



Sustainable Chemistry for Climate Protection

Capacity Development as a Key to Effective Climate Action in the Chemical Sector

Abstract

The GIZ-hosted initiatives CAPCI and ISC3 strive to support sustainable practices in the chemical sector, particularly in its important role for tackling climate change. Developing the capacities needed to strengthen the ability of people, organisations and societies to initiate and manage their own sustainable development pro-

cesses is therefore imperative. CAPCI and ISC3 offer a broad range of training formats to achieve this together with partners particularly in developing countries and emerging economies. Both initiatives are looking to intensify their international outreach on the topic and seeking local and regional cooperation partners.

1. Introduction, background and challenges

Megatrend climate change: The importance of the chemical sector

Climate change is one of the most pressing challenges of our time. The Intergovernmental Panel on Climate Change (IPCC) states that without additional initiatives to reduce greenhouse gas (GHG) emissions, global warming is likely to exceed 2 °C by the end of the 21st century. Achieving the objectives of the Paris Agreement and limiting global warming to 1.5 °C or at least “well below 2 °C” is a global challenge that requires long-term commitment and serious efforts by many different sectors.

The chemical sector is a major player in terms of industrial production and products for our daily life, but also for tackling climate change. The chemical and petrochemical industries account for up to 10% of the world’s final energy demand (ICCA, 2018)¹ and up to 8.5% of global GHG emissions (IPCC, 2022)². In 2005, total GHG emissions by the chemical sector amounted to 2,092 million t CO₂ eq and might more than double to 4.5 million t CO₂ eq by 2030 (ICCA, 2009)³. On the other hand, the chemical sector is an important source of low-carbon solutions and materials needed for the energy transition or sustainable mobility.

The chemical sector is therefore an important industry as far as tackling climate change and achieving the

objectives of the Paris Agreement are concerned. The chemical sector, but also related organisations, such as ministries, regulatory bodies, industrial associations, academia and civil society, face the following challenges:

- The transition towards low-emission chemical production is a huge and complex task and requires a critical review and discussion among experts.
- Large parts of the chemical sector lack awareness and knowledge about the climate impacts of the production and use of chemicals.
- Capacities for sound chemicals management and implementation of low-emission practices in the production and use of chemicals are missing.
- There is a lack of knowledge about innovative business models for the efficient use of chemicals and resources in general in the sense of a circular economy.

On behalf of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) is implementing two projects with a particular focus on capacity development targeting the chemical and related sectors.



FIGURE 1

Chemical innovation can drive sustainable consumption and combat climate change



FIGURE 2

ISC3 and CAPCI strive to reduce greenhouse gas emissions from chemicals production, while enhancing climate-friendly solutions

The International Sustainable Chemistry Collaborative Centre ([ISC3](#)) is an international centre that fosters the transition of the chemical and chemical-related sectors to Sustainable Chemistry, promoting a circular economy that is striving to implement multifaceted aspects of sustainability at every step of the life cycle of products and changing all stakeholder behaviour. The centre therefore takes a multi-stakeholder approach, targeting policymakers, the public and private sectors, academia and civil society. ISC3 contributes globally to international chemicals policy, develops professional and academic training measures, offers advisory services, fosters innovations, supports entrepreneurship and conducts research. ISC3 is hosted by GIZ in cooperation with Leuphana University Lüneburg as ISC3 Research & Education Hub and DECHEMA Society for Chemical Engineering and Biotechnology (DECHEMA e. V.) as ISC3 Innovation Hub. The centre was founded in 2017 on the initiative of the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and the German Environment Agency (UBA). In addition to educational measures for entrepreneurs and academics, the centre deliberately targets vocational training – especially the strengthening of capacities in developing and emerging economies.

ISC₃

The Climate Action Programme for the Chemical Industry ([CAPCI](#)) aims to enable key actors in selected developing countries and emerging economies to identify and tap mitigation potentials in chemical production and associated value chains. The project focuses on strengthening the capacities of key actors for effective climate protection in the chemical industry. CAPCI supports national stakeholder dialogues at the chemistry-climate change nexus in Argentina, Ghana, Peru, Thailand and Vietnam, bringing together stakeholders from the public and the private sector as well as from civil society and academia. Key partners include authorities such as the ministries of industry and environment, which are generally responsible for climate and chemicals policies, as well as chemical industry associations in the partner countries. At international level, the UN Climate Secretariat with its Capacity Development Network (PCCB-Network) and the International Council of Chemical Associations (ICCA) are key partners. Regarding the technological options for GHG mitigation, CAPCI has a broad focus that includes energy supply and use, resource efficiency, life-cycle approaches, circular economy and options related to products as well as production processes. The information, capacity building, knowledge transfer and targeted advice provided by the project are oriented towards realistic and efficient pathways and solutions. CAPCI is funded by the BMUV through the International Climate Initiative ([IKI](#)).

