

Climate Action Programme for the Chemical Industry (CAPCI)

Report for discussion at the ICCM5

Climate Protection in the Production and Use of Chemicals: Learning Experiences and Recommendations Concerning Developing Countries and Emerging Economies.

September 2023

About this paper

This paper addresses the interlinkages between sustainable chemicals management and climate change with a focus on realistic greenhouse gas (GHG) mitigation pathways in the production and use of chemicals, particularly in developing countries and emerging economies. It is based, among others, on the learning experiences of the Climate Action Programme for the Chemical Industry (CAPCI), written comments from cooperating experts and results of an online workshop with representatives from public, private, academic and civil society organisations from selected partner countries and international institutions and projects, held on 23 August 2023.

The most relevant conclusions of this process will be presented in a side event at the 5th Session International Conference on Chemicals Management (ICCM5) at the end of September 2023 in Bonn. The discussions at the ICCM5 and additional feedbacks on this paper will be included in a final version that is then published on the CAPCI website within the Homepage of the International Sustainable Chemistry Collaborative Centre (ISC3)¹.

Background

The chemical industry is not only a vital pillar of modern life and the global economy, but it is also a key player in tackling climate change successfully. On the one hand, it is a significant consumer of fossil energy and, hence, a major emitter of greenhouse gases. On the other hand, the chemical industry also has immense potential for developing and providing innovative solutions and products for climate protection in other sectors.

Chemical products are needed in practically all areas of manufacturing, agriculture, and our daily lives. Correspondingly, there are tens of thousands of chemicals for commercial use with a broad spectrum of properties; many of them need special care because they are associated with potential risks or hazards for human health, the environment or the climate. "Pollution" through chemicals and waste, together with climate change and biodiversity loss, is qualified

¹ isc3.org/page/capci

as one of the three fundamental emergencies that threaten the ecological basis of life on our planet (UNEP, 2021²)

At the international level, risks and hazards of defined groups of chemicals are addressed by multilateral environmental agreements such as the Basel, Rotterdam, Stockholm, and Minamata conventions, as well as the Montreal Protocol for ozone-depleting substances (ODS) and the Kigali Amendment that also regulates defined substances with a high global warming potential (GWP). In addition, the Strategic Approach to International Chemicals Management (SAICM) offers a holistic framework that goes beyond defined chemicals. The further development of SAICM is determined in the Fifth Meeting of the International Conference on Chemicals Management (ICCM5) in Bonn at the end of September 2023.

Overarching guidance, also for the sound chemicals management and climate protection, is provided by the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs). Nevertheless, developing countries and emerging economies face particular challenges to simultaneously implement effective chemical policies as well as ambitious climate policies and respective commitments according to the UN Framework Convention on Climate Change (UNFCCC) and the Paris Agreement.

The Climate Action Programme for the Chemical Industry (CAPCI) is a project funded by the German Ministry for the Environment (BMUV) through the International Climate Initiative (IKI) and aims to enhance capacities for adequate climate protection in the chemical sector in selected developing countries and emerging economies. CAPCI learning experiences refer to cooperation with partner countries such as Argentina, Ghana and Thailand, but also Peru and Vietnam. Special attention is given to the broad involvement of relevant stakeholders from government and private sector, academia and civil society,

Conceptual Approach

In line with the virtual workshop held in August 2023 this paper has the following objectives:

- To discuss the relations between international chemicals management and international climate policies with a view on the ICCM5 and the negotiations on the follow-up of the Strategic Approach to International Chemicals Management (SAICM)
- To analyze the specific challenges developing countries and emerging economies are facing when it comes to the implementation of these policy frameworks, taking into account learning experiences from international cooperation (especially CAPCI)
- To formulate lessons learnt and recommendations on the way forward, particularly regarding coherence and synergies between climate protection and sustainable management of chemical substances

Starting with learning experiences of CAPCI from cooperation activities with its partner countries, guiding questions were formulated in order to structure the discussions and outcomes of the mentioned online workshop as well as the present update of this paper, along 4 main topics:

- I. Specific challenges for developing countries and emerging economies.

² [Making Peace With Nature | UNEP - UN Environment Programme](#)

