Regional Perspectives on Sustainable Chemistry Innovation and the Global Chemicals Outlook II: Understanding Trends, Risks and Opportunities

Report on Regional Expert Workshop
Panama City, 13 - 14 April 2018

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On 13 - 14 April 2018, the third of four expert-scoping regional stakeholder workshops took place in Panama City, Panama. This initiative was part of a strategic partnership, in which ISC3 and UN Environment examined the long-term perspectives and roles of sustainable chemistry. This workshop brought together a select group of specialists from the Americas, including innovators and entrepreneurs, policy-makers and scientists, regional experts and futurologists from relevant stakeholder groups. Key take-away lessons from this event include:

1. When examining issues pertaining to sustainable chemistry innovation in the Americas, the differences within region (e.g. North- and Latin America, but also within Latin America), considering their income, their probability to suffer from pests, or their susceptibility for climate change (among others) vary greatly.

2. Governments in the Latin American region need to improve their ability to assess different chemicals and their risks, in order to create a climate for innovation for industry, and to regulate truly hazardous chemicals. This would include policy instruments to create economic incentives for innovation, as well as a transfer of knowledge and information.

3. Both, south-south, as well as north-south cooperation were envisaged, including harmonizing regulations both within the region, as well as inter-regional harmonization to allow for international trade.

4. EU-regulations have a great impact on Latin American countries, when it comes to chemicals use. Chemicals that are prohibited in the EU cannot be used on produce intended for the EU-market, while the substitutes that are developed in (and for) European countries are not necessarily suitable for use in tropical countries.

5. Policies incentivising considerations of the end-of-life of a product already at the design and production phase, as well as practices or legislation that ensures extended producer responsibility were thought to be beneficial for the region by fostering a life-cycle approach. However, these would not be easily implemented.

6. Improved labelling of agrochemicals whilst ensuring that the labelling is easily understandable and educates users about the possible adverse effects of the product, is one way to reach small-scale farmers who are usually not affected by regulations for the agricultural sector.

7. For the waste management/services sector, to reach the desirable state of using waste as a resource in the waste management sector, some of the current policies that are unfavourable to such practices should be reviewed and/or changed.
1. Introduction and context

Innovation is key to sustainable development. Sustainable chemistry, as a cross-cutting and interdisciplinary concept, is one major driving force for innovation and provides new intelligent solutions paired with diverse ecological, social and economic benefits. Sustainable chemistry is the single largest opportunity to move entire supply chains towards circular economy models, avoiding waste and making better use of natural resources. It is strongly interlinked to a broad range of topics including, among others, renewable energy, climate change, sustainable cities, healthcare, agriculture, and buildings and living.

As a new and independent organisation, the International Sustainable Chemistry Collaborative Centre (ISC3; www.isc3.org) aims to accelerate the global breakthrough of sustainable chemistry by promoting innovation, assessing processes and products and stimulating international debate on the future of chemistry. As a first step into the debate, UN Environment and the ISC3 have joined together to discuss global megatrends and regional perspectives on innovation, technology change and new business models relevant for advancing implementing sustainable chemistry solutions worldwide.

As part of this strategic partnership, ISC3 and UN Environment have organised a series of interactive multi-stakeholder workshops in various regions. The objective of the partnership is to gain expert insights from different actors on the future role of chemicals and chemistry considering important factors such as global and regional megatrends, sustainable development needs, the potential of disruptive technologies, innovative business models etc.

The workshops serve two purposes: the ISC3 intends to facilitate a scenario-building process on shaping the transition towards more sustainable chemistry. Various inputs from different actors will be carefully and holistically considered. The workshops provide a unique opportunity for a) civil society representatives to voice expectations and concerns, b) industry representatives to refine strategies and investments, c) policy-makers to gain insights on shaping effective policies, and d) academics to further spur research.

This series of workshops has also contributed directly to the UN Environment’s second edition of the Global Chemicals Outlook II (GCO-II). The results and contributions from all workshops will flow into a collating overall picture illustrating what the future of sustainable chemistry can look like, and what role chemicals and chemistry will play in addressing emerging and future challenges in implementing the UN Sustainable Development Agenda 2030 and its corresponding Sustainable Development Goals (SDG’s). They will form the underlying foundation for international expert decisions at the GCO Steering Committee Meeting in June 2018 and provide significant input on how the issue of sustainable chemistry and underlying mega-trends will merge into the next GCO-II.

The GCO-II is being prepared in response to the second session of the United Nations Environment Assembly (UNEA) and will be globally released in early 2019. Designed to be forward-looking and policy relevant, the GCO-II is expected to capture the state of scientific, management and policy knowledge to support policymakers and stakeholders in their efforts to assess the implementation of the 2020 SAICM goal, and for deliberating on the sound management of chemicals and waste beyond 2020. Structured in four parts, the GCO-II will address relevant global and regional trends and developments, review chemical management topics and instruments, identify enabling environments and drivers of change, and provide options for implementing actions towards relevant SDGs.

