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CONTENTS

Editorial

The present issue of *elni* Review starts with two articles from the field of chemicals law.

Julian Schenten, Martin Führ und Leonie Lennartz analyse the challenges in the declaration of substances in articles in the supply chain and develop proposals on successful complete declaration. In their article "Substitution requires all possible support" Antonia Reihlen, Heidrun Fammler, Arne Jamtrot, Martyn Futter and Jana Simanovska discuss the background and comment on the discussions of a jointly organised workshop of three EU projects which are dealing with the aim to reduce risks from hazardous chemicals.

In her contribution "EU Dieselgate: unveiling the weirdness of the EU's attitude to compliance on environmental matters" Delphine Misonne asks whether the current inspection landscape, as applicable in the European Union and as far as environmental matters (and emissions into the environment in particular) are concerned, could have taken hold of what is now called 'dieselgate'.

Next Ludwig Krämer comments on case T- 545/11 of November 2018 where the General General ruled that an EU substance approval dossier (for glyphosate) contains no information related to environmental emissions.

The contribution discusses once more the question, of what constitutes an emission to the environment and whether access to this information may be refused to protect confidential commercial and industrial information, unless there is an overriding public interest in disclosure.

William Rundle comments on the complaint of Friends of Earth against the United Kingdom for its failure to comply with the Aarhus Convention when legislating its withdrawal from the EU.

Finally Leonie Lennartz reports on the closing event of the project "Consumer behaviour and innovations for sustainable chemistry (KInChem)" at the Protestant Academy Loccum in September 2018.

We hope you enjoy reading the journal.

The editors welcome submissions of contributions addressing current national and international environmental laws issues in particular on the subject of strategic environmental impact assessment (SEA) for elni Review 2019/01 by April 2019.

Claudia Schreider / Gerhard Roller
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EU traceability of substances in articles: supply chain communication challenges and the perspective of full material declaration (FMD)

Julian Schenten, Martin Führ and Leonie Lennartz

1 Introduction

Companies producing or importing articles[1] (or parts thereof) as well as retailers are facing new challenges coming from societal demands and expectations directed at transparency of (problematic) substances[2] in articles (SiA), and the overall "sustainability" of supply chain operations.[3] Legislation on chemicals in the EU (e.g., REACH) and beyond stipulating legal SiA requirements reflect these developments. In addition, with a view to eliminating problematic substances in material circles, the recently amended[4] Waste Framework Directive requires, from January 2021 on, companies placing articles on the European Economic Area (EEA) market to report to authorities the presence of substances of very high concern (SVHC) above a certain threshold in such articles. Council Conclusions of June 2018 emphasising "the need for information on substances of concern for all actors and to ensure at the latest by 2030 the traceability of substances of concern in materials, including those in imported articles, through the entire supply chain, including end-of-life operations"[5] raise expectations of related future regulatory developments. Chemical compliance management is not part of the core business for many companies. Many actors perceive related challenges as an overwhelming task. IT-based solutions offer opportunities to establish a systematic approach to transparency and traceability of SiA within complex global supply chains. In order to "be prepared" for future legislation, the long-term vision of a Full Material Declaration (FMD) is a promising approach. FMD implies the creation of a bill of materials (BOM) of an article with which all supply chain actors can determine the substances present in supplied articles. This way, firms can meet their present requirements from law as well as from sectoral or company specifications, and can prepare for future requirements. Section 2 compares supply chain communication requirements and needs on the one hand and actual practice on the other in order to subsequently identify the respective delta. Section 3 introduces FMD as a strategy to overcome the delta and shows development perspectives for existing approaches. Finally, Section 4, after drawing conclusions, formulates recommendations for EU policies.[6]

2 Challenges

Supply chain actors are facing legal requirements (Section 2.1) triggering information needs (Section 2.2). Taking into account the status quo in supply chain communication (Section 2.3) a "delta" between the needs and the actual performance is identified (Section 2.4).