II. Specific capacity development needs of developing countries and emerging economies

III. Enabling policy frameworks and finance

IV. Pathways and mitigation options

Major starting points and learning experiences from CAPCI

1. Climate Change is an existential challenge to humanity. Enormous efforts are needed to tackle its causes, to reduce greenhouse gas (GHG) emissions, and to adapt to its impacts.
2. All stakeholders and sectors must contribute for successfully tackling climate change. And the chemical industry is one of the key players because:
 - a. The production of chemicals is an essential source of GHG emissions; 7.4 % of the global GHG emissions (scopes 1 and 2) stem from chemical and petrochemical industries (IPCC, 2022³).
 - b. The chemical industry has enormous potential for innovation and providing products and solutions for the “decarbonization” of other sectors.
3. Value chains related to chemical products are often international, and a growing share of chemical production and use occurs in developing countries and emerging economies. These countries must be considered when it comes to the needed transformation towards sustainable chemistry, particularly climate-friendly production and use of chemicals. Missing this trend would imply that these countries suffer disadvantages and the risk of losing competitiveness in global markets.
4. Many developing countries and emerging economies have defined ambitious climate goals in the form of GHG emission reduction targets in their Nationally Determined Contributions (NDCs), and some have already committed to climate neutrality by 2050. The implementation of these ambitious NDCs relies on effective mitigation strategies for all relevant emission sectors.
5. The role of the chemical industry has often been overlooked: One of the reasons was that most GHG emissions of the chemical sector are energy-related and attributed to the energy sector in national GHG inventories according to UNFCCC standards, while the “Industrial Processes and Product Use (IPPU)” sector only accounts for remaining GHGs and hence a relatively minor share in total emissions.
6. The latest IPCC assessment report (2022), however, reveals that industry is the sector with the highest share of GHG emissions and even more so when not only direct emissions (scope 1) are included in the balance but also indirect emissions under scope 2. Within the industrial sector, chemical production is among the most emission-intense subsectors.
7. The implementation of national mitigation strategies based on more detailed and in-depth analysis of emission sources in recent years has also yielded evidence that the chemical industry often accounts for a significant share of GHG emissions.

³ [AR6 Climate Change 2022: Mitigation of Climate Change — IPCC](#)

8. Globally, the chemical industry has become increasingly aware that it has a vital role to play in fighting climate change, reducing own emissions and facilitating climate protection in other sectors. This awareness is also growing in developing countries and emerging economies (in some cases partly due to CAPCI activities). Collectively, there is increasing agreement on the need to address climate change immediately in order not to be left behind and miss the benefits of a timely transformation.
9. As transformation of the chemical sector towards sustainable and climate-friendly production is a complex challenge, financial mechanisms and incentives are needed, as well as information, technology transfer and capacity development.
10. Capacity development is needed at different levels, including political and economic decision-makers and practitioners in companies or facilitators, experts and advisers that work with the chemical sector.

Guiding questions

- I. What are the specific challenges for developing countries and emerging economies concerning effective chemical policies and ambitious but realistic climate policies and the inter-relations between both?
- II. What are specific needs and demands of developing countries and emerging economies for targeted capacity development?
- III. What are the crucial elements of enabling policy frameworks that integrate climate aspects and chemicals management?
- IV. What do we know about effective and efficient technological pathways toward mitigation in the production and use of chemicals (especially in DC and EE)?

Brief summary of workshop results: Key findings and recommendations

I. Specific challenges for developing countries and emerging economies.

All countries in the world are called to contribute to fight climate change with commitments laid down in Nationally Determined Contributions according to the philosophy of “shared but differentiated responsibilities”. Especially developing countries and emerging economies, struggle to define an ambitious but feasible climate agenda. Political commitments e.g. to climate-neutrality sometimes prove to be very ambitious and are not always matched by coherent strategies and means of implementation, including policies, finance as well as human and institutional capacities. Additionally, there tend to be gaps between regulatory framework and implementation on the ground.

Reliable data, information flows and communication between different levels of administration are crucial for informed decision-making - but often missing or incomplete due to insufficient funding, e.g. for GHG monitoring. Severe shortcomings are also seen for functioning inter-ministerial collaboration that is considered a necessary pre-condition for implementing effective and coherent policies for climate protection and the sound management of chemicals.

II: Specific capacity development needs of developing countries and emerging economies

In general, developing and emerging economies have strong needs for capacity development with regards to climate protection and the sound management of chemicals. Domestic funding for this important task is usually limited, while access to external finance may be complicated. The needs for capacity building range from access to knowledge and best practices, South-South exchange and examples of low-hanging fruits to awareness creation, available technologies and reliable data, particularly through well-functioning GHG accounting and MRV systems.

It is hard to find experts or advisory institutions who can provide integrated advice on climate change and sound chemicals management. Though some countries do already have a good basis of well-educated professionals, these are often not included in policymaking and implementation. Small and medium-sized enterprises generally need special support as they have little knowledge and expertise. At the same time, stakeholders and particularly the private sector must be sensitized and informed about available technology alternatives and possibilities to reduce the carbon footprints of their products.

III. Enabling policy frameworks and finance

At the national level, long-term political commitment is needed for implementing enabling policy frameworks that integrate climate aspects and chemicals management. Ownership by all political parties and relevant stakeholders is crucial. At government level, inter-ministerial coordination, for example in form of thematic tables or commissions, is needed in order to ensure coherence particularly of climate and chemicals policies and to avoid potential trade-offs.

