

Value chain impacts of EU Waste Framework Directive 2018/851 as a result of reporting Substances of Very High Concern from 2021

Sukhraj S. Takhar ^{a,*}, Kapila Liyanage ^b

^a Assent Compliance, Ottawa, Canada and University of Derby, College of Engineering and Technology, United Kingdom

^b University of Derby, College of Engineering and Technology, United Kingdom

*Raj.Takhar@assentcompliance.com, K.Liyanage@derby.ac.uk

Abstract

The EU Waste Framework Directive 2018/851 sets out requirements for producers and importers of products within the EEA, to report data on Substances of Very High Concern (SVHC) content within products into a new central European database to from 5th January 2021. The reporting requirements: (1) support chemical regulations that impose the need on industry to record the use of hazardous chemicals; (2) identification of products entering waste streams containing hazardous chemicals; (3) support circular economy initiatives within the EU. To meet these new reporting requirements industry will need to collect additional information from all supply chain actors, who as duty holders will also be required to report into the new EU SVHC database system. Failure to provide the required information may result in enforcement actions from the authorities, which could see products being restricted from the EEA. The new EU database system will be accessible to industry, regulators, NGOs and the general public. This paper explores the new requirements, together with feedback received from various stakeholders for collection of data and reporting into the new EU database system from 2021.

Keywords: EU Waste Framework Directive 2018/851; Substances of Very High Concern; Safe Use Information; Duty Holder Role; Waste Streams Operator

1. Introduction

A dramatic rise in environmental degradation has been attributed to human activities, particularly in the use of hazardous chemicals. As society has evolved, increasing global industrialization has given rise to the challenges of how to manage the big three C's (chemicals, climate change, circular economy) to prevent further environmental degradation. In 2017, the size of the global chemicals industries was identified around \$5 Trillion, by 2030, the figure is expected to be more than \$10 trillion (UNEP, 2019). Toxic, persistent, bio accumulative chemical substances, are classed as contaminants which are a major cause of environmental degradation, which can be directly attributed to construction, agriculture and electronics sectors. EC, 2019 statistics showed each EU inhabitant creates 16 tonnes of waste per year, of which 6 tonnes enters waste streams. In 2010 alone: (1) 2.5 billion tonnes of waste was generated; (2) 36 % of the amount being recycled; (3) the remainder being incinerated or ending up in landfill waste sites; (4) hazardous waste content was 96 million tonnes. Eurostat, 2019a statistics for 2016: (1) 2.538 billion tonnes of waste was created in 2016; (2) 37.8 % of the amount being recycled; (3) 45.7 % incinerated or ending up in landfill waste sites; (4) hazardous waste content was 100.7 million tonnes, underlying increased waste being generated with increased levels of hazardous content. ILO, 2019 predicts climate change will result in global temperature increases of 1.5 °C by 2100. By 2030, as a result of increasing temperatures, the equivalent of 80 million full-time jobs are expected to be lost, the resulting economic loss is projected at US \$2,400 Billion. The largest loss is expected to be within the agriculture and construction sectors. With ever decreasing natural resources, the potential to use waste streams to generate 'secondary raw materials' for metals, plastics, wood, glass and paper is seen as key to successful future prosperity. The circular economy is seen as a means to reduce the effect of environmental degradation by supporting the use of sustainable manufacturing and consumption by using the R-imperatives (repair, refurbish, remanufacturing, recycle, repurpose) of products which reach the End of Life (EOL) state. The estimated annual savings from the circular economy: (1) \$700 Million material savings from consuming secondary raw materials against new raw material consumption; (2) \$500 Billion healthcare cost savings from food sector; (3) projected €3,000 disposable income increases for households in the EU (Ellen MacArthur Foundation, 2019). The EU Waste Framework Directive 2018/85 (EU, 2018c) has a key provision for the European Chemical Agency (ECHA) to establish a central database where producers of products within the EU and importers of products will need to provide details of SVHCs for all products placed on the market within the European Economic Area (EEA). This paper is organized as follows: Section 2 outlines the purpose of the research, this is followed by the research methodology shown in Section 3, the findings from shown in Section 4, the conclusions are then presented in Section 5.

2. Purpose

The objective of this paper is to review current literature relating to the impact on industry in terms of reporting against current chemical regulations in Europe, contrasting with the proposed new ECHA SVHC database requirements. Key research objectives to be addressed: (1) what are the new roles and tasks being proposed for reporting for the new database? (2) what is the current state database design being proposed? (3) what are the current concerns from all stakeholders?

