Unofficial Protocol to the Expert Talk: Summary Sustainability Evaluation of Case Studies on Sustainable Chemistry

Monday 10 September 2018, 10.00 a.m. – 4.00 p.m.

Bismarckplatz 1, 14193 Berlin

Content

1. Background and Aim of the Expert Discussion

Next to research and documentation of best-practice case studies on sustainable chemistry, a reference framework for the case studies was developed. In essence, this reference framework is of a qualitative nature but uses quantitative data insofar as they are available for the case studies.

Four case studies (see below) were researched and documented to show what sustainable chemistry may mean. In the course of this work, it has proved to be indispensable to develop a working concept for sustainable chemistry. Within the framework of this concept, the field of action and objectives of sustainable chemistry were defined.

The reference framework makes qualitative statements on the extent to which a case study may contributes to achieve the goals of sustainable chemistry. Further, it results in an exemplary sustainability evaluation of an example, which may be read and understood more quickly than a full Life Cycle Assessment.

The aim of the expert discussion was to debate on strengths, weaknesses and possibilities for improvement with regard to the reference framework with actors in the field of sustainable chemistry, using four case studies.

2. Discussion on the developed Sustainability Concept

Similar to the Agenda 2030, the reference framework is based on the concept of integrated sustainable development. Within the reference framework, sustainable development is considered a synonym for sustainability.

The following aspects were addressed in the plenum discussion:

- integrated sustainable development (as well as the application of the Agenda 2030) also includes dealing with conflicts of objectives (e.g. economic development <-> preservation of biodiversity).
- Although integrated sustainable development gives equal weight to the three dimensions of sustainability, the different functions of the three dimensions and the priorities of certain actors must nevertheless be taken into account (e.g. economic pressure on companies to succeed).
- Sustainable development leads to a dynamic process: the "sustainability concept" is less about an exact definition of sustainability than about determining what should be sustainable and about linking the temporal and spatial levels that a sustainability policy must include.

Conclusion: In the light of the multifaceted discussion around sustainability, the differentiated sustainability concept was evaluated as a clarifying and content-wise consistent contribution to the interpretation of the concept of sustainability.

3. Discussion of the Reference Framework

The reference framework was commented as follows.

3.1 High priority comments

- It should be clarified whether the case studies are rated relatively (comparison with other products or processes) or absolutely (how much sustainability is sufficient?) to their sustainability.
- Materiality or hot-spot analysis:
- In order to get an overview of the topic, a materiality or hot-spot analysis was proposed prior to the actual evaluation by means of the scheme. This should guarantee that the focus of the subsequent investigation is solely on relevant aspects and that the result remains manageable and meaningful.
- For conducting a materiality analysis, a spatial delimitation may be considered, for example referring to the European economic area or individual countries. This is particularly important for economic and social aspects, as well as for local or regional environmental aspects.
- In addition, the analysis may distinguish between a certain development stage of a process and a company the evaluation is limited to, since there can be differences in the respective potentials (start-up vs. established company or R&D project vs. mature technology).
- The result of these preliminary analyses should ideally also provide the answer to the question: "What is the issue?" Thus, it is always necessary to assess the current state or the potential of a process or an application in relation to the initial state.
- Based on the results of the hot-spot analysis, the system boundaries (time, space, supply chains) for the sustainability evaluation should be defined.
- Dialogue with stakeholders: Both the presented concept for sustainable chemistry and the reference framework for case studies as well as their evaluation do not resemble a final state; interested stakeholders should be encouraged to participate in further development and submit additional best-practice cases.
- A summary of the sustainability evaluation should be made.
- The results of the sustainability evaluation should be presented in the form of a matrix.
- Concerning the fourth evaluation level (Agenda 2030):
- A specific chemical company or a sustainable chemistry project can never meet all SDGs and targets
- It is crucial to what extent the chemical industry as a whole may contribute to the SDGs
- It is a matter of assessing the extent to which a project is making its maximum possible contribution to the SDGs
- Although a project cannot equally contribute to the three dimensions of sustainability, it is nevertheless possible that it makes a substantial contribution to achieving the SDGs.
- Focus on current status or prospect: Are current or future impacts of the project paramount - or both?
- In the examples, a general distinction should be made between efficiency and effectiveness. Even with processes or products that can be produced more efficiently, it cannot be ruled out that increased demand for them or excessive consumption will ultimately lead to higher burdens. This must be pointed out in the evaluation.
- By means of a more systematic structuring of the examples, a comparison of thematically different examples would be possible. An initial structure could be as follows:
- Current problems / hot-spots associated with the example
- Solution approaches of the alternative, related to the hot-spots (first qualitative description)
- New burdens induced by the alternative (initially qualitative representation)
- Qualitative evaluation of solution approaches and new burdens
- Elaboration in case a qualitative evaluation is insufficient, and quantification is necessary.

