



4TH ISC3 Stakeholder Forum

29 November 2022
Online Event

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4th ISC3 Stakeholder Forum

29 November 2022

The International Sustainable Chemistry Collaborative Centre (ISC3) hosted its 4th Stakeholder Forum on 29 November 2022. With the lessons learnt during the pandemic, the Forum was once more held as an online event to allow easy and convenient participation for all international stakeholders.

ISC3 is an international centre that fosters the transition of the chemical and chemical-related sectors towards Sustainable Chemistry, promoting a circular economy that is striving to implement multifaceted aspects of sustainability at every step of the product life cycle and to change overall stakeholder behaviour.

Therefore, the centre takes a multi-stakeholder approach, targeting policymakers, public and private sectors, academia, and civil society. On a global scale, ISC3 contributes to international chemicals policies, develops professional and academic trainings, offers advisory services, fosters innovations, supports entrepreneurship, and conducts research.

ISC3 is implemented by the [Deutsche Gesellschaft für Internationale Zusammenarbeit \(GIZ\)](#) in cooperation with the [Leuphana University Lüneburg](#) as ISC3 Research & Education Hub, and the [DECHEMA Society for Chemical Engineering and Biotechnology \(DECHEMA e. V.\)](#) as ISC3 Innovation Hub.

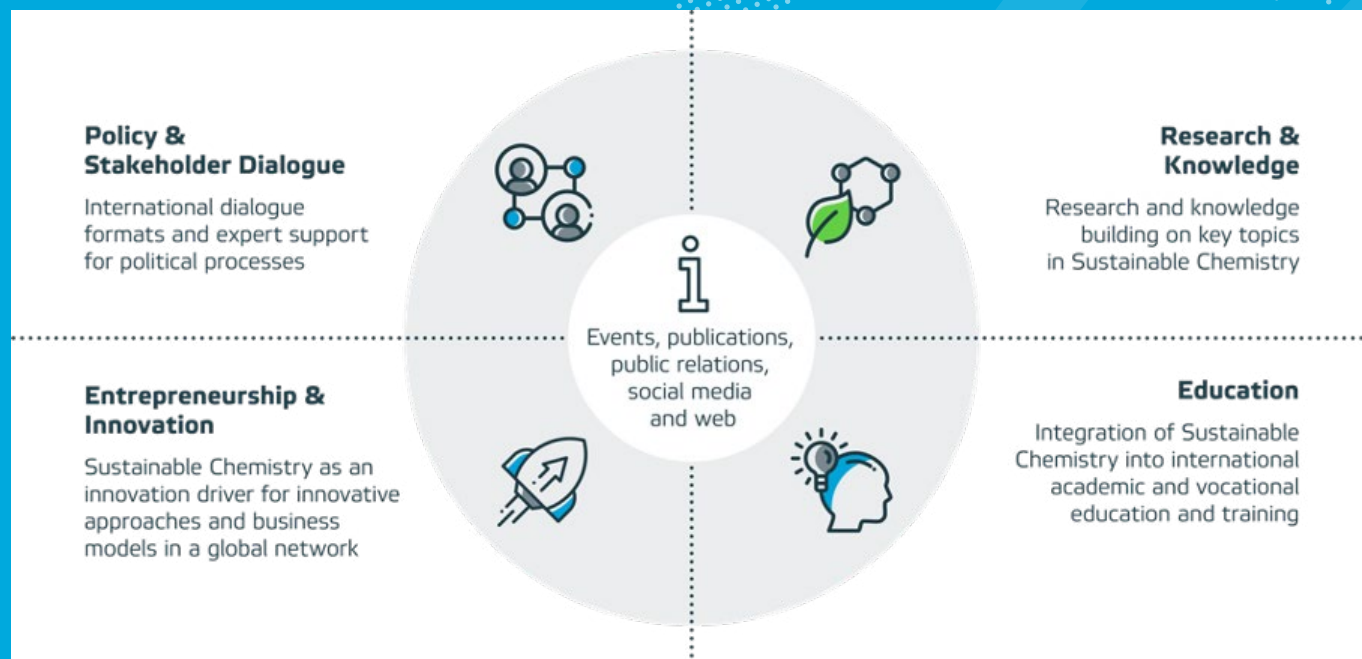


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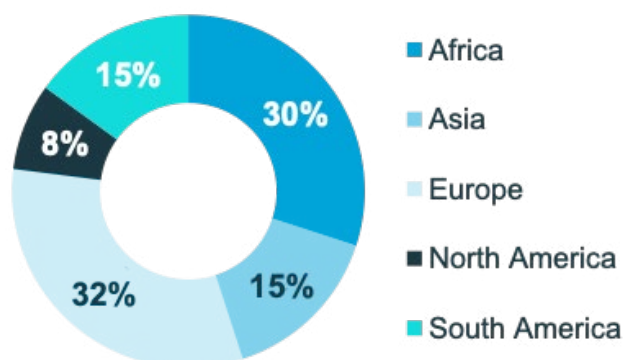
Review and Outlook

Dr Thomas Wanner, Managing Director of ISC3, welcomed all participants, in particular the commissioners of ISC3, the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection ([BMUV](#)) and the German Environment Agency ([UBA](#)). He then gave a brief overview on ISC3 being an international centre promoting the transition of the chemical and related sectors towards Sustainable Chemistry to achieve the [UN's SDGs](#) of the Agenda 2030, supported by a highly skilled multinational team. Key elements of his speech were the circular economy and the change in stakeholders' behaviour. Sustainable Chemistry fosters this approach. It even goes beyond the entire product life cycle by incorporating systems thinking. The shift towards Sustainable Chemistry is crucial for addressing the global challenges of our time such as climate change, resource scarcity, pollution, biodiversity loss, and inequality.