CAPCI

2. Our approach to Capacity Development

With their capacity development programmes, CAPCI and ISC3 want to enable people and partners to take positive action in the field of climate protection and Sustainable Chemistry. This is a two-way process and goes beyond knowledge and technology transfer, involving professional networks, knowledge sharing and technology cooperation. More and more developing countries

and emerging economies are committing to ambitious climate objectives and exploring pathways towards low emissions and even climate neutrality. CAPCI support is focused on providing information, knowledge and needs-oriented capacity development measures for successful GHG mitigation in the chemical sector.



FIGURE 3

Capacity development programmes enable people to take positive action in the field of climate protection and Sustainable Chemistry

GIZ's management model "Capacity WORKS" (Springer Trade Press, 2015)⁴ describes capacity development as "the development of the ability of people, organisations and societies to manage their own sustainable development processes and adapt to changing circumstances". It recognizes four levels of capacity development.

1. **Competence building focused on individuals.** For example, training measures, coaching and knowledge sharing in communities of learning.
2. **Organisational development in governments, civil society and the private sector.** In other words: change management.
3. **The development of cooperation partnerships in society.** This includes the development of cooperation systems and networks across organisations.
4. **The development of enabling frameworks in society.** This includes advice on policies and their implementation.

WHAT IS CAPACITY DEVELOPMENT?

3. What do CAPCI and ISC₃ offer?

The portfolios of ISC3 and CAPCI include a variety of approaches, ranging from trainings to workshops and webinars. The following paragraph describes a selection of our activities. A more complete overview can be found on our website: www.isc3.org.



Training course “Sustainable building and living, focus on plastics”

The “National Construction Authority” in Kenya was in the process of implementing a new building code. To make sure the sustainable use of plastics was reflected in this building code, ISC3 held a 6-module virtual **training** session in February 2022 for a group of NCA’s own in-house trainers. NCA intends to offer the training course regularly in the framework of its own training carousel.

Train-the-Trainer course for sustainable chemistry and climate change

The Train-the-Trainer course on “Sustainable Chemistry and Climate Change” was developed by CAPCI for participants from selected partner countries: Argentina, Ghana, Peru, Thailand and Vietnam.

It imparts knowledge on policy as well as technical and managerial aspects of climate change mitigation in the chemical sector. In addition, the course participants are empowered to act as multipliers and trainers and to design and implement training measures on chemistry and climate change according to the specific needs of target groups, ranging from practitioners to decision-makers.

Customised country-specific training measures

On the basis of the train-the-trainer course, CAPCI supports the development of country-specific training courses for practitioners and high-level professionals. These capacity-building measures are designed and implemented together with relevant partner organisations and address the specific needs of the defined target groups as well as the characteristics and challenges of the chemical sector in the country. Participants learn how to develop their own solutions out of a menu of different technological options, existing experiences and best practices.



FIGURE 4

ISC3 and CAPCI use workshops, masterclasses, and trainings to spread knowledge in the field of Sustainable Chemistry



FIGURE 5

Sharing ideas and thinking outside the box makes projects in the realm of Sustainable Chemistry grow



Expert workshop “Power to X”

The Ministry of Energy and Mining in Uruguay developed a new “Hydrogen Roadmap”. ISC3 joined forces with the GIZ project “Power-to-X-hub” (more information: www.ptx-hub.org to learn more) and held a training session and an expert workshop to make sure the new roadmap included Sustainable Chemistry and climate protection.

Webinar series

CAPCI is continuing to organise international [webinars](#) in 2022 and beyond. The webinars are targeted at a wide range of professionals from the public and private sectors along the entire value chain of the production and use of chemicals. They focus on sustainable pathways to greenhouse gas mitigation and practical solutions, while highlighting the great potential of the chemical sector as a provider of innovative products and technologies for combating climate change through circular economy concepts or power-to-X technologies.

Biocides leasing

Chemical leasing is an innovative business model that focuses on the performance of chemicals and not on the tonnage of chemicals (more information: www.chemicalleasing.com). The COVID-19 pandemic saw

a sharp rise in the use of biocides, which makes them ideal candidates for this sustainable business model. ISC3 therefore initiated a [project](#) and joined forces with the regional centre of the Basel-Stockholm convention for Latin America. The aim was to create a network of biocide users and producers, which ultimately led to a supervised pilot project, including awareness-raising activities in LATAM. Uruguay was selected first because the country has signed a “Joint Declaration on Chemical Leasing”, which states its intent to implement this innovative business model.

