ETIP PV Annual Conference: Shaping Europe’s Energy Future with Photovoltaics

ETIP-PV’s 2022 Annual Conference “Shaping Europe’s Energy Future with Photovoltaics – Sustainable Manufacturing and Deployment” took place 4-5 May 2022. The event was focused on highlighting the status of photovoltaics (PV) and answering the following questions:

- How can Europe’s position along the PV value chain be strengthened?
- What are future challenges as PV deployment is increasing towards Terawatt levels?
- What are innovative technological solutions for a sustainable Terawatt-PV?

The online event covered four sessions – with a mix of presentations and roundtable discussions –across two days, each one covering the challenges or opportunities of the transition to climate neutrality and a sustainable future with PV technology. The conference had an average of over 200 participants per session and was chaired by Dr. Simon Philipps (Head of R&D Strategy, Fraunhofer Institute for Solar Energy Systems ISE). The conference opened with a welcome address from Dr. Philipps, who noted that shaping Europe’s energy future through PV technology was the “ambition and motivation” of ETIP-PV – particularly as PV was the “backbone” of the European Green Deal. He also noted that sustainability was key to PV’s future success, both in manufacturing and in large-scale deployment.

Session I: Strengths of PV and Ongoing Initiatives

The opening session – “Strengths of PV and Ongoing Initiatives” – was chaired by Maria Getsiou (European Commission, Directorate-General for Research & Innovation) and Dr. Marko Topic (ETIP PV Chairman). This session, which was more focused on policy, imagined PV at the centre of the energy transition and highlighted European initiatives aimed at accelerating PV deployment, strengthening the value chain and maximizing its value and impact on a wider scale. The session began with a presentation from Ignacio Asenjo (Policy Officer at European Commission, DG ENER) on the **EU Solar Energy Strategy**. The Commission considers slow and complicated permitting procedures to be a barrier to faster deployment of PV and it would like to achieve multiple use of land through agri PV or floating PV, and see more examples of product-integrated PV such as building integrated PV. A large skilled PV workforce will be needed. Žygimantas Vaičiūnas (Policy Director at European Solar Manufacturing Council) continued the session by focusing on PV manufacturing in Europe and short-term measures to ensure future success. These measures include **clear goals for the European manufacturing**, namely 35 GW PV manufacturing capacity by 2025 and 100 GW by 2030. To deliver this investment, appropriate financing mechanisms will be needed. Member States’ support for PV manufacturing their **Recovery and Resilience Plans** is limited, but also support instruments such as the **Innovation Fund** and **Just Transition Fund** could play more supportive roles. He also introduced the PV-IPCEI framework (see **Figure 1**), which is a proposed governance and management framework for the PV industry.

Figure 1

The first session continued with Dr. Daniel Mugnier (IEA PVPS Chairman) who shared good news from the PV innovation side to address the TW challenge. He noted that PV is progressing quickly, particularly in terms of technology to broaden applications (i.e. see the earlier references to multiple use of land and product integrated PV), increase competitiveness and become more mainstream. Finally, Dr. Jutta Trube (Vice Managing Director, VDMA) presented the newest, 13th edition of the **International Technology Roadmap for Photovoltaics (ITRPV).** The session concluded with a panel discussion with all the above participants, who echoed similar thoughts of the most pressing challenges to PV. Financing is perceived as a "key barrier" as financial institutions view the sector as "risky" due to the small margins and strong competition. An industry alliance was suggested as a possible avenue for enacting policy on a wider scale and to help expand manufacturing in the EU. Greater manufacturing capacity is certainly needed in the EU, as well as strengthening of the entire value chain – currently, limitations on materials and capacity prevent the EU from having a complete PV value chain. The panel agreed with the EU Solar Energy Strategy's identification of a lack of people to work in the industry and drawn-out permitting processes as obstacles to PV's growth.

