EU PVSEC 2025
42nd European Photovoltaic Solar Energy Conference and Exhibition

EU PVSEC 2025

PANEL DISCUSSION

Session DO.13:

Scalability and Manufacturability Prospects in Europe for New Technologies

Key Take-aways

Jens Holm, ESMC, Belgium

I think it's worth remembering that much of the solar revolution once began here in Europe. Europe showed the world how solar could move from niche technology to mainstream power with manufacturing in Europe. But today, China controls more than 90% of the global PV supply chain. This rapid decline is unprecedented. In what other technology sector has such a massive drain of industrial capacity been allowed to happen so swiftly – without policymakers stepping in to protect their industry?

We need to get to grips with this problem urgently:

- Break the dependency on China and rebuild a resilient European solar PV ecosystem. European manufacturers have enormous potential but need strong policy and financial support to scale up production.
- A level playing field is essential – imports must meet the same rules as European products, with stronger enforcement of CBAM, the Forced Labour Regulation, CSDDD and other relevant legislation.
- It is high time that EU Member States leverage the provisions of the Net-Zero Industry Act to provide public support for European solar PV manufacturing – and start purchasing European-made PV products by applying the non-price criteria set out in the NZIA. Public procurement and renewable auctions should also include a clear *Made in Europe* criteria to ensure that locally manufactured solar PV products are prioritized.
- EU state-aid rules must be reformed to simplify access to public support for European manufacturing companies. Financial and policy backing are critical; beyond one-off capital aid, manufacturers need operational (OPEX) support to compete with the U.S. IRA and Asian subsidies. We propose establishing a dedicated Clean Tech Manufacturing Fund with rapid access to both CAPEX and OPEX support.

It's time to decide what future we really want. Do we want to remain almost entirely dependent on imports from one single supplier where we have no control over product quality, environmental standards, labour conditions, and human rights? Or do we build a future with a reborn, thriving solar manufacturing industry in Europe – with secure supply chains, thousands of new green jobs, and a Europe that meets its climate targets with truly clean, affordable solar energy?

It is time to back European solar PV manufacturing!

Veronica Bermudez Benito, BERBETIN, France

- Europe does not lack scientific excellence, however it consistently underestimates the difficulty of industrializing new PV technologies (*voice off: technologies in general….*).
- CIGS and other thin-film experiences show a critical mismatch between TRL and Scaling Readiness (SRL). We can achieve record cells, but manufacturability, throughput, uniformity and cost control are the real bottlenecks at GW scale. Excellence in R&D is not enough if factories cannot ramp.
- Real outdoor validation and long-term stability remain decisive. World-class efficiency is not enough; bankability requires proven field performance, reliability, and degradation data under real conditions.
- Europe should avoid a "commodity race" against China. Silicon is not a competitor, but it can be allied. Competitiveness lies in differentiated, high-value segments: lightweight PV, building-integrated solutions, agrivoltaics, tandems for rooftop, and specialised industrial or defense applications.
- Industrial policy needs long-term visibility. Targeted procurement, stable incentives, and coherent supply-chain strategy are essential. Without them, we risk repeating the CIGS trajectory: great science, insufficient scaling, global leadership lost.

Maria Getsiou, European Commission DG RTD, Belgium

EU Financial support framework:

The EU facilitates access to funds like the **Innovation Fund** and **Horizon Europe** for solar PV manufacturing projects (First of a kind and pilot lines respectively). Under Horizon Europe starting in 2025 the **European Partnership for Solar Photovoltaics (EUPI-PV)** has been established to bring together research and industry to drive innovation and development in the solar PV sector.

Regulatory and policy support framework:

The **Net-Zero Industry Act (NZIA)** sets a goal of at least 30 GW of European solar PV manufacturing by 2030 and includes provisions to support the sector. Such provisions are either demand-side measures or direct support for manufacturing under the Clean Industrial Deal State aid framework (CISAF).

- **demand-side measures**: The NZIA allows EU countries to use non-price criteria, such as sustainability and resilience, in public auctions and procurement to create demand for high-quality, EU-made products.
- **updated State Aid rules**: These were revised to make it easier for Member States to provide support for setting up PV manufacturing projects (CAPEX), with a push to further update them to support operational costs (OPEX) to help manufacturers reach scale.

