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Reaping the full potential of sustainable chemistry for SAICM, the Sound Management of Chemicals and Waste beyond 2020 and the 2030 Agenda

Contributions of the International Sustainable Chemistry Collaborative Centre (ISC₃) towards sustainable transformation in the chemicals sector

Chemicals and the related industry sectors play a crucial role in today's world. Chemical products contribute to our modern living standards and are an increasingly important aspect of the world's economies. "The size of the global chemical industry exceeded United States dollar 5 trillion in 2017. It is projected to double in 2030¹". The exponential growth of chemicals pollution is a source of serious concern, exposing public health and environment to severe risks from hazardous substances, which subsequently hamper sustainable development. According to the second edition of the Global Chemicals Outlook (GCO-II),² "The global goal to minimize adverse impacts of chemicals and waste will not be achieved by 2020. Solutions exist, but more ambitious worldwide action by all stakeholders is urgently required."

Against this background, business as usual is no longer an option. A transformation towards sustainability in the chemical sector is urgently needed. Not only to solve the problems of today, promote the sound management of chemicals and waste on all relevant levels, and prevent future legacies, but also to harness the power of chemistry for sustainable development and the 2030 Agenda. "Driven by global megatrends, growth in the chemical-intensive industry sectors (e.g. construction, agriculture, electronics) creates risks, but also opportunities to advance sustainable consumption, production and product innovations."³ Furthermore, sustainability-driven innovation and digitalisation have the potential to substantially contribute to establishing circular business models, enhance traceability and promote the change towards low carbon energy and feedstock in the chemicals sector. As the GCO-II recognises, accelerating progress is possible, yet only under a sustainability scenario.

The International Sustainable Chemistry Collaborative Centre (ISC₃) is a new independent, international centre, dedicated to shaping the transformation towards sustainability in the chemicals sector. By promoting the emerging concept of sustainable chemistry as a new holistic approach, the ISC₃ thrives to contribute to an ambitious framework for the Sound Management of Chemicals and Waste (SMCW) beyond 2020 as well as to the 2030 Agenda for sustainable development and its goals (SDG). In this endeavour, the centre promotes sustainable chemistry innovation based on the understanding that we need to assess the whole life cycle of products, foster chemical solutions which are benign-by-design and promote new sustainable business models and services. As promoted by ISC₃, sustainable chemistry innovation encompasses the sound management of chemicals and waste and actively works to avoid future legacies through sustainable materials and circular processes in the chemicals sector and beyond. The ISC₃ is convinced that the new holistic approach of sustainable chemistry is among the important drivers of change and thus a key contribution to the SAICM beyond 2020 process and the implementation of the 2030 Agenda.

¹ SAICM/OEWG.3/INF/3 Global Chemicals Outlook II Summary for Policymakers: From Legacies to Innovative Solutions – Implementing the 2030 Agenda for Sustainable Development.

² See footnote 1 for reference

³ See footnote 1 for reference

Reaping the full potential of sustainable chemistry

Transitioning towards a green and sustainable chemistry requires new systems thinking approach. It implies to replace the current linear commodities-based take-make-consume-dispose approach with a closing-the-loops benign-by-design approach kept within the planetary boundaries. Sustainable chemistry practices embrace green chemistry and are based on considering the whole life-cycle of substances and materials while looking at waste as a valuable resource to be safely re-used. By following the sustainable chemistry approach, companies and entrepreneurs embark a journey towards re-thinking not only their product assessment and product stewardship schemes, but also towards re-designing their research and development activities and, last but not least, their overall business strategy.

Re-thinking chemistry in a sustainable way enables companies to become increasingly aware that each step and product phase must be designed “with sustainability in mind”.⁴ An industry driven by sustainable chemistry can make a big difference in solving key societal and environmental challenges by using and developing innovative materials, products and business models. UNEP report “Analysis of Stakeholder Submissions on Sustainable Chemistry Pursuant to UNEA Resolution 2/7” shows that sustainable chemistry has the potential to contribute to achieving at least 12 out of 17 SDGs. By re-shaping business models and by inspiring entrepreneurs and startups, the emerging concept offers market-oriented approaches to transform the chemicals sector, while impacting the up- and downstream industries in a positive way.

As a source of inspiration for innovation, sustainable chemistry has the potential to be even more than a transformative element in the chemical sector: as orientation and conceptual approach it supports scientists, entrepreneurs and startups, especially in developing countries, to develop new products and processes which are purpose-driven and add value to our societies. Hereby the concept supports economic development and entrepreneurship in developing countries as well as in emerging and industrialized economies, based on the overarching goals of sustainable development.

