics

With an exceptionally strong solar R&D landscape and the most advanced equipment providers, it will be essential to leverage existing European R&D resources and know-how to advance these technologies. The conference will highlight how policy, supply chain factors, research and innovation, international trade, economic growth and environmental and climate concerns can deliver the resurgence of a European solar supply chain.

The conference is chaired by Peter Fath (RCT Solutions), Delfina Munoz (CEA Liten) and Nabih Cherradi (Desert Technologies).

Date:
10 & 11 May 2023

Location:
VBO FEB Brussels

[REGISTER
HERE](#)

CONFERENCE PROGRAMME

ETIP PV Annual Conference 2023 - **Day 1**

13.30 – 14.00

Registration and Welcome Coffee

16.30 - 17.00	<p>Chairs/ moderators: David Moser (Eurac research), Bianca Lim (ISFH)</p> <p>Keynote speeches</p> <p><i>Can the European dream of a competitive EU Solar Industry become true?</i></p>	<p>Peter Fath (RCT Solutions)</p>
17.00 - 18.00	<p>Panel Discussion on the competitiveness of European production, supply chain for overall PV ecosystem</p> <p><i>European leading edge of innovation combined with verticality and scale; the European manufacturers could produce competitive very high-quality products system. This session will explore the pathway to be followed for the EU to achieve its objectives within the next 5 years and how the European PV innovation-to-market pipeline is enabling this ambition today.</i></p>	<p>Ozer Ergul (Aquila Capital)</p> <p>Peter Fath (RCT Solutions)</p> <p>Wolfgang Storm (Wacker Chemie AG)</p> <p>Goran Bye (Norwegian Crystals)</p> <p>Christoph Podewils (Meyer Burger)</p> <p>Lucas Weiss (Voltec Solar)</p>
18.00-19.00	Networking Drinks	

ETIP PV 2023 Annual Conference 2023 - **Day 2**

9.00-9.20	Registration and Welcome Coffee	
9.20 – 9.30	<p>Opening Speech</p> <p>Rosalinde Van der Vlies (Director of the Clean Planet DG RTD, European Commission)</p>	

9.30 – 10.00

Chairs/ moderators: Nabih Cherradi (Desert Technologies), Jutta Trube (VDMA)

Keynote speeches

Research and development for sustainable PV production in Europe.

Key Levers for a competitive solar PV Manufacturing in Europe

Ralf Preu
(Fraunhofer ISE)
Raffaella Giardino
(Carbon)

10.00 – 11.00

Panel Discussion on Photovoltaics innovative technologies manufacturing and in manufacturing for a TW solar age

European companies and research centers have demonstrated their global innovative edge by developing world-leading high-efficiency cell and module technologies as well as future-proof solar applications on the integration of photovoltaic energy. How to transform the European leading edge in PV R&D Technologies, equipment manufacturing and PV installation into a \$ per Wp.

Ralf Preu
(Fraunhofer ISE)
Raffaella Giardino
(Carbon)
Anis Jouini
(CEA Liten)
Gerard de Leede
(Solarge)
Stefan Rinck
(Singulus Technologies)

11.00-11.30

Coffee Break

11.30-12.00

Chairs/ moderators: Bonna Newman (LightYear), Delfina Munoz (CEA liten)

Keynote speeches

Status of End-of-Life of PV modules in the EU and existing waste streams.

Regulatory framework of sustainable design in PV

Karsten Wambach
(bifa Umweltinstitut GmbH)
Raffaele Rossi
(SolarPower Europe)

12.00-13.00

Panel Discussion on Sustainability and Social impact of Photovoltaics

There are multiple benefits to growing domestic renewable energy manufacturing, including job creation, economic development and reducing GHG emissions. Thinking about the cycling economy, cradle-to-cradle, and recycling concepts, Europe is predestined to introduce real sustainability into the energy system and provide real “green” energy. Social acceptance.

Karsten Wambach
(bifa Umweltinstitut GmbH)
Raffaele Rossi
(SolarPower Europe)
Gernot Oreski
(PCCL)
Laura Miranda Perez
(Oxford PV)
Wolfgang Storm
(Wacker Chemie AG)

13.00-13.30

Closing Session

Closing Keynote Speech

Wrap-up

13:30-14:30

Lunch Break

14.30-16.00

VIPERLAB First Public event: “Status of achievements in the perovskite based PV field-Performance, Infrastructure, Community and Strategic Research and Innovation agenda”

Register [here](#) for the workshop

