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## RECYCLED PLASTIC IN FOOD CONTACT MATERIALS

### - Policy Report by Safe Food Advocacy Europe -

Food contact materials (FCMs) are defined as all the materials and articles that are intended to be put into contact with food and beverages or will presumably be in contact with food or beverages<sup>1</sup>. They include food packaging, kitchen equipment, tableware, machinery used in processing food, and objects that are used to transport food. These items can be made from a variety of materials including plastics, rubber, paper, and metal.

Numerous concerns have been raised regarding the health risks FCMs might pose for consumers during exposure, as well as the efficiency of EU legislation in ensuring the safety of these materials. Among them, SAFE focuses on the emerging high-risk issue of the increasing use of recycled plastics in FCMs, which could negatively affect human health through the migration of harmful chemical substances, integrated before and/or during recycling processes, from FCMs into food.

Drawing attention to health risks associated with recycled plastics in FCMs and the shortcomings of relevant legislation, SAFE would like to urge the European Commission to use the upcoming FCMs Regulations revision to ensure European consumers' health.

The policy report is produced within SAFE's working area of food packaging, financially supported by LIFE Programme, aiming to advocate for better food packaging that is able to reduce its environmental impacts and maintain consumers health at the core of the decision-making process.

### 1. RECYCLED PLASTICS IN FCMs: A CURRENT AND INCREASING HIGH-RISK ISSUE

Recycled plastics can be defined as plastic packaging that has passed through a mechanical recycling process which includes cleaning, grinding, re-melting, and re-granulating steps. Recycled plastics may also come from chemical recycling processes, consisting of depolymerised plastics into monomers which are subsequently used for re-polymerisation of virgin-like material<sup>2</sup>.

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<sup>1</sup> Regulation (EC) 1935/2004 of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109/EEC, art.1 (2): "This Regulation shall apply to materials and articles, including active and intelligent food contact materials and articles, (hereinafter referred to as materials and articles) which in their finished state:

(a) are intended to be brought into contact with food; or

(b) are already in contact with food and were intended for that purpose; or

(c) can reasonably be expected to be brought into contact with food or to transfer their constituents to food under normal or foreseeable conditions of use".

<sup>2</sup> Guecke, B., Groh, K., & Muncke, J. (2018). Food packaging in the circular economy: Overview of chemical safety aspects for commonly used materials. *Journal of Cleaner Production*, 193, 491-505

SAFE considers the use of recycled plastics in FCMs to be a high-risk issue in food safety for two main reasons:

- (1) the higher possibility of hazardous substances migration from FCMs containing recycled plastics into food; and
- (2) the increasing exposure of consumers to recycled plastics in FCMs nowadays.

### **1.1. Higher possibility of hazardous substances migration into food**

Statistics show that there are over 12,000 distinct chemical substances intentionally used in FCMs<sup>3</sup>, not to mention the unknown and non-intentionally added ones. These chemicals, including hazardous ones classified as carcinogenic substances and/or Endocrine Disruptors, can transfer from FCMs into food, representing an important health issue that cannot be ignored. Endocrine Disruptors such as phthalates, adipates, styrene or bisphenol A, to name only a few, are often present in plastic containers and can migrate into food. According to experts, these substances are increasingly believed to be key factors contributing to the ever-growing number of citizens suffering from type 2 diabetes, obesity, reproduction troubles, and some kinds of cancer.

Hazardous substances are more likely to be present in recycled plastics than in virgin plastics. It is the result of contamination due to previous misuses by consumers, cross-contamination from waste disposal and environmental contaminants, as well as faulty sorting systems allowing materials that are prohibited from being recycled into FCM such as Waste Electric and Electronic Equipment (WEEE) to enter recycling processes. Moreover, various groups of contaminants which are unintentional by-products formed during the synthesis, use and recycling of polymers have been often reported, namely oligomers, chemicals from non-food grade plastics, additives and their degradation products<sup>4</sup>.

