Integrating "Green Chemistry" into the Regulatory Framework of European Chemicals Policy

Study on behalf of the
Austrian Federal Ministry for Sustainability and Tourism

Summary
final report – draft version

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Note:

This document provides the summary of the final report (draft version). The full text or the report is also available at the conference website.

Overview

Abbreviations and Glossary

AfA	Applications for Authorization (under REACH)
BAT	Best available techniques (under IED- and Seveso-Directive)
CEN	Comité Européen de Normalisation
CENELEC	European Committee for Electrotechnical Standardization
Chemical(s)	The term is used in the sense of "industrial chemical substances" being produced and/or used in industrial processes (and thus in narrower sense than in Art. 3(1) REACH). Depending on the context the term often refers to "problematic" chemical substances (in the sense of Art. 14 (4) REACH, thus indicating "problematic properties")
ECJ	European Court of Justice
ED	Ecodesign Directive (2009/125/EC)
EGC	European General Court (of first instance)
ELR	Ecolabel Regulation (66/201)
FMD	Full Material Declaration/Disclosure
GC	Green(er) Chemistry
GCP(s)	Green Chemistry Principle(s)
IC&C	Information, Communication and Cooperation (obligations under REACH along the supply chain)
IED	Industrial Emissions Directive 2010/75/EU
IPP	Integrated Product Policy (on EU level)
JRC	Joint Research Center, European Commission
LP(s)	Learning Process(es)
PPORD	Process orientated research and development
Problematic substance	Substances with properties meeting the criteria in Art. 14 (4) REACH
Product	articles and mixtures according to REACH. The term includes services offered in combination with the use of products. It does not cover (chemical) substances as such (as defined in Art. 3 (1) REACH).
SVHC	Substances of Very High Concern (as defined in Art. 57 REACH)

1 Executive summary

20 years ago the concept of “green chemistry” was formulated by Paul Anastas and John Warner. In the meantime the concept, laid down in a set of 12 principles, has found support in various arenas. This shift of mind was supported by enhancements of the legislative framework; not only in the European Union. Nevertheless industry actors – whilst generally supporting the idea – still see “cost and perception remain barriers to green chemistry uptake”.[1] Thus, the questions arise how additional incentives as well as measures to address the barriers and impediments can be provided.

An analysis addressing these questions has to take into account the institutional context for the relevant actors involved in the issue. And it has to reflect the problem perception of the different stakeholders. Remarkably a broad set of actors has expressed the willingness to change their attitude during the last months: a product sustainability and regulatory compliance manager with Google under the title “Innovation in safer chemistry and product design is critical for the circular economy”[2] announced that Google has “embraced its principles of a circular economy. These are

- to design out the concept of waste;
- to rebuild natural capital; and
- to keep products, materials and molecules flowing effectively through the economy at their highest value.”

At the same time consumer organisations ask for “full material disclosure” for consumer goods,[3] meanwhile a cross-sectoral initiative consisting of producers, downstream users, brands and retailers are joining their forces in a “Proactive Alliance” in order to establish a “global inter-sector standard for communication on Substances in Articles” supporting the “full material disclosure” approach.[4]

Against this background the supply chain into which the chemicals are distributed are of pivotal importance since they create the demand pull for chemicals designed in accordance with the “Green Chemicals Principles” (GCPs). Consequently the scope of this study includes all stages of the process of designing and producing the final products to which chemical substances contribute. For each stage the most relevant legislative acts establishing the regulatory framework of the “chemicals policy” in the EU are analysed against the yardstick of the “Green Chemicals Principles”; shortcomings are indicated as a “delta”. In order to foster the learning curve towards greener chemicals solutions in addition a procedural context is needed stipulating information, communication and cooperation (IC&C) mechanisms for all actors involved in the process. To this end the study addresses two core questions:

1. To what extent are the existing EU policies relevant for chemicals already reflecting the elements of the Green(er) Chemistry concept?
2. How can EU policies relevant for chemicals put more emphasize on this concept, taking into account
   - the product context of the Green Chemistry Principles (GCP) as well as
   - the institutional framework fostering learning processes of the actors involved in the innovation process?

