## Sustainability, Climate and EHS

### Welcome remarks for the day

C. Frieling
Director Advocacy and Public Policy
SEMI Europe, Brussels, Belgium

**Abstract**
Opening remarks for the day at the TechArena

**Biography**
Christopher Frieling is Director for Advocacy and Public Policy and Head of office at the SEMI Europe Brussels Office. He has a background in EU affairs, innovation, and tech policy. Mr. Frieling has 15+ years of experience in Brussels and leads SEMI's team for advocay and oversees all of SEMI's engagemen in European projects. Prior to SEMI he worked at the Brussels office of Fraunhofer in several roles including most recently as Senior Advisor. Mr. Frieling holds an MSc in Economics of Science and Innovation and a Bachelor of Business Administration.

References

## Opening remarks by session chair



E. Michalopoulou
Program Manager, Sustainability and Innovation
SEMI, Berlin, Germany

**Abstract**
Aligning climate ambition, regulatory readiness and industry performance

This session explores how sustainability, climate priorities, and EHS considerations are increasingly shaping semiconductor manufacturing and operations across Europe. Industry experts will share practical approaches and collaborative initiatives that support regulatory compliance, reduce environmental impact, and strengthen the resilience of the semiconductor ecosystem.

Climate Strategy and Decarbonisation Pathways

EHS and Regulatory Readiness

Circularity and Resource Efficiency

**Biography**
**Eleni Michalopoulou** is a Program Manager for Sustainability Innovation at SEMI Europe, working to strengthen Europe's semiconductor ecosystem through collaborative innovation, sustainability initiatives, and strategic EU projects. She brings together industry, research, and policy stakeholders to address challenges related to climate, circularity, skills, and technological competitiveness.

References

## Opening Keynote presentation

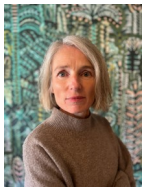
B. Bongers
Director of Sustainable Manufacturing (and
Director of Renewable Energy)
NXP Semiconductors, Berlin, Germany

**Abstract**
Coming soon

**Biography**
Coming soon

References

## Turning ambition into action across the value chain



C. Stevenson
Global Lead for Sustainability Engagement
Atlas Copco Group, Berlin, Germany

**Abstract**
As sustainability priorities become increasingly central to semiconductor manufacturing, organizations must balance regulatory readiness with business performance and resilience. In this session, Edwards will share how environmental and societal considerations are embedded across its operations, supply chain and technology development including approaches to decarbonization, resource efficiency and safety. The discussion will demonstrate how collaboration drives innovation, strengthens competitiveness and supports customer success.

**Biography**
Coming Soon

References

## The Semiconductor Industry and EU and Global EHS Policy

I. Chaki
Senior Policy Coordinator
SEMI Europe, Advocacy & Public Policy, Brussels, Belgium

**Abstract**
The EU PFAS restriction is approaching its conclusion. SEMI Europe maintains that the entire semiconductor value chain must be covered under Restriction Option 3 (RO3), and work on this remains to be done. The PPWR has applied since 12 August 2026. SEMI Europe's PPWR Sub-group is working towards a common industry interpretation of the definition of packaging, distinguishing packaging from items that serve a function in the manufacturing process. It is also pursuing an exemption from the recycled plastic content requirements under Article 7(4). Pending the Commission's derogation procedure, it is analysing recycled plastics markets to evidence that the industry cannot meet these requirements. On POPs, the presentation will outline how decisions taken under the Stockholm Convention at UN level are carried into regulation worldwide. It will also explain how members can support SEMI Europe's efforts to ensure that the semiconductor industry's perspective is duly considered in international chemicals regulation.

**Biography**
Iranda Chaki is a Brussels-based young professional working closely with European institutions at the core of EU policymaking. With experience across public affairs, stakeholder management, event management and international collaboration, gained through roles in public organisations, NGO's and industry association environments. She enjoys building bridges between sectors to shape forward-thinking, sustainable outcomes. Currently working in the semiconductor sector with a particular focus on EHS & Sustainability.