These contaminants, including Endocrine Disruptors such as phthalates, antimony, bisphenol A, etc., are present in recycled plastic FCMs at higher levels compared to the virgin ones, as studies reveal<sup>5</sup>. An investigation of recycled polyethylene terephthalate (PET) packaging submitted to cleaning processes for recycling into FCMs detects migration of non-volatile and inorganic residual compounds (i.e. silicon, calcium, sodium, iron, magnesium, aluminium, zinc), which are contaminants not allowed in EU Regulations, even in deep cleaning samples<sup>6</sup>.

The exposure of hazardous substances to humans is of great concern from a human health perspective. A risk of “cocktail-effect” may arise on account of the simultaneous exposure to

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<sup>3</sup> Groh K, Geueke B, Muncke J. FCCdb: Food Contact Chemicals database. <https://doi.org/10.5281/zenodo.3240108>. Zenodo; 2020.

<sup>4</sup> Geueke, B., Groh, K., & Muncke, J. (2018).

<sup>5</sup> For example, see:

Dreolin et al. (2018). Development and validation of a LC-MS/MS method for the analysis of bisphenol a in polyethylene terephthalate. *Food Chemistry*, 274(2019): 246–253.

Keresztes et al. (2013). Study on the leaching of phthalates from polyethylene terephthalate bottles into mineral water. *Science of the Total Environment*, 458–460(2013): 451–458.

Lee, J., Pedersen, A. B., & Thomsen, M. (2014). The influence of resource strategies on childhood phthalate exposure—The role of REACH in a zero waste society. *Environment International*, 73, 312–322.

<sup>6</sup> Dutra et al. (2014). Migration of Residual Nonvolatile and Inorganic Compounds from Recycled Post-Consumer PET and HDPE. *Journal of the Brazilian Chemical Society*, 25(4): 686–696.

different substances through FCMs and the lack of research concerning the effect of chemical mixtures on human health.

Equally important, several studies indicate that **the migration level of those substances into food is even higher with recycled plastic**. For instance, a comparative study on recycled and virgin polystyrene used in FCMs manufacturing shows a higher volume of chemical leakage into the vegetable oil that in contact with recycled polystyrene compared to the virgin one<sup>7</sup>. Another study assessing the safety of (multiple-)recycled high-density polyethylene (HDPE) and polypropylene (PP) FCMs finds increasing migration rates of some additives during repeated recycling<sup>8</sup>.

## 1.2. Increasing exposure of consumers to recycled plastics in FCMs

Nowadays, consumers tend to prefer food that is in contact with recycled materials, whether for its preservation, preparation, transportation, distribution or use. This tendency is further promoted by the European Green Deal, the new Circular Economy Action Plan, and the Plastic Strategy which are encouraging the use of recycled plastic for food packaging, such as the Single-Use Plastics Directive adopted by the European Parliament in 2019.

Namely, under the European Strategy for Plastics in a Circular Economy framework, the Commission is committed to swiftly finalise the authorisation procedures for over a hundred safe recycling processes<sup>9</sup>. Furthermore, ambitious targets have been set out in the Single-Use Plastics Directive. These targets include that each Member State would ensure a minimum collection rate for recycling of single-use plastic beverage bottles of 77% from 2025 and 90% from 2029<sup>10</sup> as well as at least 25% recycled content for beverage bottles from 2025 and 30% from 2030<sup>11</sup>.

Within the framework of the circular economy, the demand for recycled plastics, and more generally, recycled food packaging, will be growing which will lead to increased exposure to harmful chemicals found in recycled containers. Given the health risks posed by recycled plastics in FCMs, SAFE believes that it is of utmost importance to strengthen EU legislation on FCMs to ensure achieving a circular economy without trading off consumers' health.

## 2. CURRENT EU LEGISLATION ON RECYCLED PLASTICS IN FCMs

FCMs are regulated at EU level by the **Regulation (EC) 1935/2004 of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives**

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<sup>7</sup> Kanwal et al. (2007). FT-IR analysis of recycled polystyrene for food packaging. Journal – Chemical Society of Pakistan, 29(3): 239–242.