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1 Patrick Harmon, BASF's industry manager in North America; as reported by Chemical Watch (26 April 2018); see also corresponding findings from a public consultation performed in the REFIT of chemicals legislation (excluding REACH) context, Postle et al. 2017, 55.

2 Mike Werner, Guest column to the Chemical Watch Briefing issue 109 (July 2018), 27-28.

3 Claus Jörgensen, Danish Consumer Council, Chemical Watch Briefing issue 109 (July 2018), 26.

4 CW, 14 June 2018: “Cross-sector initiative sets full materials disclosure goal - Could be key turning point for supply chain data exchange on chemicals; cf. ”https://chemicalwatch.com/67695/cross-sector-initiative-sets-full-mater

Following the introduction in chapter 2 the normative context of “green(er) chemistry” is summarized in chapter 3. The regulatory framework governing the various stages in the life cycle of a chemical substance is analysed in chapter 4; the results of the delta-analysis are summarized in tabular form in section 4.5.3.

Chapter 5 describes the policy option addressing the identified delta. In addition to regulatory options on EU-level proposals are made to be implemented on a meso-level, e.g. by sectoral supply chain associations. Finally other institutional options supporting learning processes are presented.

Chapter 6 gives an overview on the set of policy options presented in this study.

In a nutshell the main elements of the study can be summarized as follows: Green Chemistry (GC) is the utilisation of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture and application of chemical products. Besides, reaction efficiency, including energy efficiency, and the use of renewable resources are other motives of Green Chemistry. Putting the GC concept in a broader market context, however, it can only prevail if in the perception of the relevant actors there is a respective market. Therefore, the study analyses the product context in which chemistry is to be applied, as well as the substance’s entire life-cycle – in other words, the **six stages in product innovation processes** (cf. section 2.2):

1. Substance design,
2. Production process,
3. Interaction in the supply chain,
4. Product design,
5. Use phase and
6. After use phase of the product (towards a “circular economy”).

Figure 1 illustrates the interplay of the six stages in the Green Chemistry innovation driving system.