2.1 Normative objectives and legal requirements

Various regulations in and beyond Europe govern SiA related aspects. In particular, the EU REACH Regulation[7] introduced different legal mechanisms regarding substances of very high concern (SVHC) in articles. According to REACH Art. 7(2), producers and importers of articles have to notify the European Chemicals Agency (ECHA) of articles in which SVHC are present in quantities totalling over one tonne per producer or importer per year and where these SVHC are present in those articles above a concentration of 0,1 % weight by weight (w/w). In addition, presence of SVHC triggers information requirements along the supply chain and, on request, to consumers. Within the article supply chain, pursuant to REACH Art. 33(1) suppliers of articles containing SVHC above 0.1 % w/w must provide the recipients with sufficient information available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance. According to Art. 33(2) that same information has to be provided to a consumer upon

1 In accordance with REACH Art. 3(3), an "article" means an object, which during production is given a special shape, surface or design, which determines its function to a greater degree than does its chemical composition. Chemicals and mixtures thereof, such as cosmetics or household detergents, are thus not covered by the article definition and neither is food. All other physical products do fall within its scope.

2 In this piece, problematic substance means a chemical substance with intrinsic properties that may cause damage to human health and/or the environment. SVHCs fall under the term as well as substances classified as "hazardous" according to the CLP Regulation, cf. Regulation (EC) No 1272/2008, 2008 OJ L 353/1.

3 Führ and Schenten 2019, Supply chain communication, in Leal Filho et al. (eds.), Encyclopedia of the UN Sustainable Development Goals, Responsible Consumption and Production (SDG 12), Springer.

4 This amendment being one result of the Circular Economy Package, cf. COM(2018) 32.

5 Council of the EU conclusions 10447/18, 11.

6 The authors would like to thank Carsten Dietsche for his valuable input from a practitioner's perspective. This paper also draws on research done in the context of the Project LIFE AskREACH (No. LIFE16 GIE/DE/000738), which is funded by the LIFE Programme of the European Union, cf. www.askreach.eu.

7 Regulation (EC) No 1907/2006, 2006 OJ L 396/1.

request. SVHC are legally defined by REACH Art. 57 and identified by public authorities in a formalized procedure set out in REACH Art. 58. SVHC include substances, which are persistent, bioaccumulative and toxic or very persistent and very bioaccumulative (PBT/vPvB), substances that are carcinogenic, germ cell mutagenic or toxic to the reproductive system (CMR) and substances with properties of equivalent concern, e.g. endocrine disrupters (ED) or respiratory sensitizers.[8] Due to their problematic properties, SVHC may cause damage to human health, wildlife or the functioning of ecosystems. The group of PBT/vPvB substances are of particular concern for the environment because they persist and accumulate in certain environmental compartments and along the food chain. This also leads to considerable exposure of humans to SVHC with potential adverse health effects. The SVHC (legal) status of a substance becomes effective upon publication online.[9] In 2008, ECHA added the first 15 entries to that list. By January 2019, it had grown to 197 substances. By 2020 several hundred substances are expected to be on the list according to the SVHC Roadmap.[10] Regarding the point of reference for the 0.1% threshold, the European Court of Justice decided in September 2015 in favour of the 'once an article always an article' (O5A) approach,[11] according to which the 0,1 % threshold applies to each article of a complex object made up of more than one article, which were joined or assembled together.[12] In addition, the motivation behind the recently amended EU WFD[13] is to reduce the content of hazardous substances in materials and products, as well as in recycled materials: new obligations regarding SiA arise for EU Member States and the European Chemicals Agency (ECHA), which has the task to create a database to collect and provide information about articles that contain substances of very high concern (SVHC) above 0.1% by weight. When transposing the Directive into national legislation, Member States have to "ensure that any supplier of an article" (as defined by REACH) provides the information on SVHCs in articles to ECHA from 5 January 2021.[14] The scope of the requirements refers to REACH Art. 33, which stipulates that identical data should already be provided to every downstream "recipient of the article" since 2008.[15] This new reporting mechanism under the WFD concerns all articles supplied on the European Economic Area (EEA) market. It is one

Beyond SVHC-related rules, REACH stipulates specific restrictions (substance use bans, partly linked to thresholds). Likewise, product law[16] provides product-specific rules (certain substances must not be present, e.g., above certain thresholds)[17] and perhaps procedural aspects to ensure compliance (analytical methods of chemical testing). Additional rules relevant for substances in articles follow from global treaties (PIC, POP and Minamata Conventions) or are effective in other jurisdictions.