3. Design/methodology/approach

This study is based on: (1) analysis of legal texts relating to existing chemical regulations, reviewing previous impacts on industry; (2) analysis of EU Waste Framework Directive 2018/85 (EU, 2018c) legal text; (3) participation in stakeholder consultations and workshops at ECHA and trade association events which discussed the impacts of the proposed ECHA SVHC database.

4. Findings

4.1. EU Waste Framework Directive 2008/98/EC

The EU Waste Framework Directive (WFD) 2008/98/EC (EU, 2008a) was originally implemented to introduce a framework for establishing waste management across the EU, to protect environmental and human health by preventing or reducing the adverse impacts of waste generation. EU, 2008a defined: (1) waste as “*any substance or object which the holder discards or intends or is required to discard*”; (2) hazardous waste as “*waste which displays one or more hazardous properties*”.

4.2. Existing EU regulations which require reporting to take place

A number of existing EU regulations and directives exist which require industry to undertake significant control measures and report information relating to products: (1) packaging and packaging waste (EU, 1994; EU, 2018a); (2) release of waste into landfill sites (EU, 1999; EU, 2018b); (3) control waste generated from end-of live vehicles (EU, 2000a); (4) limiting pollution into the air, soil, surface and groundwater (EU, 2000b); (5) identification of hazardous substances used within products (EU, 2006a); (6) safe shipment of waste across borders (EU, 2006b); (7) classification, labelling and packaging of hazardous substances (EU, 2008b); (8) restriction of hazardous products in electronics (EU, 2011; EU, 2015); (9) recovery and recycling of waste electronic and electrical products (EU, 2012). As EU regulations were introduced to restrict the use of hazardous substances use within products, the amount of data being made available to waste stream operators remained limited. This resulted in a significant burden on waste stream operators having to develop methods for identification of hazardous substances, when EOL products were entering waste streams, without this data, waste stream operators were at risk of losing permits to process waste. A number of EU regulations were updated in 2018: (1) directive on landfill and waste (EU, 2018b); (2) directive on packaging and waste (EU, 2018a); (2) waste framework directive (EU, 2018c); (4) directive on environmental reporting (EU, 2018d). These updated regulations included updated targets for waste recycling: (1) a common EU target for recycling 65 % of municipal waste by 2035, against a figure 37.8 % of waste being recycled in 2016; (2) a common EU target for recycling 70 % of packaging waste by 2030; (3) a target to reduce landfill to maximum of 10 % of municipal waste by 2035; (4) separate collection obligations are strengthened and extended to hazardous household waste (by end 2022), bio-waste (by end 2023), textiles (by end 2025); (5) minimum requirements are established for extended producer responsibility (EPR) schemes to improve their governance and cost efficiency.

4.3. EU Waste Framework Directive 2018/851

Two specific articles within the EU Waste Framework Directive 2018/851 (EU, 2018c) establish the need for the database: (1) article 9(2) a specific requirement for database to be established by ECHA by 5th January 2020; (2) article 9(1)(i) which requires suppliers of articles (products) to provide data in line with EU REACH (EU, 2006a) article 33(1) declarations, to the new ECHA SVHC database by 5th January 2021. The database is expected to be accessible by supply chain actors (manufacturers, distributors, retailers, etc), consumers, authorities, and waste stream operators, who will be able to connect to the database and identify products that contain SVHCs. The key features of the proposed database (ECHA, 2019a): (1) reduce the amount of hazardous waste being generated and enable greater substitution with safer alternatives; (2) enhanced monitoring and control; (3) provide required data to waste stream operators. It must be noted that the EU definition interpretation of municipal waste (Eurostat, 2019b) covers a broader definition in comparison to other regions around the world “*the bulk of the waste stream originates from households, though similar wastes from sources such as commerce, offices, public institutions and selected municipal services are also included. It also includes bulky waste but excludes waste from municipal sewage networks and municipal construction and demolition waste*”.

4.4. What are the new roles and tasks being proposed for the new database?

ECHA's conceptual design for the database (ECHA, 2018a) introduces a conceptual role entitled 'duty holder' based on article 9(1)(i) (EU, 2018c), the duty holder is defined as: (1) manufacturers of products placed onto the EEA; (2) importers of articles in the EEA; (3) assemblers who combine products into other products (known as complex objects – a populated PCB with several hundred components); (4) companies who distribute products across a supply chain; (5) additional supply chain actors for example second hand resellers. Figure 1 depicts a basic example of duty holders providing data in relation to substances, mixtures, materials which form into products which are manufacturers and then distributed to consumers and end-users.