The two-day regional expert workshop, held in Bangkok, Thailand on 25 and 26 April 2018, was the last of four regional workshops to examine Regional Perspectives on Sustainable Chemistry Innovation and the Global Chemicals Outlook II: Understanding Trends, Risks and Opportunities. This workshop specifically focused on:

- identifying regional and industry sector trends in Asia,
• reviewing chemical management topics and instruments,
• identifying enabling environment and drivers of change in Asia, and
• reviewing options for implementing actions towards relevant Sustainable Development Goals (SDG)

The results of these four workshops serve as inputs for the respective initiatives of GIZ ISC3 and UNEP/GCOII. In case of ISC3, the insights gained during the workshops will form the basis for a scenario development process on sustainable chemistry with a long-term perspective (by 2050). This scenario development process will, among other functions, help to further define “sustainable chemistry” and its future role in shaping a sustainable world. For the UNEP/GCOII, the workshop inputs will immediately contribute to preparing the second Global Chemical Outlook (GCOII), which will officially launch in early 2019. The GCOII, in its chapters 3 and 4, will capture issues pertaining to innovation in the context of sound chemicals management by 2020 and beyond.

To prepare and implement these workshops as well as the preparation of the ISC3 scenario development process, the GIZ ISC3 has engaged an external consulting consortium, consisting of experts from the adelphi (www.adelphi.de) and IFOK (www.ifok.de).
2. Proceedings

The workshop was structured to provide a suitable platform and forum for participants from different countries in the Americas to share their views, concerns and ideas. The approach consisted of snapshot presentations, brainstorming, discussions in full plenary, moderated by an expert team from adelphi and IFOK (Dr. Nils Simon, Melissa Allen, Luisa Schulte).

To gather a wide variety of diverse views, participants representing policy-makers, research and development, academic institutions, industry, start-ups, business intermediaries and non-governmental organizations were invited to attend. The workshop brought together 26 participants from Europe and the Americas (Argentina, Bolivia, Brazil, Chile, Costa Rica, Ecuador, El Salvador, Colombia, Panama, Peru, St. Kitts & Nevis, Trinidad & Tobago, Uruguay, USA) representing various stakeholder groups (industry, government, NGO, research and academia as well as UN Environment).

The workshop started with a brief welcome and an introduction to ISC3 by Agnes Dittmar, and to UNEP/GCOII by Jordi Pon and Jost Dittkrist (via Skape), outlining the respective roles and missions of the two partners behind this series of workshops. This was followed by four sessions, for which details are provided in the following sections.

Session 1 – Global Megatrends and Industry Sector Trends in the Americas

The purpose of this session was to share preliminary findings on global megatrends and its links on regional industry sector trends, as well as to collect regional perspectives and snapshots on chemical management and innovation in the Americas. This session moderated by Dr. Nils Simon started with a presentation on preliminary findings of the research on mega- and industry sector trends, also incorporating outcomes of the other two regional workshops in Nairobi and Frankfurt.

The moderated discussion particularly focused on the implications of megatrends on the presented industry sectors, as well as collecting regional snapshots of issues related to innovation to advance sustainable chemistry. Workshop participants contributed several thoughts, ideas and opinions on the overall topic, covering the following:

- The participants agreed that the global population growth and an increase in urbanization is contributing negatively to consumption of plastics, especially linked to an exploding middle-class and population density along coastal areas in this region. Changing consumption patterns and the decrease in product life-cycles contributes to a tremendous increase in waste without a proper waste management system in place. As a result, there is limited trust in the governments to properly dispose of waste.
- Participants also discussed if dangerous waste could be also be defined as a megatrend, especially for Latin America, which is an importer of products and does not have the capacities to treat the waste appropriately. Therefore, it is necessary to think about the end of life of products while developing new products.
- Climate change leads to fewer water-resources and in Colombia the industry water-usage is a huge problem, which will only worsen as the climate continues to change. Small companies in the chemicals field are growing, causing an increase of the informal sector, which then becomes an issue for environmental protection.
- It was agreed within the group that risk evaluation is often uncertain and product life-cycles are at their lowest point. It is unclear how to dispose pharmaceuticals correctly in the health care sector, or to exploit rare earths in a sustainable way, as well as how to sustainably dispose of clean energy innovations.
- Common opinion was that the private sector has to get more involved in research and develop sustainable production processes as well as products. Within the chosen countries, the public...
sector is hardly able to make large investments in regional needs, partly because more information on chemicals and chemicals waste management is needed to address the issue.

- Legislation and regulations need to better foster sustainable usage and chemistry. A harmonized legal framework needs to be created. The participants agreed that the Latin American region is always one step behind the latest developments in this area and does not have the capacity to respond to innovations and trends in time. Therefore, the government has to commit to sustainable (chemistry) innovations and pass these commitments on to politicians.

- It was also mentioned that innovation needs be seen as a social aspect, which seeks to satisfy the societal needs. There is a tendency for people to lose trust in institutions because the common understanding with regard to sustainability is developing slower than technology and societal demand. As of now institutions are not yet prepared to understand innovations and how to use them to their own and society’s benefit. Therefore, they are restrictive and hinder innovation. Trends therefore, should be seen as opportunities to create economic success.