It is strongly recommended to take the necessary time for developing and implementing a comprehensive policy framework, while focusing on issues that can be delivered, including feasible local solutions with potential for upscaling (“think globally and act locally”). The concepts of a circular economy and the product lifecycle are considered an important orientation for defining country-specific pathways and measures. The institutional framework should guarantee transparent communication and multistakeholder involvement.

Funding is a key issue: Financial assistance and economic incentives from governments but also international agencies and development banks (inter alia according to Art. 6 of the Paris Agreement) should be provided to state agencies and the private sector, last but not least for facilitating the introduction of environment- and climate-friendly technologies and the phase-out of obsolete equipment, technologies and defined hazardous or climate-damaging substances. Carbon-taxing can be a game-changer and effectively facilitate the introduction of new climate-friendly alternatives in many areas.

IV. Pathways and mitigation options

There is no blueprint or “one size fits all” pathway toward sustainable and climate-friendly production and use of chemicals. Establishing roadmaps with a step-by-step approach and different time horizons and degrees of complexity that respond to the specific situation of a country’s chemical sector are considered a very useful strategic approach. The range of

available technological options is broad and may start with low-cost measures, including systematic loss reduction as well as energy and material efficiency. Circular economy approaches, e.g. reuse of waste heat and solid waste as a secondary raw material, often applied in chemical parks (“Verbundstandorte⁴”), are economically and environmentally beneficial. Recycling of chemicals is still underdeveloped and should be increased, together with improved collection and separation practices.

Renewable energies for electricity supply and heat production have huge potentials to reduce GHG emissions of the chemical industry, particularly in developing countries and emerging economies; appropriate locations should be identified, also in order to attract investors. With renewable energy, future-oriented green technology solutions for the production of basic chemicals, such as green ammonia, green methanol and green hydrogen, become feasible. Using alternative feedstocks such as biomass, plastic waste and CO₂ from industrial sources through CCU (Carbon Capture and Utilization) are further options toward climate neutrality. In this sense, the chemical industry and chemical parks could also serve as a laboratory for testing and introducing new solutions and innovative technologies.

The dominating supply-based approach should be replaced by demand-based business and, in consequence, alternative business models, e.g. benefit-based pricing within chemical leasing. New design concepts for chemicals (“benign by design”) are also available and should be promoted, starting with the education of chemists and chemical engineers.

Conclusions and recommendations

Based on cooperation experiences and expert discussions, a number of important conclusions and recommendations on the interlinkages between sustainable chemicals management and climate protection is formulated, with special regards to the challenges that developing countries and emerging economies are facing. They are primarily meant for policy and decision-makers e.g. from government institutions responsible for climate and chemical policies as well as from private sector, industry and international cooperation.

The importance of the chemical sector for successfully tackling climate change is not yet always taken into consideration – neither on international nor on national level. On the other hand, interlinkages must be addressed more consequentially: A sound management of chemicals is also beneficial for climate protection as well as for biodiversity.

The following 10 points were found to be of special importance:

1. **Include** the chemical sector explicitly in sector plans and strategies for implementing Nationally Determined Contributions (NDCs).
2. **Develop** roadmaps for the chemical industries as a helpful stepwise approach towards realistic mitigation pathways and the identification of benefits and synergies, including contributions to national climate policies.

⁴ The German term „Verbundstandorte“ refers to chemical parks, where plants and companies are interlinked and synergies are identified and used systematically, e.g. joint infrastructure, use of waste heat and residual materials from one company as secondary raw materials in other countries (among many other options)

3. **Avoid** trade-offs between chemicals management and climate protection, whereas synergies should be identified and used systematically at the policy level and in production processes.
4. **Support** the establishment of policy frameworks that enable the sector's transformation towards sustainable chemistry and GHG mitigation.
5. **Encourage** cooperation between governmental and private sector stakeholders ideally with the involvement of academia and civil society as this is essential for success.
6. **Provide** financing and economic incentives, incl. the use of mechanisms according to Art. 6 of the Paris Agreement, for developing such roadmaps and implementing successful measures for GHG mitigation in the chemical sector.
7. **Realize** training and capacity building programmes, in order to qualify the relevant target groups, including professionals, managers as well as technicians, in all areas needed for designing and implementing effective climate action while taking care of sustainable management of resources, chemicals and waste.
8. **Address** using international cooperation and knowledge-sharing networks and facilitate specific South-South exchange, as mitigation in the chemical industry is still new for many developing countries and emerging economies.
9. **Explore** the broad range of available mitigation options and innovative technologies, particularly the enormous potential for cost-effective mitigation in developing countries and emerging economies through loss reduction, energy and resource efficiency and synergies between plants and companies (e.g. provided by chemical parks organized as “*Verbundstandorte*”).
10. **Use** the Responsible Care Programme with its existing structures and networks that could be used for amplifying climate-related issues in the chemical industry.