Sharing economy business models

With its project “[Open Labs Brazil](#)”, ISC3 is sharing business models that are based on sound ecological, social and economic principles as important drivers towards achieving the Sustainable Development Goals (SDGs). Together with the SENAI Institutes and the Clustermarket sharing platform, it has established a system for more reliable, faster, easier and affordable access to lab infrastructure and services for Sustainable Chemistry innovations in Brazil.



Stakeholder dialogues

CAPCI supports national stakeholder dialogues in its partner countries – Argentina, Ghana, Peru, Thailand and Vietnam – in the overarching topic of “Sustainable Chemistry for Climate Protection”. In addition to knowledge and information, the stakeholder dialogues provide a space for exchange between public and private sector institutions as well as academia and national and international experts to discuss the situation and challenges of the chemical sector in the partner country. Conceptually, these formats involve cross-sectoral capacity building and networking aimed at joint identification of key problems and solutions along a more sustainable and climate-friendly development pathway in the chemical sector.

Start-up service

The ISC3 Innovation Hub helps innovations in the field of Sustainable Chemistry contribute to solving urgent societal challenges. One of the core innovation activities is the ISC3 [Global Start-up Service](#), which helps entrepreneurs to become Sustainable Chemistry Changemakers. In addition, it offers masterclasses, which introduce start-ups to the basic concepts of Sustainable Chemistry and its Sustainability Checklist. The Sustainability Check serves as a self-assessment tool to measure selected aspects of the sustainability impact for businesses. Based on a broad concept of sustainability, three dimensions are analysed: environmental, social and economic sustainability.

Academic education

ISC3 is helping Leuphana University Lüneburg, Germany, to establish a “Research and Education Hub”, which runs research and [masters’ programmes](#) (MSc and MBA) in “Sustainable Chemistry” as well as a regular summer school on Sustainable Chemistry for professionals in the field of chemistry.

Knowledge base on climate protection in the chemical sector

The CAPCI knowledge base aims to provide a comprehensive overview and collection of best practices as well as upcoming innovations that can contribute to reducing emissions and environmental impacts, hence increasing the chemical sector’s overall sustainability. A special focus lies on technologies and practices that can deliver solutions for reducing GHG emissions, while increasing energy and resource efficiency as well as circularity in the chemical sector. It has been developed to provide consistent, up-to-date case studies and possible solutions that can range from easy-to-implement practices to more technologically advanced alternatives.

Online Atlas & Event Calendar

The [Online Atlas](#) is published on the ISC3 website and provides a platform to connect stakeholders across sectors. Via a drop-down menu, it can be filtered by sector, country and city. The [Event Calendar](#) allows for like-minded organisations to advertise events on Sustainable Chemistry and involve as many people from the community as possible.

Further steps

Both initiatives are looking to intensify their international outreach on the topic and seeking local and regional cooperation partners. If you are interested in promoting Sustainable Chemistry for the purpose of climate protection e.g. by implementing the abovementioned formats, please contact us at: info@isc3.org.



FIGURE 6

The promotion of cross-sectoral collaboration raises awareness for the responsible use of chemicals – in business, politics and science

- 1 ICCA. (2018). *SDG Sector Roadmaps: How to leverage the power of sectoral collaboration to maximize business impact on the Sustainable Development Goals*. Geneva, Switzerland.
- 2 IPCC. (2022). *Climate Change 2022: Mitigation of Climate Change. Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. United Kingdom and New York, USA: Cambridge University Press.
- 3 ICCA. (2009). *Innovation for Greenhouse Gas Reduction*. Brussels, Belgium.
- 4 Springer Trade Press. (2015). *Cooperation Management for Practitioners. Managing Social Change with Capacity Works*. Wiesbaden: GIZ GmbH.

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Implemented by:

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Friedrich-Ebert-Allee 32 + 36
53113 Bonn
Germany
contact@isc3.org
www.isc3.org

Editors

Dr. Claudio Cinquemani
Email: Claudio.Cinquemani@isc3.org

Detlef Schreiber
Email: Detlef.Schreiber@giz.de

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Stresemannstr. 128 – 130, 10117 Berlin/Germany



of the Federal Republic of Germany

German Environment Agency (UBA), Wörlitzer Platz 1,
06844 Dessau-Roßlau/Germany



International Climate Initiative (IKI) Office,
Zukunft – Umwelt – Gesellschaft (ZUG)
Stresemannstraße 69-71, 10963 Berlin/Germany