- Another concern mentioned during the discussion was the lack of transparency around chemical composition of products due to imports of final products and the correct labelling of dangerous substances. Chemical assessment criteria needs to be implemented for new and so called sustainable products (e.g. the efficiency of electronical vehicles in lowering CO₂ emission is discussed intensively, but hardly how high chemical usage for production, commission action is).

- The complexity of product components makes consumers less knowledgeable of what they are consuming. There is hardly any understanding of which products contain what kind of chemicals. Unfortunately, there is a lack of professionals in the region in the field of chemicals and technical science in general, which makes it harder for institutions to access such knowledge and human resources.

- The agrochemical industry’s common opinion is that it should take no responsibility for regulations and restrictions. The responsible ministries usually only deal with prevention, trying to limit negative impacts on farm workers and consumers (e.g. Paraquat on banana plantations: chemicals are prohibited in Europe but continued to be used in Ecuador where is no prohibition in place. Even if prohibited chemicals were banned from the legal market, there would be certain channels how for these chemicals to enter the country and be used illegally.). By collaborating within the region incremental social and public-sector, costs could be decreased. By sharing infrastructure and management systems, the saved money could be invested in prevention.

- It was also highlighted that sustainable chemistry is usually confused with non-harmful chemistry to human health and environment, but social aspects must be considered as well. It was agreed that the term sustainable chemistry is used during the workshop per definition as a holistic approach (ecological, economic, and social).
Referring to the outcome of the discussions during the session, Melissa Allen (IFOK) facilitated the discussion process towards selecting two key sectors which would be discussed in more detail during the subsequent sessions. The participants selected (1) the Agricultural sector and (2) waste management/service sector as the two preferred sectors.

Waste management was added to list of key sectors by the participants during the discussion. Sectors such as mining and energy also received high scores during the selection process.

**Session 2 – Overview of Chemical Sector and Sustainable Chemistry Innovation in the Americas**

Using the two sectors selected in session 1, the participants discussed more details in a plenary moderated by Dr. Nils Simon and Melissa Allen, specifically examining how megatrends affect regional industry sectors and related chemical use patterns, risks and opportunities for sustainable chemistry innovation. Due to translation, the two topics were discussed in plenary and not separately in breakout groups. The process evolved along the following guiding questions:

1. What are potential impacts of relevant megatrends on the selected sectors?
2. How will the expected trends in the selected industry sector affect chemicals production, use, disposal and exposure?
3. What are chemicals-related opportunities (e.g. jobs, economic growth) and risks (health, and environment) associated with these trends?

At the end of the session the participants identified three main risks and innovation opportunities with regard to their importance for each of the two selected sectors.

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<td>Fostering formal waste treatment and management infrastructure and facilities</td>
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<td>Fostering re-use of components (fewer restrictions)</td>
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Summary of sectoral discussions
Agriculture

One topic participants discussed was the use of Glyphosate and its effects on health and the environment. It was agreed among the group that there is a significant increase in use of agrochemicals, products that have been on the market for years as well as new ones, which cause, according to the participants, an increase in cancer rates and therefore, lead to an increase of health care sector costs. The legislation in place, there is hardly any compliance and only little regulation in public and private relationships. Farm workers receive no to little education on the proper usage of agrochemicals, which is also caused by complicated labelling. ISC3 asked if there are voluntary initiatives in place and if have a real impact. Experiences from El Salvador are that sugarcane producers are making an effort by asking the responsible ministry for help and support to initiate an assessment for chemicals use in sugarcane production, which lead to the result that some of the used chemicals were already prohibited. Nevertheless, the initiative was restricted to sugarcane production. Another comment made was that an important contribution to chemicals management by the industry is implementing poison control centers, because agrochemicals are mainly used wrongly. The introduction of new, less hazardous molecules by the industry is an ongoing effort. Nonetheless, the agrochemicals industry needs to participate in local and regional markets and not only on a global level. The EU approach to regulating newly introduced chemicals and phasing-out of hazardous one is an important indicator of how to deal with harmful agrochemicals, even though substitutes are often more expensive. Difficulties with introducing these new types of chemicals can be caused by farm workers who have their own culture, which is difficult to change. Since there is little to no interest in proper usage, education on these topics has been initiated for high school children. There is also an ongoing initiative to build centers to assess intoxications. Since then, there has been an increase in farm workers and citizens that are educated on where to call when they are poisoned. Air fumigation in banana production has especially altered the ministerial level.