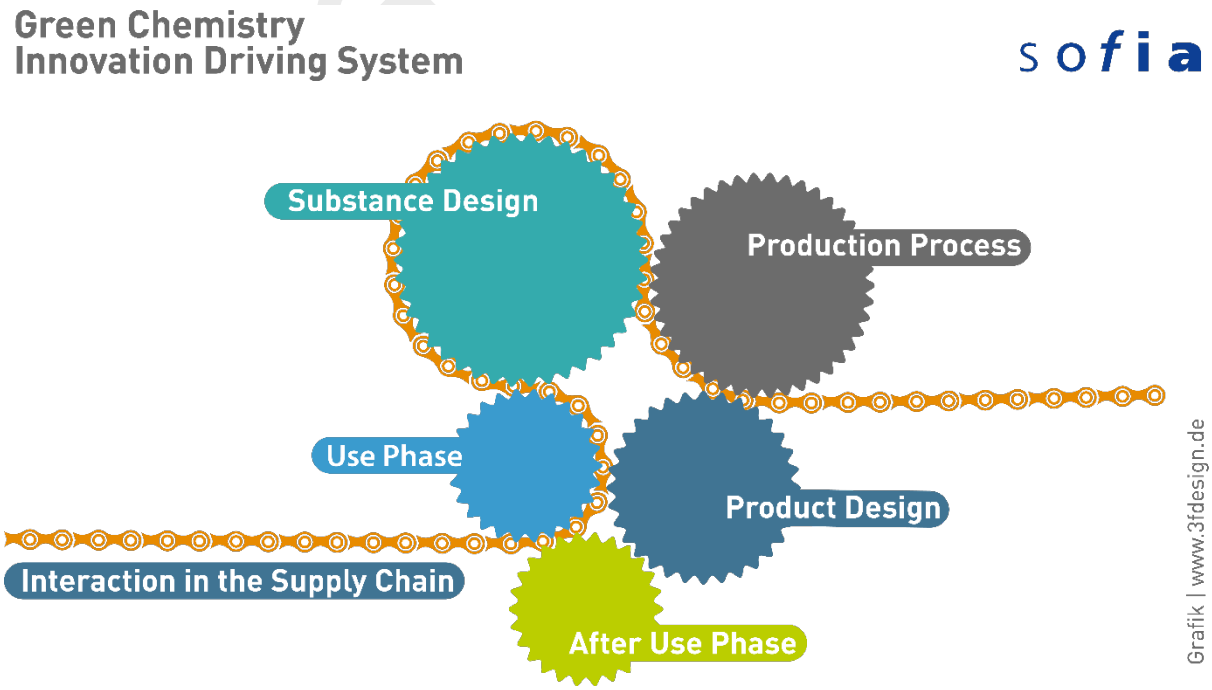

Figure 1: Green Chemistry Innovation Driving System

Green Chemistry aims at continuous improvement processes integrated in the (re-) design of chemical substances, of processes and products. Hence, the different actors of the supply chain have to interact in a way that prepares the ground for GC innovation. Against this background, the **assessment criteria** for the regulatory framework (cf. section 3.4 with Table 1 and Table 2) have to reflect the principles of Green Chemistry (GCP), but also the capability of the regulatory framework to foster learning processes by providing transparency and inclusive governance elements (Learning Process Principles – LPP).

The report presents an overview to what extent the existing framework, i.e. legislation and the wider institutional context along the six stages, is setting incentives for actors to adequately address problematic substances and their potential impacts, including the learning processes intended to invoke creativity of various actors to solve challenges posed by these substances (cf. chapter 4). In this respect, measured against the GC and Learning Process assessment criteria, the study identified shortcomings ("delta") at each stage of product innovation (cf. section 4.7). Some criteria are covered by the regulatory framework and to a relevant extent implemented by the actors. With respect to those criteria, there is thus no priority need for further action. Other criteria are only to a certain degree covered by the regulatory framework, due to various and often interlinked reasons. For those criteria, entry points for options to strengthen or further nuance coverage of the respective principle already exist.

Most relevant are the deltas with regard to those instruments that influence the design phase; both for the chemical substance as such and for the end-product containing the substance. Due to the multi-tier supply chains, provisions fostering information, communication and cooperation (IC&C) of the various actors are crucial to underpin the learning processes towards the GCP.

The policy options introduced in chapter 5 aim to tackle these shortcomings in the context of the respective stage in order to support those actors who are willing to change their attitude and their business decisions towards GC. The findings are in general coherence with the strategies identified by the Green Chemistry & Commerce Council to foster GC. The following policy options comprise of EU regulatory options (macro level) as well as institutional options on the meso-level:

- **Stage 1 substance design:** Policy instrument: REACH Regulation
  Addressing delta: "safer design" (GCP 4) and "design for degradation" (GCP 10)
  - Adaptation of REACH by introducing new Articles 14 (6a) and 37 (5a) to implement the basic obligation of "safer design" (GCP 4) and "design for degradation" (GCP 10) (find more details in section 5.1.1.1)
  - Improvement of the procedure to handle applications for authorisations (AfA) (Art. 64 REACH) by supporting third parties in AfA to provide relevant information on alternatives (section 5.1.1.2)
  - Creation of a mechanism in the AfA procedure to take into account PPORD substances in AfA alternatives assessment (Art. 64 REACH) (section 5.1.1.3)
  - Consider of a new chapter in REACH Title II implementing the REACH principle of substance responsibility in the PPORD context (section 5.1.1.3)
- **Stage 2 production process**: Industrial Emission Directive (IED)
  Addressing delta: "prevent waste" GCP 1, "resources efficiency" (GCP 2) "safer chemical synthesis" (GCP 3) and "increase energy efficiency" (GCP 6)
  - Enhancement of the scope and accuracy of the BREF/BAT documents in the context of the JRC Sevilla process under the IED, regarding the above named GCP (section 5.1.2)

