PLASTIC PATHWAYS: THE DISCURSIVE REPRESENTATIONS OF PLASTICS ECONOMY IN FINNISH MEDIA

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ABSTRACT

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Abstract

The linear plastics economy calls for a transformational change due to its consequent environmental impacts. This study examines the representations of the plastics economy in the Finnish news media to identify the discourses framing its pathway to improved sustainability and mirrors the findings to socio-technical transitional theory. The news framed plastics as a problem due to the waste generation due to plastics consumption and the atmospheric emissions due to the fossil raw material of plastics. The identified dominant circular economy discourse addressing these problems consisted of the *recycling*, *improving waste management*, *replacement*, *reduction of consumption and production* and *reuse* sub-discourses. The identified sub-discourses were mutually inconsistent and conflicted with the circular economy principles, signaling a lack of established understanding of the concept. Furthermore, the dominant, mainly unchallenged circular economy discourse represents mostly incremental changes to the established plastics economy, treating the systemic symptoms of waste and emissions over the underlaying cause of consumption. Thus, the discourse is reproducing the regime lock-ins of efficiency and economic growth. Based on the results and the complexity of the plastics problem, a more holistic approach needs to be emphasized to transition towards a more sustainable plastics economy.

Keywords
plastic, plastics economy, circular economy, sustainability transition, discourse

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Tiivistelmä

Lineaariselle muovitaloudelle vaaditaan muutosta siitä johtuvien ympäristövaikutusten vuoksi. Tässä tutkielmassa tutkitaan muovitalouden diskursiivisia ilmentymiä suomalaisessa uutismediassa, tarkoituksena tunnistaa kestävämpää muovitaloutta muotoilevat diskurssit peilaten niitä sosiotekniseen transitioteoriaan. Uutiset kehystivät muovit ongelmalliseksi niiden kulutuksesta johtuvan jätetuotannon ja niiden fossiilisesta raaka-aineesta johtuvien ilmastopäästöjen vuoksi. Näihin ongelmiin vastaamaan tunnistettiin aineistosta hallitseva kiertotalousdiskurssi, joka koostui *kierrätys-*, *jätehuollon parantaminen-*, *korvaaminen-*, *kulutuksen ja tuotannon vähentäminen-* ja *uudelleenkäyttö* -aladiskursseista. Tunnistetut aladiskurssit olivat keskenään epäjohdonmukaisia sekä ristiriidassa kiertotalousperiaatteiden kanssa, viestien kiertotalouskäsitteen vakiintumattomuudesta. Sen lisäksi, hallitseva ja lähes haastamaton kiertotalousdiskurssi edustaa lähinnä vähittäisiä muutoksia vakiintuneeseen muovitalouteen, keskittyen järjestelmän jäte- ja päästöoireisiin pohjimmaisen kulutusongelman sijaan. Siten kiertotalousdiskurssi toisintaa regiimin lukkiutuneita tehokkuuden ja talouskasvun oletusarvoja. Tulosten ja muoviongelman monimutkaisuuden perusteella on syytä korostaa kokonaisvaltaisempaa lähestymistapaa muovitaloudelle kestävämpää järjestelmää kehittäessä.

Asiasanat
muovi, muovitalous, kiertotalous, kestävyystransitio, diskurssi

Säilytyspaikka
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Contents

List of figures

1 INTRODUCTION

In an era of increased consumption and constantly more tangibly finite resources, a fundamental change is required regarding our economic system (Ellen MacArthur Foundation, 2013). Transitions, described by Mulder (2007), are the most fundamental forms of change, and the kind of change required for a sustainable future. Sustainability transition calls for sustainable technology: technology, that does not exhaust finite resources, that uses renewable resources in a volume enabling planetary recovery and does not contribute to social inequity (Mulder, 2007).

The plastics economy, in its current state of production and consumption, does not operate according to the principles of sustainable technology. The term plastics economy is adopted from the Ellen Macarthur Foundation (2016) report *The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action*, in which it was used to describe the entire material flow of plastics within the economic system, including their production and consumption. Plastics are used in a vast number of applications due to their practical qualities of low weight, durability, and hygiene (Leal Filho et al., 2019). The practicality has led to the rapid growth in global plastic use over the past decades, and the consumption is predicted to double in the decades to come (Ellen MacArthur Foundation, 2016). The significance of plastic as a material is further emphasized by Geyer et al. (2017), who estimate that the cumulation of plastics production has surpassed all other manmade materials. Since the regime life cycle for plastic products has so far been short and linear, it has contributed to a multitude of economic and environmental problems (Ellen MacArthur Foundation, 2016).