This introduction was followed by a short overview of ISC3's four main areas of work, the first of which is contributing to the international chemicals policy and conducting a dialogue with stakeholders. In the field of "Research & Knowledge", ISC3 performs active research while developing and promoting expert knowledge. Under the label "Education", the ISC3 is invested in generating value from all research development by imparting knowledge. Gaining value from knowledge also applies to the field of "Entrepreneurship & Innovation", where ISC3 uses Sustainable Chemistry as a driver for innovative business models and solutions.

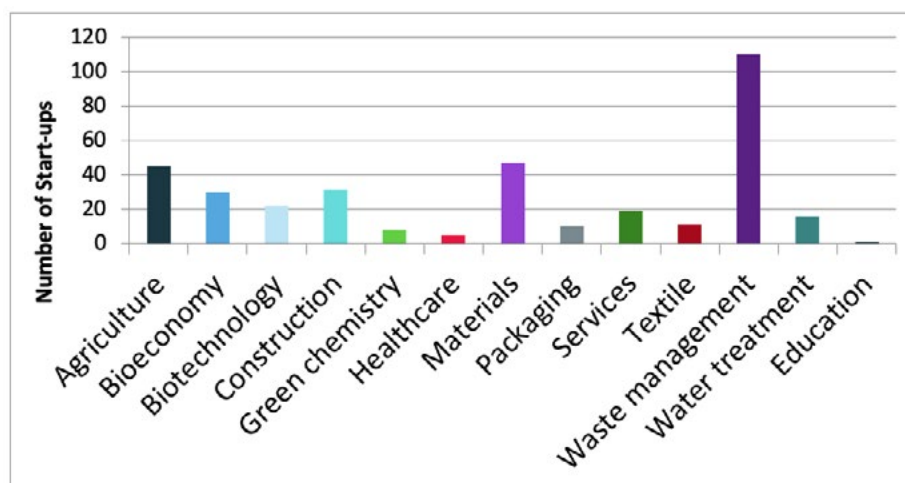
Dr Alexis Bazzanella, Director of the ISC3 Innovation Hub, added an overview of the ISC3 Innovation Hub activities. An important focus in the Innovation Hub's area of work is the Global Start-up Service, which supports innovators related to Sustainable Chemistry succeed in different stages of development, providing holistic support to Sustainable Chemistry innovators globally.

In the Global Start-up Service, there are 193 start-ups in the pool for Level 1 support, which consists of workshops in relevant topics. Features on the ISC3 website and Social Media as [Start-up of the Month](#), participation in the [ACHEMA](#), and showcasing at the [Investor Forum 2022](#) are services provided in Level 2 for the 91 eligible start-ups. Level 3 support offers customised support such as pitch trainings, life cycle assessment, and specialised services to currently 28 start-ups. He further outlined the geographical distribution of start-ups in the Global Start-up Service: Africa 30%, Asia 15%, Europe 32%, North America 8%, South America 15%.



Review and Outlook

Additionally, the audience was very interested in the sectoral and technological distribution of start-ups in the Global Start-up Service (GSS):



At the 2021 AICHEMA, the ISC3 invited start-ups from the GSS to the ISC3 booth and the innovation showcase. At the Investor Forum, the ISC3 provided 2 panels, allowed for showcasing and pitching, and held the Innovation Challenge Award Ceremony. There were 172 start-ups in the first round of the Innovation Challenge. Of those 82 continued to the second round, leading to 10 finalists. The geographical distribution showed that 56% of the participants were from Africa. The winners of the Innovation Challenge were:

Best Social Impact:

[Ray Cosmetics](#)

(prize EUR 5,000)

Best Regional Impact:

[Materials In Works](#)

(prize EUR 5,000)

Main Winner:

[We Are Galaktika](#)

(prize EUR 15,000)

The first [Corporate Challenge](#) was to successfully investigate new recycling opportunities and structures within Africa. Further activities by the Innovation Hub included workshops on “Holistic and integrated life cycle sustainability assessment of regional bioeconomy”, “Women in leadership”, and “Market research” in the GSS.

