FULL MATERIAL DISCLOSURE IN THE ELECTRONICS INDUSTRY: AN OVERVIEW

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ABSTRACT

The electronics industry plays a pivotal role in shaping modern society, driving technological advancements, and transforming economies. With the ever-increasing demand for electronic products, the electronics industry has observed a greater demand for transparency with regards to chemicals used in its products and process. The regulatory requirements for chemicals in electronics also continue to increase in scope and complexity. Full material disclosure (FMD) emerges as a critical concept, encompassing aspects of definition, importance, legal frameworks, and consumer disclosure. This paper provides an overview of FMD within the electronics industry, shedding light on its multidimensional significance and implications.

1. INTRODUCTION

The electronics industry, characterized by rapid innovation and global supply chains, faces significant challenges, all of which would be greatly assisted by the implementation of FMD. FMD is the practice of disclosing comprehensive information about the materials used in electronic products, from their production to disposal. This paper delves into various facets of FMD, aiming to emphasize its importance and implications.

2. DEFINITION AND IMPORTANCE OF FMD

The definition of FMD should be sharpened to remove uncertainty amongst industry. FMD specifically refers to all homogeneous materials contained within a product, including their composition and concentration, while omitting the ingredients used to manufacture the product. There are ongoing discussions on how to define homogeneous materials. REACH defines homogenous material as a material that cannot be mechanically disjointed into different materials. RoHS defines the term “homogeneous” as “of uniform composition throughout”. Examples of “homogeneous materials” are individual types of plastics, ceramics, glass, metals, alloys, paper, board, resins, and coatings. Threshold limits in full material disclosure should be allowed as this type of flexibility is presently allowed under existing regulations such as ECHA’s REACH and EPA’s TSCA reporting requirements. Threshold limits are a practical and longstanding industry practice and should be aligned with the latest science regarding impact to human health and the environment. For example, Article 33(1) of the REACH Regulation states that manufacturers and importers of articles (products) are required to notify their customers of the presence of any Substances of Very High Concern (SVHC) in their products exceeding 0.1% by weight and provide instructions on safe use of the product[1]. Lack of threshold limits would place undue burden on industry. Compounding the issue, the process of finding a chemistry used in the supply chain can take up to a year or more if the substance has never previously been tracked.

[1] https://echa.europa.eu/documents/10162/2324906/articles_en.pdf

3. LEGAL AND REGULATORY FRAMEWORKS

While a comprehensive regulatory driver for FMD is currently lacking, several FMD standards are in place, including IPC-1752A, IPC-1754, and IEC 62474. The IPC-1752A standard is a critical standard in the electronics industry, providing guidelines for material declaration in electronic products. The IPC-1752A standard was first introduced in 2006 by the Association Connecting Electronics Industries (IPC) as a means of standardizing the format and content of material declarations. The standard was later revised in 2008, and the most recent revision was in 2018. The standard has evolved over the years, incorporating changes in regulations and industry best practices. The IPC-1752 standard establishes four classes of Material Declarations. These classes are based on the level of detail provided in the declaration. The Class A declaration is the most basic level of declaration, where the supplier simply states whether their product meets a defined query list. The Class B declaration provides a higher level of material declaration, which includes information on the substances that are intentionally added to the product, as well as any substances that are known to be present above certain threshold levels. The Class C declaration provides a product-level material declaration based on the JIG-101 material list and REACH substance list. Finally, the Class D declaration provides a full material disclosure (FMD) at the homogeneous level, which means that the declaration includes information on all substances in each homogeneous material within the product[2].

IPC-1754 is focused on the Aerospace and Defense data exchange. These standard covers exchanging data on chemical substances that may be present in materials and processes used in production, operations, maintenance, repair or overhaul/refurbishment of a supplied product or sub-product. This standard applies to business-to-business transactions and is not intended to be used by the public when making purchasing decisions[3].

IEC 62474 provides an international standard for the exchange of material composition data and provides requirements for material declarations. This standard benefits the electrotechnical industry by establishing requirements for reporting of substances and materials, standardizing protocols, and facilitating transfer and processing of data. The database specifies the substances, substance groups and material classes that need to be included in material declarations to the electrical and electronics industry and its suppliers; and specifies the data format for the exchange of material declaration data to software developers[4]. IEC benefits include providing a common framework for the exchange of information promoting transparency and accountability in the supply chain, ensuring compliance with national and international regulations, and reducing the risk of non-compliance penalties and reputational damage and supports the development of sustainable and environmentally friendly products, as it encourages the use of alternative materials and the reduction of hazardous substances. One of the drawbacks of the IEC substance lists is that they do not include all information customers are currently requesting, leading to incomplete datasets. Also, IEC 62474 is only a database, not a scheme to exchange information among suppliers.

