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CHEMICAL NETWORK

DISCUSSION



Division of Environmental Health | UCT



TOPIC: Accelerating Innovation to Drive the Informed Substitution of Chemicals of Concern.

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Informed substitution through **alternative assessment** is an emerging framework and **critical strategy** used to **reduce the risks to human health and the environment and support the sound management of chemicals of concern in manufacturing processes**. (Tickner et al., 2019). The third University of Cape Town's (UCT) Chemical Network discussion of 2023 addressed the topic on **innovation and the informed substitution of chemicals**. It was presented by **Joel A. Tikner**, Professor of Environmental Health, University of Massachusetts Lowell and **Molly Jacobs**, Director of Applied Research, Lowell Centre for Sustainable Production.

To view the PowerPoint presentation and other resources for this discussion, click [here](#).

KEY MESSAGES

Participants agree that **focusing on innovation is important to ensure the health and safety of the product is preserved and provides economic benefits for manufacturing companies**. Though some countries have initiated innovation in managing certain chemicals e.g., using biological alternatives instead of pesticides in agriculture. There are still many barriers to innovation identified by participants such as the **lack of funding, the import and dumping of banned chemicals in Africa, the cost of implementation and the lack of expertise and capacities from low- and middle-income countries (LMICs)**.

Shifting toward the usage of safer alternatives should be **proportional to the reduction in poisoning from hazardous chemicals (e.g pesticides) and the increased usage of alternatives** which can be measured using indicators. A way to **accelerate innovation**, as indicated by participants, is **through interdisciplinary engagement with stakeholders at all levels of the supply chain from the producers, users, policymakers, and research institutions**.

Innovation requires of an **organisation to rethink its processes; the function of the chemicals used and assess whether there is a need to switch to an alternative and the benefit thereof**. This could be a challenging and costly process as it requires organisations to shift their work practices. Despite these challenges, it is an opportunity to improve processes, products used and find an alternative solution to chemical usage.

There is a **lack of data and resources to evaluate or understand how alternatives are beneficial**. However, alternatives supported by innovation provides direction and resources to solve the chemical management problem. Success stories, lessons learned and collaboration between different sectors are important to build momentum.

ABOUT THE PRESENTERS



Joel Tickner leads the Sustainable Chemistry Catalyst at the Lowell Center for Sustainable Production, UMass Lowell where his group works on research, analysis, and strategy to make chemistry safer for people and the planet. His research focuses on the development of innovative scientific methods, policies, and practices to accelerate the design and application of safer products and



manufacturing processes. He is an expert in environmental health, risk assessment, green chemistry, chemical policy, and pollution prevention. His research has led to the establishment and growth of the field of chemical alternatives assessment, the process of comparing alternatives for chemicals of concern. He is the founding executive director of the Association for the Advancement of Alternatives Assessment, a professional association dedicated to advancing the science, practice, and policy of alternative assessment and informed substitution. Tickner also founded the Green Chemistry and Commerce Council (GC3), now called Change Chemistry, a powerful network of more than 100 companies, bringing together the entire value chain from chemical producers to major brands and retailers.

Tickner is a Professor of Environmental Health at the University of Massachusetts-Lowell, where he has worked to build interdisciplinary bridges across departments and colleges to position the university as a leading institution in the design and application of sustainable chemicals and materials.



Molly Jacobs is the Director of Applied Research for the Sustainable Chemistry Catalyst (the Catalyst), a research institute at the Lowell Center for Sustainable Production. Molly has over 20 years of experience in public health research and practice, engaging with a variety of organisations to promote effective disease prevention solutions. Since 2013, she has managed the Catalyst’s extensive alternatives assessment and informed substitution work. This has included: supporting governments in the US and internationally to institute programmatic and policy structures that advance the substitution of toxic chemicals with safer solutions. Molly’s research at the Lowell Center for Sustainable Production also examines other environmental health issues, utilising her deep expertise on the environmental and occupational causes of cancer and asthma. She is currently a member of the Green Ribbon Science Panel for the California