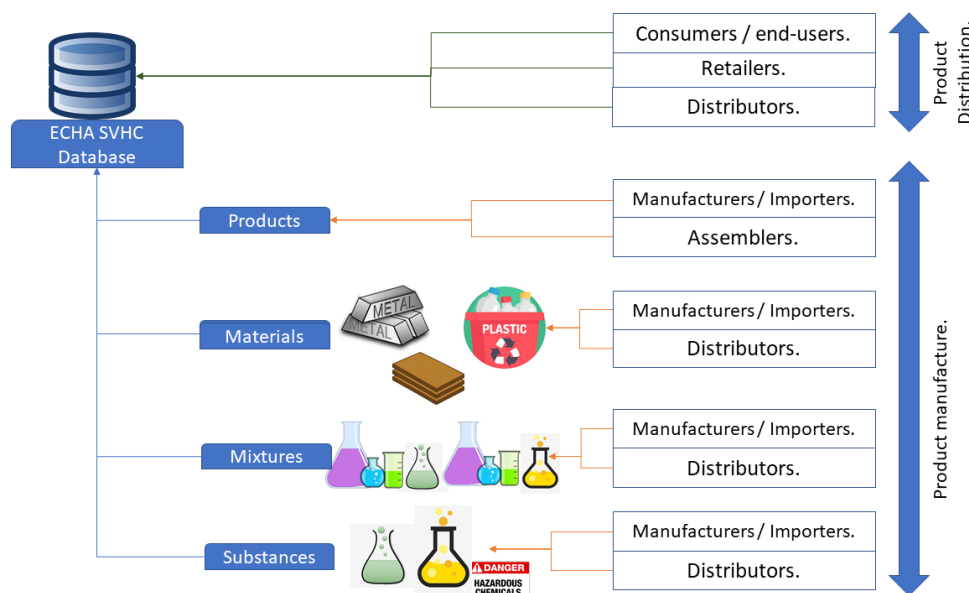


Figure 1. Duty holder reporting role examples. Source: [based on ECHA, 2018a].

Figure 2 depicts the system context diagram for the new ECHA SVHC database, highlighting expected duty holder interactions. The data has to be provided from the lowest component within a supply chain, if an SVHC is present from 5th January 2021.

4.5. What is the current state database design being proposed?

The current state database design is shown in Figure 3. The ECHA REACH-IT account is created either (1) overall organisation level or (2) per specific regional legal entity level, to enable identification of either the entire business organisation or specific regional unit. The article level information is specific to a given product, it may contain unique data such as barcode, part name and description, import codes to identify a product. The substance level information pertains to the presence of an SVHC on a given part, the duty holder is obliged to provide either specific SVHC concentration values or may elect to provide a range of SVHC concentration value, ECHA are currently developing new material lists to identify specific material type and use, as well offering data from ECHA's mixture recording system. The event notification fields are expected to record data being updated and reasons why.

4.6. What are the current concerns from all stakeholders?

The following section is based on feedback comments received from: (1) ECHA's initial public consultations (ECHA, 2018b; ECHA, 2018c), (2) a one day ECHA stakeholders workshop held in Helsinki on 22nd October 2018, (ECHA, 2018d); (3) additional feedback in a second consultation sent to participants who attended the ECHA stakeholders workshop, during May to June 2019; (4) participation in an article manufacturer and waste operator trade association event to discuss issues (EUPC, 2019); (5) additional discussions with consultants collecting data on database design for ECHA. European Commission views: (1) database is a key enabler to the EU circular economy strategy; (2) the database will enable greater substitution from product manufacturers towards the use of safer non-hazardous substances; (3) waste products within the EU will overtime contain less hazardous substances, enabling higher quality secondary materials being created by waste stream operators.

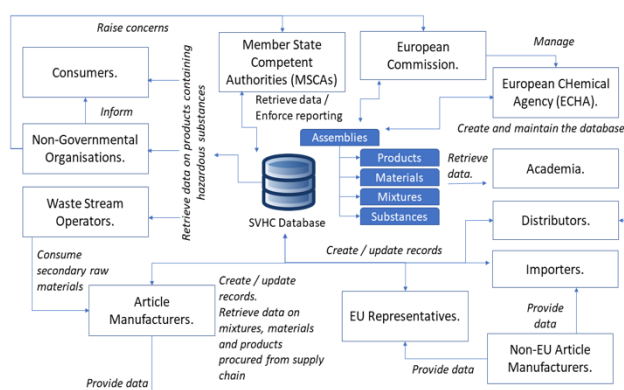


Figure 2. ECHA SVHC database system context diagram
Source: [derived from ECHA, 2018a].