Plastics are tightly connected to the fossil fuel industry contributing to greenhouse gas emissions, as most plastics are produced with non-renewable resources, such as natural gas or oil (Leal Filho et al., 2019; Ellen MacArthur Foundation, 2016). Plastic products, due to their short lifespan, typically undergo a rapid transformation from fossil feedstock to discardable waste (Mulder, 2007). Mismanaged plastic waste has been studied to cause contamination that has environmentally adverse effects, such as harm to wildlife, soil and waterways (Chen et al., 2020: Greene, 2014). Regardless of the negative impacts of plastics being increasingly acknowledged, consumption has continued to increase (Heidbreder et al., 2019). Nevertheless, the policies generated to address the issues (Ellen MacArthur Foundation, 2017; European Commission, 2018; Ministry of the Environment, n.d.) share the view that the need for plastics in modern societies is unquestionable. The current plastics economy is a major sustainability challenge that calls for a transformational change.

The most recurrent solution suggested in the literature to close the sustainability gap of plastics both in policy and scientific literature is transitioning into a circular economy (e.g. Hohn et al., 2020; Vanapalli et al. 2020; Getor et al., 2020; Leal Filho et al., 2019). The current plastic initiatives and policies point also towards the direction of circular economy transition, on global (Ellen MacArthur

Foundation, 2016), EU- (European Commission, 2018) and national (Ministry of the Environment) level. In brief, circular economy is an industrial system operating on bio-based consumables, reusable durables, and renewable energy, preventing the leakage of resources outside the economic system by eliminating waste (Ellen MacArthur Foundation, 2013). The circular economy solutions that the initiatives and policies have presented are improving plastic recycling, replacement with plastics made from renewable materials, and reducing the plastic waste at source by eliminating single-use plastics. Nevertheless, the circular economy of plastics production and consumption does not appear unproblematic: issues related include the financial inferiority of recycled plastics compared to virgin plastics (European Commission, 2018), the inferiority of resource-efficiency of organic replacement materials compared to fossil feedstocks (Kohvakka & Lehtinen, 2019) and the relative sustainability of the bio-based replacement varieties in a life cycle assessment (Chen et al., 2020; Kakadellis & Harris, 2020). Moreover, Nielsen et al. (2019) suggest that the focus on plastics might be a low-hanging fruit to address for governments in the place of more significant sustainability issues.

The scholarly interest in plastics, especially towards the end of their life cycle, has increased in recent years (Nielsen et al., 2019; Johansen et al. 2021). According to Nielsen et al. (2019), the scholarly articles on plastic production have so far focused on the raw materials; on the consumption of specific plastics applications; on recycling and improving waste management; and on plastic pollution, especially in the marine environment. According to the literature review by Heidbreder et al. (2019), the existing social-scientific literature on plastics has concentrated on risk awareness, consumer preferences, consumption, and discarding habits and solutions via behavioral change, focusing on recycling behavior and certain plastics products. Although several literature reviews on plastics studies have been conducted (Dijkstra 2020; Heidbreder et al., 2019; Nielsen et al., 2019) no studies, to the best of my knowledge, have been conducted on the media discourses of the sustainability transition of the plastics economy. Moreover, Heidbreder et al. (2019) note the lack of study about media presence, to which this study aims to contribute.

According to Park and Kleinschmidt (2016), media not only conveys messages but has a broader influence on societal issues, such as environmental awareness. Media can dominate the representation of phenomena, both through topic framing and enabling or disabling visibility (Park & Kleinschmidt, 2016). In this study, I aim to examine the representation of the sustainability transition of the plastics economy in the Finnish news media via discourse analysis. Not only is the Finnish news media interesting due to its inconsistent reporting on plastics (Kohvakka & Lehtinen, 2019), but also due to the aim of objectivity of the news format, which makes the news an ideal platform to examine plastic discourses. In other words, as the news is bound to report the 'truth' and 'reality', the constructivist discourse analysis enables to address the kind of discourses regarded as the objective truth related to plastics economy and its transition towards sustainability.