Dr Bazzanella also gave an outlook for the Innovation Hub’s activities in 2023 that will include another round of the Innovation Challenge and the annual Investor Forum, most likely as a hybrid event. There will also be new workshops by the GSS and [Sustainable Chemistry Club](#) events. In addition, the Innovation Hub is hoping for another Corporate Challenge, for which they are still looking for corporate partners and problems to solve. Interested in the possibility of internship programmes, a stakeholder asked Dr Bazzanella, if the Innovation Hub’s [Mentoring Programme](#), especially the Professional Academic Advisors Programme ([PAAP](#)) would be a good option. The conversation was continued outside the Stakeholder Forum.

Review and Outlook

Prof. Klaus Kümmerer, Director of the ISC3 Research & Education Hub at Leuphana University, gave a brief overview of last year's activities which included entropy change as a measure for chemical sustainability, the electrochemical synthesis of chemicals, metals as a non-renewable yet critical resource, the opportunities, barriers, and potential solutions of photovoltaics, and the introduction of Chemoinformatics as a versatile tool in Green and Sustainable Chemistry.

Among others, the research activities lead to the following scientific publications:

- [“Chemistry and materials science for a sustainable circular polymeric economy”](#) by Vânia Zuin and Klaus Kümmerer in “Comment”
- [“Toward Application and Implementation of *in silico* Tools and Workflows within Benign by Design Approaches”](#) by Stefanie Lorenz, Ann-Kathrin Amsel, Nicole Puhlmann, Marco Reich, Oliver Olsson and Klaus Kümmerer in “ACS Sustainable Chemistry & Engineering”



One of the most important topics in the research area still is ionic liquids, which were and are thought to be green, but actually are not. This led to an article on improving the end-of-life management of solar panels in Germany in “Renewable Sustainable Energy Reviews”.

Report on the activities & deep dive of the ISC3 Science & Innovation, and Policy

by Dr Claudio Cinquemani, Director of ISC3 Science & Innovation

Dr Cinquemani gave a brief overview of what his colleagues would be reporting on during the day. The focus topic, which changes every year, was Capacity Development, newly established in phase 2, and the Common Understanding of Sustainable Chemistry and how it can be put into practice. Stepping in for a colleague, Dr Cinquemani would also be reporting on policy topics.

He began his report on the focus topic by outlining which trends he expected in the foreseeable future and how they would impact the sectors, branches, and companies involved. This year's focus topic was [Renewable Energy and Sustainable Chemistry](#) as the overarching theme, with a deeper look into PtX and hydrogen. ISC3 developed [trainings](#) to bring stakeholders to a joint level of knowledge so that side effects of PtX could be discussed in order to find strategies and solutions for dealing with PtX and hydrogen together.

The next focus topic will be Circularity, for which Morocco was chosen as partner country. As the knowledge gained from the focus topics should be passed on to interested parties in training courses and webinars, etc, Capacity Development will be an additional area of expertise for ISC3. The self-learning platform Atingi, currently used for training on Plastics and Building in Kenya, is a tool used in addition to live trainings.

Additionally, Science and Innovation is currently working on a Common Understanding of Sustainable Chemistry. This theoretical framework, which was developed 2 years ago, is about to be put into practice. Best and bad practices will be collected to provide better access to Sustainable Chemistry. The results are expected early next year and should make Sustainable Chemistry more tangible for everyone. Dr Cinquemani thanked all those who participated in the survey on the topic and gave good and bad examples.

As representative for Anna Becker, Dr Cinquemani reported on the ISC3's [policy](#) activities. The assignment comprises the development of ISC3 policy trainings on Sustainable Chemistry in the following areas:

- Strategic Approach to International Chemicals Management (SAICM)
- EU Chemicals Policy
- Multilateral Environmental Agreements (MEAs) and Human Rights
- Participation in UN processes (i.a. at the Intersessional Process (IP4) in Bucharest, Romania)
- Contribution to youth-related events (such as the Spring Symposium of the Young Chemists Forum (JCF), or the Award Ceremony for young academics at the 2022 ACHEMA)



Report on the activities of the ISC3 Research & Education Hub

by Prof. Klaus Kümmerer, Director of the ISC3 Research & Education Hub

After providing some insights into current research activities in his opening, Prof. Kümmerer started his presentation with a closer look at [academic education](#). ISC3 is not only interested in students, but also in imparting knowledge to people who might already be working in organisations as well as people who may have an academic education and are decision-makers in their respective organisations. Together with the Leuphana University, the ISC3 is trying to achieve this through extra-occupational programmes in Sustainable Chemistry, as there are more and more interested parties who want to implement changes in their companies towards more sustainability. Therefore, the study programmes are geared to the needs of the students and are constantly being developed, which is quite demanding for the teaching staff.

The first cohort of the master's programme M.Sc. Sustainable Chemistry, and thus the first decision-makers of the future with a great deal of knowledge in Sustainable Chemistry, just graduated. There is the so-called Full Programme (duration: 2 years), in which not only chemistry is taught, but also Green Chemistry, toxicology and chemical informatics. Sustainable Chemistry concepts are also part of the curriculum as it is important to teach the difference between Green Chemistry and Sustainable Chemistry. Due to the fact that the degree programmes are predominantly part-time, this Full Programme can be prolonged to 5 years.



