

## The concept of sustainable chemistry: key drivers for the transition towards sustainable development

Christopher Blum<sup>1</sup>, Dirk Bunke<sup>2</sup>, Maximilian Hungsberg<sup>3</sup>, Elsbeth Roelofs<sup>4</sup>, Anke Joas<sup>5</sup>, Reinhard Joas<sup>5</sup>, Markus Blepp<sup>2</sup> and Hans Christian Stolzenberg<sup>1</sup>

<sup>1</sup>German Environment Agency, Germany

<sup>2</sup>Öko-Institut e.V., Germany

<sup>3</sup>Technische Universität Darmstadt, Germany

<sup>4</sup>CSR Netherlands, Netherlands

<sup>5</sup>BIPRO GmbH / Ramboll Environ, Germany

Producing, using, re-using, disposing, and eliminating chemicals with the least possible adverse effects on human health and the environment is the so-called 2020 goal which has been initially formulated 2002 by the Johannesburg World Summit for Sustainable Development. While rapidly approaching the initial target date, we face globally ongoing progression of production volumes, count, and uses of chemicals. Thus, the need for broad transformation to a sustainable chemistry becomes exigent. Moreover, as humankind has to rely on the chemicals sector for contributions to nearly all Sustainable Development Goals (SDG) of the Agenda 2030, it is even more essential to get the urgently needed sustainable solutions from a thoroughly sustainable chemistry. Sustainable development is a process to ensure the future as well as present potential to meet essential human needs and desires within the ecological and resource

limits of our planet. This paradigm is relevant for all areas including those where chemicals are produced, traded, used, processed, incorporated into products, reused and recycled, disposed of and released into the environment. Sustainable chemistry is a holistic approach for sustainable development considering the entire lifecycle of chemical products and the related system of actors, institutions and culture. This holistic approach distinguishes sustainable chemistry from green chemistry and from operational safe use of chemicals. Sustainable chemistry is building on and goes beyond these two concepts. Therefore, besides health and environment, social conditions, science, research, technical and economic aspects must be considered and balanced within the capacity-limits of our planet. The herewith-presented Concept of Sustainable Chemistry describes the understanding of what sustainable chemistry is about in view of the authors. Based on this assumption, to guard against green washing, to reduce current burdens, and with a view to the SDG, we propose seven Objectives and Guiding Principles of Sustainable Chemistry to be applied in all chemical relevant areas: design and use of benign chemicals; development and use of alternative solutions for problematic applications; reduction of impacts; conservation of natural resources; promotion of reuse and recycling; increase of market opportunities; application of corporate social responsibility. In conclusion we point out action topics promoting the holistic approach that sustainable chemistry entails.

christopher.blum@uba.de