Experiences from Peru are that the industry offers new alternatives, but the government has not been able to put regulation in place for the new products to enter the market. The silent reproach is that...
governments are ill-informed and therefore, do not have the right assessment systems and expertise in place to decide which chemicals are allowed to enter the market, also risking the entry of hazardous products. In Chile the legislation of chemicals is highly standardized taking international legislation on pesticides as best practice examples. This standardization led to a decrease in calls at information centers, especially with regard to illnesses due to chemicals use. Another task of the centers would be public education on how to read labels. Participants agreed that there is a high percentage of misuse in agrochemicals, which then leads to soil decontamination, also caused by increased plastic covers usage, which ends up as microplastics in soil after breakdown. Alternatives are seen as innovation opportunity. There is a pressing need for cooperation between the different ministries (environment, agriculture, commerce) in issuing agrochemical licenses. Registering chemicals in the Dominican Republic is in place, but improper waste treatment still remains a problem for pesticide use. Therefore, risk-prevention is needed given that specific countries prohibit the use but not the production of chemicals, meaning these chemicals are exported elsewhere. The Caribbean islands are faced with issues regarding pesticide usage since the majority of pesticides are imported. The farm workers are unable or unwilling to follow the instructions on the labels.

In Colombia regulations are in place, but there is still a lot of room for improvement. The government is trying to increase workers awareness of chemicals usage, but there is hardly a way to influence field workers. Producers could be required to document the dangers and to improve the quality of information. The discussion raises the question of innovation opportunities in the agricultural sector. Common understanding among the participants is that there are plenty of innovation opportunities, but the regulatory framework hinders such innovations. Large investments would be needed as well as cooperation among the countries. The prohibition of chemicals in Europe is seen as difficult if there are no substitutions for tropical countries in place. Cooperation is mentioned as important topic since Costa Rica has lots of regulations in place, but only one system for pesticides, which lead to three different results for a chemical sample assessed by three different laboratories. A comprehensive quality of laboratories is needed to ensure qualitative analyses and results. The moderator raises the
question if GMOs are only seen as a threat, or can be part of the solution. Opportunities for GMOs are seen in the drought resistance, but also create the possibility for knowledge transfer on how best to modify crops (e.g. indigenous knowledge). Considering traditional knowledge and practices as innovation opportunity, could foster the paradigm shift that agriculture would break down without pesticides. Environmental risk assessment methods need to be improved since there are difficulties for proper risk assessment. Reference values/amounts for health impacts of chemical substances are unclear as well as the risk of environmental contamination, due to interactions between contaminants.

Chemicals related opportunities were identified as phasing out hazardous pesticides and replacing them with more benign alternatives to incentivize green alternatives and innovations by enhancing regulation and using untapped capacities. Producer responsibility, especially with regard to providing information on how to correctly use of chemicals, could be fostered through cooperation between the private and public sector. Pesticide container recycling programs need to be put in place. Another opportunity mentioned was incorporating traditional knowledge and natural repellents in biological pesticide research at universities.

Waste management/service sector

In considering sector trends and their impact, participants focused largely on the regulations or infrastructure that ought to be met by the public sector, as well as opportunities for innovations.

A change in consumer patterns and demands would ideally lead to a shift in producing more sustainable and recyclable products. In addition to increased consumer demand, it would need long-term economic incentives to develop new materials. Policy instruments were suggested to create favourable economic conditions for innovation.

There was general agreement that products’ end of life must be considered as a part of development and production. As such, developers and producers ought to reduce or eliminate the use of hazardous components in products (as well as in containers), in order to ensure the products’ recyclability. The current state, however, was described as being different in many Latin American countries: The Dominican Republic reported that there are laws that prevent the use of waste as a resource. While Argentina seems to have overcome the burden of such restrictive laws recently, they faulted that waste is still not considered a resource but a cost burden.
Another problem affecting the waste management sector in several Latin American countries was that waste management is largely in the hands of the informal sector. As such, executing regulations was said to be often ineffective. Formalizing the recycling industry was seen as an - albeit difficult - undertaking to make the sector more sustainable.

Trading wastes poses a challenge to several Latin American countries. Uruguay reported on difficulties with shipping waste to other destinations, since recipient countries often reject the shipments. In this regard, the participants also indicated that there is a lack of communication amongst the different authorities and often confusion about responsibilities. He suggested that changes may be brought about by a bottom-up approach through informed citizens demanding recycled products. St. Kitts and Nevis reported that with regards to chemical waste, the island states are unable to either store or ship chemical residue, so it has to end up in landfills.

The group indicated several opportunities for innovations. The prevention of waste, e.g. through fostering the re-use of components, or by introducing bio-benign materials, was seen as one key area in which innovation should take place. What's more, working towards a circular economy, by ensuring the recyclability of products and better quality of recycled materials, was viewed as desirable by the participants, while Chile expressed the desire for technology transfers from the European region towards Latin American countries.

On the issue of plastic waste, the group suggested that research should be increased on packaging with a focus on the disposal of such packaging. Here, non-plastic or bio-plastic alternatives should be explored, as well as the possibility of better recyclability. Daniella Russo from "Think beyond Plastic"
argued that the prices for virgin plastic are influenced by oil prices, the current drop in the latter, leading to comparably high prices for the former, thereby making them less compatible to virgin plastic.

Another innovation that participants deemed promising was the practice of chemical leasing to reduce chemical waste. Along the lines of an extended producer responsibility, industry should take a greater responsibility in the disposal, re-use and recycling of products. Stricter, and more harmonized regulations across the region, were mentioned as one method to arrive at a more responsible industry. Meanwhile, a representative from Crop Life argued to encourage stakeholders to collaborate and to exchange views as well as possible innovations to search for solutions together. From a public-sector perspective, Argentina reported that in order to involve the industry, they established a cooperation group on regulations in order to build bridges between the two entities.