Research aim and research questions

The research task is to examine Finnish news articles covering plastics in the process of sustainability transition, including their production, consumption, recycling, and replacement via constructivist Foucauldian discourse analysis. The presumed final product of the study is identified discourses and their mutual relations related to the sustainability transition of the plastics economy. Furthermore, the identification of discourses potentially excluded from the news representations may further contribute to the identification of the dominant discourse, the 'objective truth'. This study by no means attempts to implicate what form of the plastics economy would be optimal regarding the sustainability transition: instead, I aim to identify what kind discourses the media constructs for the sustainability transition of the plastics economy. The examination of the reported phenomena will contribute to the understanding of the sustainability transition of the plastics economy in the context of socio-technical change. The identified discourses will presumably provide information on what kind of "reality" of the future of the plastics economy the Finnish news media discourses construct and how the transition is considered to take place. Furthermore, the identified discourses can potentially present which stakeholders are considered to take part in the transition and how.

Due to the current policies and the well-established position of the circular economy framework in the field of plastics related research, it is presumed that the dominant framing regarding the sustainability transition of the plastics economy is the circular economy model. This presumption is why a more detailed look at the discourses related to circular economy transition should be cast, to establish how the news discourses of plastic position within the circular economy framework and principles.

The guiding research questions of this study are

- **Which discourses related to the sustainability transition of the plastics economy can be identified within the Finnish news media?**
- **How are the discourses positioned regarding one another?**
- **Which discourses are underrepresented or completely unrepresented?**
- **How do the identified discourses compare with the circular economy principles?**

Based on the analysis, the potential societal impacts of the distinguished discourses can be discussed, mirroring the results to socio-technical transition theory. Taylor (2001b) suggests that the discourse analysis can be influential either by suggesting improvements or by providing critique to the prevailing sys-

tem. The aim of this study is to provide research results relevant in a wider cultural context, to produce results that would contribute to the awareness on how the sustainability transition of the plastics economy is framed to occur in Finland.

The paper will start with the examination of the current state of the plastics economy, emphasizing the viewpoint of sustainability. Thereafter, chapter 3 will discuss socio-technical transitions in general and the circular economy framework as a transition pathway towards sustainability. The following chapter explains the research method of discourse analysis and the execution of the study. Chapter 5 presents the results of the discourse analysis, after which the results will be reflected to the relevant literature. The paper will end at the concluding remarks.

2 THE PLASTICS ECONOMY

This chapter discusses the sustainability issues related to the current, linear plastics economy. Thereafter the most common solutions for the sustainability issues presented in the literature are discussed.

2.1 Sustainability limitations of the linear plastics economy

When talking about plastics, one is actually talking about a great variety of chemical compounds. The ISO 427:2013 standard, which is dedicated to defining the terminology around plastics, defines plastic as follows: "material which contains as an essential ingredient a high polymer and which, at some stage in its processing into finished products, can be shaped by flow" (ISO 427:2013).

The most tangible sustainability issue regarding plastics is the plastic pollution in the natural environment that is a consequence of the vast, short-lived use of plastic items. The main issue of plastics is the short life cycle of the material: single-use plastics, plastics that are designed to be used only once, represent approximately half of all the plastics produced, and they are mostly used in packaging (Chen et al., 2020). It has been estimated that the majority of the 8,3 billion tons of plastics made until 2015 is currently ended up as waste in landfills or the environment (Kohvakka & Lehtinen, 2019; Geyer et al., 2017). Incineration has been the faith of 8-12 % of all plastics and recycling of 6-9 % (Kohvakka & Lehtinen, 2019; Geyer et al., 2017; Chen et al., 2020), with Kohvakka and Lehtinen (2019) estimating that a bit less than a third of all plastic made would still be in use. The volume of discarded plastics is the main contribution to the plastics pollution issue: Rhein and Schmid (2020) state that the current waste and recycling infrastructure is not capable of processing the end-of-use plastics as fast as it is generated.