[2] https://www.ipc.org/materials-declaration-data-exchange-standards-homepage

[3] https://www.ipc.org/materials-declaration-data-exchange-standards-homepage

[4] https://std.iec.ch/iec62474

It is worth noting that ROHS substances are evaluated at the homogenous material level while REACH evaluates at an article level. Full material disclosure will extend beyond regulatory requirements, enabling a deeper understanding of environmental and social impacts, fostering transparency, enabling stakeholders to make informed decisions, facilitating sustainable design, minimizing health risks, and supporting circular economy initiatives.

4. PRODUCT DISCLOSURE

Pursuing FMD disclosure can potentially help prevent products from falling out of compliance with applicable laws and regulations such as REACH and RoHS. Chemical laws and regulations are constantly changing, and new laws are continuously being introduced. Collecting FMD enables companies to take a more proactive approach to regulatory management and helps facilitate a quicker assessment of compliance status and identification of pertinent data gaps for applicable regulations. In this line, future-proofing products through understanding complete chemistries will ensure compliance with any up-and-coming regulation. For example, the proposed EU PFAS restriction. Currently it can take months to query supply chains to determine if just one specific substance with a CAS number exists in a final product. If the substance has never been tracked, it may take up to a year. FMD offers a timely and accurate solution to these complex supply chain queries. The ability to quickly find and pull data on any product would reduce the burden on industry to understand if they are impacted by potential regulation. Further, in 2023 there are over 6,000 regulations in force concerning chemicals, with over 500 proposed .

Other industries already utilize an FMD-based solution to these queries, such as the automotive industry's IMDS system. The IMDS system requires 90 percent disclosure of components used in vehicles and their parts however data on 10 percent of components can be classified as miscellaneous or "not declared" (which can be used to protect confidential information). If electronics manufacturers provided FMD information to a similar centralized database, such a system would allow a supplier to generate data once and send it to their customers, instead of costly individual data calls.

It also encourages market competition for safer, greener products and acts as a driver for manufacturers to improve practices. For example, it has been reported that the presence of certain substances that are harmful for human health or the environment, or that prevent clean recycling, continue to hamper efforts by the EU to achieve their circular economy objectives . FMD may assist in the effort to identify and track the presence of such substances throughout the life cycle of the materials and products by ensuring information is more readily available and less burdensome to obtain.

[5] Library - C2P (compliance2product.com)

[6] https://environment.ec.europa.eu/strategy/chemicals-strategy/implementation_en

For example, the European Union's Ecodesign for Sustainable Products Regulation (ESPR) requires a wide range of requirements, including but not limited to the presence of substances that inhibit circularity, recycled content, remanufacturing and recycling, carbon and environmental footprints and information requirements, including a Digital Product Passport. The Digital Product Passport is intended to provide information about a products' environmental sustainability. This information will be easily accessible by scanning a data carrier and will include attributes such as the durability and reparability, the recycled content, or the availability of spare parts of a product. The Digital Product Passport is intended to help consumers and businesses make informed choices when purchasing products, facilitate repairs and recycling and improve transparency about products' life cycle impacts on the environment. Full material disclosure is becoming increasingly necessary as disclosure laws such as the ESPR come into effect soon.

5. CHALLENGES AND FUTURE OUTLOOK

Implementing FMD presents challenges such as complex supply chains, proprietary information protection, and the need for standardized reporting formats. However, advancements in technology, like blockchain and advanced material analytics, could facilitate more accurate and efficient FMD processes. The future may witness stricter regulations, industry collaboration, and increased consumer demand for transparency.

As new regulations and guidelines emerge, concerns remain on implementing an electronics industry focused blockchain solution or building a third-party database modeled off the automotive industry's IMDS system. Chiefly, there are concerns as to whether these systems could potentially disclose sensitive and confidential data. Companies should carefully consider what data is used within blockchain and review customized blockchain-related data protection and privacy provisions to their commercial agreements, as well as consider compliance obligations. Companies may not prefer to use a third-party database due to cost, maintenance and CBI concerns. There are additional concerns over access and data quality management, for instance, permissions for what information customers and regions can view and the use of internally developed forms create varying formats of responses without an exact response to the question, or an answer to a completely different question.