Conclusion: Despite the numerous proposals for changes, the reference framework was appreciated by various participants. In addition, UBA was encouraged by industry representatives (Ilzhöfer-Covestro and Imlinger-Wacker) to further develop the reference framework.

3.2 Low priority comments

- Missing information due to data gaps must be adequately described and put into context.
- A qualitative reference framework is limited to the criteria considered, therefore questions may remain open and cannot be answered without further criteria and quantitative data.
- The reference framework is intended to demonstrate to what extent the concept of sustainable chemistry is in line with the SMCW concept and to what extent it goes beyond.
- The evaluation reference framework does not serve the purpose of establishing a sustainability certificate or label.
- Evaluation hierarchies are useful but not always clear (e.g. waste hierarchy and handling of contaminated waste).
- The evaluation should identify options for action.
- A distinction must be made between products containing chemicals and individual chemicals, as there may be differences concerning workability.
- In many cases a dialogue is important in order to gain an understanding of the interdependence of the different sustainability dimensions (e.g. relationships between SDG targets).

4. Discussion of the Case Studies

4.1 Covestro: cardyon® - CO2 use for polyurethane synthesis

Economic Dimension

- Covestro is active in the BtoB sector but not in the BtoC sector.
  - Covestro produces CO2-based polyols for PUR soft foam manufacturers, who in turn produce PUR soft foam for mattress manufacturers.
  - Since the market for polyurethane flexible foams for mattresses is highly competitive and prices are dictated by mattress manufacturers, cardyon® was developed in such a way that the manufacturers of the flexible foams did not have to make any changes to the production equipment (due to this fact, the installation of CO2 in polyols is limited to up to 20w% / higher CO2 contents lead to higher-viscosity polyols).
- Mattress market is not included in the evaluation
  - High sales figures for mattresses are expected for Asia, in particular in the future.
  - In general, consumers in Asia cannot afford expensive mattresses made of natural materials.
  - There are not enough natural raw materials (natural latex, horsehair, etc.) available to cover the demand for raw materials.
  - The production of natural latex has also negative environmental effects.

Social Dimension

Use phase: High-quality mattresses promote healthy sleep

Ecological Dimension

Sufficiency: Are PUR mattresses really necessary?

4.2 Remondis: TetraPhos® - phosphate recycling from sewage sludge ash

- TetraPhos® contributes to chemical safety and thus to the SMCW.

- Proposal: Compare TetraPhos® with a reference method (production of a fertilizer, production of conventional phosphoric acid) (It must be made clear which comparison is made and why. For example, it is important for the evaluation to determine whether mono-incineration plants are assumed or whether their construction, including the necessary resources, must be included in the consideration).
- If the system boundaries are set accordingly, phosphate production in Morocco must be taken into account.
- More targeted fertilisation is promoted: Conservation of resources
- Depending on the system boundaries, new jobs are created (social dimension).
- With regards to the SDGs, it was noted that the evaluation appears too negative and that the example certainly contributes to the integrative character of the SDGs.

4.3 BASF: RAK 1+2 M - biotechnological crop protection

- It should be stated whether it is an absolute or relative sustainability evaluation.
- In the case of a comparative evaluation, the definition and description of the initial state is essential, defining which parameters are considered and what is beyond the system boundaries.