However, few of the mentioned legal acts foresee "cooperation between producers and recyclers" (e.g. Art. 4 WEEE). For economic operators under RoHS, the standard EN 50581 provides guidance on *how* to organise communication along the supply chain and how to document related activities and data to ensure compliance. Besides, the Korean Ministry of Environment proposed on 3 May 2018 a mandatory system for tracking chemicals including mixtures under its Chemicals Control Act. This system is meant to trace substances along their supply chain including downstream uses, apparently also in articles.[18] Documentation is pivotal with a view to avoiding product liability. One fundamental principle of EU private law is that producers are liable for damage caused by a defect in their products, whereas in this respect all "movables" including consumer products, chemical substances as such and all materials supplied in the supply chains are covered by the product term.[19] The

8 Many of the substances identified as SVHC due to their CMR/ED properties are also covered by the labelling obligations under the so-called 'Proposition 65' (Safe Drinking Water and Toxic Enforcement Act of 1986) in California.

9 Cf. https://echa.europa.eu/de/candidate-list-table.

10 ECHA 2013, SVHC Roadmap to 2020 Implementation Plan; Ref. ECHA-13-R-11-EN, Helsinki echa.europa.eu/documents/10162/19126370/svhc_roadmap_implementation_plan_en.pdf (14.11.2018).

11 ECJ, Case 106/14 FCD and FMB v Ministre de l'Écologie, du Développement durable et de l'Énergie, ECLI:EU:C:2015:576, para 50.

12 ECHA 2017, Guidance on requirements for substances in articles, Vers. 4, ECHA-17-G-19-EN, Helsinki, https://echa.europa.eu/documents/10162/23036412/articles_en.pdf (12.11.2018), p. 27. In addition, the packaging used for transport and presentation of an article is considered as a separate article under REACH and is therefore separately subject to all article related provisions.

13 Directive 2008/98/EC on waste 2008 OJ L 312/3, amended by Directive (EU) 2018/851, 2018 OJ L 150/109.

14 Führ 2018, The modern Augean stable. Cleaning up and detoxing product-related industrial material flows, https://chemicalwatch.com/72672/the-modern-augean-stable (19.12.2018).

15 Führ 2018, *supra* note 18.

16 E.g., Directive 2011/65/EU (RoHS), Art. 15 of Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), Directive 2009/48/EC on the safety of toys.

17 In addition, Directive 2001/95/EG on general product safety, 2002 OJ L 11/4, (GPSD) generally prescribes product "safety".

18 OECD 2018: Outline of a Focus Session on Information Systems on Chemicals in Products to Facilitate Risk Management. 58th Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology, 1. October, ENV/JM(2018)32.

19 Articles 1, 2 Directive 85/374/EEC on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products, 1985 OJ L 210/29 amended by Directive 1999/34/EC, 1999 OJ L 141/20.

respective EU directive obliges Member States to establish a comprehensive and strict basis for liability claims relevant for all activities in the substance supply chain in cases where a product "does not provide the safety which a person is entitled to expect" and is therefore defective.[20] If defects can be attributed to a violation of a company management's due diligence, even cases of personal liability could be established.[21]

2.2 Information needs

Article suppliers are obliged to ensure that their products at least comply with the existing regulation. They must know the extent to which regulated substances are included in their articles, taking into account the O5A approach. In addition, supply chain practitioners consider information on the presence/absence of substances that may be regulated in the future highly useful.[22] Indeed, a mere focus on regulated substances does not support proactive companies. Companies need not only to ensure compliance today, but must also prepare to be compliant tomorrow; not least due to the increasing velocity of regulatory developments (e.g. SVHC list update twice a year). This was also among the main findings of an empirical case study on the textile sector, searching for strategies for how to avoid problematic substances in the global textile chains.[23] Companies interested in gaining control over the SiA related supply chain operations – and in creating related market opportunities – have a particular need for SiA information regarding the regulated substances of tomorrow. In addition, from a circular economy perspective, traceability of problematic substances in articles is pivotal to prevent "risk cycling",[24] i.e., only materials in an end-of-life article that do not contain (certain) problematic substances (to a certain extent) should be allowed to re-enter the material cycles.[25]

2.3 Supply chain communication on SiA in practice

Supply chains are usually a very complex managerial object, not least since they are often stretched across various continents: In order to capitalize on cost differences most companies locate their production processes at places with low costs, e.g., due to less developed legislation on environment, occupational health and safety or worker rights in general, or due to enforcement deficits.[26] In addition, short-term supplier agreements imply a high volatility for the actors involved. Hence, usually, supply chains cannot be understood as a one-dimensional chain of suppliers but rather must be seen as an, at least partly, three-dimensional actor network, e.g., when for the same end product (e.g., a car) components are used which were produced in different batches by different suppliers and subject to specific conditions in terms of input materials and manufacturing processes.

