



VdL Comment on the Safe and Sustainable by design concept for Chemicals and Chemical Products

Introduction

In the Chemical Strategy for Sustainability under the Green Deal, the EU Commission states: *“The transition to chemicals that are **safe and sustainable by design** is not only a societal urgency but also a great economic opportunity, as well as a key component of EU’s recovery from the COVID-19 crisis.”*

So far, there is no definition of safe and sustainable by design chemicals, but the EU-Commission plans to define the criteria during 2022. The Chemical Strategy only gives a rough idea, what is outlined by the concept: *“At this stage, safe and sustainable-by-design can be defined as a pre-market approach to chemicals that focuses on providing a function (or service), while avoiding volumes and chemical properties that may be harmful to human health or the environment, in particular groups of chemicals likely to be (eco) toxic, persistent, bio-accumulative or mobile. Overall sustainability should be ensured by minimising the environmental footprint of chemicals in particular on climate change, resource use, ecosystems and biodiversity from a lifecycle perspective.”* During different web conferences, the Commission clarified that base chemicals as well as chemical products shall be addressed.

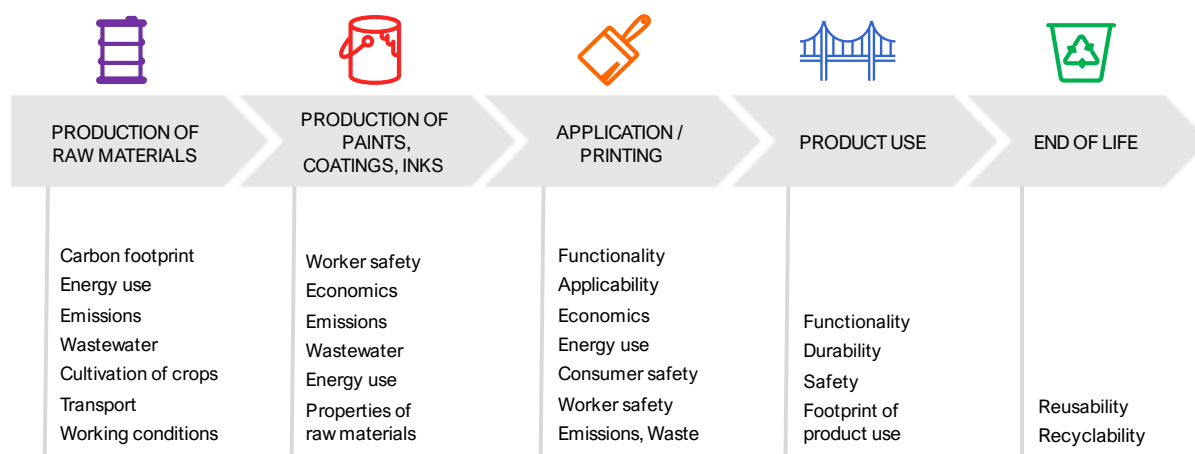
Using Safe and Sustainable by design Chemicals

Minimizing the environmental footprint of chemicals and chemical products, in particular on climate change, resource use, ecosystems and biodiversity is an important goal, especially from a lifecycle perspective. This is supported by the German paint and printing ink industry. However, sustainability needs to be understood holistically and is best defined and broadly accepted on the basis of the UN Sustainable Development Goals (SDGs), to which paints, coatings and inks contribute significantly. The careful selection of raw materials and avoiding chemicals that may be harmful to human health or the environment wherever possible is one important aspect on the road to sustainability. However, solely focusing on the properties of the chemicals is simplistic and falls short of the problem’s complexity. In order to reach the ambitious goals of the Green Deal and to fulfill on the UN SDGs a more holistic and complex approach is necessary, which accepts scientific limitations and addresses conflicting goals. It needs to be stressed that chemicals as such are neither safe nor unsafe nor are they sustainable or unsustainable; these properties are not intrinsic to a substance but depend crucially on the applications and in the case of sustainability even on the whole life cycle. The same chemical compound may play a crucial part in a safe and sustainable application and be a risk to the consumer or the environment in another application. Hence, to define sustainability the whole lifecycle needs to be analyzed. Life Cycle Assessment (LCA) tools are helpful but depend on the specific product life cycle in question. Different results may be obtained for the

same chemical substance contained in different articles; therefore, it is not possible to project all aspects of sustainability on the chemical properties of a given substance. Identifying criteria, which help in choosing the chemical substances to create products that can be used safely, and which best support the sustainability aspects of the applications makes sense and VdL will support every effort in this direction. However, this is not the same as identifying “safe and sustainable chemicals”. Thus, we propose to carefully define the goal of the concept.