At the end of the discussion, participants used sticking dots to prioritize the innovation opportunities that they saw most important and promising for the region. The participants agreed that the most important topics were: building formal waste treatment systems, managing infrastructure and facilities, fostering of a re-use of components in contrast to a restriction of such re-use, and more general fostering of a circular economy.

Session 3 – Shaping the future by advancing chemistry innovation: Actions in the Americas

Building on the insights from previous sessions, session 3 further analysed how to enhance innovation conditions to advance sustainable chemistry. In this regard, the plenary and group work discussions during this session evolved around the following three questions:

1. What are key drivers that advance innovation (in general and specifically for sustainable chemistry)?
2. Which factors need to be overcome/changed to drive innovation in the region?
3. Which measures will/would facilitate more innovation in the region?

Following an introduction by Dr. Nils Simon, in which he outlined key findings from day 1, three participants shared impulse statements from different perspectives using three key questions.

Dr. Ana Boisco of the Pan American Health Organization focused on health impacts of chemicals and presented global data related to 2012, which indicates that around 23% of total deaths and around 22% of the Disability average lost years (DALYs) were attributable to environmental factors. Similar fractions related to environmental factors by disease were also presented. Meanwhile, figures from the WHO 2016 publication on the public health impact of chemicals indicate that around 1.3 million deaths were attributable to chemicals exposures. She highlighted the significance of these figures, considering the underestimated trends since these estimates cover only chemicals and exposures for which reliable data exists such as lead, occupational exposures and acute poisonings. She also outlined the causes and effects of many chronic exposures, especially neurotoxins, subclinical and multi-causal health effects that occur over the medium and long term (such as intelligence disability) to varying degrees of severity. They require increasing focus on risk communication and personal capacity building in health services.

Yolanda Salazar de Tobar from the National Cleaner Production Center (NCPS) in El Salvador introduced chemical leasing, a business model which helps to create a new form to buy and use chemical solutions. The key players are suppliers, enterprises, universities, and chambers, which agree on the quantity and process to optimize using chemical solutions. The unit payment is the service instead of the chemical quantity. There are three models to promote chemical leasing:

Model A: business between supplier and enterprise
Model B: business between chemical supplier, technology supplier and enterprise
Model C: business between chemical supplier, technology supplier, enterprise and other organization (university or research centers)

Innovative chemical solutions (ICS) allow optimizing processes with different options, like:

- Input material change
- Product modification
- Upgrading of by-products
- New applications
- On-site recycling or recovery
- Process change
- Equipment modification
- Optimization of process control and process conditions
- Occupational health and safety
- Overall improvement
- Functional improvement
- Technological

Daniella Russo from Think Beyond Plastic, a hub for innovators, entrepreneurs, industry, and science, that aims to disrupt the 800 bn. USD plastics economy also contributed. The organization does not focus on research, which MS Russo described as “converting dollars into knowledge”, but on innovation, which she described as “converting knowledge into dollars”. As such, for a sustainable technology to be successful, it needs to create jobs, return on investment and/or revenue. Thus, economic incentive for innovation needs to be created. At the same time, innovation cannot rely solely on public funds; it also requires private investment. In order to bring both funding sources and actors together to transition research into commercially viable solutions, MS Russo advised building an innovation eco-system. This would include creating demand, identifying and formulating research, accelerating commercialization and investments, starting regional pilots, and formulating economic policies. Such innovation eco-system require a multi-disciplinary approach as well as multi-disciplinary research, since researchers are not necessarily good business people. Investors often need help finding innovations worth investing in. The four key service areas of the innovation center include: innovation incubation (target actor: innovators), business acceleration (target actor: entrepreneurs), investor services (target actor: investors), and innovation search (target actor: industry).

Participants highlighted the importance of a multi-stakeholder approach to innovation, as well as the necessity of funding new projects. Along these lines, participants also highlighted that sound chemicals management is quite expensive and that companies often do not invest the money they save into becoming more sustainable.

As an example of innovation that are already used in the agricultural sector, a representative of CropLife identified several key technologies including: geo-referencing, the growing use of IT in agriculture and the needed automation of agriculture practices, the use of agrochemical-automation to scale up precision-harvesting, chemicals analysis, performance- and yield charts, 4G broadband internet in machinery to trace amounts of chemicals use, use of drones to capture pest spreading for faster reaction, and use of drones to distribute biological controllers to control certain pests. He stressed that south-south collaboration would be needed, as well as north-south collaboration to enhance the transfer of technology.
Agreeing with this, Daniella Russo pointed out that it does not matter where on earth innovators are located, since greater interconnectivity and globalization allow for information to spread around the globe. Furthermore, she elaborated on work that is undertaken in Brazil, namely the introduction of plastic ground covers by alternative materials that can be reintegrated into the soil.