With complexity transparency of all supply chain actors decreases and so too traceability in terms of SiA. In a common constellation, article suppliers situated in the EU are sourcing articles from third countries. They have direct contact with the importer abroad who as "tier one" often assembles the article, thus merging contributions from other supply chain actors. The EU-based suppliers do not know those other actors, as the tier 1 seeks not to disclose such contacts.

Another quite common constellation is that EU-based suppliers are in a weak position when they request information from their suppliers, as orders from only a single customer usually correspond to a rather small share of the supplier's overall trading volume. Regarding the trading volumes one must also consider that often suppliers provide products – and therefore sit at the interface between many sectors (e.g., textile for fashion and automotive or electronic articles intended for different sectors).

Requesting SiA information from suppliers may thus pose major challenges, notably for SME, but also large multinationals can struggle. Challenges increase if information is requested that goes beyond the legal minimum. Companies compile lists of substances relevant for their business prescribing use conditions or bans for their suppliers. Restricted substance lists (RSL) that define rules on substances in articles are most common. Manufacturing restricted substance lists (MRSL) define rules on the substances used in production processes (input stream management), an approach put forth by the

20 Article 6 GPSD.

21 Schenten, Führ and Bizer 2017, Overcoming Nanomaterial Uncertainties: A Responsive Governance Framework, in v. Matthis (ed.): Economic Analysis of Law in European Legal Scholarship (Vol. 4), Springer.

22 Reihlen and Halliday 2017, Scientific and technical support for collecting information on and reviewing available tools to track hazardous substances in articles with a view to improve the implementation and enforcement of Article 33 of REACH, prepared for DG Environment (Sustainable Chemicals), Luxembourg.

23 Kleihauer, Führ and Schenten, 2019, Marktchancen für "nachhaltigere Chemie" durch die REACH-Verordnung. Sustainable Sporting Goods – SuSport, sofia Studien zur Institutionenanalyse, Darmstadt.

24 Lahl and Zeschmar-Lahl 2013, Risk based management of chemicals and products in a circular economy at a global scale (risk cycle), extended producer responsibility and EU legislation. Environmental Sciences Europe 2013 25:3. https://doi.org/10.1186/2190-4715-25-3.

25 Cf. Bernard, Chemicals in material cycles: how EU law needs adjustments for the transition to an environmentally beneficial circular economy, elni 2017(2), 54.

26 While so-called offshoring is "far from petering out", in the last decade a counter trend has emerged often referred to as reshoring or backshoring, cf. Di Mauro et al., Offshoring and backshoring: A multiple case study analysis, Journal of Purchasing and Supply Management 2018 (Vol. 24), pp. 108-134.

Zero Discharge of Hazardous Chemicals (ZDHC) initiative in textiles[27] but also used in e.g., aerospace. These lists focus on regulated substances to ensure compliance. However, some companies mostly with higher demand volumes go beyond legal requirements, e.g. by prescribing specific thresholds for all substances meeting the criteria laid down in REACH Art. 57, regardless of their being identified as SVHC.[28] Suppliers usually provide general statements of conformity (e.g., "legal requirements are met") regarding the (M)RSL rather than information on actual substances. Information on the specific location of a substance in an article is not routinely exchanged.[29] Regarding REACH Art. 33(1) ECHA observes "clear indications that the information on substances is not adequately communicated in the article supply chains."[30] The European Commission concludes that it "remains difficult for actors in the supply chain to retrieve, verify and communicate information on SVHCs in articles".[31] Article suppliers refrain from responding and providing SiA information due to different reasons, such as that they

- lack the data they should supply themselves;
- are not aware of (all) legal obligations on SiA;
- lack resources to collect data and provide it;
- hesitate to provide information because they perceive it as confidential.[32]