Session II: Technological Sovereignty for PV

The second session was titled "Technological Sovereignty for PV" and was chaired by Dr. Trube (VDMA) and Dr. Jochen Rentsch (Head of Department Production Technology – Surfaces and Interfaces, Fraunhofer ISE). This session emphasized the importance of complete PV supply chains in Europe as an "essential prerequisite for establishing sustainably successful and independent PV manufacturing". This applies to both the production of process equipment and the acquisition of materials. Dr. Peter Fath (CEO, RCT Solutions GmbH) showed that many kinds of manufacturing equipment are fully available in Europe (see **Figures 2 and 3**). On the material side, he pointed to a need to invest in foils and glass production. Dr. Fath referred to an integrated (1.2 GW) solar factory in Ankara, Turkey (set up by his company and Kalyon PV) to show that relevant knowledge is available for a successful PV supply chain in Europe and its neighborhood in terms of engineering, technology, equipment and installation processes, but this supply chain must be strengthened.

Figure 2

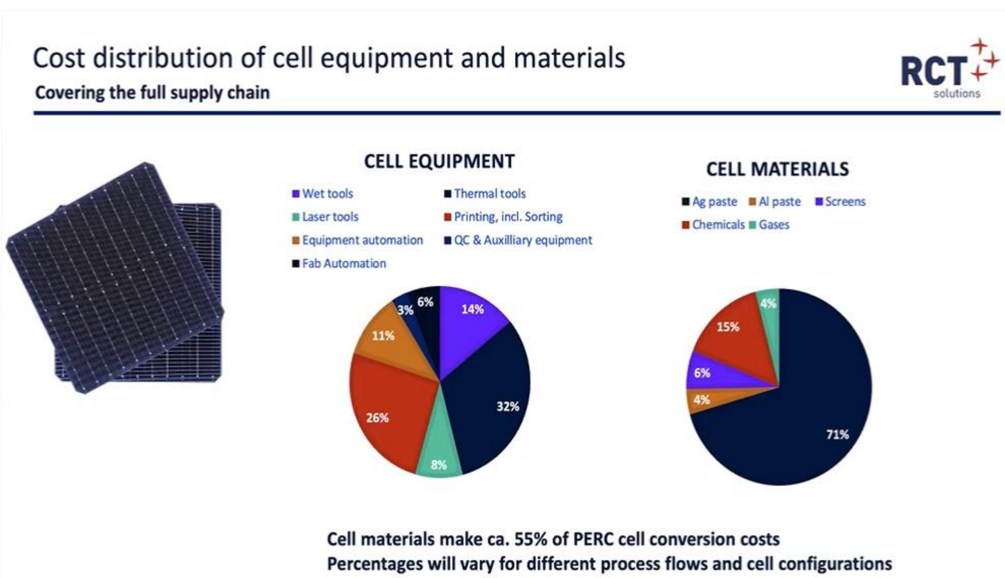

Figure 3

Dr. Christian Westermeier is Vice President of Solar Power Europe. He is also Vice President of Marketing, Sales, and Application Engineering at WACKER Polysilicon. His company’s main market is China, which operates under greater total installed solar capacity. While high costs (OPEX, CAPEX) are hurdles for investment in expansion of EU solar capacity, demand is growing quickly and will outpace domestic supply. Therefore, it is imperative to strengthen domestic supply chain to a minimum target of 20 GW in 2025 (Solar Power Europe's target) and increase **EU support via OPEX and CAPEX** to gain competitiveness and build on the superior environmental footprint of European products (see **Figures 4 and 5**).