Furthermore, sustainable chemistry offers guiding principles for the development of enabling policies for green-tech, eco-design, consumer and worker protection and the sound management of chemicals and waste on the national as well as on the international level. Fostering the emerging concept might therefore be an important asset to speed up the sound management of chemicals and waste. An ambitious framework for SMCW beyond 2020 should profit in many ways from integrating and reaping the full potential of green and sustainable chemistry.

Contributions to SAICM and SMCW framework beyond 2020 while serving the 2030 Agenda

The ISC₃ strongly supports the development of an ambitious SAICM beyond 2020 framework as an essential element of the future international agenda towards the sound management of chemicals and waste and as an important driver towards sustainable transformation in the chemicals sector.

As a globally acting independent institution, the ISC₃ promotes sustainable chemistry solutions worldwide while enhancing SMCW and serving the 2030 Agenda. The centre works on five levels: collaboration, innovation, education, research and information. Together with its Innovation Hub at DECHEMA e.V.⁵ and its Research & Education Hub at Leuphana University⁶ as well as its new “Americas Hub” at University Massachusetts Lowell⁷ and its network of experts and partners, the ISC₃ engages on different levels in the international dialogue and the sustainable innovation agenda.

⁴ Tom Keijer, Vincent Bakker & J. Chris Sloopweg: Circular chemistry to enable a circular economy.

⁵ Dr. Andreas Förster, DECHEMA e.V., Society for Chemical Engineering and Biotechnology, Frankfurt, Germany

⁶ Prof. Dr. Klaus Kümmeler, Institute of Sustainable and Environmental Chemistry, Leuphana University, Luneburg, Germany

⁷ Prof. Joel Tickner, UMass Lowell Center for Sustainable Production, Massachusetts, USA

- As a multi-stakeholder platform ISC₃ serves as an interface between science, industry, politics and civil society. By connecting different stakeholders, the centre enables co-creation and transformative collaboration on new solutions. The ISC₃ helps to inspire decision-makers and raises awareness for the potentials of sustainable innovations – in business, politics and science.
- Acting as an innovation accelerator, the ISC₃ carries out innovation scouting activities to discover new technologies, materials and new business ideas, especially in developing countries. Through its Global Start-up Service, the centre offers start-ups, entrepreneurs and innovators mentoring, training and other supporting services to bring new sustainable solution from the chemicals sector to the markets.
- ISC₃ initiates collaborative foresight and projects to explore the benefits and challenges of sustainable chemistry innovation and develop recommendations and pathways towards transformation. Through its collaborative projects, the centre engages with frontrunner companies to push forward sustainability related activities.
- Through its International School and annual Summer School, the ISC₃ brings sustainable chemistry as a new field to the curricula for chemists and helps to change the mindset of chemical experts. The centre monitors trends in research, thus contributing to the global scientific discussion on sustainable chemistry.

Developing a common understanding of sustainable chemistry

The ongoing international debate on sustainable chemistry and the sound management of chemicals highlights not only opportunities of the emerging concept, the debate also shows that expectations towards sustainable chemistry differ between the stakeholder groups. Developing a common understanding of sustainable chemistry therefore seems to be vital for the future of the new transformative concept.

To address the different perspectives, expectations and criteria discussed in the context of sustainable chemistry, the ISC₃ seeks to initiate a stakeholder dialogue process towards a common understanding of sustainable chemistry.

According to UNEP's "Survey on the Sustainable Chemistry Concept", a large majority of respondents felt that sustainable chemistry is an important component relevant in advancing chemicals and waste management beyond 2020. [...] The idea to use sustainable chemistry as an assessment framework for evaluating the contributions of chemicals to the SDGs received the strongest support (93% agreement). The results of the survey indicate that a large majority of respondents strongly agreed [...] that the sustainable chemistry concept encompasses the following:

- Identification and assessment of chemicals and non-chemicals alternatives for chemicals of concern (95 % agreement)
- Traditional chemical management tools, such as chemical hazard assessment, risk assessment and risk management (95 % agreement)
- Advancing technology transfer for safe chemicals and non-chemical alternatives (95 % agreement)
- Scaling up innovation through universities, start-up companies, and the chemical industry (91% agreement)
- Reforming chemistry curricula to integrate green chemistry and sustainable development (90% agreement)
- Use of economic instruments and innovative financing to advance innovation (82% agreement)".