Mismanaged plastic waste causes environmental contamination that has adverse effects on wildlife, soil, and waterways, damaging animals, decreasing soil productivity and intensification of toxins, posing a risk to biodiversity and potentially to human health through toxin cumulation in food chains (Chen et al., 2020: Greene, 2014). Plastic waste breaks down extremely slowly in natural conditions and remains in the environment as less than 5mm particles, microplastics (SAPEA, 2019 (as cited in Henderson & Green, 2020). Microplastics and their potential impacts on health have recently received more scholarly attention (Henderson & Green, 2020).

Moreover, plastics are tightly connected with the fossil fuel economy, as most plastics are produced with non-renewable resources, such as natural gas or oil (Leal Filho et al., 2019; Ellen MacArthur Foundation, 2016). Approximately 6 % of the total oil production is used to satisfy the global plastics need, and the percent, as well as the plastics-related emissions, are predicted to rise considering

the vast increase in plastics use (Ellen MacArthur Foundation, 2016). Atmospheric emissions are caused both by plastics manufacturing as well as the incineration and landfilling of plastics, although some of the gases produced in the waste treatment can be harvested for energy production (Greene, 2014). The plastics issue is hardly one-sided: according to Kohvakka and Lehtinen (2019) plastics are on many occasions a more sustainable material option than many other, organic materials due to their high resource-efficiency.

2.2 The replacement, recycling and reduction of plastics and plastic waste

Although plastics have been studied to be considered environmentally unfriendly and the impacts of the current plastics economy widely known, it is still preferred due to its practical qualities (Rhein and Schmid, 2020; Heidbreder et al., 2019). The results of behavioral studies towards plastics on both organizational (Khan et al., 2020) and individual (Escario et al., 2020) levels suggest that although the recycling of plastics has been incorporated successfully in the attitudes, the reducing and reusing features, key features of commonly presented circular economy, are not as well adopted. Moreover, Heidbreder et al. (2019) pointed out that the existing plastic research emphasized recycling behavior rather than reducing or avoidance, which implicates that the research focus so far has been to functionalize the circularity of the material rather than reducing or removing plastics from use.

In addition to the reduce, reuse and recycle actions typical to the circular economy framework (Johansen et al., 2022), the replacement of plastics is one of the more frequently presented solution for the plastics-related issues. The replacement of plastics is not straightforward: for example, Evans et al. (2020) argued against the incremental replacement of plastics with other materials as well as giving up plastics altogether, explaining that these approaches lack the subtlety to address the underlying problem. This is also echoed by the EU strategy of plastics (European Commission, 2018), which stated that modern life without plastics is highly unimaginable.

One of the sustainability improvements suggested for plastics as a material is decoupling its production from finite raw materials. The decoupling from fossil feedstocks requires either innovation in biomass feedstocks or in generating plastics from atmospheric greenhouse gases (Ellen MacArthur Foundation, 2016). Chen and Yan (2019) define renewable plastics to be both made of bio-based materials and biodegradable. As Chen and Yan (2019) state, bioplastics are not necessarily biodegradable and biodegradable plastics are not necessarily made of biomass. The separation between the terms is significant, but the results of the Zwicker et al. (2020) study implicate that people are not aware of the difference.

The biodegradation of plastics is globally standardized (ISO 14855-2:2018), defining that the plastic must convert to carbon dioxide, water, and biomass in certain conditions within a specified timespan (Greene, 2014).

Although Zwicker et al. (2020) found that people generally thought more positively about bio-based plastics than the fossil-based variety, Kohvakka and Lehtinen (2019) argued against the replacement with bio-based and biodegradable materials due to their inferior resource-efficiency and the eventual breakdown as microplastics. Moreover, Kakadellis and Harris's (2020) study results pointed out there are trade-offs between the environmental impacts of biodegradable and conventional plastics and suggested that biodegradable plastics should be used in situations in which the conventional plastics cannot be properly recycled. The issue of bio-based and biodegradable plastics is still minor since in 2018 bioplastic production represented less than 1% of total plastic production (Chen & Yan, 2019). Nevertheless, the Ellen MacArthur Foundation (2016) report suggests that some level of leakage of plastic waste into the natural environment is inevitable, and thus plastics should be designed bio-benign, as to not cause environmental damage.