Report on the activities of the ISC3 Research & Education Hub

by Prof. Klaus Kümmerer, Director of the ISC3 Research & Education Hub

There is also a Certificate Programme, in which students can choose sub-areas of the programme and obtain certificates in the respective fields. One of these sub-areas is Sustainable Chemistry and Benign by Design.

From the beginning, the ISC3 knew that these study programmes had to be accredited. With pride, Prof. Kümmerer announced that this goal has been achieved at European level. Here is a short overview on the possibilities of academic education:

M.Sc. Sustainable Chemistry (since March 2020):

- German and European Accreditation
- Online programme with selected on-site classes
- International professionals from all over the world
- 6/8 already completed their studies
- 15 students in 2020, 2021 & 2022
- 55 applications for the cohort 2023

The second-degree programme offered at Leuphana University is the MBA Sustainable Chemistry Management. This programme also offers the Full Programme and the possibility to obtain certificates.

M.Sc. Sustainable Chemistry MBA Sustainable Chemistry Management	Dates & Deadlines
Free Taster Course "Benign by Design"	27 th September 2022
Online Info Sessions "Application & Admission"	6 th October 2022 and 14 th November 2022
Application Deadline	10 th December 2022
Next Info Session	14 th January 2023

MBA Sustainable Chemistry Management (since March 2022):

- Online programme with selected on-site classes
- International professionals from all over the world
- 4 students in 2022
- 42 requests for information from potential applicants in 2022
- 10 applications for 2023

Annual Summer School on Sustainable Chemistry

Target audience of the Summer School are postgraduates, PhD students as well as young professionals from industry, public authorities, research, and non-governmental organisations that have a professional interest in the topic of Sustainable Chemistry as a cross-cutting issue. The international trainer team consists of scientists and practitioners from Sustainable Chemistry-related fields. The programme comprises lectures, practical exercises, case studies, group discussions, a field trip, and a laboratory tour to exemplify important aspects of Sustainable Chemistry.

Key facts:

- Imparting basic knowledge on Sustainable Chemistry and chemicals management
- Varying focus topics (2022: Hydrogen Economy, 2023: Climate Crisis)
- 128 registrations in 2022
- Gender split: 67 female and 61 male participants
- Participants from 23 different countries (e.g., Argentina, Chile, Ecuador, India, Jordan, Malaysia, Pakistan, Trinidad, United Arab Emirates)
- Next Summer School: 10-14 July 2023

Green & Sustainable Chemistry Conference

During the annual Green & Sustainable Chemistry Conference from 16 to 18 November 2021, organised by ISC3's partner Elsevier, several presentations and speeches were given to discuss and further the topic of Sustainable Chemistry on an international academic level.

It took place as an online event. A special feature of the conference is the Elsevier Foundation Chemistry for Climate Action Challenge that awards projects that use Green and Sustainable Chemistry solutions to tackle some of the developing world's greatest sustainability challenges. The next conference will take place 22-24 May 2023, in Dresden, Germany.



Moderated discussion:

Impact of start-ups and start-up promotion on the implementation of Sustainable Chemistry

Panel discussion with Dr Alexis Bazzanella as chair.
Discussants: Katerin Carrillo, co-founder of NatuPla,
Jeff Beegle, co-founder of Mobius, and Colin
Hannahan, UNEP expert on Green and Sustainable
Chemistry

During his introduction, Dr Bazzanella pointed out that "impact is the change expected due to an action." He further explained that output (events, workshops, ...) is easy to measure but outcomes (improving sustainability, solving problems) and the related impact are more challenging to judge. Methodologies to evaluate outputs could be the Theory of Change, contributing to the SDGs, and a cause-and-effect relationship. The leading questions being: How can we prove that we make a difference? How is impact assessment part of our thinking? What is the impact of what we do and how can we measure it?

Ms Carrillo started the discussion by sharing two different experiences, as an entrepreneur and as an impact officer. She explained that from the perspective of an entrepreneur, especially in the early stages, it is hard to see a direct impact besides the employment. But she believes that having clear sustainability visions and values is important to establish the necessary processes. As an impact officer, she believes that it is important to measure impact from the beginning, and to develop an impact strategy that aligns with the vision of the company.

Mr Beegle followed up the question by talking about the importance of eco-design, and impact assessment of the products and processes before going to commercial scale. He explained that his partnership with the ISC3 helped him to better understand the impact assessment via life cycle assessment (LCA) and the importance of evaluating the materials that are used.

Dr Bazzanella pointed out the challenge for start-ups to scale up and asked about Ms Carrillo's and Mr Beegle's respective journey as well as the perception of their impact. Mr Beegle spoke about the need for innovations in Sustainable Chemistry, explaining that start-ups need the involvement of the entire value supply chain. He pointed out how important it is for them to build relationships across the supply chain to understand the customer's needs, the product's impact and how to bring innovation to the market. He also stated that the impact of the materials they use is difficult to measure as the required input would have to come from the entire supply chain. Therefore, a better connection to the market and suppliers would help create a long-lasting impact.