After the panel discussion, the participants re-visited the discussion on two selected sectors (see session 2) to consider the following guiding questions:

1. What innovations (both readily available as well as disruptive technologies and business models) have the potential to shape a sustainable chemistry transformation and make trends in the sector sustainable?
2. Where might innovation lead to non-sustainable products or processes and how can this be prevented?
3. What is needed to drive sustainable chemistry innovation forward, e.g. in terms of education, information, collaboration?

**Overview of key sectoral findings**

**Agriculture**

The group identified GMOs, biological pest control and linen-based soil cover as readily available innovations. Precision farming and drones, as well as geo-information systems were the technological developments agreed on by participants. Drivers for sustainable business models were identified as problem understanding and visualization, especially with regard to what kind of innovations were really needed as well as the power of the consumer.

In North-America linen-based soil cover is tested with beery farmers, instead of plastic foil. As of today, it is water absorbent and biodegradable, but still needs third party research to examine more extensive chemical problems. The resulting question is how precision farming and digitalization can solve issues of chemical exposure amongst farm workers and if these methods will result in job-loss in the farming sector. On the other side, digitalization may bring more transparency to chemical use in products as well as make more information accessible to consumers, especially because European
consumers often want to know where their food comes from, where it was grown and under what conditions. In Latin America there are two types of consumers, the ones who buy organic/healthy food, who would likely appreciate increased information on packaging, and the ones who look for the best price, because the region is rather poor. Information and health factors have lower priority than satisfying needs. Digitalization may support a more harmless application of the product by ensuring that the correct amount prescribed by the producer. Trainings and education should be incentivized through regulations and policies. Digitization may also have a positive effect on the health sector, given that Latin America often does not have access to European markets (MRLs), meaning produce will be sold on local and regional markets, which will in turn expose people to high levels of pesticide residues.

Even though GMOs are seen rather positively by the experts group, their experience is that genetically modified crops are often rejected for reasons of fear. Another factor is that produce from the region is often rejected at the European and Japanese market, which causes a lack of understanding among the participants. Reason for high residue levels may be that some countries are more vulnerable to pests than others, meaning industry must develop new products to meet particular regional needs. With regard to climate change, the experts discussed whether less rain in a specific region results in a higher concentration of pesticides. Applicable data sets must be developed to counteract the progress of climate change. The question with regard of agro-ecology as solution comes up. In the Dominican Republic, banana and cocoa production has reacted to European regulations and import policies by developing organic methods of crop protection for exports. Resulting difficulties are the locations of such farms. If traditional farms are located in close proximity to organic farms, air fumigation with conventional pesticides causes restricted residues on organic produce. Also fast investment returns in conventional farming will lead to an increase in pesticide and fertilizer usage. With this example, lots of training and research on organic food production must be done in the near future.
Waste management/service sector

In discussing the waste management/service sector, representatives from Think Beyond Plastic argued that it is necessary to first consider preventing waste. Instead of directing costs at collecting plastic from the environment, they encouraged more sustainable practices such as redirecting costs towards innovative (e.g. biodegradable) substitutes for plastic. In discussing plastic recycling, they added that one of the major issues that needs to be overcome is that recycled plastic currently has a very low value, offering no real incentive for companies to invest in more and better recycling technology. The only success-story is the recycling of PET bottles.

One innovative way of using plastic waste as a resource comes from Honduras, where plastic was collected from beaches, shredded and added to concrete to make the latter more durable. Similarly, Argentina is looking for trends to improve cement conditions.

Also in Argentina, the leftovers from cotton crops are used to fabricate textiles. However, working with residues from processes or using waste has caused problems in Argentina’s customs system, since taxation also includes certain by-products. Meanwhile, coconut fibres are used by the carmaker Toyota to produce trunk liners, floorboards, and interior door covers for cars and plant residue, such as sugarcane pulp, to produce packaging materials.

There was general agreement among the participants that creating business models with local communities was a way forward to foster innovation, and that governments need to build capacities to bridge the gaps between what the industry offers and what is needed for sustainable innovation.

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Session 4 – Chemicals Management in the Americas: Enabling environment and key concerns

With particular reference to the Global Chemical Outlook II as well as the ongoing work under the Strategic Approach for International Chemicals Management (SAICM), Vera Barrantes and Jordi Pon presented snapshots of recent major regulatory developments relevant for sound chemicals management and innovation as well as emerging policy issues (EPIs).

Participants then were asked which regulations and institutions are needed to advance both sound chemicals management and sustainable chemistry innovation.

Ecuador reported on an environmental organic code, enabling the government to regard chemical substances as something integral. Implementing an extended importer responsibility has led to a registry of imported substances. Ecuador stated a need for government to be informed on how to comply with environmental legislation or regulations, since the country faces difficulties therein. Waste
management was also named as a difficult issue in the country, though work is being undertaken to tackle that issue.

The Dominican Republic reported, not having an integral policy for sound chemicals and waste management. Environmental law plays a very important role in the country, since health law and labor law have been used in isolation, and environmental law was able to foster cooperation between the issue areas on the topic of chemicals management. Environmental law in the Dominican Republic requires companies to come up with management and transportation plans for chemicals. The country only exports waste (such as DDT). Current work focuses on creating a list of chemical substances that are present and used in the country through software. Such data should in future be also forwarded to customs to improve the latter’s handling of substances.