4.4 Tärnsjö Garveri: Vegetable leather tanning

- There was agreement on the following goal: The sustainability of the process should be evaluated relatively, in relation to conventional chrome tanning.
- The significance of a possibly lower performance or service life should be clarified. This can be of varying importance depending on the area of application.
- The term "sustainable" price is misleading. It should be avoided. In fact, external costs should be disclosed and, if possible, these costs internalised, i.e. integrated into the product price.
- Sustainable industrialisation can be promoted if local sources of raw materials (e.g. leaves from olive trees as a waste product in olive tree cultivation) are used for local industrial development.
- Increasing chemical safety should be considered as a social dimension of occupational safety and consumer protection.
- Instead of the term "natural resources", the term "renewable resources" should be used.
- It should be examined whether vegetable-tanned leather goods are more susceptible to microbial attack and require a higher use of biocides (storage, transport, shelf life).

5. Result: Important Need for Adaptation of the Reference Framework (cf. Section 3.1)

- Distinguish between relative and absolute sustainability evaluation.
- Carry out a materiality or hot-spot analysis prior to the sustainability evaluation.
- Define system boundaries (time, space, supply chains) for the sustainability evaluation.
- Summarize the sustainability evaluation (possibly with matrix).
- Concerning the fourth evaluation level (Agenda 2030):
  - The aim is to assess the extent to which a project makes its maximum possible contribution to the SDG.
  - If a project cannot equally contribute to the three dimensions of sustainability, it is nevertheless possible that it contributes substantially to the achievement of the SDGs.
- Focus on current status or prospect: Are current or future impacts of the project paramount - or both?
- Distinguish between efficiency and effectiveness.
- Structure the documentation of case studies more systematically.

List of Participants

Name	Institute
Andreas Schumacher	BASF
Patricia Cameron	BUND/Friends of the Earth
Roland Schröder	Chemie³ - Verband der Chemischen Industrie
Laura Kühn	Chemie-Cluster Bayern
Achim Ilzhöfer	Covestro Deutschland AG
Nils Decker	DECHEMA
Volker Jörg Soballa	Evonik Industries AG
Myriam Elschami	ISC_3 Research and Education Hub
Henning Friege	N³ Nachhaltigkeitsberatung Dr. Friege & Partner
Pia Skoczinski	nova-Institut GmbH
Achim Raschka	nova-Institut GmbH
Ángel Puente	nova-Institut GmbH
Dirk Bunke	Öko-Institut
Veronika Abraham	Ramboll
Florian Senoner	Ramboll
Marie Oldopp	Systain Consulting
Christina Schampel	Systain Consulting
Peter Fantke	Technical University of Denmark | USEtox International Centre
Dirk Uhlemann	The Natural Step Germany
Christopher Blum	UBA
Ralf Geiß	UBA
Jens Günther	UBA
Andreas Höllrigl-Rosta	UBA
Ingrid Nöh	UBA
Andrea Roskosch	UBA
Pia Splanemann	UBA
Hans-Christian Stolzenberg	UBA
Nicolas Imlinger	Wacker Chemie AG
Silvia Pleschka	WECF

Agenda

10:00	**Opening and welcome**
10:10	**Presentation and plenary discussion** Sustainable chemistry in the context of international environmental policies *Presentation Dr. Hans-Christian Stolzenberg, UBA*
10:30	**Presentation and plenary discussion** Assessment scheme for sustainable chemistry *Presentation Dr. Ralf Geiß, UBA*
11:30	Coffee break
11:45	**Discussion of case studies in working groups** Each working group will discuss the documentation and assessment of one case study on sustainable chemistry. The aim is to receive feedback from the participants on the applicability of the assessment scheme and to validate its practicability for the assessment of sustainable chemistry case studies. *Moderation Dr. Ralf Geiß, UBA; Veronika Abraham, Ramboll; Florian Senoner, Ramboll; Prof. Dr. Dirk Bunke, Öko-Institut* The following case studies will be discussed: 1. CO_2 utilisation for polyurethane synthesis 2. Phosphate recycling from sewage sludge 3. Use of pheromones for pest control in agriculture 4. Vegetable leather tanning Schedule for the working groups: - Formation of four groups - Introduction to the case studies and discussion of the description - Presentation and reading of case study assessment and discussion thereof - Summary of the discussion results for the plenum
13:30	Lunch break
14:30	**Presentation and discussion of the results of the working groups in the plenum** *Moderation Prof. Dr. Dirk Bunke, Öko-Institut and group rapporteurs*
15:30	**Summary and closure**
16:00	End of the event

Moderation: Prof. Dirk Bunke (Öko-Institut)