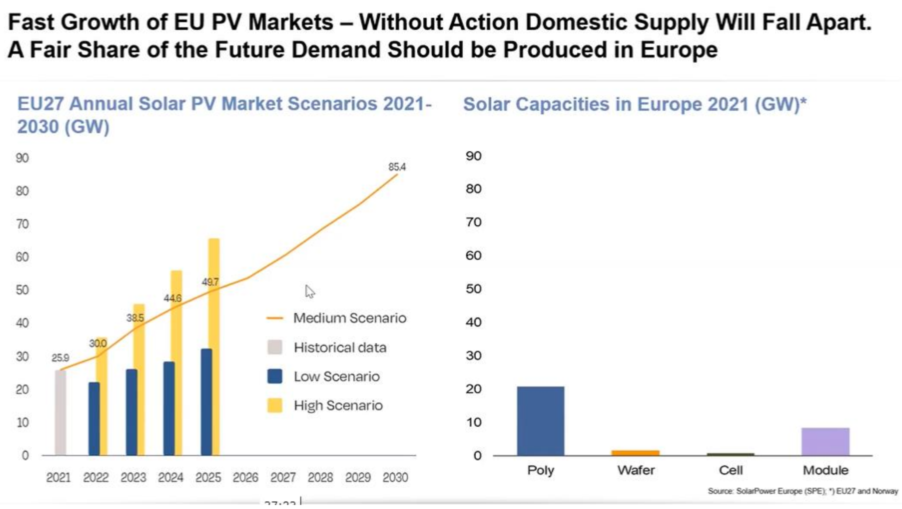

Figure 4

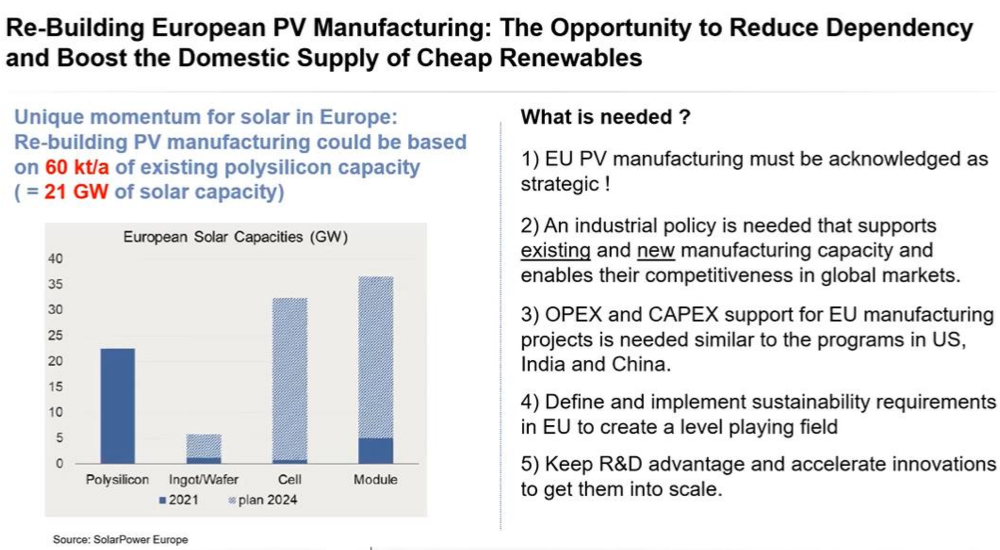

Figure 5

Thomas Keyser (Solar Glass Products Manager at AGC Solar) said the European market requires local sustainable, industrial production and reliable and strategic alliances among businesses along the local PV value chain. Lucas Weiss (CEO of VOLTEC Solar) said producing locally could solve a lot of supply chain issues; it could secure supply, stabilize prices and stimulate technology development. Local production is also key to ensure greater sustainability and circularity of the supply chain.

Session III: Future Challenges for the TW-Era

The third session, on day 2, highlighted future challenges for the TW era. Chaired by Walburga Hemetsberger (CEO, SolarPower Europe) and Dr. Ivan Gordon (Manager Photovoltaic Technology and Energy Systems, IMEC), it discussed the main hurdles to PV deployment on a scale of several TW per year. The session covered future scenarios for PV deployment to realize Europe's contribution to climate goals and their impact on the cost of the resulting PV electricity. Subsequent presentations focused on specific challenges for massive PV deployment – grid integration and grid stability, security of supply, public acceptance, space availability, and multiple-use of land – and how the European research and development community could address these challenges. Dr. Christian Breyer (Professor for Solar Economy, LUT University) provided an overview of scenarios for TW PV deployment, including sector by sector insights for the European energy transition (see **Figure 6**). Key to success in this field is higher levels of **grid interconnection**, which result in lower overall system costs; an early but steady transition process; and flexibility. The ideal energy system structure would therefore have flexible generation, grid exchange, storage capacity and strong sector coupling.