<sup>8</sup> Coulier et al. (2007). Analytical protocol to study the food safety of (multiple-)recycled high-density polyethylene (HDPE) and polypropylene (PP) crates: influence of recycling on the migration and formation of degradation products. Polymer Degradation and Stability, 92(11): 2016–2025.

<sup>9</sup> COM/2018/028 final: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - A European Strategy for Plastics in a Circular Economy

<sup>10</sup> Article 9(1) Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment.

<sup>11</sup> Article 6(5) Directive (EU) 2019/904.

**80/590/EEC and 89/109/EEC**, which defines FCMs in its scope (see footnote 1 of this paper), and lays down general safety requirements for all FCMs. Accordingly, to be considered as safe for consumers, FCMs must “be manufactured in compliance with good manufacturing practices”, so that any potential transfer to foods does not raise safety concerns, change the composition of the food in an unacceptable way or have adverse effects on the taste and/or the odour of foods<sup>12</sup>.

Plastics and recycled plastics are among a few materials which are regulated by specific EU measures in addition to the general regulation mentioned above. **Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food**, dedicated to regulating virgin plastics in FCMs, sets out a positive list of substances that are authorised to be intentionally used in the manufacture of plastic FCMs<sup>13</sup>. It also sets an Overall Migration Limit (OML) of 60mg/kg food, or 10 mg/dm<sup>2</sup> of the contact material for the migration to a food of all substances together, in addition to the Specific Migration Limit (SML) for individual authorised substances<sup>14</sup>. These substances are authorised basing on the opinion of European Food Safety Authority (EFSA) that evaluate whether they meet the requirements for FCMs set out in Article 3 and 4 Regulation (EC) 1935/2004<sup>15</sup>.

Meanwhile, recycled plastics are regulated by **Commission Regulation (EC) No 282/2008 of 27 March 2008 on recycled plastic materials and articles intended to come into contact with foods and amending Regulation (EC) No 2023/2006**. Accordingly, recycled plastics used in FCMs should only be obtained from recycling processes which have been assessed for safety by EFSA and authorised by the European Commission<sup>1617</sup>.

### 3. SHORTCOMINGS IN CURRENT EU LEGISLATION ON RECYCLED PLASTICS IN FCMs

Even though plastic recycling used for FCMs is regulated rather strictly in the EU, the health risks associated with recycled plastic FCMs indicate the need for improved legislation in order to better protect consumers’ health. With this policy report, SAFE would like to elaborate on four main shortcomings in the EU regulations on recycled plastic FCMs, including:

- (1) the lack of attention on final articles,
- (2) ineffective enforcement and implementation,
- (3) the lack of scientific and political scrutiny in the risk assessment procedure,
- (4) the lack of mechanisms to control Endocrine Disruptors in FCMs.

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<sup>12</sup> Article 3(1) Regulation (EC) 1935/2004.

<sup>13</sup> Article 5 Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food.

<sup>14</sup> Article 11-12 Regulation (EU) 10/2011.

<sup>15</sup> Article 7-11 Regulation (EC) 1935/2004.

<sup>16</sup> Article 3 Regulation (EC) 282/2008.

<sup>17</sup> EFSA evaluates these recycling processes to ensure they meet all the conditions for authorisation established in Article 4 Regulation (EC) 282/2008, requiring that (1) final recycled plastic FCMs must comply with Article 3 Regulation (EC) 1935/2004, (2) recycling input must originate from materials produced in accordance with criteria for food-grade plastics set out in Regulation (EU) 10/2011, and (3) recycling process must be demonstrated to be able to sufficiently reduce any contamination of plastic recycling input.

### 3.1. Lack of attention on final articles

**One of the primary shortcomings of current regulations on recycled plastic in FCMs is that they focus solely on starting substances and recycling process with not much attention paid to the final articles.** Like that, the complexity of non-intentionally added substances (NIAS), including external contaminants as well as by-products of reaction and degradation occurred during manufacturing, use, waste management, and recycling processes, which are present in final materials and articles, are largely neglected.