- **Stage 2 production process**: Industrial Emission Directive (IED)
  Addressing delta: "inclusion of GCP in research strategies and activities" LPP 3
  - Utilisation of the information exchange platform for the enhancement of BAT under the IED (operated by the European IPPC Bureau, JRC Sevilla) to provide specific "incentives for the inclusion of GCP in research strategies and activities" (LPP 3) (section 5.1.2)
- **Stage 2 production process**: Industrial Emission Directive (IED)
  Addressing delta with regard to the input streams: "prevent waste" (GCP 1) and indirectly "maximize atom economy" (GCP 2) and "use renewable feedstocks" (GCP 7)
  - Introduction of taxes on raw materials on the IED governed input streams based on Council Consensus or national legislation (section 5.1.2)
- **Stage 3 Interaction in the supply chain**: REACH Regulation context
  Addressing delta: "communicate on substances along the supply chain" (LPP 2)
  - Implementation of a full material disclosure reporting in article supply chains as a meso-level approach based on a stakeholder driven process and public support to improve the communication of information (section 5.2.1)
- **Stage 3 Interaction in the supply chain:** Sectoral product legislation
  Addressing delta: "communicate on substances along the supply chain" (LPP 2)
  - Formulation of explicit Information, Communication & Cooperation (IC&C) requirements in sectoral product legislation to enable informed decision-making, centralized information collection and publication of information on substances in articles (alternatively implemented via "Horizontal policy approach on substances in articles"; see below) (section 5.1.3.3)
- **Stage 4 Product design:** Ecodesign Directive (ED)
  Addressing delta: "provide transparency on the chemical, its properties and use as well as the (possible) impacts on human health and environment" (LPP 1)
  - Modification of informal procedures and expert groups to better integrate problematic substances into ED implementation (section 5.1.3.1)
  - Adaption of ED to expand the directive's scope to not energy-related products (section 5.1.3.1)
- **Stage 4 Product design**: REACH Regulation
  Addressing delta: "provide transparency on the chemical etc." (LPP 1) and "communicate on substances along the supply chain" (LPP 2)
  - Specification of the information requirement on the use of substances in articles in REACH Annex VI Section 3 and Annex I Sections (e.g. 0.7, 0.8 and 5) to increase the informative value of the exposure scenarios in the registration dossiers (section 5.1.3.2)
  - Expansion of the consumer "right to know" regarding SVHC by adapting the REACH Art. 33(2) to make answers to the consumer in any case obligatory and reduce the time frame to respond (section 5.1.3.2)
- **Cross-cutting issues**
  - Horizontal policy approach on substances in articles addressing all actors along the product life-cycle (section 5.1.4)

- Establishing a comprehensive Platform: Product design for Green Chemistry as all-embracing knowledge hub connecting all actors along the product life-cycle (section 5.2.2)
- Additional institutional options (meso-level and beyond)

Green Chemistry is focussing on environmental impacts linked to the production of chemicals. In essence, Green Chemistry stands for a “benign by design” approach, aiming at hazard reduction and sustainable resource use in the chemical synthesis. Since chemicals are produced for specific needs and intended functions the incentives towards a “Greener Chemistry” are to a large extent provided by the design of the end-product and the culture of cooperation in the respective supply chain. This “bigger picture” offers a variety of options to enhance the innovation process towards the Green Chemistry Principles. In the context of the “Non-toxic Environment”-Strategy and the efforts towards a “Circular Economy” the actors on EU Level are invited to consider the proposals developed in this study to enhance the institutional framework.