Moderated discussion:

Impact of start-ups and start-up promotion on the implementation of Sustainable Chemistry

Regarding the importance to connect with stakeholders, SCC's showcasing of lighthouse solutions to raise awareness for the topic within the entire value chains brought up the general question as to the topic's relevance to the UNEP. Mr Hannahan regarded the raising of awareness as a means to get a resolution through, the foundation for the intended outcomes. Another type of impact and a next step would be to synthesize best practices based on the developed framework manual. In his opinion, this would represent a qualitative approach towards more impact.

As ISC3 places great importance on stakeholder activities involving education and knowledge sharing, Dr Bazzanella raised the question whether Ms Carrillo and Mr Beegle saw themselves as multipliers that inspire others. Ms Carrillo confirmed to see herself as a multiplier, which could be seen as a mid-term outcome. As such, it could be measured and might lead to the desired long-term changes. For example, how start-ups connect to one another and recommend the ISC3 programme to others.

In this context, Mr Beegle referred to the help and mentorship received from more experienced founders during the founding-stage. To reciprocate in kind by supporting early-stage entrepreneurs to come would be a pillar of their own work, especially to solo founders.

The audience added a policy element to this, wondering about the wishes these young founders had towards policies. One key point was to strengthen the connection between research and founders, as well as a standardisation across countries, an element of great importance especially to Europe as a leading indicator. Another question from the audience was how to unlock funds for scaling up business solutions, especially with regard to electric waste problems in Kenya and other countries, and how to enable more companies to grow in such a field. In response to this, Dr Bazzanella explained that this could only be answered from an investment perspective, which the panel did not have. Mr Hannahan pointed out that a business model like the e-waste co-working space from ecowork from the SCC might be helpful.



Policy Outlook 2023 through the lenses of Sustainable Chemistry



Policy meetings in 2023



A moderated discussion including virtual board with Anna Holthaus & Dr Minu Hemmati, Hemmati Consulting

Dr Hemmati gave an overview of ISC3's activities and input given by attending policy events in 2022, such as:

- The UNEA-5.2 from February to March 2022
- The UN Assembly on the human right to a clean, healthy, and sustainable environment in July 2022
- The BRS Triple COP 2022 in June 2022, Geneva, Switzerland
- The SAICM IP4, from August to September 2022, in Bucharest, Romania
- The SPP OEWG1.1 in October 2022, Nairobi, Kenya

She then drew attention to the events in 2023, which would be:

- The OEWG 1.2: Science Policy Panel, 30 Jan – 3 Feb 2023, in Bangkok, Thailand
- The SAICM resumed IP4, 27 Feb – 3 March 2023, in Nairobi, Kenya
- The BRS Triple COP, 01 – 12 March 2023, in Geneva, Switzerland
- The ICCM5, 25 – 29 Sept 2023, in Bonn, Germany
- The OEWG 2: Science Policy Panel (second half)

Policy Outlook 2023 through the lenses of Sustainable Chemistry

Dr Hemmati pointed out that opportunities for Sustainable Chemistry were included in the SAICM Beyond 2020 process under the following aspects: Vision, Scope, Strategic Objective D, Issues of Concern, and in elements for a possible High-Level Declaration. Therefore, ISC3 will continue to advocate Sustainable Chemistry in the SAICM Beyond 2020 process.

The Science Policy Panel on Chemistry, Waste and Pollution is considered to be another opportunity to disseminate the concept of Sustainable Chemistry. Namely the OEWG process to prepare proposals for the science policy panel. ISC3 will advocate for Sustainable Chemistry to be included in the OEWG process.

The educational aspect was included in the policy field in 2022. Therefore, ISC3 prepared workshops on the topic of Sustainable Chemistry with the four modules SAICM, EU Chemicals Policy, MEAs, and Human Rights. The modules provide information on the historic background, institutions, and processes with a focus on current developments, policy contents and measures, the possibilities to participate politically, stakeholders in the policy field, and linkages to Sustainable Chemistry. A trainers' manual, a manual for the participants, a training agenda as well as methods, presentations and a questionnaire are provided for each module. The results of collected suggestions on what additional topics could be interesting for future workshops are shared with all participants.



ISC3's knowledge elaboration:

New Focus Topic "Renewable Energy & Sustainable Chemistry"

A whiteboard discussion with Oleg Ditkovskiy & Dr Claudio Cinquemani, ISC3 Science & Innovation

Mr Ditkovskiy presented the new focus topic and used the example of iridium demand to explain why it was chosen. The world population will increase significantly in the coming years and more and more raw materials will be needed. Since raw materials are planetarily limited, it is important to have a circular economy, a system that aims to avoid waste and instead circulates and recycles products thus conserving resources and the environment. In this context, the "6 Rs" are of great importance: Rethink, Reuse, Reduce, Recycle, Recover, Refuse. The white paper, which will be published after the topic has been worked out further, will deal with the following 3 examples: The recycling of photovoltaic panels, rotor blades and batteries from electric cars.

