



Highlights scienceindustries

A CHIMIA Column

Update on activities and initiatives from scienceindustries

Driving Sustainable Chemistry: Insights from the Swiss Green Economy Symposium (SGES)

The Swiss chemical, pharmaceutical and life sciences industries are facing a pivotal moment in their transformation towards sustainability. The Swiss Green Economy Symposium (SGES), held annually in Winterthur, has become a key platform for stakeholders across industry, academia, and government to discuss and advance strategies related to defossilization, circularity, and biodiversity protection.



Reducing Fossil-Based Raw Materials: A Core Challenge

One of the central topics addressed at the SGES is the urgent need to reduce reliance on fossil-based raw materials in chemical manufacturing. The chemical industry has traditionally depended heavily on petroleum- and natural gas-derived feedstocks. However, to meet Switzerland's commitments under the Paris agreement and its national climate targets, a transition to alternative, non-fossil carbon sources is essential.

At the symposium, experts highlighted promising progress in the development and deployment of alternative feedstocks. Renewable biomass – including organic side streams from agriculture, forestry, and the food industry, as well as municipal waste – offers versatile and sustainable carbon sources that can replace fossil carbon in many applications. Similarly, green hydrogen, produced with carbon-neutral electricity, holds great potential as a reducing agent and energy carrier within chemical processes. Equally important is the advancement of CO₂ utilization technologies, which capture and convert waste carbon dioxide into valuable chemicals and materials, effectively turning emissions into resources.

Electrification and Process Innovation

Alongside the substitution of fossil raw materials, the electrification of chemical production has also been highlighted as a key lever for decarbonization. Traditional chemical processes often rely on the combustion of fossil fuels to provide the necessary heat and energy. By transitioning to electrically powered reactors and heating systems – powered by carbon-neutral electricity – greenhouse gas emissions can be significantly reduced.

Moreover, electrification opens new possibilities for process innovation. Biotechnological processes, electrochemical synthesis, and plasma-assisted reactions typically allow for mild-

er reaction conditions, higher selectivity, and improved energy efficiency. Additionally, electrically powered systems are often modular and more flexibly scalable, enabling decentralized and demand-driven production.

From Linear to Circular: Advancing Circular Strategies

Circular economy approaches constitute another major focus within the chemical, pharmaceutical, and life sciences industries, as presented at the SGES. Instead of following the traditional linear 'take-make-dispose' model, companies are increasingly adopting strategies that extend product lifecycles, promote reuse, and minimize waste generation.

Best practices include advanced chemical recycling techniques or closed-loop systems for plastics and batteries. Additionally, product design strategies that incorporate principles of 'Safe & Sustainable by Design' encourage manufacturers to consider recyclability, durability, and reduced environmental impact from the outset.

These measures not only reduce environmental burdens but also improve resource efficiency – a key competitive advantage amid rising raw material costs and supply chain volatility.

Integrating Biodiversity in Sustainable Production

Biodiversity is a critical yet often underestimated aspect of sustainability in the chemical sector. At the SGES, biodiversity was emphasized as a fundamental component of sustainable economic development. The chemical, pharmaceutical, and life sciences industries rely heavily on biodiversity – not only for sourcing biobased raw materials like plant-derived feedstocks and microorganisms but also for accessing genetic resources essential for drug discovery.

The symposium highlighted the need to integrate biodiversity considerations into corporate sustainability strategies. This includes responsible sourcing, minimizing environmental impacts from production and supply chains, and actively supporting habitat restoration and conservation efforts. By aligning with international agreements such as the Convention on Biological Diversity, these initiatives contribute to the long-term health and resilience of ecosystems that are vital to business continuity.

Digitalization and Transparency as Catalysts

Digital tools and transparency mechanisms are essential enablers for sustainable chemistry. Digital product passports, blockchain technologies, and QR codes can significantly improve traceability and accountability in complex supply chains. By providing verifiable information on origin, composition, and environmental impacts, such technologies facilitate compliance with regulations, enable informed consumer choices, and drive continuous improvements.

Complementing digitalization, Life Cycle Assessments (LCAs) are emphasized as indispensable tools for quantitatively evaluating environmental impacts across a product's life cycle – from raw material extraction through manufacturing, use,

and end-of-life disposal or recycling. The widespread adoption of LCA methodologies allows companies to identify hotspots, prioritize interventions, and communicate progress credibly.

Balancing Sustainability and Competitiveness: Key to Switzerland's Transition

The transformation of Switzerland's chemical industry towards sustainability is complex and must preserve the country's industrial competitiveness. Success depends on supportive framework conditions, including streamlined regulations aligned with EU and international standards, affordable access to climate-neutral energy, and progress in digitalization. With the right policies and infrastructure, Switzerland can continue to drive innovation sustainably while meeting its climate goals.

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