References

## PFAS Whitepaper of Industrial Alliance

J. Bierwagen
Teamleiter Forward Material Compliance for Semiconductors
Robert Bosch GmbH, Reutlingen, Germany

**Abstract**
The semiconductor industry is facing increasing regulatory attention on PFAS while simultaneously enabling many of the technologies that support Europe's digital and green transition. This presentation provides an overview of the PFAS White Paper developed by the European Semiconductor Alliance, outlining the role of PFAS in semiconductor manufacturing, ongoing innovation efforts to reduce dependency where technically feasible, and the potential implications of future regulatory measures.
The presentation will discuss how the semiconductor value chain is addressing PFAS-related challenges, the importance of maintaining technological feasibility and supply chain resilience, and the need for science-based, risk-driven regulatory approaches. It will also highlight key messages and recommendations from the White Paper, intended to support a constructive dialogue between industry, policymakers, and other stakeholders on the future of PFAS regulation in Europe.

**Biography**
Dr. Jakob Bierwagen is a semiconductor environmental and regulatory compliance expert at Robert Bosch GmbH in Reutlingen, Germany. He specializes in material compliance, environmental regulations, and sustainable semiconductor manufacturing. He currently serves as Chair of the Environmental, Health and Safety (EHS) Working Group of the European Semiconductor Industry Association (ESIA) and represents industry interests in discussions on environmental and chemical regulation affecting the semiconductor sector.
Dr. Bierwagen works closely with the European Commission, Member State authorities, and industry stakeholders on the development of appropriate environmental requirements for semiconductor manufacturing, including the ongoing STM-BREF (Semiconductor BREF) process under the Industrial Emissions Directive. His work focuses on balancing environmental objectives with technological feasibility, innovation, and the global competitiveness of the European semiconductor industry.
In addition, he is a member of the PFAS Working Group of the European Semiconductor Alliance, contributing to the development of the Alliance’s PFAS White Paper. He has also provided semiconductor industry input on behalf of Bosch to the GENESIS Consortium in support of discussions on PFAS and future regulatory approaches.
For today's topic, Dr. Bierwagen brings both an industry and policy perspective, combining practical semiconductor manufacturing experience with active engagement in European regulatory and sustainability initiatives.

References

## Sustainable Microelectronics and the GENESIS project

J. Osten
Research Manager
Fraunhofer IPMS, Dresden, Germany

**Abstract**
Sustainable microelectronics requires resource-efficient semiconductor manufacturing and circular process concepts. The goal of the Chips-JU project GENESIS is to develop new solutions for implementing such measures in European semiconductor factories. Activities by the consortium include reducing material consumption in wet processing and lithography, replacing critical materials, lowering process emissions, improving equipment energy efficiency, and developing greener manufacturing technologies. Recent results obtained by Fraunhofer IPMS together with other project partners include PFAS removal from wastewater, recycling of CMP slurries to reduce fresh material consumption, and recovery of high-purity solvents for reuse in semiconductor production. Together, these approaches support a more sustainable and resilient European semiconductor industry.

**Biography**
Julia Osten is a research manager working in Business Development at Fraunhofer IPMS in Dresden. She has been with the Fraunhofer-Gesellschaft since 2018, after previously working at HZDR. She has a PhD in Physics. Her work combines research management, strategic development and collaboration, with activities spanning topics such as microelectronics and resource-efficient technologies. In the Genesis Project she coordinates one work package.

References

## Innovative Primary Substitution and Secondary Valorisation Routes for Europe's Silicon and Silicon Carbide Semiconductor Raw Material Value Chains