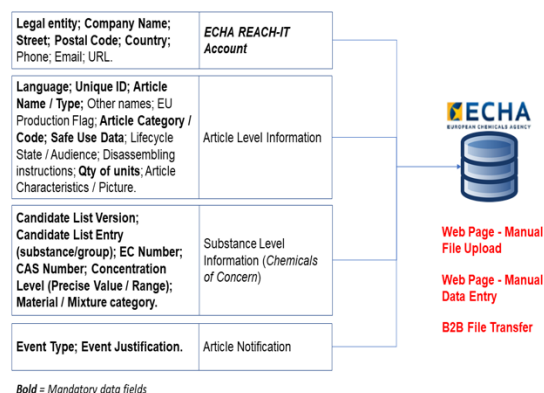


Figure 3. Proposed current ECHA SVHC Database Design (August 2019).

ECHA views: (1) database requirement was presented as part of the legal text EU, 2018c, which stated specific requirements; (2) database requires additional resources; (3) ECHA asked for additional funding for the additional resources, which were scaled down by the EC (Food Packaging Forum, 2019). Member State Competent Authorities views: (1) database is an appropriate way to manage SVHC data; (2) database will enhance recycling rates and increasing the supply of good quality secondary raw materials; (3) the database needs to be an easy-to-access system for users; (4) enforcement of reporting needs further development; (5) database needs to be scalable. Public authority views: (1) database is necessary; (2) waste operators should not be expected to use the database for every piece of information; (3) database should consider materials which are subject to recycling; (4) aggregated information on products containing SVHC substances is a preferred option; (5) importers of articles will need to perform additional notifications; (6) system is liable to have lots of duplicated data; (7) a transitional period was seen as a necessity. Article manufacturers and trade associations views: (1) design supports EU court of justice ruling (COJ, 2015), defining ‘Once An Article Always An Article (O5A)’ (lowest component identified within a BOM should be reported for any SVHC content); (2) supported the idea of having safe use data relating to SVHC content on a finished product; (3) should be implemented in all common European languages; (4) supply chain data reporting should be limited to the smallest product available on the market and not as a complex object; (5) output data reporting should be provided at an aggregated against product type level; (6) database may be seen as a technical barrier to trade leading WTO-TBT (WTO, 2019); (7) ECHA is encouraged to develop database with other regulatory authorities around the world; (8) the duty holder role and reporting obligations need to more clearly defined; (9) mandatory fields need to align to the legal text of EU REACH (EU, 2006a); (10) cost of implementing the database versus actual use; (11) ECHA should not be developing a ‘one glove fits all’ solution which may only work for some sectors; (12) how consumers will gain any benefit from using such as system?; (13) potential mass duplication of records within the system; (14) data needs to flow firstly from substance, mixture and material manufacturers into the database; (15) concerns over the amount of data fields in scope; (16) how will business confidential information will be maintained within the new database?; (17) how data will be collected from the supply chain?; (18) concerns over the additional data collection burdens for SMEs; (19) concerns over the cost of updating existing IT systems / data exchange standards; (20) concerns over enforcement of duty holder data reporting; (21) concerns on how data from non-EU companies will flow into the database; (22) concerns expressed that some products have a very long shelf life, an issue may arise where the data is correct for an earlier reportable list of substance list but not current version(s). Waste stream operator views: (1) in favour of proposed central database; (2) database seen as reducing the burden on waste stream operators having to identification of SVHC content in waste; (3) database needs to be easily accessible; (4) concerns over how SVHC concentration levels would be identified for products; (5) concerns over timescales in terms of updates to SVHC substance lists (every 6 months) and product data being updated within the database; (6) concerns over profitability impacts to waste stream operators who handle vast amounts of products, little time is allowed to observe individual product data; (7) suggested using some form of visual product marking to identify products which contain hazardous substances. NGOs and academia views: (1) in favour of the proposed database design; (2) enables consumers to make informed purchasing decisions as well as article manufacturers being able to identify more easily products which contain SVHCs; (3) data should be in a simple format; (4) database should allow for additional data such as test reports, material composition testing to be uploaded as supporting documentation; (5) obtaining data from certain non-EEA locations may be difficult due to the cultural issues and lack of data, training and support should be offered by ECHA; (6) database should be designed to enable data records to be updated; (7) tailoring of reporting requirements should be dependent on duty holder role being undertaken; (8) concerns expressed over how SVHC data would be identified in used second-hand products; (9) concerns over the potential size and number of records within the database.