The presence of these NIAS pose a challenge to assessing the safety of the finished materials, because it is not always possible to identify NIAS since many of them are uncharacterized impurities and by-products, and also unpredictable from the known starting substances<sup>18</sup>. In recycled plastics, NIAS even reach higher levels of complexity on account of the materials intended for recycling that may contain intrinsic contaminants such as dyes, additives, and their degradation products. Thus, the presence of NIAS should be systematically monitored in recycled FCMs.

Furthermore, recycled plastic FCMs may be degraded with a greater number of chemicals that are accumulated when materials are recycled several times. Previous use and misuse of plastic packaging may also contribute to the presence of unwanted and unexpected contaminants, and non-food grade materials may enter the recycling stream<sup>19</sup>. Also, many types of plastics absorb chemicals during waste management which are difficult to remove during the recycling process. Introduce sorting systems that separate FCM from non-food grade plastics represents a challenge.

Therefore, risk assessments of the recycling input and processes are clearly insufficient to ensure the safety of the final materials and articles.

### 3.2. Ineffective enforcement and implementation

**Another limitation of the existing legislation concerns its efficiency in ensuring compliance.** The current mechanism relies on self-declaration of compliance and official control. While converters must provide a written declaration that only recycled plastics obtained from authorised recycling processes are used, recyclers must declare that their recycling processes are authorised, authorising conditions are met, and a quality assurance system is in place<sup>20</sup>. However, this mechanism of enforcement has proved to be weak, as discussions convey. Official control, which is carried out by Member States' Competent Authorities, are said to be ineffective due to lack of expertise and necessary guidance, to name but a few<sup>21</sup>.

Some studies indicate that weak enforcement may have resulted in the deliberate recycling of non-food plastics into new food packaging. One of these studies analyses ten black polymeric food-

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<sup>18</sup> Muncke et. Al. (2017). Scientific challenges in the risk assessment of food contact materials. Environmental Health Perspectives (Online), 125(9) doi: dx.doi.org.ez.statsbiblioteket.dk:2048/10.1289/EHP644

<sup>19</sup> Geueke et al. (2018).

<sup>20</sup> Article 12 Regulation (EC) 282/2008.

<sup>21</sup> European Commission. (2019). BTSF Workshop on Food Contact Materials.

[https://ec.europa.eu/food/sites/food/files/safety/docs/cs\\_fcm\\_eval\\_btsf\\_20190604\\_controls-sum.pdf](https://ec.europa.eu/food/sites/food/files/safety/docs/cs_fcm_eval_btsf_20190604_controls-sum.pdf)

contact articles purchased on the European market<sup>22</sup>. The results show 7 out of 10 samples contained a bromine level exceeding the authorized one and typical elements present in Waste Electric and Electronic Equipment were detected either at trace level or at elevated concentrations. Brominated samples containing flame retardants are regularly found in plastic items intended for FCMs, which is a clear indication that waste electric and electronic equipment has been used in the recycling process, which is prohibited.

Another study analyses a range of plastic consumer products (i.e. coffee stirrers, thermo cup lids)<sup>23</sup>. Bromine is detected in 18% of 789 analyses performed on non-electronic samples. Strengthened enforcement as well as better sorting system are necessary to improve this situation.

### **3.3. Lack of scientific and political scrutiny in the risk assessment procedure**

The third shortcoming SAFE would like to elaborate on here is associated with **the risk assessment procedure by EFSA to evaluate the safety of starting substances and recycling processes**. The current FCMs legislation does not allow nor encourage the participation of independent researchers and institutions to scientifically review the data submitted. Therefore, to ensure transparency and objectivity of the risk assessment procedure, SAFE believes that the collaboration with independent research centres to conduct the risk assessment is necessary, and the related data should also be collected by an independent organisation, not by the industry applying for the approval of the recycling process.

Moreover, the Commission wants to use a fast-track approval procedure for some 140 recycling processes for recycled plastic in FCMs, which means that the Parliament and Council will not have the opportunity to scrutinise the decisions before they are adopted. SAFE is highly concerned that this swift move may lead to potential improper evaluation and authorisation of recycling processes which may hamper consumers' health.