N. Somi Ganesan
Research Scientist
SINTEF AS, Sustainable Energy Technology,
Trondheim, Norway

**Abstract**
Silicon (Si) and silicon carbide (SiC) are foundational to modern electronics. Si powers logic, memory, and photovoltaic technologies, while SiC is critical for high-efficiency power electronics in electric vehicles, renewable energy systems, defense and aerospace applications. They drive digital and green transitions, holding complementary and non-substitutable roles in the global semiconductor value chain. Both materials start from the same source: quartz. Quartz is transformed through thermal and chemical processes into EG-Si (Electronic grade), achieving purity levels of 9-12N, and then drawn into Czochralski (CZ) or Float-zone (FZ) ingots for wafer production. SiC is produced by carbothermic synthesis, mixing quartz with carbon at temperatures up to 2500°C to form boules and wafers for high-power applications.
High-quality quartz comes in two distinct grades. High-purity quartz (HPQ, >5N $SiO_2$) is indispensable for manufacturing quartz crucibles used in the CZ pulling of Si-ingots. Metallurgical-garde quartz (MGQ, 2N-3N) with precise granulometry and morphology is a critical bottleneck for Europe's metallurgical grade (MG-Si) and SiC production, directly impacting the security of supply for semiconductor-grade SiC and poly-Si, amongst other strategic industrial outputs.
ReSiLient, an EU-funded project, aims to strengthen Europe's strategic capabilities in Si and SiC production by developing and upscaling integrated, sustainable process routes. The project will demonstrate the production of high-purity silica utilizing domestic minerals such as olivine and aplite, as well as industrial by-products such as Si slurry, quartz, and graphite residues. The high-purity silica produced will be utilized for the production of Si ingots and SiC boules, supporting a more resilient and circular European semiconductor raw material value chain.

**Biography**
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References



E. Michalopoulou
Program Manager, Sustainability and Innovation
SEMI, Berlin, Germany

**Biography**
**Eleni Michalopoulou** is a Program Manager for Sustainability Innovation at SEMI Europe, working to strengthen Europe's semiconductor ecosystem through collaborative innovation, sustainability initiatives, and strategic EU projects. She brings together industry, research, and policy stakeholders to address challenges related to climate, circularity, skills, and technological competitiveness.

References

## Future Standards for Sustainability

L. Pain
Sustainable Electronics Program Director
CEA Leti, Grenoble, France

**Abstract**
The semiconductor industry is pivotal for global digital transformation, with the ICT market projected to double by 2030, driven by advancements in AI, 5G, and cloud computing. Ensuring sustainable growth necessitates a transition to more resilient, resource-efficient, and circular manufacturing processes. Key challenges include reducing consumption of water, gas, and critical materials, minimizing the use of PFAS, and enhancing the circularity of effluents and waste.
To tackle these challenges, the European program GENESIS, supported by the CHIPS Joint Undertaking and launched in May 2025, brings together 57 partners under the coordination of CEA-Leti. GENESIS focuses on developing and qualifying innovative materials and solutions to optimize resource efficiency, waste management, and the environmental performance of the semiconductor manufacturing value chain.
Complementing GENESIS, CEA-Leti is now activating the SUBFAB LABS initiative in collaboration with the International SubFAB Research Labs (ISRL). This initiative aims to transform sub-fabrication operations by enhancing process optimization and end-of-life waste treatment. SUBFAB LABS emphasizes improving material efficiency, abatement strategies, and circular resource management, all while reducing operational costs and environmental impact.
Together, GENESIS and SUBFAB LABS exemplify an integrated approach to semiconductor sustainability. They achieve this by replacing hazardous substances, deploying advanced monitoring technologies, optimizing the management of critical materials, and enhancing recycling and circularity. This presentation will show how these programs are paving the way for lower emissions and more sustainable semiconductor manufacturing, potentially guiding the establishment of future sustainability standards

**Biography**
**Laurent Pain** is a fellow expert in the field of semiconductors and lithography. He graduated from the Physics-Electronics-Materials engineering school of Grenoble in 1992 and earned his PhD for work on DUV resists. He joined CEA-Leti in 1996 to work on infrared technology. In 1999, he was assigned to STMicroelectronics to introduce 193nm and e-beam lithography new generation equipment.From 2008 to 2014, Laurent led CEA-Leti's lithography laboratory, later managing business and partnership development for the CEA-Leti Silicon Technologies Division. In September 2023, he became the Sustainable Electronic Program Director, tasked with shaping CEA-Leti's strategy and programs in eco-innovation and sustainability, building on decades of expertise in semiconductor processes, lithography, and technology leadership across industrial and research collaborations.

References

## PFAS, tbc

S. Mashiro
GSS Committee Chair, Munich, Japan

**Abstract**
Abstract coming soon

**Biography**
Coming soon

References