5. Conclusions

The value chain impact of the new ECHA SVHC database cannot be underestimated. Any product which is placed onto the EEA from 5th January 2021, if it contains any SVHCs used on their own, within mixtures or materials will require reporting to the new ECHA SVHC database, failure to provide the data, will result in enforcement actions being undertaken. This database will record all products which enter the EEA, regardless of whether they are manufactured within or outside the EEA. This places huge burdens on: (1) ECHA to design and implement a database which can meet the requirements; (2) industry having to update existing declaration processes (standards, service offerings, IT systems); (3) industry having to update contractual agreements between buyers and suppliers to ensure the data flows into the new ECHA SVHC database, this is not an easy ask, setting up and implementing reporting for EU REACH (EU, 2006a), reporting for SVHCs ran into several '000s million euros across EU supply chains. The current design of the ECHA SVHC database, far exceeds the data reporting needed under EU REACH (EU, 2006a). The European Commission views the new ECHA SVHC database as the cornerstone to enabling products to be recycled safely whilst encouraging manufacturers to produce products which are free from toxic substances, over time there is an expectation that the European Commission will begin to penalize manufacturers who persist in using toxic chemicals in products. In the future, costs of decontamination and recycling are also expected to be passed back to suppliers of products containing SVHCs under a 'polluter pays' principle. The underlying expectations from NGOs and consumers is that products should not contain any toxic chemicals whatsoever, there is an expectation that industry has a duty of care to manufacture products which are safe. Industry has voiced strong concerns over the amounts and types of additional data collection which is being proposed. The reporting required will impact all value chains across all industrial sectors, as the data is required regardless of which supply chain source is used to provide products. Further research to be developed as part of an extended research paper includes: (1) a survey designed to ascertain stakeholder perceptions; (2) further participation within stakeholder and trade association engagements relating to the new ECHA SVHC database, and; (2) reviewing the finalised database design.

Acknowledgments

Many thanks to the ECHA and IPC for allowing participation in various stakeholder events and trade association discussion events relating to the new ECHA SVHC database.

References

- COJ, 2015. *Press release 100/15*. Court of Justice of the European Union, Luxembourg. Available at: <curia.europa.eu/jcms/upload/docs/application/pdf/2015-09/cp150100en.pdf> (accessed 19.07.2019).
- EC, 2019. *Waste*. European Commission, Brussels, Belgium. Available at: <ec.europa.eu/environment/waste/index.htm> (accessed 11.07.2019).
- ECHA, 2018a. *Technical supporting document*. The European CHemical Agency (ECHA), Helsinki, Finland. Available at: <echa.europa.eu/documents/10162/24198999/technical_annex_en.pdf/fd3dd13c-dc53-d5d4-b1ee-015307ed0331> (accessed 19.07.2019).
- ECHA, 2018b. *Feedback received to ECHA's call for input [XLSX]*. The European CHemical Agency (ECHA), Helsinki, Finland. Available at: <echa.europa.eu/documents/10162/24198999/feedback_waste_framework_ws_en.xlsx/a583fef3-bd19-7262-bf96-336f20c3f2c4> (accessed 16.07.2019).
- ECHA, 2018c. *Feedback received to ECHA's call for input [Zip File]*. The European CHemical Agency (ECHA), Helsinki, Finland. Available at: <echa.europa.eu/documents/10162/24198999/feedback_files_waste_framework_ws_en.zip/67f3c0c5-9c30-da58-cc3a-24173d6ffad0> (accessed 16.07.2019).
- ECHA, 2018d. *Workshop on Waste Framework Directive database*. ECHA, Helsinki, Finland. Available at: <echa.europa.eu/-/workshop-on-waste-framework-directive-database-22-23-10-2018> (accessed 16.07.2019).
- ECHA, 2019a. *Database*. The European CHemical Agency (ECHA), Helsinki, Finland. Available at: <echa.europa.eu/wfd-database> (accessed 15.07.2019).
- Ellen MacArthur Foundation, (2019), *What is a circular economy?*, Ellen MacArthur Foundation. Available at: <ellenmacarthurfoundation.org/circular-economy> (accessed 21.07.2019).
- EU, 1994. *Directive 94/62/EC on Packaging and Packaging Waste*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:31994L0062> (accessed 11.07.2019).
- EU, 1999. *Directive 1999/31/EC on Landfill of Waste*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31999L0031> (accessed 11.07.2019).
- EU, 2000a. *Directive 2000/53/EC on the End-of Live Vehicles*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000L0053:20050701:EN:PDF> (accessed 11.07.2019).
- EU, 2000b. *Directive 2000/76/EC on Incineration of Waste*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32000L0076> (accessed 13.07.2019).