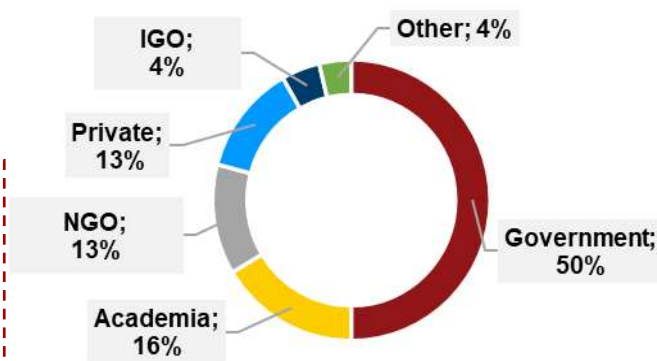
Department of Toxic Substances Control and a member of the Executive Council for the Association for the Advancement of Alternatives Assessment.

ATTENDANCE BREAKDOWN

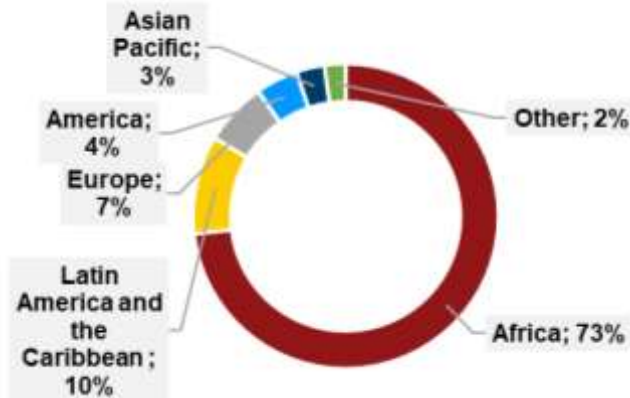
ATTENDEES:
134
Female – 43%
Male – 55%

IGO* =
 Intergovernmental Organisations
 NGO* = Non-governmental Organisations

Sector representation



Region representation



CONTRIBUTIONS FROM PARTICIPANTS IN THE DISCUSSION:

Disclaimer: The information in this digest represents the opinions of members participating from different stakeholder groups expressed during the discussion. The views expressed in this document do not necessarily represent the opinion or the stated policy of the Swedish Chemicals Agency (KemI) or DEH UCT, nor does citing trade names or commercial processes constitute endorsement.



The discussion was structured around three questions. The key discussion points raised by participants and organized by themes or countries (although not representatives) are presented under each question.

QUESTION 1: Why focus on innovation and adoption of safer, more sustainable chemicals?

PARTICIPANTS RESPONSES

HUMAN HEALTH AND ENVIRONMENTAL PROTECTION

- Transitioning towards safer chemicals will ensure the protection of human health and the environment.
- Focusing on innovation and adoption of safer, more sustainable chemicals will help to find substitutes for hazardous chemicals.
- Safer chemicals will ensure the reduction of environmental contamination and safer alternatives will reduce exposure and the risks associated with hazardous chemicals.
- It is best to eliminate or replace hazardous chemicals in the design of products to make the product safer before it reaches the consumers.
- Innovation and adoption of non-chemical solutions will help to protect human rights.

ECONOMIC BENEFITS

- Hazardous chemicals affect trade and reduce revenue for countries.
- Innovation helps to boost the economy and access circular economy principles.
- Innovation allows for a broader assessment of alternatives that will have a high level of efficacy of methods used.
- To assess the functionality of methods used.

Throughout the discussion, informal polls were conducted to help encourage discussion among the participants. They do not provide any representative data but rather provide a snapshot of participants' views.

Poll 1: What do you see as the biggest barriers to innovation, evaluation, and adoption of safer, more sustainable substitutes to chemicals of concern in your country? Name your country.

- Financial support.
- The dumping of chemical waste and banned substances from high-income countries (HICs) to LMICs.
- High cost and availability of substitutes.
- The dominant presence of the chemical industry in the commercial and agricultural space.
- Lack of:
 - technical experience in sustainable substitute of chemicals.
 - capacity and research for the development of safer alternatives
 - data and information to both producers and consumers of chemicals in LMICs.
 - coordination between the innovative sector and the chemical industry.
 - legal provisions or regulations on safer alternatives.
 - promotion of those safer and sustainable substitutes.