During a Miro board discussion, comments, remarks, and questions made verbally and in writing by the participants of the 4th ISC3 Stakeholder Forum were collected in a knowledge elaboration on the new focus topic "Renewable Energy and Sustainable Chemistry".

Topic suggestions from the participants could be sub-divided into four categories: environmental, social, economic, and governmental. Environmental topic suggestions encompassed industrial ecology, in particular the waste heat recovery, measures for CO₂ reduction, the use of substances that are environmentally benign to begin with, respecting global ecological boundaries, and fostering the use of (green) hydrogen, especially in the chemical industry. The topic of sufficiency was raised not only as a suggestion but also as a major concern considering the impossibility of real circularity (close to 100%). This entailed the question on how to measure the success of recycling and determining how complete the cycle truly is.

The need for a life cycle assessment involves environmental demands to ensure a material and energy balance of renewable energy facilities as well as economic concerns when it comes to avoiding stranded investments.

Suggestions from a social point of view included the topic of diversity and the chances for new business models, which in return could lead to new jobs. The latter was also deemed an economically important topic, alongside with the ever-growing energy demand, the current development in Smart Grid Management, and the required investments in alternative materials, which also call for a transformation in R&D.

Under the topic suggestions for governmental issues, Smart Grid Management was at the top of the list, followed by the need for specific policies incentivising recycling. Further topics requiring government involvement were the use of substances that are environmentally benign to begin with, the question of how to measure the success of recycling, how to avoid greenwashing, and how to complete the transformation of the industry towards designing their products for circularity from the start.

The participants were also asked to comment on the regulations deemed necessary to establish a CE standard. The answers were mostly driven by ecological concerns like the need for regulations ensuring the use of non-toxic materials, measures for CO₂ reduction, and again the topic of industrial ecology, i.e., the waste heat recovery. Other answers included the establishment of new business models and jobs, and the fostering of the use of hydrogen in the chemical industry. However, it was pointed out that even the CE standard has several limitations. Therefore, CE should be embedded in a wider range of sustainability policies, not seen as an isolated solution.

ISC3's knowledge elaboration:

New Focus Topic "Renewable Energy & Sustainable Chemistry"

As non-technical solutions for CE, the participants suggested to make resource extraction bear the full environmental cost. In addition, social structures could be useful, considering that CE, like every other framework, requires behavioural changes on a larger scale. The collaboration within and across sectors as well as an overall Capacity Development were also listed as possible key factors.

Economic solutions could involve new business models of a sharing economy, chemical leasing chemicals-as-a-service, or legitimate take-back programmes. Other suggestions included the development of Artificial Intelligence (AI) specifically for energy supply and use, or a market platform for CE-approved materials. For these suggestions to work, governments have to establish a producer responsibility where every manufacturer is held accountable.

Overall, the suggestions of the participants reflected that the search for a new focus topic is closely aligned with the need for a systemic change to further the transformation towards Green and Sustainable Chemistry. The solution cannot be found only in technology but requires ecological, social, economic, and governmental measures as well.



Learning Platforms:

How to translate acquired knowledge to Capacity Development

Presentation of the Atingi "Building & Plastics" exercise followed by discussion with Jan-Patrick Paul & Dr Claudio Cinquemani

The e-learning platform Atingi, which is intended to convey content in Capacity Development and enable personal learning in the future, was presented using the example of "Building & Plastics". The access link was shared with the stakeholders in advance to explore the platform and training individually.

In the meantime, Jan-Patrick Paul and Angela Vejarano gave a demonstration of the platform to the participants remaining in the forum using the existing "Building & Plastics" course. It was announced that all questions regarding the functionality of the tool would be personally answered to the participants after the presentation. As a closing remark, Dr Cinquemani asked the audience to connect him to potential and interested participants.

Workshop:

Developing a common understanding and best practice examples of Sustainable Chemistry

Bettina Geiken, Elsbeth Roelofs, HEAT, Kiana Frank, ISC3 Science & Innovation

Elsbeth Roelofs from HEAT welcomed all participants and pointed out the close working relationship between HEAT and ISC3 on a common understanding. Afterwards, Kiana Frank from ISC3 explained why this project was included in the work process of ISC3 and provided insights on the state of progress. In 2020, the [10 Characteristics of Sustainable Chemistry](#) were published by ISC3. The current task is to fill these 10 characteristics with both good and bad practices to make them more descriptive for all interested stakeholders thus working towards a global community with a common understanding as well as shared values and aims regarding Sustainable Chemistry. The goal is to position ISC3 and the holistic interpretation of Sustainable Chemistry and to develop a communication strategy that includes materials with practical applications, examples, visualisations and related tools.

There were 5 work packages. The first was an Askallo survey. Its key objective: mapping stakeholders and different understandings of Sustainable Chemistry and gathering examples of Sustainable Chemistry. It began simultaneously with the second work package, a workshop series intended to gather input for a communication paper. Work packages 3, 4 and 5 included the development of a communication strategy paper on a common understanding of Sustainable Chemistry, the development of communication materials and of content for e-learning materials.