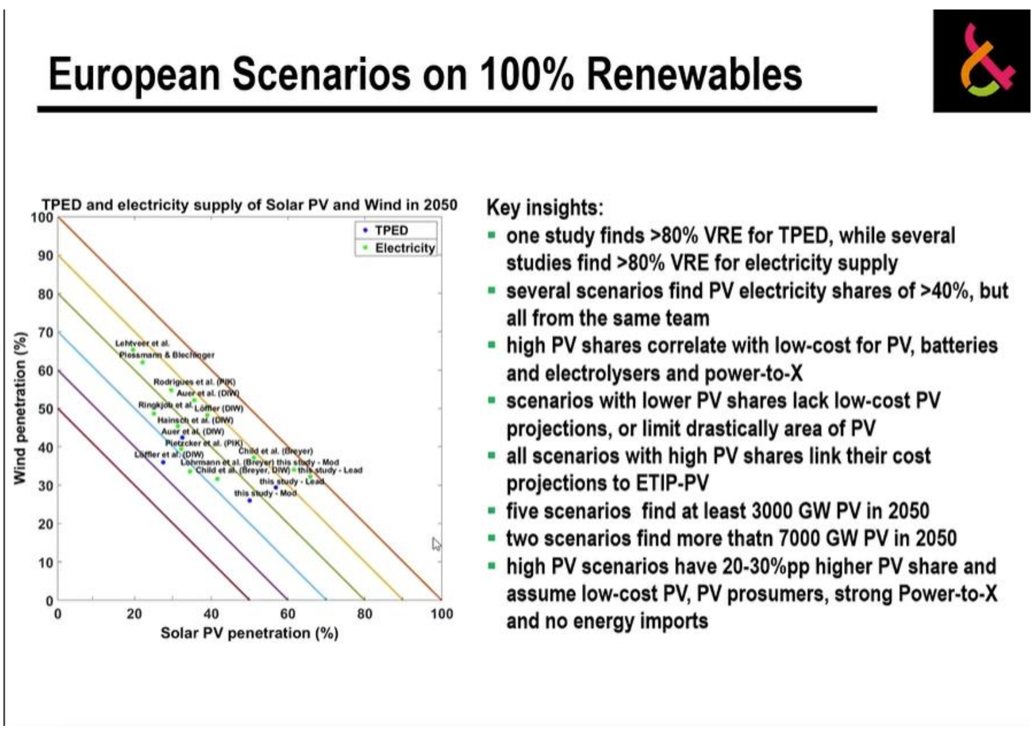

Figure 6

The next presentation, held by Thorsten Bülo (System Development Engineer, SMA Solar Technology) concerned maintaining security of supply and system stability under the assumption of much greater PV deployment. He noted that stability must emerge from power electronics-based generators and market-based services of battery storage systems. Mr. Bülo also singled out the Caribbean island St. Eustatius as a role model for using hybrid systems to manage PV-dominated grids. Other ways to provide stability include grid codes (like ENTSO-E's Network Codes) to force new capacities, new grid operator assets, or new system services to provide stability (i.e. the UK (Stability) Pathfinder Program by NGESO). Thomas Lebreuilly (Solar Technology Director, Akuo Energy) highlighted the multiple-use of land as way to make PV popular. Using combined land use increases overall land efficiency by over 60% (by combining agricultural use and solar use, see **Figure 7**) and can be adapted to fit different environments.