To promote the development of a common understanding of sustainable chemistry, the ISC₃ has drawn up a thought-starter as a starting point for a broader cross-sectoral dialogue, here attached in the following annex. The thought-starter invites you to voice your expectations towards a common understanding of sustainable chemistry. With the development of a common understanding, the ISC₃ thrives to integrate different perspectives and provide a sound contribution to the implementation of sustainable chemistry approaches on the international and national level.

Annex

Developing a Common Understanding of Sustainable Chemistry

Developing a common understanding of sustainable chemistry is an important prerequisite for the full and coherent implementation of the new transformative concept. To address the different perspectives, expectations and criteria discussed in the context of sustainable chemistry, the ISC₃ seeks to initiate a stakeholder dialogue process towards a common understanding of sustainable chemistry.

As a starting point for a stakeholder dialogue process, the ISC₃ prepared a thought-starter on the key aspects that should be taken into consideration for the development of a common understanding of sustainable chemistry. The thought-starter invites you to voice your expectations, raise awareness for your concerns and give your ideas to draw up a common understanding of sustainable chemistry. Further information on the dialogue is available on the ISC₃ website: www.isc3.org

Thought-Starter “Thriving towards a Common Understanding of Sustainable Chemistry”

Sustainable Chemistry is a long-term global process that transforms chemicals management, substances, processes, services and innovations to serve the Agenda 2030 for Sustainable Development and its goals (SDGs). Sustainable Chemistry needs the commitment of all stakeholders and sectors using or dealing with chemicals.

Sustainable Chemistry is a new systems thinking approach that is based on the following elements of a common understanding:

- Sustainable Chemistry is a holistic systems approach addressing all aspects of sustainability. It seeks to optimize the different sustainability aspects of chemicals⁸ throughout their life-cycle, including their supply chain origin, design, raw material extraction, production, use and re-use as well as waste management (including recycling) for the benefits of our societies and the planet.
- Sustainable Chemistry aims to avoid transfers of problems along the life-cycle of chemicals and chemical products into other domains, spheres, regions and products and does not exceed the ecological planetary boundaries.
- Sustainable Chemistry builds on the experience of Green Chemistry and supports the implementation of a circular economy by aiming to close all material cycles. At the same time, it creates a less toxic environment by using the most efficient, effective, safe and environmentally benign solutions.

⁸ In this context, the term “chemicals” includes chemical substances, chemical mixtures and chemical materials

- Sustainable Chemistry requires at every moment that all sectors interacting with chemicals are protecting human health, the environment, bio-diversity, resources and climate.
- Sustainable Chemistry provides the frame to identify, assess and promote chemical innovations and innovative business models that contribute to the Agenda 2030. Moreover, it contributes to the SAICM⁹ objectives and a pollution free planet.
- Sustainable Chemistry creates new economic opportunities and benefits for our societies and is particularly relevant for the sustainable development of industries in developing countries and emerging economies.
- Sustainable Chemistry innovation will be a key solution provider for the global energy, agriculture, mobility, water and urbanization challenges as well as for the implementation of the 2015 Paris Agreement endorsed by global leaders as response to the threat of climate change.

Sustainable Chemistry addresses the following objectives throughout the transformation process and includes all chemical substances, processes, services, innovations and business models throughout the life-cycle:

- Maximizing the benefits for our societies and at the same time minimizing the harm to human health and environment.
- High level of protection of workers and consumers through high material, product and process standards.
- Identification, promotion and support of transformative and viable business models based on transparent sustainability assessments and decisions.
- Transparency about substances, products, processes and services throughout the life-cycle by means of adequate, easily accessible and understandable information for all people.
- Application of the precautionary principle and consideration of non-chemical alternative solutions.
- Comprehensive application of inter-related and globally important issues such as scientific research, education, gender mainstreaming, consumer awareness, international fair trade and sustainable financing, as well as corporate social responsibility and sustainable entrepreneurship as Sustainable Chemistry is a holistic systems approach.

Join the dialogue and send your comments to:

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For further information on the dialogue towards a common understanding of sustainable chemistry please visit our website: www.isc3.org

⁹ Innovative and sustainable solutions, re-use of products, new technologies and business models as well as sustainable production principles and life cycle management in the product design etc. are aspects characterizing the concept of sustainable chemistry which are explicitly mentioned as targets (strategic objective D “Benefits are maximized and risks to human health and environment are prevented through innovative and sustainable solutions and forward thinking.”) in the Appendix to the Paper by the Co-chairs of the Intersessional Process on the Strategic Approach to International Chemicals Management (SAICM) and the sound management of chemicals and waste beyond 2020.

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