Elsbeth Roelofs explained the objective of the workshop to follow: First, the results of work package 1, the Askallo survey, would be presented. The gathered examples of Sustainable Chemistry would then be examined, firstly to learn how stakeholders think and secondly to learn how to communicate about Sustainable Chemistry. A third goal would be to collect input for a policy paper on communicating about Sustainable Chemistry.

The aim of the Askallo survey was to collect practical examples of Sustainable Chemistry (best/insightful/failed) and – by asking how biased respondents were in understanding Sustainable Chemistry – to gather evidence on how well the different understandings of Sustainable Chemistry are known. In light of the answers given, the participants were divided into 10 groups, each with a different example, a different case study, to discuss the examples collected and share new insights. Afterwards, the results were displayed on a Miro board and presented collectively. In addition, all participants received viewing access to the Miro board after the event to follow the discussions and results of the other groups.





UNEP session on strategic action to advance Green and Sustainable Chemistry

Chair: Dr Achim Halpaap, former Chief of the Chemicals and Health Branch and lead author of the Framework Manual, UNEP

Participants: Dr Jutta Emig, German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), Rafael Cayuela, DOW Chemical

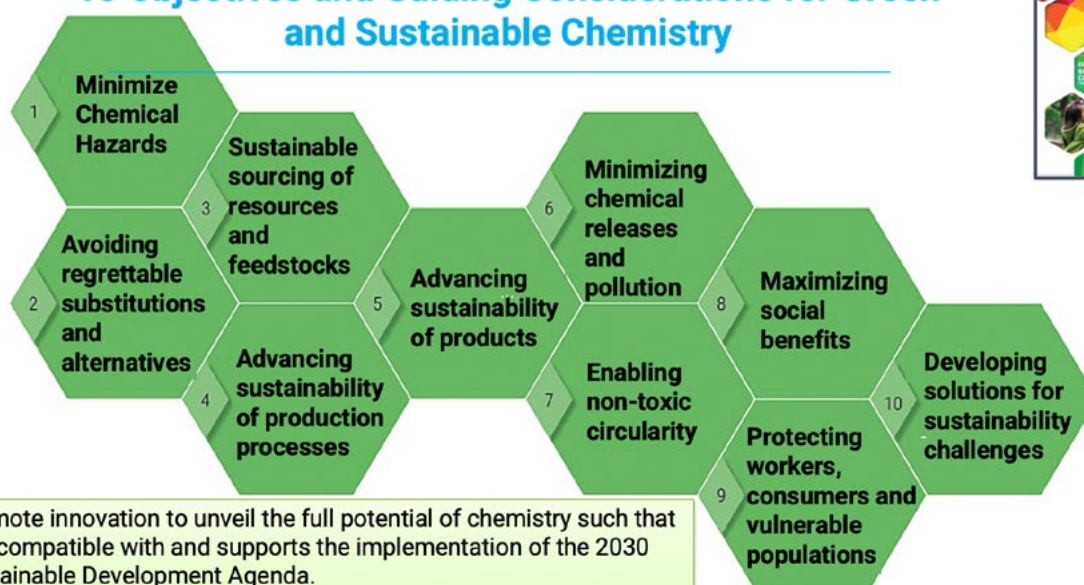
ISC3 was delighted that UNEP joined another ISC3 event with a panel discussion on the topic of strategies to advance Green and Sustainable Chemistry. Dr Halpaap welcomed all participants and thanked them for the opportunity for this panel discussion. He pointed out that the day would show that the topic of Green and Sustainable Chemistry is on the rise and that many activities are already being undertaken to advance it. However, it is also clear that much work still needs to be done to mainstream the issue in industry, government, and research. This session was divided into 2 parts. An introduction by colleagues from UNEP on their activities related to Green and Sustainable Chemistry, followed by a panel discussion.

Sandra Averous Monnery, officer in charge in the department of risk management at UNEP, gave the introduction to UNEP's work and manuals in the area of Green and Sustainable Chemistry with the main question: "Why do we need Green and Sustainable Chemistry?" It was pointed out that "business as usual" is not an option.

In 2019, a resolution was adopted by the 4th United Nations Environmental Assembly and UNEP was tasked to develop manuals on Green and Sustainable Chemistry fostering general learning, reflection and scaling-up to a global understanding of Green and Sustainable Chemistry as envisioned by the 2030 Sustainable Development Agenda. The goal is to establish common Green and Sustainable Chemistry objectives across all chemistry and technology areas by enabling instruments and policies as well as sectors and programmes and providing the necessary metrics assessment and reporting.

Ms Averous Monnery shortly presented the 10 objectives and guiding considerations for Green and Sustainable Chemistry. The intention of the work is to promote innovation in order to unveil the full potential of chemistry so that it is compatible with and supports the implementation of the 2030 Sustainable Development Agenda. It should complement traditional approaches in chemistry by emphasising sustainability and highlighting what outcomes Green and Sustainable Chemistry seeks to achieve.