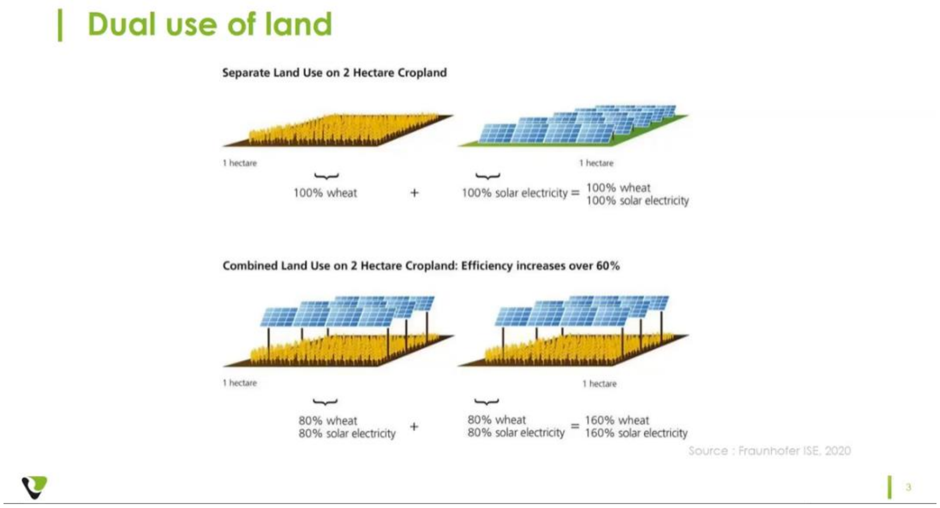

Figure 7

Following these presentations, there was a panel discussion with all the aforementioned speakers as well as Pénélope Vlandas (European Commission, DG Agriculture, and Rural Development) and Noémie Poize (Head of Renewable Energies Division, AURA-EE) regarding how to make the TW deployment a reality. Ms. Vlandas emphasized the new **Common Agricultural Policy** as a way to give additional flexibility to Member States to design their national strategic plans according to local realities and therefore most efficiently incorporate the multiple use of land. Ms. Poize underlined the fact that social acceptance is one of the biggest non-technical challenges to high-level PV deployment; this requires **citizen-led initiatives** to increase the participation of local stakeholders and mitigate the potential of negative perception of PV plants. In France, for example, crowdfunding has increased in popularity with regard to renewable energy sources. Panelists also stressed the need for more ambitious and clear policy targets from lawmakers.

Session IV: Technology for Sustainable TW-PV

The fourth and final session was titled "Technology for Sustainable TW-PV" and was chaired by Dr. Delfina Muñoz (Senior Researcher in Photovoltaics, CEA) and Dr. Rutger Schlatmann (Director PVcomB, Helmholtz Zentrum Berlin) and delved into the technical challenges of TW PV deployment. Panelists discussed harmonizing environmental, social, and bankable sustainability; material and energy flows connected to the PV production process; and circularity and sustainability potential of future PV technologies. Dr. Nieves Espinosa (Scientific Officer, European Commission, DG Joint Research Centre) outlined a regulatory approach to achieving PV sustainability that would see circular economy criteria and carbon footprint integrated into ecodesign criteria and, separately, an energy labelling methodology rolled out to steer small PV buyers towards the most productive systems (see **Figures 8 and 9**).