### **3.4. Lack of mechanisms to control Endocrine Disruptors in FCMs.**

Endocrine disruptors (EDs), known as substances that interfere with humans' hormonal systems, are inherent to food contamination as they are present in everyday substances, from foodstuffs' packaging to pesticides. The list of EDs that were found in FCMs includes a variety of chemicals such as phthalates, adipates and Bisphenol-A. In particular, the latter was identified by the European Chemical Agency as a substance of very high concern due to its adverse effects on the human and animal reproductive system.

EDs are considered as FCMs that can cause adverse effects on human health. As a matter of fact, a recent statement, written by a group of 33 eminent scientists and based on more than 1,200 peer-reviewed studies, raised the issue of the hazardous effects of endocrine-disrupting chemicals

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<sup>22</sup> Yu, G., Bu, Q., Cao, Z., Du, X., Xia, J., Wu, M., & Huang, J. (2016). Brominated flame retardants (BFRs): A review on environmental contamination in China. *Chemosphere*, 150, 479-490.

<sup>23</sup> Turner, A., & Filella, M. (2017). Bromine in plastic consumer products – Evidence for the widespread recycling of electronic waste. *Science of The Total Environment*, 601-602, 374-379.

found in FCMs<sup>24</sup>. Indeed, chemicals migrating into food are not subject to any ED effects' assessment.

However, low levels of exposure to some chemicals - that might be EDs - are not tested because exposures to them are considered to be below the toxicologically established no-effect level. These above-explained loopholes in the current FCMs Regulation should be considered to set up a new assessment process to ensure that FCMs do not contain any endocrine disruptors.

We fully support the European Parliament, which in its [resolution of 15 January 2020](#) on the European Green Deal, "calls for an ambitious legislative proposal by June 2020 to tackle endocrine disruptors, especially in cosmetics, toys and FCMs, and an action plan that provides a comprehensive framework with targets and deadlines to minimise citizens' exposure to endocrine-disrupting chemicals (EDCs)".

## RECOMMENDATIONS AND CONCLUSIONS

Considering the potential health risks associated with recycled plastics in FCMs together with the increasing exposure of consumers to recycled plastic FCMs as a result of the push for a greener and sustainable lifestyle, SAFE would like to highlight the need for recognising recycled plastics in FCM as a high-risk issue to be addressed.

While we highly appreciate the Commission's efforts in approaching a new Circular Economy Action Plan, we call the attention for the importance of a great concern towards the presence of non-intentionally added substances (NIAS) in recycled plastic FCMs, as well as the risk of cocktail effects when consumers are exposed to multiple substances simultaneously. Thus, SAFE would hope the current legislative review will address the issues of NIAS and cocktail effects associated with recycled plastic FCMs.

Addressing the four main shortcomings of the current EU legislation on recycled plastic in FCMs sketched out above, SAFE would propose the following recommendations for the adequate protection of consumers' health:

- **A novel approach to FCMs risk assessments that focuses also on final materials and articles should be developed**, rather than solely on the starting substances and the recycling process.
- **A deeper harmonisation is required in enforcement controls of the recycling processes.** SAFE believes better framework rules, helping Member States to perform regular monitoring and *in situ* controls more efficiently as well as ensuring that they have the necessary staff trained to do such controls, will result in safer food for consumers.
- Regulations should be revised to **encourage and give space to independent research centres to participate in the data collection and safety evaluation processes**, in order to ensure objective and non-bias assessments.

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<sup>24</sup> Muncke, J., Andersson, AM., Backhaus, T. et al. (2020) Impacts of food contact chemicals on human health: a consensus statement. *Environ Health* 19: 25.

- **A novel assessment process should be developed to ensure that FCMs do not contain endocrine disruptors.**

Revising the FCMs legislation is essential to provide a safe and healthy legal framework that would be applied uniformly and with high standards in all EU Member States to guarantee maximum protection of European citizens' food, health, and environment. Besides strengthening regulations on recycled plastics in FCMs, SAFE advocate for policies that promote FCMs alternatives to recycled plastics that are eco-friendly and safer for consumers, i.e. glass and steel, as well as food packaging alternatives such as safe reusable containers and bulk retail sales.