As the replacement with renewable plastics is still under development, another commonly presented solution is to recycle the oil-based plastics currently in circulation. However, recycling is not without problems either: recycled plastics are currently not as cost-efficient as their virgin variety and the quality of the recycled plastic is not as homogenous as the virgin one due to the multitude of polymers in circulation (Getor et al., 2020; Kohvakka & Lehtinen, 2019). Plastics can be recycled either by mechanically reprocessing or chemically by retrieving the chemicals producing polymers (Greene, 2014), and the recycled polymers can be mixed with virgin plastics (Getor et al., 2020). The sourcing of recyclable material is troublesome already at the sorting level: both municipal and industrial waste separation infrastructure is not efficient enough, in addition to the lack of incentives for separation (Järvinen & Saarinen, 2016). Ellen MacArthur Foundation (2016) estimated that 5% of the material value of the end-of-life plastics are retained for further use, and often reprocessed into lower-value products. Major recycling barriers for plastics in Europe are the low demand, uncompetitive prices, and the uncertain market conditions for recycled plastics (Leal Filho et al., 2019). The European Commission (2018) estimated that approximately 6 % of the total European plastics demand is covered by recycled plastics. Regardless, the EU strategy for plastics includes boosting the markets for recycled plastics via integrating and optimizing the recycling of plastics.

As plastics are most often problematized in the context of plastic waste pollution, a brief overlook should be cast on waste generation and management. The modern waste management infrastructure has developed into an efficient system that individuals do not have to co-live with the waste they produce (Valkonen et al., 2019), which has inevitably contributed to the development of single-use plastics. Recently the concept of waste has entered the public discussion, in the context of which its existence is trying to be ceased via the circulation of materials along with the circular economy principles (Valkonen et al., 2019).

Similarly as Nielsen et al. (2019) noted the research emphasis on the end of the plastics life cycle, a shortcoming of addressing the sources of waste in the waste prevention policies was noted by Johansson and Corvellec (2018). Johansson and Corvellec (2018) found in their analysis on the national waste prevention policy of Sweden and the European waste prevention policy that the policies did not adequately address the sources of waste generation but rather addressed the management of existing waste. Moreover, the private sector so far has focused on the recycling end of the plastics life cycle, with only few existing business models directed to waste prevention and reuse (Dijkstra et al., 2020). According to Johansson and Corvellec (2018), the two concepts, the prevention of waste generation and the management of already existing waste, were not differentiated enough. Furthermore, the policies addressed rather minor waste streams with soft, non-binding policies and market-driven changes instead of addressing the larger waste streams by binding regulation.

Furthermore, Johansson and Corvellec (2018) analyzed that the waste prevention policies in the EU and Sweden did not address consumption per se, but rather aimed at decoupling waste generation from economic growth, not addressing the impact of population growth. Furthermore, the authors argued that the policies fail to address consumption as the key driver of waste generation. The separation of various waste streams and abolishment of landfills has contributed to the fragmentation of the waste management system, scattering the responsibilities to different actors including municipalities and producer unions (Valkonen et al., 2019). Furthermore, Valkonen et al. (2019) argue that the study of waste cannot be disentangled from the lifestyle that produces it: the authors call for criticism for the way of life that produces and defines waste.

The presented plastics-specific sustainability solutions focus commonly on the technical side of things (e.g. Getor et al., 2020; Ellen MacArthur Foundation, 2016), focusing on the changes in demand and industrial operations. However, some scholars have pointed out the need of change in the institution of plastics consumption and social aims. Heidbreder et al. (2019) argue that technological advancements are not likely to occur quickly enough to react to the problem, stating that the current global behavior regarding plastics is likely to undermine any technological advancements. Also, Shove et al. (2012) speak for advancing the plastics issue through adaptation of the social norms related to its production and consumption. Vilella (2018) presents another view for the potential of plastics recycling in the context of modern technologies and speaks for limiting the production of non-necessary plastic products. Furthermore, both Nielsen et al. (2019) and Evans et al. (2020) suggest a more comprehensive approach to assess the services gained from plastics embedded in the current political and economic models rather than aiming at solving the issues with material-specific technological solutions. The current plastics economy has developed into a wicked problem, which calls for more systemic, holistic solutions in order to operate sustainably.