Poll 2: List examples of innovations to address toxic and hazardous chemical problems that are occurring in your country.

AFRICA

- **ESWATINI** - Biological controls, collaboration within sectors to make valid decisions on chemical importation and measure the maximum residue level in food products.
- **KENYA** -Innovation in the control of insects such as fall armyworm biopesticides using Integrated Pest Management (IPM) methods.
- **MALAWI** - Deregistration of highly hazardous pesticides (HHPs) and waivers on the registration of biopesticides to register 10 biopesticides from the total registered pesticides in the country. Advancing agroforestry and using organic manure to boost plant health and reduce the use of hazardous chemicals with organic fertilizers to replace synthetic ones.
- **NIGERIA** - Introducing bug eaters into farms instead of pesticides.
- **SOUTH AFRICA** - Reformulation of products from vapours to solids, drones for pesticide application, imposing import quota on the import of methyl bromide, implementing the Globally Harmonized System (GHS) to remove carcinogenic, mutagenic and reprotoxic chemicals (CMR) substances or mixtures and ban or restricting certain substances that meet the criteria for HHPs.
- **TUNISIA** - Usage of biological alternatives.
- **TANZANIA** – Using organic products in agriculture, produce materials with fewer chemicals or phasing out of chemicals of concern.
- **ZAMBIA** – Promoting integrated pest management by using biopesticides and natural remedies to kill pests. Introducing management in t school curriculums, and training people involved in chemical review.

ASIA PACIFIC

- **IRAN**- Printing booklets on information about how to deal with dangerous chemicals.

AMERICA

- **BRAZIL** - Replacing pesticides with biological alternatives.
- **CANADA** - Weeding with robots instead of pesticides.
- **UNITED STATES OF AMERICA** - Mandating companies to report what chemicals of concern they use and a plan to transition to safer solutions.

OTHERS

- Using mechanical weeding and heat solutions instead of weedicides like paraquat and glyphosate.
- Separating and storing hazardous chemicals away from humans and animals.
- Using new technology like drones in transporting chemicals, non-conventional industrial chemicals, and encouraging the use of organic ones.
- Using nets and larvae control techniques instead of DDT for malaria prevention.
- Cleaning of drainage areas and ensuring that there are no reedy pools to prevent mosquito

QUESTION 2: How do we know we are transitioning to safer, more sustainable chemicals and practices?

PARTICIPANTS RESPONSES:

REDUCTION IN:

- Poison from chemicals.



- Usage rate of HHPs.
- Incidences of illnesses and death arising from hazardous chemicals.
- Quantities of hazardous chemicals sold/used.
- Environmental and health impacts.

INDICATORS ON:

- Benchmarks of the existing state of safety on several parameters.
- Clear metrics/indicators by which to measure the progress or trade-offs of chemicals.
- Demand for alternatives at consumer levels.
- The effectiveness of the new chemical alternatives e.g., the number of customers adopting alternative practices.
- Residues in agricultural products.
- Statistics from poison centres and poisoning reports.
- Chemical residues in food, water, and animal products.
- Reduction of poisonings on farms, the impact on the immediate environment.

INCREASED PRACTICE:

- The rate at which information is shared regarding chemical alternatives should match their usage in the chemical market.
- Consider the function of substitution and include it in different chemical processes.
- Chemical regulation and banning of HHPs.
- Usage of green chemistry principles and processes.
- Usage of risk assessment processes as hazard identification, assessment, classification, elimination, or substitution.

REGULATION:

- Governments and regulatory bodies worldwide are implementing stricter regulations and policies.

Poll 3: What criteria, other than safety, do you evaluate in determining whether a chemical is 'sustainable'? n=19.