Costa Rica has established a technical secretariat for managing chemical substances, which works via committees and includes a SAICM-Representative on its board. A commission set out to draft a policy on chemicals management and tried to involve different ministries, but was unsuccessful in doing so. 2017/18 included work on an action plan to deal with chemicals and public safety. Furthermore, there are resources available for a future project (with the OECD) on implementing the GHS. The GHS is already integrated in national legislation but the country still needs to learn about ways to implement it.

Daniella Russo stressed the need for an innovation fund, which could also be geographically specific to offer investors low interest rates for investments in specific regions. To offer economic incentives for sustainable innovations, governments should create policies to encourage industries to invest in innovations.

Peru reported on an integral control of chemical substances that was established with the help of consultancies and UN agencies. A prioritization of activities led to a new integral waste management system focused on circular economy and discarding. Peru stressed, that prioritizing issues is very important (including the questions: How many chemicals? What chemicals? What pesticides? What uses of chemicals?), and that successful sound management of chemicals would require strategic planning for such action. Furthermore, mercury is a massive problem in Peru, due to informal mining practices. To regulate such practices, new legislation was established, namely a registry, in which any user of mercury is obliged to register any purchase of material that they use, as well as what they export. The law allows users to handle or export certain amounts of mercury. The proper implementation of GHS (and other actions) in Peru would first require a clear definition of which ministry is in charge, to avoid duplicating work as well as turf wars.

Argentina stated that they are very behind establishing a regulatory framework. Future work should include establishing a focal point in the ministry, followed by creating a committee focused on chemical substances. Such a committee should be inter-ministerial and include the 17 relevant agencies. Registering chemicals is of major importance, combined with a follow-up process on the possible risks of the registered chemicals. However, Argentina stated that there is currently a lack of capacities to evaluate such risks. For Argentina EPIs are interesting but just two steps ahead of where Argentina is. Budget for capacity building is needed in the region and the region needs to cooperate closely to avoid isolated efforts that will end as soon as the resources are pulled out of the countries.

Costa Rica reported on an inter-institutional platform, which resulted in establishing a registry of dangerous waste materials under the ministry of health. The ministry of environment is also closely connected with the Montreal-, Rotterdam-, and now the Minamata Convention.

During the second part of session 4, the participants reflected on the various emerging issues to be covered in GCO II, namely, lead in paint, chemicals in products, endocrine-disrupting chemicals, nanotechnology, highly hazardous pesticides (HHPs), life-cycle of electronics, pharmaceutical pollutants, and PFCs.

A representative from the BCCC and SCRC from Uruguay explained that the issue of eliminating lead in paint is led by the foreign affairs ministry. Uruguay is also working along different areas on Chemicals in Products. She explained that governmental labs are not capable of dealing with
endocrine-disrupting chemicals. The country is also lagging behind on dealing with nanotechnology, mainly due to a lack of academic research, not legislation. Hence, reporting on using nanomaterials is not mandatory. HHPs are not used in Uruguay anymore (check the list first, not sure what is on the list of HHPs). Furthermore, the representative explained that there is pressure from international organizations to place EPIs on the academic agenda. E-waste increases exponentially every year, while the recovery is very difficult due to low economic incentives for companies. The country is still trying to understand the issue of pharmaceutical pollutants and where the country stands on that issue. In this regard, the SCRC will hold workshops for the region in 2018, which are hoped to provide a baseline state of the art for the region. What’s more, the SCRC is working on the global monitoring program on PFCs and therewith connected air monitoring.

St. Kitts and Nevis reported on an inventory in which PFCs are present in the country. The fact that they were unable to find many, is probably due to a lack of inventories at various companies. Many products are disposed of at illegal dumpsites. The fire department also uses chemicals of which they are unsure what they are. Another priority for action is mercury, predominantly found in women’s cosmetics.

The Dominican Republic reported on a high concern in e-waste (recycling), since countries are buying more and electronics, while it remains unclear how a recycling process can be established. Hence, a lot of e-waste ends up at (illegal) dumpsites.

Peru reported that lead in paint was also identified as a topic of interest by the WHA, and that Peru is part of one of the projects focused on the issue. Issue areas of chemicals in products are lead in toys and lead in roads paint. Each country needs to decide what product line they want to tackle first.

In Chile, scientific research is focusing on the emerging policy issues but political relevance needs to be given to these issues as well.

One project from the UNDP (enlighten project) found that several lightbulbs do not comply with regulations of maximum mercury content.

Peru stated that ministries often struggle to employ experts on a certain issue and to prevent them from migration to other countries/institutions/companies. Furthermore, social and environmental problems push governments to act. The issue of Indigenous communities affected by mercury has caused the governments to provide funds to a UN agency to act on the issue. Meanwhile, international standards for chemicals management, such as restrictions from Europe need to be considered more universally.