Request overload is another impediment, closely related to a lack of resources. Apart from a few available sector standards,[33] companies tend to create their own (M)RSLs,[34] thus contributing to the proliferation of SiA requests to suppliers. As for data quality and reliability, information provided in compliance declarations is too scarce to check even plausibility.[35] In fact, to verify compliance companies do excessive testing, e.g., risk-based testing of materials in every article (e.g., phthalates in plastics). For instance, Nike in 2015 carried out almost 500,000 chemical tests in its supply chains to make sure articles do not contain restricted substances.[36] Another challenge is how companies collect and manage the data required for documenting and reporting SiA information activities. Most companies use basic approaches such as excel spreadsheets in this respect, the handling of which may cause a significant workload.[37]

2.4 Delta Analysis

The outlined challenges companies are facing indicate certain information needs. Measured by those needs, the following delta can be observed:

- Suppliers generally do not possess adequate knowledge regarding problematic substances in their articles; thus they refrain from providing the needed information to downstream actors or consumers.
- At best, information on (usually: non-presence of) regulated substances is provided (negative reporting).
- Information provided is often too scarce to even check plausibility.[38]
- Excessive chemical testing is needed to ensure compliance and avoid related liability risks.
- Many companies still have no IT solutions or inefficient ones to collect SiA information, although IT solutions have the potential to manage risks and obligations with a more cost and time effective approach.

Suppliers may report declarations of conformity regarding certain substances regulated such as SVHC, perhaps supported by chemical testing. Presuming the accuracy of such statements, they ensure compliance with respect to specific substances. However, such declarations refer to the product properties upon the date of delivery and thus refer only to the substances listed on a RSL or e.g., on the SVHC list by this date. It follows that with every new identification of SVHC the compliance declaration is outdated. An additional declaration, probably accompanied by chemical testing and

27 ZDHC 2015, Manufacturing Restricted Substances List Version 1.1, https://www.roadmaptozero.com/fileadmin/pdf/MRSL_v1_1.pdf (12.11.2018).

28 H&M 2017, Restricted Substance List - Apparel |Accessories | Footwear | Home Interior Textile Products, Valid for all brands in H&M group, http://sustainability.hm.com/content/dam/hm/about/documents/masterlanguage/CSR/Policies/HM%20Chemical%20Restrictions%202017_Apparel_Accessories_Footwear_Home%20Interior%20Textile%20Products.pdf (31.10.2018).

29 Reihlen and Halliday 2017, supra note 26.

30 ECHA, Report on the Operation of REACH and CLP 2016, Ref. ECHA-16-R-08-EN, pp. 136, 13: "The current legal requirement for information on substances in articles is not working well enough. A fundamental review of these obligations would be helpful and could usefully form part of work on the circular economy and the drive towards a non-toxic environment."

31 SWD(2018) 58 final, part 1, 30.

32 Reihlen and Halliday 2017, supra note 26.

33 E.g., ZDHC MRSL.

34 In fact, even in sectors where standards are established, companies tend to add their "individual" substances to the list, as this might reflect requirements of specific markets and / or to yield competitive advantages. For instance, in automotive one RSL (GADSL) is shared by all OEM, which each put certain substances on top.

35 Reihlen and Halliday 2017, supra note 26.

36 See https://chemicalwatch.com/47800/nike-supply-chain-carried-out-almost-500000-chemical-tests-in-2015 (14.11.2018).

37 E.g., Chemical Watch 2018, Chemicals Management Software Guide, 2nd ed., p. 11, https://chemicalwatch.com/software-guide (9.1.2019) refers to a company that reported having received 40,000 requests for information in Excel or Word in just eight months.

38 In cases where information is lacking, companies rely on internal expert judgement, sometimes following specific rules, cf. e.g. for the automobile sector ACEA et al., Automotive Industry Guidance of REACH V. 4.0, p. 34, https://www.acea.be/uploads/publications/AIG-4.0_English.pdf (14.1.2019).

taking into account the newly added substances is then required. In addition, from the circular economy perspective, presuming declarations are communicated to recyclers after all,[39] enormous uncertainties as to the toxic load of end-of-life articles still would remain. In general, mere negative reporting thus deprives recyclers of their possibilities to bring materials from end-of-life articles back into the material streams. Knowing in contrast which substances are present in articles would allow companies to control compliance of their products also in terms of future regulations and would at the same time satisfy the needs of circular economy. In an overall perspective, Full Material Declaration (FMD) is a prerequisite to gain manageability in terms of adequately identifying and controlling substance-related risks linked to the articles in a company's portfolio.