3 SOCIO-TECHNICAL TRANSITION AND THE CIRCULAR ECONOMY

This chapter starts with the description of socio-technical transition theory in general. Thereafter, the circular economy framework is presented with a plastics-specific angle. Moreover, the scholarly discussion over the suitability of the circular economy framework is presented. Finally, this chapter discusses the existing studies on the impacts on media discourses on socio-technical transitions.

3.1 Socio-technical transition theory

Van den Bergh et al. (2011, p. 7) define sustainability transitions as follows: "major, system-wide changes that are likely to involve breakthrough technologies and possibly fundamental changes in social aims, institutions, industrial structures and demand". Many scholars have developed theories on how such fundamental changes take place, of which the multi-level perspective (MLP) framework by Geels (i.e. Geels, 2012) is one of the most widely adopted among scholars. In brief, the MLP theory consists of three levels of socio-technical processes in interplay: niches represent the radical innovations aiming to challenge or supplement the regime; the regime, the hegemonistic state of affairs, consists of incumbent norms; and the landscape, which is the exogenous socio-technical context of a system (Geels, 2014).

Out of the three levels, the socio-technical regimes are the in the center of attention of this study, as the method of this study, the Foucauldian discourse analysis, is a tool for identifying the discursive regime. Regimes represent the established ways of operation within the socio-technical system, setting restrictions on both the incumbent and challenging actors operating within the system (Geels, 2014). The existing socio-technical systems tend to be path-dependent, reproducing themselves rather than undergoing drastic transformations (Loorbach et al., 2016). Socio-technical regimes develop in the interaction of prevailing technology, infrastructure, socio-cultural discourses, and regulation, based on which they path-dependently re-create themselves through positive feedback loops (Geels, 2004; Dijk et al., 2015). The development is likely to lead to a regime lock-in, in which alternative systems might be incapable to enter the regime even when potentially superior (Dijk et al., 2015). When a regime change is required, it is important to understand how the regime operates.

The key common attribute between the transitional theories is that transitions are fundamental forms of change, that develop in an interaction of several, interlinked actors. The changes initiated on a regime level tend to reproduce existing systems with short-term incremental solutions, and typically treat symptoms rather than address the underlaying problems, which contributes to recur-

ring system problems (Loorbach et al., 2016). Geels (2014) states that the incumbent regime actors might not only be passively locked-in, but actively opposing change. The incumbent regime is unlikely to be challenged by policymakers and major businesses, that are deeply connected to the prevailing system, but rather by grassroot movements (Loorbach et al., 2016).

Raven et al. (2015) differentiates two transitional strategies: in a fit-and-conform strategy actions are taken to offer competitive options to mainstream selection, while stretch-and-transform strategy aims at more fundamental change in the mainstream. Out of these two the fit-and-conform transition is likely to occur (Raven et al., 2015). According to Garcia and Calantone (2003), incremental innovation develops using existing technology for the existing markets, while radical innovation disrupts both the prevailing technology and the markets. However, Westley et al. (2011) argue that all innovation is intrinsically incremental, as it is unavoidably based on existing knowledge and solutions.

Sustainability transition is commonly considered to start within the economic system (Feola & Jaworska, 2019) and, more specifically, the private sector (Westley et al., 2011). As the development of innovations is trusted on the private sector, which operates within a profit lock-in, incremental changes receive more positive feedback from regime actors than the more disruptive ones (Westley et al., 2011). Nevertheless, the incremental optimization of existing structures tend to induce accumulation of problems, and set the regime vulnerable for a more radical change (Loorbach et al., 2016). This is echoed by Roberts (2017), who argues that the longer a system is in a lock-in, the more critique it attracts. The recurring issues in the incumbent system also contribute to the volume of potential disruptive discourses, such as the emerged discourses examined by Loorbach et al. (2016) after the economic crisis of 2008. Both Loorbach et al. (2016) and Roberts (2017) theorize that the problems arising from the regime incite discourses challenging it, and to succeed in destabilization the discourse must transform the meanings and organization of the society. According to Roberts (2017), challenging the incumbent regimes has as a major role in transitions as developing a new system, to which the media can influence.