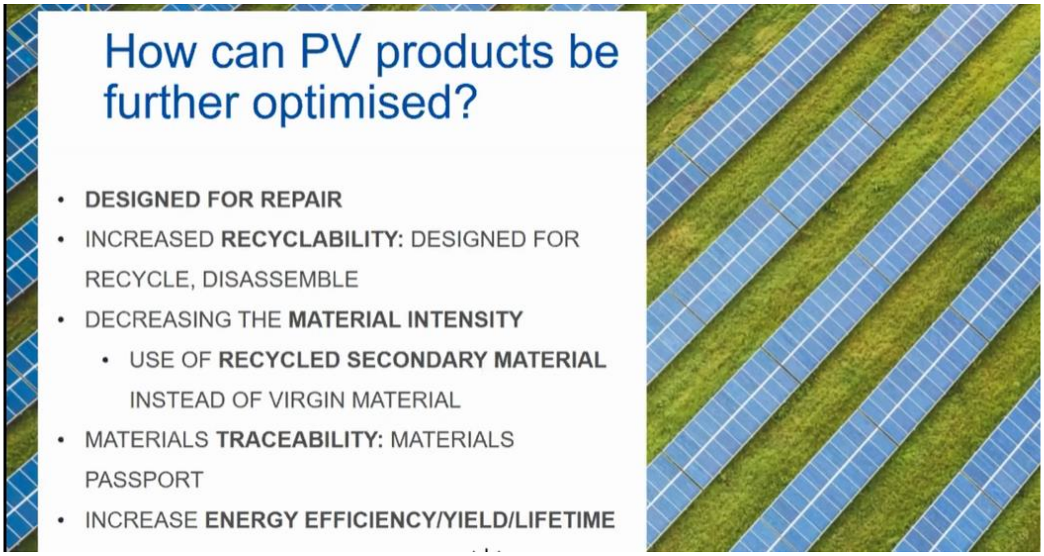

Figure 8

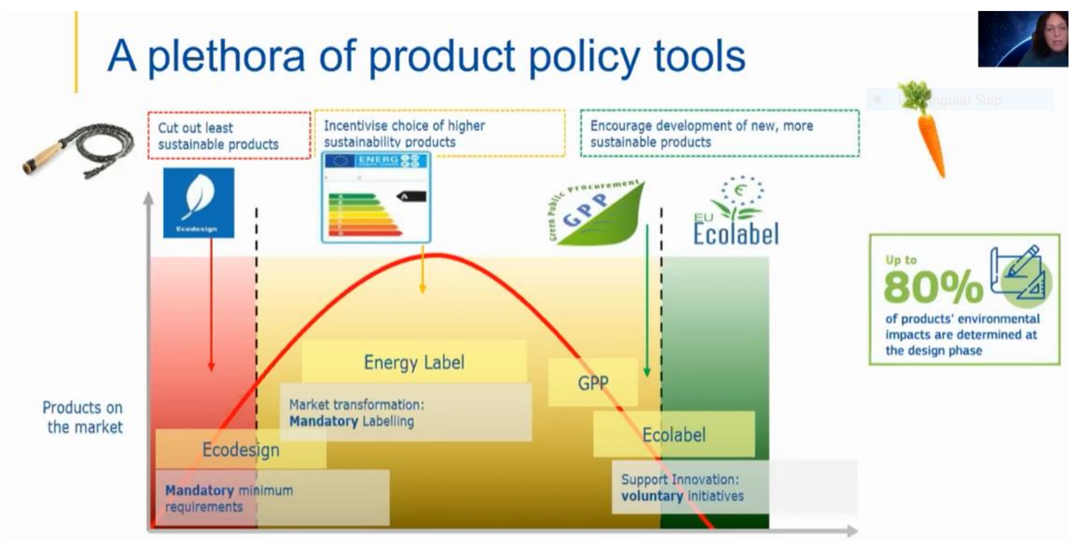

Figure 9

Dr. Brett Hallam (Associate Professor, UNSW) presented on the TW deployment of PV (see **Figure 10**). He highlighted sustainability and ways to reduce emissions in the value chain, such as through local module assembly and lean production. He also stressed the need, with TW-scale deployment, to shift focus from efficiency or low-cost to minimizing the consumption of virgin materials. For Dr. Hallam, silicon is the "absorber of the future" and will meet the material availability challenge.