3 IT based solutions

In order to ensure compliance with existing legislation as well as to "be prepared" for future legislation, Full Material Declaration (FMD) is a promising approach (Section 3.1), which is operationalised by specific tools (Section 3.2). Options to render the approach even more effective are briefly introduced (Section 3.3).

3.1 Full Material Declaration

There is no standard definition for FMD. In this piece, it means the full declaration of materials used in the making of supplied (part) articles down to basic substance level. This approach is applied to all substances present in the articles in their respective physical and chemical states upon delivery. FMD applies within the professional supply chain.[40] With this degree of traceability, companies can ensure to be compliant today and tomorrow concerning future requirements. Tools providing for FMD are based on material data systems (MDS). In the MDS, suppliers report data on their materials. Material is usually a generic term applicable to articles, mixtures and substances in terms of REACH.[41] The purpose of the MDS is to generate a structure tree of all materials present in a certain final article (Bill of materials – BOM) subject to reporting, which is usually a complex object (incorporating more than one individual article). The structure follows the different stages in the production process of an article (traceability), e.g., from semi-finished article (e.g., plastic sheet), further processed component (e.g., machining, coating), to incorporation in the final article.

At the same time, tools must take into account confidential business information, including business relations. Some MDS thus combine different approaches to reporting:

- As a general rule all suppliers must report all substances present in articles (FMD).
- At the same time, suppliers may make use of "wild cards", i.e., a certain share (e.g., per weight) of substances per article must not to be disclosed. However, the "wild card" function is not available for substances included on a specific RSL42 acknowledged by the tool. Thus, in any case, suppliers must report substances that are contained in the RSL.

Data systems based on FMD can be efficient tools to communicate on substances in articles along the supply chains, as users can

- ensure compliance with existing SiA legislation (taking into account the O5A ruling of the ECJ), inter alia facilitating answers to REACH Art. 33(2) requests by consumers
- prepare in case of regulatory developments to be compliant in future,
- better control product liability risks due to FMD documentation,
- proactively manage chemicals used in supply chains to further reduce company risk,
- facilitate the material classifications needed for recycling,
- reduce needs of risk-based testing as transparency facilitates supplier evaluation, and
- benefit from the reporting standard shared with other sectors or companies as this increases suppliers' willingness to provide data.

However, whether or not a meaningful BOM is created capable of yielding all those listed benefits depends strongly on the tool-specific implementation of FMD, of the (sector) standard and RSL applied in this respect.

3.2 Challenges

Many available tools (claim to) support FMD – however, as there is no standard definition for the term, the actual performance depends on the tool-specific operationalization of FMD. MDS tools usually support sector-specific standards, notably IPC 1752A and IEC 62474 for electronic components in general, or the new IPC 1754

39 Which is rather doubtful, cf. Bernard *supra* note 29.

40 In contrast, the concept of Full Material Disclosure put forward e.g. by NGO advocates a public disclosure of (parts of) the data subject to Full Material Declaration.

41 Cf. the legal definitions in REACH Art. 3(1), (2) and (3).

42 The RSL should be updated in line with legal changes, *i.a.* biannually at least to reflect updates of the REACH Candidate List for SVHC.

"Material Declaration Standard for Aerospace and Defense". Standards define e.g., reporting rules and lists of declarable substances. As regards SVHC coverage, for instance, IEC 62474 covers exclusively SVHC that have applications in the electrical engineering and electronics industry.[43] IPC 1752A in contrast supports the full SVHC list. It follows that two BOMs for the same article created under IPC 1752A, or IEC 62474 respectively, may differ in that under one BOM a substance is reportable as SVHC while under the other the same substance is not reportable, and thus perhaps hidden. The extent to which material data systems based on FMD yield SiA-related benefits for users thus may depend on the standard used to compile the BOM.