There are currently no specific regulatory drivers on full material disclosure reporting obligations in effect, leaving a lack of a broad regulatory driver. Further, there are questions on how information is gathered, via what method and what types of declarations are acceptable. For example, TSCA in the US requires a due diligence check of what is in your products where the EU's REACH requires registration of chemical substances manufactured or imported into the EU above certain quantities.

6. CONCLUSION

Full Material Disclosure is emerging as a pivotal factor in promoting transparency, sustainability, and proactive practices within the electronics industry. There remains significant debate regarding FMD's definition, which data exchange format to utilize, and how to protect confidential business information. Beyond compliance, FMD provides an opportunity for proactive future proofing of products used across the supply chain, enhanced speed of data collection and dissemination, empowering consumers, and driving innovation.

Keywords: Full Material Disclosure, electronics industry, sustainability, transparency, corporate responsibility, ESG factors, consumer protection, regulations.

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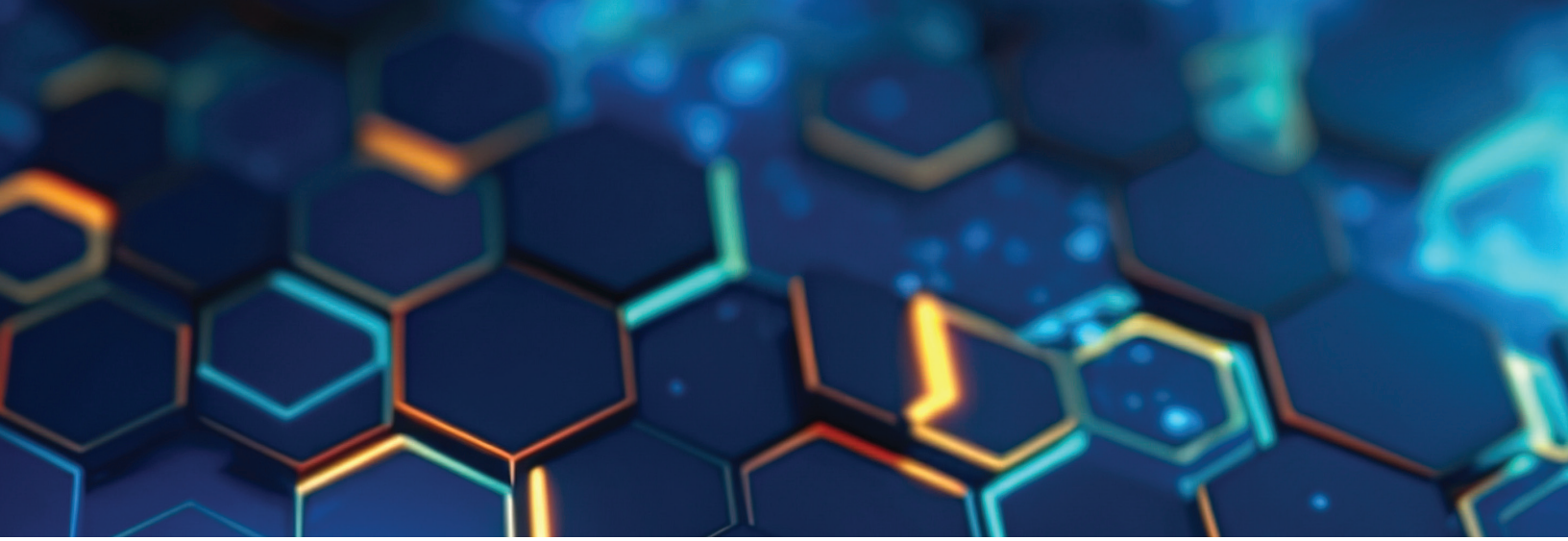

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Stephen Sweeney is an environmental sustainability professional with almost a decade of accomplishments and experience in the Federal/State government and non-profits. Stephen is responsible for IBM's global materials and chemical management program and related requirements and strategies from an environmental sustainability perspective. He holds a B.S in environmental studies and agriscience from Michigan State University and a Master's degree in public policy from American University.

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