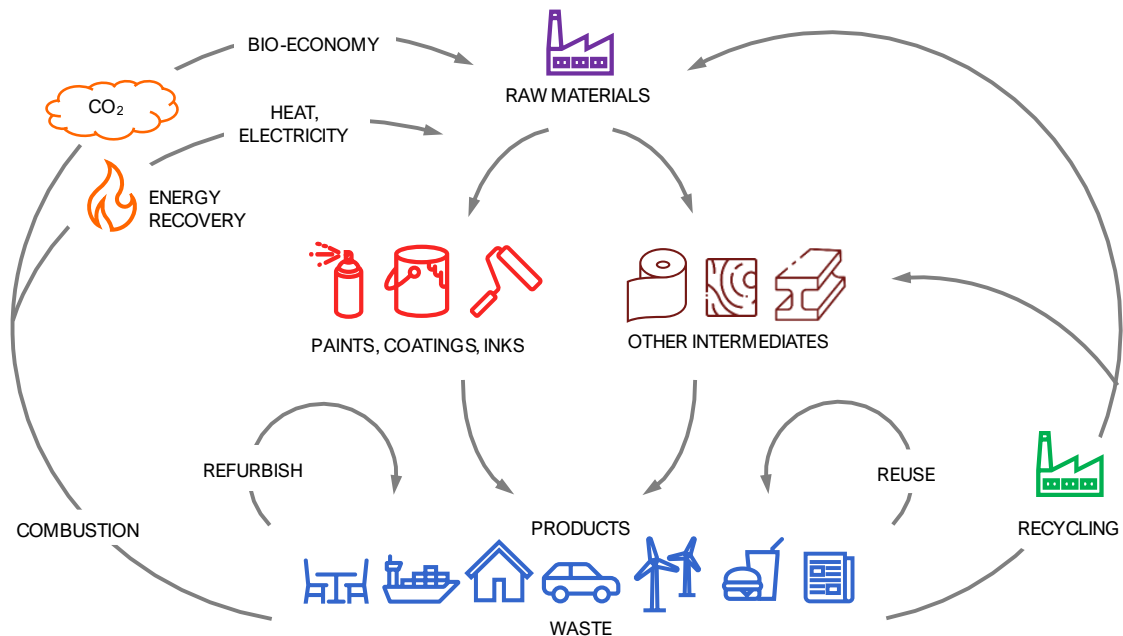
Safe and sustainable by design: paints, coatings and inks

In contrast to chemical substances, defining safe and sustainable by design criteria for chemical products (which are mixtures of chemical substances), such as paints, coatings or inks, may be possible to a certain extent. Nevertheless, it is still a challenging task. In this case a holistic approach is also needed taking the full complexity into account while differentiating between different applications and technologies. To find safe and sustainable by design criteria, the complete life cycle of paints, coatings or inks needs to be considered. Starting from the chemical substances, via the production and application to the use-phase of the coated or printed product and its end of life. For chemical substances, the footprint of their production, any emissions, the cultivation of crops in case of bio-based materials, the transport and the local working conditions are important aspects. The production of the coating or ink itself is obviously an important factor and worker safety, economics, energy use and emissions play an important role. Obviously, also the (hazard) properties of the chemical substances are an important factor, albeit not the only one. The process of application also needs to be included in a life cycle analysis. Apart from the worker safety the applicability and functionality are also highly important at this step. It needs to be kept in mind that any coating or ink needs to meet certain functionalities, without which the product would be useless and cannot fulfill sustainability functions. To achieve these functionalities a high variety of chemical substances with different properties is required. This again demonstrates that one needs to look beyond the pure hazard properties of raw materials.



The use-phase of the coated or printed product plays a very important part in the life cycle. Paints, coatings and printing inks fulfill sustainability functions in the sense of the Green Deal and the UN SDGs (see below). Coatings are typically applied to protect certain products, be it a wind turbine or a steel bridge, and to extend their lifetime. This is in line with the goals of an efficient circular economy, foreseeing long service life and waste prevention. As stated above, these functionalities can only be achieved, if the right chemical substances, with the right

properties are used. Depending on the application, this may also involve chemicals, which are classified according to certain hazard classes. The use phase of the coated products is a significant contributor to the overall sustainability and hence these aspects need to be included in the assessment of sustainability of paints and coating. Finally, the end of life and the circularity needs to be taken into account. Here, all different loops of the products, which are depicted schematically below need to be considered.



Coated or printed products can often be reused or recycled. Sometimes the reuse involves a refurbishment step, in which for instance the coating may be renewed. This again underlines the sustainability function of coatings. Typically, the substrate on which the coating or ink is applied needs to be recyclable to a certain extent. The challenge is, to design paints, coatings and inks that fulfill the intended function, without impeding with the recycling process. However, sometimes, the properties, which are important for the use-phase (e. g. durability) are conflicting with recyclability, which needs to be taken into account. Furthermore, the properties needed for recyclability may vary depending on the technical specifications: For certain recycling processes it is important to have printed products, which may easily be deinkable (i.e. the ink is removed in order not to impede with the recycling process). In other process, an ink is needed that sticks to the substrate, which is the cases for certain printed labels that are designed to be cleanly washed off. It needs to be stressed that energy recovery in some cases is the most sustainable option. All different loops need to be considered for a **design for circularity**, which can then be combined with the other factors explained above to a true **design for sustainability**.

The German paint and printing ink association (VdL) represents roughly 200 – mostly mid-sized – manufacturers of paints, coatings and printing inks. The VdL stands for nearly 90 percent of this industry in Germany. In 2019 the German manufacturers of paints, coatings and printing inks realized sales of ca. 8 billion euros and employed ca. 25,000 staff.