Additionally, the MDS differ in their ability to combine different sources of information. Some systems enable users to complement their material data with common materials as published in international standards for metal alloys. This allows the users to create material data from in-house and from external sources to show very complex articles. These can be assessed with a "where used" analysis to determine whether they contain problematic substances such as SVHC. Besides, these standards, while defining a (limited) range of reportable substances, do not define all (other) substances. Rather, MDS tools such as IMDS used in the automotive sector[44] add to the reporting system's comprehensive databases for all substances. Hence, a BOM created in one tool need not necessarily be identical with a BOM for the same article created in another tool B, as there may be differences in the substance databases. These differences are a major source of struggles regarding data exchange between different tools. In addition, some standards use, as a reference point for the reporting obligations, homogenous materials as established e.g., in the RoHS Directive. Art. 3(20). RoHS defines a homogenous material as one material of uniform composition throughout or a material, consisting of a combination of materials, that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes".[45] In contrast, pursuant to REACH Art. 3(3) the term articles "means an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition".

Hence, due to the different rationales, reporting on homogenous material levels may not automatically apply to articles in the REACH context, which needs to be taken into account in any REACH compliance efforts. With a view to the practical implementation of FMD, it needs to be emphasized that only the material producers can ensure that materials are properly reported once they enter the supply chain for the first time, as only they know the chemical composition. Barriers for suppliers to cooperate should thus be as low as possible (cf. the next section). Moreover, in order to avoid a huge collection of obsolete material data, "change management" is key. Thus, the challenge for industries is to keep any database updated over time, reflecting changed article material composition due to e.g., engineering changes.

3.3 Perspectives

The possibility of easy and quick information transfer between different tools appears essential to increase the efficiency of communication and thereby the acceptance of such tools. Thus a common data structure and exchange format is recommended, ideally agreed upon at global level.[46] In fact, the inter-sectoral "Proactive Alliance", initiated in 2018, sets out to define recommendations for a global cross-sector standard for communicating SiA information, which also supports FMD and takes into account the O5A-principle for articles in terms of REACH.[47] The group gathers representatives from automotive, chemicals, furniture, childcare products, electrical and electronic, mechanical, metalworking and metal articles, home textiles, textiles and sporting goods and medical devices. It acknowledges that FMD is already being used by some parts of industry where it is seen as the most efficient vehicle to achieve compliance – and goes beyond.

4 Conclusions and Recommendations

Companies face increasing SiA-related legal requirements as well as new sectoral, contractual or general societal demands concentrating more and more on the "sustainability" of supply chain operations. Companies however struggle to meet

43 ZVEI 2015, Material Declarations Within the Supply Chain. Guideline, https://www.zvei.org/fileadmin/user_upload/Presse_und_Medien/Publikationen/2015/februar/Material_Declarations_Within_the_Supply_Chain/Leitfaden_Materialdeklaration_engl.pdf, Frankfurt (12.11.2018).

44 Cf. www.mdsystem.com (9.1.2019).

45 Note that back in 2009 there were Chinese interpretations that any component below the size of 4 mm^2 is considered to be "homogeneous". Such a specification was never formalized in electrotechnical standards such as IEC 62474 or in legal texts. However, it can still be found among suppliers as their internal definition of "homogeneous materials". To avoid any misunderstanding, the definition of "homogeneous materials" according to RoHS Art. 3(20) should be added to companies' supplier contracts and related documents, cf. Frimann 2009, Electronic Components Meeting Homogeneous Requirements, http://thor.inemi.org/webdownload/newsroom/Presentations/Global_ICT_Env_Oct09/Frimann.pdf (14.1.2019).