For Costa Rica, modifying legislation would also require informing legislators, which would also require exchange information on health issues, such as on the issue of endocrine disruptors and possible substitutes.
3. Findings

Key points to draw from

When examining issues pertaining to innovation for sustainable chemistry in the Americas, a further differentiation by sub-regions is essential, since the specific progress of development as well as challenges (e.g. differences in pest risk, climate, etc.) significantly differ by sub regions and countries, both between North America and Latin America, and within Latin America.

Latin American countries specifically feel they have a lot of work to do to implement legislation to ensure soundly managing chemicals and waste. This is due to a perceived inability of governments to conduct risk analyses of chemicals. On the one hand, this has led to a rather innovation-hindering climate for businesses, on the other hand, to several hazardous chemicals being unregulated.

As a way forward, participants agree that policy instruments are essential, especially ones to create economic incentives for innovation, as well as transfer knowledge and information, combined with south-south, as well as north-south cooperation.. These efforts will require harmonizing regulations both within the region, as well as inter-regional harmonization to allow for international trade e.g. the European Union currently has stricter regulations than most Latin American countries.EU-regulations have a great impact on the use of chemicals in Latin American countries as they prescribe what chemicals must not be used on produce intended for the EU-market, and the substitutes that are developed in (and for) European countries are not necessarily suitable for use in tropical countries.

There was general agreement that policies to foster a life-cycle approach, e.g. incentivising considerations of the end-of-life of a product already at the design and production phase, or extended producer responsibility practices would be beneficial in the region, but not easily implemented. To truly use waste as a resource, some of the current policies that are unfavourable to such practices should be reviewed and/or lifted.

One reason for difficulty in implementing regulations is the large informal part of the waste management/services sector (though the informal sector is not restricted to waste management), as well as small-scale farmers that are not easily reached by regulations. For the latter, improving labelling agrochemicals would be an option, ensuring sure that the labelling is easily understandable and educates users about the possible adverse effects of the product.
### Annex 1 – Workshop agenda

#### Regional Expert Workshop – Agenda Day 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>09:30 am</td>
<td><strong>Welcome</strong>&lt;br&gt;Introduction to the Regional Expert Workshop – Americas</td>
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<tr>
<td>10:20 am</td>
<td><strong>Session 1:</strong> Overview of Chemical Sector and Sustainable Chemistry Innovation in the Americas</td>
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<tr>
<td>11:30 am</td>
<td><strong>Session 2:</strong> Global Megatrends and Industry Sector Trends in the Americas: Risks and Opportunities for Chemicals Management and Sustainable Chemistry Innovation</td>
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<tr>
<td>12:45 pm</td>
<td>Lunch break</td>
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**Regional Perspectives on Sustainable Chemistry Innovation and the Global Chemicals Outlook II: Understanding Trends, Risks and Opportunities**

**Prepared by**

![IFOK](https://example.com/)

#### Regional Expert Workshop – Agenda Day 1 (cont’d)

<table>
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<th>Activity</th>
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<tr>
<td>2:00 pm</td>
<td><strong>Session 2 (cont’d):</strong> Roundtable discussion on trends, risks and opportunities in selected industries sectors&lt;br&gt;Each group discusses potential sector impacts of megatrends, its effects on chemicals production, use, disposal and exposure &amp; chemical-related opportunities and risks associated with these trends – Moderator: Melissa Allen, Nils Simon&lt;br&gt;Each group selects a rapporteur for reporting in plenary</td>
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<tr>
<td>3:45 pm</td>
<td><strong>Session 2 (cont’d):</strong> Sharing of results in plenary, closing&lt;br&gt;Reflection on megatrends and regional industry sector trends relevant for chemicals management and sustainable chemistry innovation – Moderator: Nils Simon</td>
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<tr>
<td>05:00 pm</td>
<td>Closing day 1</td>
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<td>07:00 pm</td>
<td>Joint dinner</td>
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**Regional Perspectives on Sustainable Chemistry Innovation and the Global Chemicals Outlook II: Understanding Trends, Risks and Opportunities**

**Prepared by**

![IFOK](https://example.com/)
Regional Expert Workshop – Agenda Day 2

09:30 am
Session 3: Shaping the future by advancing chemistry innovation – Actions in the Americas
Coffee/tea break

11:15 am
Session 3 (cont’d.): Breakout group discussions on Innovation

12:30 pm
Lunch break

1:30 pm
Session 3 (cont’d.): Reporting back in plenary

Regional Perspectives on Sustainable Chemistry Innovation and the Global Chemicals Outlook II: Understanding Trends, Risks and Opportunities
Prepared by IFOK

Regional Expert Workshop – Agenda Day 2 (cont’d)

02:00 pm
Session 4: Chemicals Management in the Americas: Enabling environment and key concerns
Coffee/tea break

04:30 pm
Summary and conclusions, next steps
Moderator: Agnes Dietmer (ISC3)

05:00 pm
Closing of the workshop
## Annex 2 – List of participants

<table>
<thead>
<tr>
<th>Country</th>
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<th>Institution</th>
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<tr>
<td>Argentina</td>
<td>Acosta</td>
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<td>Argentina</td>
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