CRITERIA TO DETERMINE THE SUSTAINABILITY OF A CHEMICAL

- Affordability and accessibility
- Capacity to decrease poisoning cases.
- Cost-effectiveness, persistence in the environment
- Disposability at the end of the life cycle
- Economic benefit of the chemical
- Environmental impacts and acceptability
- Efficacy and effectiveness
- Ease of developing and preparing
- Impact on natural resources
- Low waste
- Perceptions of users as well as availability in the market
- Recyclable
- Usage, and handling

Poll 4: What mechanisms are used in your country to measure whether progress is being made for transitioning to safer/more sustainable chemicals or improved chemical management?

LEGISLATION

- New policies and regulations that guide new approaches and innovations.
- Introduction of laws through statutory instruments and regulations.

RESEARCH AND COLLABORATION

- **ZIMBABWE** - Some studies have been done under the AFRO II project to look at alternatives to DDT.
- Collaboration and partnerships: a collaboration among stakeholders such as governments,



- **ZAMBIA**- Measuring residues in agricultural products.
- MONITORING**
- **ETHIOPIA**- Safeguarding highly hazardous chemicals and the reduction of highly hazardous chemicals on import data.
 - The volume of the chemicals being procured.
 - Import statistics for chemicals of concern.
 - Indicators on industry support of the alternatives.
 - **ZIMBABWE** - Monitoring usage of hazardous chemicals like mercury through a licensing system.
 - The measure of knowledge of the community on transitioning to safer/more sustainable chemicals.

QUESTION 3: How do we accelerate innovation and adoption of safer, more sustainable chemistry and practices to reduce/eliminate the use of hazardous chemicals?

PARTICIPANTS RESPONSES

COMMUNITY ENGAGEMENT:

- Working with end users in developing sustainable practices and collecting inputs from the community.
- Consumer and other stakeholder engagement, education, and knowledge sharing to drive the demand for sustainable products and make informed product choices.
- Creating awareness and strengthening research centres.

RESEARCH AND COLLABORATION:

- Closer relations and cooperation between the science and other sectors.
- Investing in research through increased funding and collaborations on the research of safer alternatives.
- Training of stakeholders and consumers on the impacts of chemical use and the need for change.
- Making readily available the latest trend in the supply and use of chemicals.
- Support innovation that is a science-based solution using research institutes.

SHARING SUCCESS STORIES

- Promoting success stories about chemical substitution.

Poll 6: What is the first step that needs to be taken in your country to promote innovation and adoption of safer/sustainable chemicals? n=12

FUNDING:

- The political will to invest money and support innovation and sustainable chemicals.

REGULATIONS:

- New national laws to protect the health of consumers.
- Administrative and legislative framework to promote safer and sustainable chemical management.
- Creating a national chemical inventory.

CAPACITY BUILDING:

- Strengthen research and testing centres.
- Review policies
- Collaboration between the academic and industry sector.
- Consumer awareness and education
- Coordination of activities amongst chemical regulatory entities.
- Implementation of One Health approach and putting chemical safety as a main component



KEY RESOURCES

- [Assessment of Chemical and Non-Chemical Alternatives: Focusing on Solutions](#)
- [Chemicals innovation action agenda](#)
- [Transitioning to Safer Chemicals: A Toolkit for Employers and Workers](#)
- [The Toxics Use Reduction Institute \(TURI\) at the University of Massachusetts making massachusetts a safer place to live and work](#)
- [Substitution Support Portal](#)
- [Substitution to safer chemicals](#)
- [Alternatives assessment and substitution of harmful chemicals](#)
- [The Swedish Centre for Chemical Substitution](#)
- [Pollution Prevention Institute](#)

Chemical Network: The Chemical Network is a non-partisan online forum established by the Division of Environmental Health (DEH) at the University of Cape Town's (UCT) School of Public Health. It was established as part of a knowledge management and sharing project supported by the Swedish Chemicals Authority (KemI).

This forum has been produced with financial assistance from Sweden, through the Swedish International Development Cooperation Agency (SIDA), which has been arranged by the Swedish Chemicals Agency (KemI). The views herein shall not be taken to reflect the official opinion of SIDA or the Swedish Chemicals Agency.

If you have any questions or require clarification on this initiative, please contact UCT at chemicallistserver@gmail.com If you are not already a member, join the Chemical Network at: <https://forms.office.com/r/Lk1tgAL6DF>