46 Reihlen and Halliday 2017, supra note 26.

47 See https://chemicalwatch.com/67695/cross-sector-initiative-sets-full-materials-disclosure-goal (4.7.2018).

these requirements and expectations. Compliance declarations, assuming that they are reliable, only relate to existing law. However, they are not future-proof in the case of new risk identification data or the adoption of new legislation applicable to the article in question. Common approaches of negative reporting are thus not (cost-) efficient in terms of ensuring compliance. Additionally, they provide only limited insight to recyclers regarding the possibilities of taking materials from end-of-life articles back into the material streams. Knowing in contrast which substances are present in articles allows companies to adequately address the substance-related risks and address product quality and liability issues. It is also a precondition to control compliance of their products also in terms of future regulations and would at the same time satisfy the information needs of a circular economy. Data systems based on FMD can be efficient tools to communicate on substances in articles along the supply chains. However, whether or not a meaningful BOM is created capable of yielding all potential benefits depends strongly on the tool-specific implementation of FMD, of the (sector) standard and RSL applied in this respect. Furthermore, there need to be effective incentives for suppliers to cooperate. EU policies should encourage the development of (inter-)sectoral solutions which support proactive companies heading for meaningful FMD and at the same time support companies with limited capabilities in this respect. In addition, proliferation of sector requirements could be reduced, and suppliers' willingness to cooperate in turn increased, if sectoral approaches were interoperable and data easily interchangeable. In this respect, understanding the capabilities and limitations of communication standards applied by different sectors, and thus also by tools providing IT solutions for such sectors, is pivotal. A "Proactive Alliance" of different industry representatives initiated in 2018 therefore aims to formulate policy recommendations on cross-sector standard design with a global scope.

elni membership

If you want to join the Environmental Law Network International, please use the membership form on our website: http://www.elni.org or send this form to the elni Coordinating Bureau, c/o IESAR, FH Bingen, Berlinstr. 109, 55411 Bingen, Germany, fax: +49-6721-409 110, mail: Roller@fh-bingen.de.

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The Öko-Institut (Institut für angewandte Ökologie - Institute for Applied Ecology, a registered non-profit-association) was founded in 1977. Its founding was closely connected to the conflict over the building of the nuclear power plant in Wyhl (on the Rhine near the city of Freiburg, the seat of the Institute). The objective of the Institute was and is environmental research independent of government and industry, for the benefit of society. The results of our research are made available of the public.
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sofia

The Society for Institutional Analysis was established in 1998. It is located at the University of Applied Sciences in Darmstadt and the University of Göttingen, both Germany.
The sofia research group aims to support regulatory choice at every level of public legislative bodies (EC, national or regional). It also analyses and improves the strategy of public and private organizations.
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elni

In many countries lawyers are working on aspects of environmental law, often as part of environmental initiatives and organisations or as legislators. However, they generally have limited contact with other lawyers abroad, in spite of the fact that such contact and communication is vital for the successful and effective implementation of environmental law.

Therefore, a group of lawyers from various countries decided to initiate the Environmental Law Network International (elni) in 1990 to promote international communication and cooperation worldwide. elni is a registered non-profit association under German Law.

elni coordinates a number of different activities in order to facilitate the communication and connections of those interested in environmental law around the world.

Coordinating Bureau

Three organisations currently share the organisational work of the network: Öko-Institut, IESAR at the University of Applied Sciences in Bingen and sofia, the Society for Institutional Analysis, located at the University of Darmstadt. The person of contact is Prof. Dr. Roller at IESAR, Bingen.

elni Review

The elni Review is a bi-annual, English language law review. It publishes articles on environmental law, focussing on European and international environmental law as well as recent developments in the EU Member States. elni encourages its members to submit articles to the elni Review in order to support and further the exchange and sharing of experiences with other members.

The first issue of the elni Review was published in 2001. It replaced the elni Newsletter, which was released in 1995 for the first time.

The elni Review is published by Öko-Institut (the Institute for Applied Ecology), IESAR (the Institute for Environmental Studies and Applied Research, hosted by the University of Applied Sciences in Bingen) and sofia (the Society for Institutional Analysis, located at the University of Darmstadt).

elni Conferences and Fora

elni conferences and fora are a core element of the network. They provide scientific input and the possibility for discussion on a relevant subject of environmental law and policy for international experts. The aim is to gather together scientists, policy makers and young researches, providing them with the opportunity to exchange views and information as well as to develop new perspectives.

The aim of the elni fora initiative is to bring together, on a convivial basis and in a seminar-sized group, environmental lawyers living or working in the Brussels area, who are interested in sharing and discussing views on specific topics related to environmental law and policies.

Publications series

elni publishes a series of books entitled “Publications of the Environmental Law Network International”. Each volume contains papers by various authors on a particular theme in environmental law and in some cases is based on the proceedings of the annual conference.

elni Website: elni.org

The elni website www.elni.org contains news about the network. The members have the opportunity to submit information on interesting events and recent studies on environmental law issues. An index of articles provides an overview of the elni Review publications. Past issues are downloadable online free of charge.

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