Take away:

European companies should focus on innovation and high-value market segments, collaborate across Member States to build a strong manufacturing ecosystem, and seek supportive policies to improve competitiveness. Key strategies include investing in next-generation technologies, or technologies/application with an EU added value, securing access to funding and R&D, and developing niche products like those with a low-carbon footprint.

Marina Foti, 3Sun, Italy

- A robust **regulatory framework** is essential to support and accelerate EU-based PV manufacturing.
- **Scaling high-efficiency photovoltaic (PV) technologies to gigawatt-level production** in Europe is both a technical challenge and a strategic imperative for energy sovereignty.
- The EU must focus on **developing innovative technologies** while safeguarding and retaining **critical knowledge in both technology and manufacturing processes**.
- **Maintaining and strengthening EU manufacturing capabilities** is crucial to ensure a solid industrial base ready to integrate more advanced technologies.
- **Silicon-based technologies still offer significant room for improvement**, making them a key pillar for future PV advancements.
- **Tandem Si/Perovskite architectures provide a major advantage**: they can be introduced as an add-on to existing silicon technology, enabling a **gradual transition** rather than a disruptive shift. This flexibility contrasts with past experiences with CIGS technology, which required a complete change of manufacturing lines and processes, making adoption more complex and costly.

Max Ma, Phoenixolar, China

- There is an overcapacity issue in PV industry which is largely driven by the similarity of current crystalline silicon PV technologies and the "lowest price win" bidding regulation in China market
- The Chinese government and industrial association are taking action to prevent the further collapse of module prices.
- EU should focus on the next-generation PV technology such as Perovskite/Si tandem solar cell to compete with current mainstream technologies. And EU shall incentive and subsidize the RD and application side of next-generation PV technologies originated from EU, instead of subsidize "manufacture in EU" directly.

Global Context for PV manufacturing:

1. **Europe's Solar Industry Decline: Europe once led the solar revolution but now faces over 90% dependence on China for PV supply chains. This rapid industrial decline is unprecedented and requires urgent policy intervention.**
2. **China's Overcapacity**: The Chinese market's price-driven competition has led to overcapacity, prompting EU to focus on next-gen technologies like Perovskite/Si tandems.
3. **Strategic Imperative**: Europe must retain critical knowledge in PV manufacturing to ensure energy sovereignty and meet climate targets

Rebuilding European Solar Manufacturing:

✓ **Policy & Financial Support**: Strong policy measures, public procurement incentives, and financial backing (e.g., CAPEX/OPEX support) are needed to scale up European production

✓ **Regulatory Framework**: A level playing field must be enforced, including stricter rules on imports (e.g., CBAM, Forced Labour Regulation) and leveraging the Net-Zero Industry Act (NZIA) to prioritize EU-made PV products

✓ **Innovation & Niche Markets**: Europe should focus on high-value segments like building-integrated PV, agrivoltaics, and tandem Si/Perovskite technologies rather than competing in utility-scale silicon

Challenges & Solutions :

- ✓ **Scaling Issues**: Past failures (e.g., CIGS) highlight the gap between R&D excellence and industrial manufacturability. Long-term stability, cost control, and real-world validation are critical
- ✓ **Funding & Collaboration**: EU funds (e.g., Innovation Fund, Horizon Europe) and a dedicated Clean Tech Manufacturing Fund could support scaling
- ✓ **Avoiding Dependency**: Europe must avoid reliance on a single supplier by fostering a resilient, sovereign solar ecosystem

Key takeaway: To regain competitiveness and reduce dependence on China, Europe must act fast and decisively to rebuild its solar industry through innovation, policy support and strategic collaboration. The MADE IN EU strategy should be accelerated by a global framework.

Contributors:
Delfina Muñoz, CEA/INES, France
Kaining Ding, Forschungszentrum Jülich, Germany
Jens Holm, ESMC, Belgium
Veronica Bermudez Benito, BERBETIN, France
Maria Getsiou, European Commission DG RTD, Belgium
Marina Foti, 3Sun, Italy
Max Ma, Phoenixolar, China
Molly Morgan, CRU, United Kingdom

Robert P. Kenny, European Commission JRC, Italy
Jon de Gregorio, WIP Renewable Energies, Germany
Buse Yildiz, WIP Renewable Energies, Germany