10 Objectives and Guiding Considerations for Green and Sustainable Chemistry



- Promote innovation to unveil the full potential of chemistry such that it is compatible with and supports the implementation of the 2030 Sustainable Development Agenda.
- Complement traditional approaches in chemistry, by emphasizing sustainability considerations and highlighting what outcomes green and sustainable chemistry seeks to achieve

[Advancing the 10 objectives and guiding considerations - Infographic](#)



In 2022, the UNEA welcomed the Green and Sustainable Framework Manual of the UNEP and its executive summary. In the context of the Beyond 2020 discussions, advancing Green and Sustainable Chemistry in key sectors and value chains is an important component of an integrated chemicals and waste management. Key milestones will be the resumed IP4 in February 2023 in Nairobi, Kenya, and the ICCM5 in September 2023 in Bonn, Germany.

Colin Hannahan, consultant at UNEP, followed up with a brief explanation of the practical guide and asked for the participants' support to work on Chapter 8 of the UNEP Framework Manual to advance the Roadmap for Green and Sustainable Chemistry. He further explained that the key characteristics of the practical guide were based on stakeholder experience. After all, the aim of the manuals is to be user-friendly, accessible, and applicable to all stakeholder groups. That is why key elements of the guide are real-life examples that illustrate the different steps of the process as well as factors for success and lessons learned from stakeholders with direct experience in carrying out relevant action processes.

These insights were followed by the panel discussion, beginning with Dr Emig giving her assessment as a government representative. Dr Jutta Emig thanked UNEP as a very important partner of ISC3 for organising this panel discussion. She then pointed out that the use of chemicals in daily life was increasing rapidly, so it was all the more important to ensure chemical products to be sustainable and green. From her point of view, it is a long journey to the goal of developing a truly sustainable product. The building of houses was given as an example. Constructions contain chemicals. Therefore, it must be ensured that these are degradable and sustainable. The most expensive building material is not always the best. Still, it must be affordable and available. In this context, asbestos is a big issue. If people are to be discouraged from using asbestos, research and industry must act and develop substitute materials that are affordable and achievable.

Raphael Cayuela, representing the industry, was then asked to introduce himself and add his thoughts to the topic. After a brief overview of his life in recent years, Mr Cayuela moved on to his main area of expertise, namely the Sustainable & Digital Transformation as a New Growth and Innovation Model.

The key assumption of the New Growth Business Model is that the value of today is largely not the value of tomorrow. This assumption can be applied to industries, crackers and even molecules. In his opinion, there is a unique opportunity to design, produce and manage the “Sustainable and Green Molecules of the future”. Additionally, there is the unique opportunity to design the sustainable future rebalancing humanity with nature. According to Mr Cayuela, he could not imagine a more exciting time in chemistry as “chemistry is essential”.

Mr Halpaap moved on to Mr David Santillo, Greenpeace representative, who gave a brief overview of his organisation's activities. Chemical pollution is one of the most important issues Greenpeace has been working on for decades. Mr Santillo stated it was his duty to keep drawing attention to chemical pollution and environmental grievances. Greenpeace itself is working on replacement materials in its own laboratories trying to make them palatable to the industry in order to achieve a more sustainable and healthier future. As Greenpeace is working towards sustainability in the textile sector, the question came up as to how it was possible to bring the various negotiating partners from industry, research, and trade to the same table? Mr Santillo responded that it was a long journey that included much effort in building trust and appreciation. Everyone had to work together in a solution-oriented way. Accordingly, companies had to be found that were willing to become partners. Greenpeace sees its role in noting bad practices, but also good ones, and mediating between them. Sometimes, these good and bad practices can even be found in one and the same company.

Another question referred to the confidence-building measures Greenpeace uses and how it was possible to get all the stakeholders to the table? Mr Cayuela underlined trust and experience as the most important aspects in this endeavour. He elaborated that the path was never easy, and that a common language had to be found. He mentioned training and the sharing of knowledge as crucial requirements.

Dr Emig was asked about the importance of stakeholder engagement for joint work on Sustainable Chemistry and the establishment and continuation of the centre. Dr Emig responded that, without the support of the stakeholders, the centre could never have developed or continue to exist and deliver all the outcomes as desired. Therefore, any kind of support, be it financial or through intellectual input, is welcome. She pointed out that the social dimension is very important and that there must be a stop to separating Green and Sustainable Chemistry linguistically. It is important to see how things are and not what others make of them linguistically.

Questioned by the audience as to whether there were any suggestions from David Santillo or Raphael Cayuela on how UNEP should proceed with its work to achieve more sustainability, Mr Cayuela responded that even the best organisation in the world couldn't achieve anything without a capable staff. On the other hand, the best organisation in the world with the most capable staff couldn't achieve anything without the interested user. He emphasised that there was always more work to be done to keep Green and Sustainable Chemistry on the agenda. His final statement was: “Think big and be ambitious.” Mr Santillo added that the 10 objectives were a good start, but that UNEP needed to remain in dialogue with all stakeholders.

Finally, Dr Thomas Wanner, Managing Director of the ISC3, thanked all participants, especially those who made this day possible. There were many new insights encouraging ISC3 to continue in its work.



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