- EU, 2006a. *Regulation concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006R1907-20140410> (accessed 13.07.2019).
- EU, 2006b. *Regulation 1012/2006 on shipments of waste*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32006R1013> (accessed 13.07.2019).
- EU, 2006c. *Directive 2006/66/EC on batteries and accumulators and waste batteries*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02006L0066-20131230&rid=1> (accessed 13.07.2019).
- EU, 2008a. *EU Waste Framework Directive 2008/98/EC*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098> (accessed 13.07.2019).
- EU, 2008b. *Directive 1272/2008 on classification, labelling and packaging of substances and mixtures*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008R1272> (accessed 13.07.2019).
- EU, 2011. *Directive 2011/65/EU on restriction of the use of certain hazardous substances in electrical and electronic equipment*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011L0065> (accessed 13.07.2019).
- EU, 2012. *Directive 2012/19/EU on Waste Electrical and Electronic Equipment*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:197:0038:0071:EN:PDF> (accessed 13.07.2019).
- EU, 2015. *Directive 2015/863 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015L0863> (accessed 13.07.2019).
- EU, 2018a. *Directive amending Directive 94/62/EC on packaging and packaging waste*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.150.01.0141.01.ENG&toc=OJ:L:2018:150:TOC> (accessed 13.07.2019).
- EU, 2018b. *Directive 2018/850 on the Landfill of Waste*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0850> (accessed 13.07.2019).
- EU, 2018c. *Directive 2018/851 amending Directive 2008/98/EC on waste*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.150.01.0109.01.ENG> (accessed 13.07.2019).
- EU, 2018d. *Directive 2018/853 procedural rules in the field of environmental reporting*. EUR-Lex, EU Publications Office, Brussels, Belgium. Available at: <eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018D0853> (accessed 13.07.2019).
- EUPC, 2019. *Joint workshop recyclers and substances of very high concern downstream users on the implementation of the Waste Framework Directive Database (registration details only)*. EUPC, Brussels, Belgium. Available at: <docs.google.com/forms/d/e/1FAIpQLSe65c9lX1JeJ4BM67w6c1of3sD7fkjvhpXWfRzQoXmRprGRw/viewform> (accessed 13.07.2019).
- Eurostat, 2019a. *Waste Statistics*. Eurostat, European Commission, Brussels, Belgium. Available at: <ec.europa.eu/eurostat/statistics-explained/index.php/Waste_statistics#Total_waste_generation> (accessed 09.07.2019).
- Eurostat, 2019b. *Municipal Waste*. Eurostat, European Commission, Brussels, Belgium. Available at: <ec.europa.eu/eurostat/web/waste/transboundary-waste-shipments/key-waste-streams/municipal-waste> (accessed 09.07.2019).
- Food Packaging Forum, 2019. *Limited ECHA database due to funding*. Food Packaging Forum, Zurich, Switzerland. Available at: <foodpackagingforum.org/news/limited-echa-database-due-to-funding> (accessed 16.07.2019).
- International Labour Organization (ILO), (2019). *Working on WARMER planet: The impact of heat stress on labour productivity and decent work*. International Labour Office, Geneva, Switzerland. Available at: <ilo.org/global/publications/books/WCMS_711919/lang--en/index.htm> (accessed 23.07.2019).
- UNEP, (2019). *Global Chemicals Outlook II – From Legacies to Innovative Solutions Synthesis Report*. United Nations Environmental Programme, Nairobi, Kenya. Available at <wedocs.unep.org/handle/20.500.11822/27651> (accessed 21.07.2019).
- WTO, 2019. *Technical barrier to trade*. WTO, Genève, Switzerland. Available at: <www.wto.org/english/tratop_e/tbt_e/tbt_e.htm> (accessed 19.07.2019).