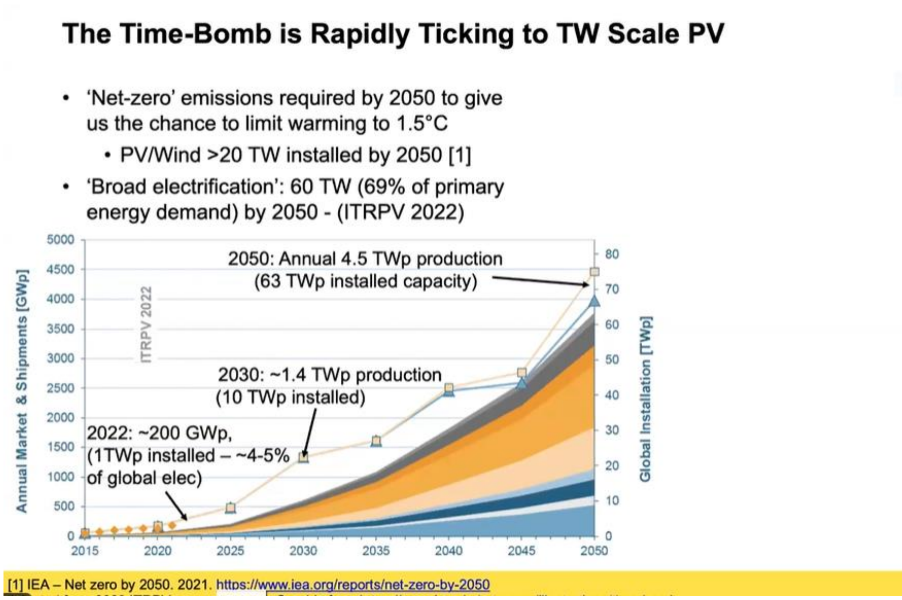

Figure 10

Dr. Teresa Barnes (Group Manager PV Reliability, DuraMAT Director, and Distinguished Member of Research Staff at NREL) spoke next, covering sustainability approaches in materials and manufacturing while Imco Goudswaard (Market Insights and Sustainability Lead, Endurans Solar) covered sustainable backsheet solutions. Dr. Barnes highlighted the fact that sustainability is not always at the forefront when designing and implementing new modules, and that longer module lifetime has a major impact on module sustainability; adding that circular solutions and increasing efficiency will also lead to compounding benefits for the PV industry, effectively causing savings and efficiencies along the entire PV value chain. Mr. Goudswaard also discussed the need to address waste from the PV industry (see **Figure 11**) through reducing toxicity and reusing or recycling materials. He felt the industry needed modules "designed for-disassembly".

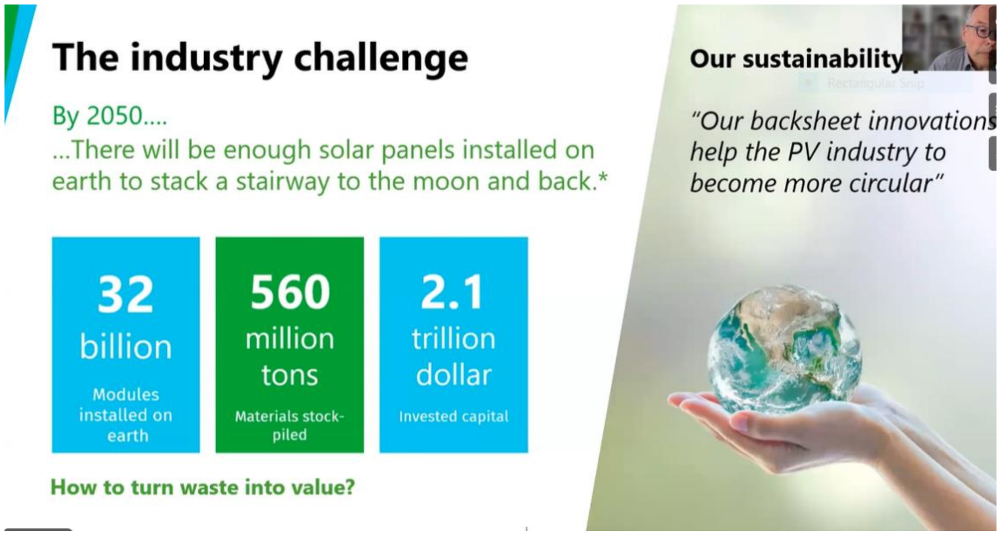

Figure 11

Conclusions and Key Takeaways

Closing the conference, Dr. Philipps called it a "milestone event for the energy transition in Europe" and claimed that experts from research, politics, and industry had underlined that PV is the "key technology for Europe's energy transition." The overarching message of the conference was the need to act fast to address Europe's energy challenges with PV, and speakers had shown that Europe has the technology and ability to meet the challenge. Panelists successfully showcased the strengths, challenges, and opportunities of the PV industry, and stressed many of the same ideas and paths forward for PV technology deployment and scaling up of the European PV sector generally.

A few key takeaways highlighted by several panelists across the conference were:

- Incorporate solar technology and renewables generally into a hybrid energy system, utilizing cross-sector coupling and grid interconnectivity for maximum efficiency and stability.
- Facilitate a more robust and resilient supply chain in Europe which limits waste and capitalizes on sustainability and stability.
- Simplify permitting procedures and enact relevant standards and certificates for the PV sector.
- Create more ambitious targets to facilitate top-down advances for the EU's green energy goals.
- Improve workers' skills in PV technology and increase their number.
- Utilise citizen-led initiatives to obtain grassroots support for PV.
- Support PV deployment through adequate funding measures to develop the European PV value chain and gain competitiveness for the European PV sector.