According to Rosenbloom et al. (2016), the transition pathways form from the interplay of several discourses framed by different actors. According to Libertson (2012), media discourses are in a central position in the process of building narratives contributing to development pathways. Evans et al. (2020) studied the socio-technical development pathway of plastic packaging, concluding in a locked-in state of single-use plastic packaging consumption due to their convenience.

Rosenbloom et al. (2016) suggest that the landscape, the socio-cultural context, is socially constructed, and gains meaning through the interpretation of niche and regime-level actors. Thus, the landscape is liable to subjective interpretation, and the different constructions of the same 'reality' are likely to be visible in the media representation of the issue. According to Turnheim and Geels (2013), the regime can be destabilized by the pressures of the landscape. This has happened to plastics: the industry representative organization, PlasticsEurope (2013), states that plastics are being perceived negatively for their environmental and

health impacts. In the case of plastics, the cumulation of issues related to plastic waste has intervened with the regime discourse of linear model, contributed by the increased media coverage. In this case, as Turnheim and Geels (2013) have theorized, the destabilization appears from the landscape level, in the cultural values, rather than radical niche.

3.2 The circular economy

The current plastics economy, consisting of the material flows of plastics through the economic system, is generally agreed to be unsustainable. The environmental externalities of the short, linear life cycle of plastics production and consumption is causing emissions and environmental degradation as well as material value loss that is greater than the profits generated by the plastics industry (Ellen MacArthur Foundation, 2016). Furthermore, the chemicals used in the production of plastics pose a potential threat to human health (Ellen MacArthur Foundation, 2016). Thus, the current plastics economy can be said to be unsustainable within the economic, environmental and social dimensions of sustainability.

As the need for the plastics economy to change is ever more acknowledged, the solution most often provided in the literature is a transition to the circular economy (e.g. Hohn et al., 2020; Getor et al., 2020: Leal Filho et al., 2019). According to Ellen MacArthur Foundation (2017a), the principles of the circular economy consist of "designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.". The circular economy framework was developed in response to the limitations of the current linear economy, in which resources are extracted, processed into goods, and then discarded (Ellen MacArthur Foundation, 2017a). The current, linear economic model has also largely contributed to environmental plastic pollution.

3.2.1 The circular economy principles

Circular economy is an industrial system operating on bio-based consumables, reusable durables, and renewable energy, preventing the leakage of resources by eliminating waste (Ellen MacArthur Foundation, 2013). The circular economy aims at mimicking the natural systems, in which no waste is generated (Ellen MacArthur Foundation, 2017a). Unlike conventional recycling, which breaks disposed of goods down to lower-grade raw materials, circular economy aims at maintaining the value of resources as high as possible as long a time as possible (Korhonen et al., 2017). The circulation of resources is enabled by carefully designing products and systems to support the cradle-to-cradle process of products (Ellen MacArthur Foundation, 2013). A transition to a circular economy would not only mean changes in production but also in consumption, which would extend outside ownership, focusing more on the services gained by the product or resource (Ellen MacArthur Foundation, 2013).

In circular economy, goods are designed to be reusable and repairable, to keep the materials and products in use (Ellen MacArthur Foundation, 2017b). The circular economy concept aims at decoupling economic growth from increased resource consumption: the circular economy framework is said to generate both economic savings, reduction in emissions, and better health for humans (Ellen MacArthur Foundation, 2017b). The literature review by Ghisellini et al. (2015) indicates that successful circular economy ventures include the engagement of multiple stakeholders and economic motivation for the private sector. The circular economy emphasizes the use of renewable resources over finite ones (Ellen MacArthur Foundation, 2017b), including the main raw material for plastics, fossil oil.

The circular economy butterfly diagram (Figure 1) depicts the material flow of both renewable, organic materials and finite materials in a cradle-to-cradle circular motion, where the leakage outside the circle is minimized (Ellen MacArthur Foundation, 2017b). The framework puts traditional ownership into question, especially regarding the finite, technical materials (Ellen MacArthur Foundation, 2017b). The first loop is achieved by design to make the life cycle of products as long as possible. The second loop represents the reuse of goods in their original form to prolong the life cycle further. The third loop utilizes the same goods by breaking them down to the component level for reassembly, while the last loop, recycling, does the same on the level of raw materials. Organic matter is further cascaded into the nutrient level and returned into the loop (Ellen MacArthur Foundation, 2017b).

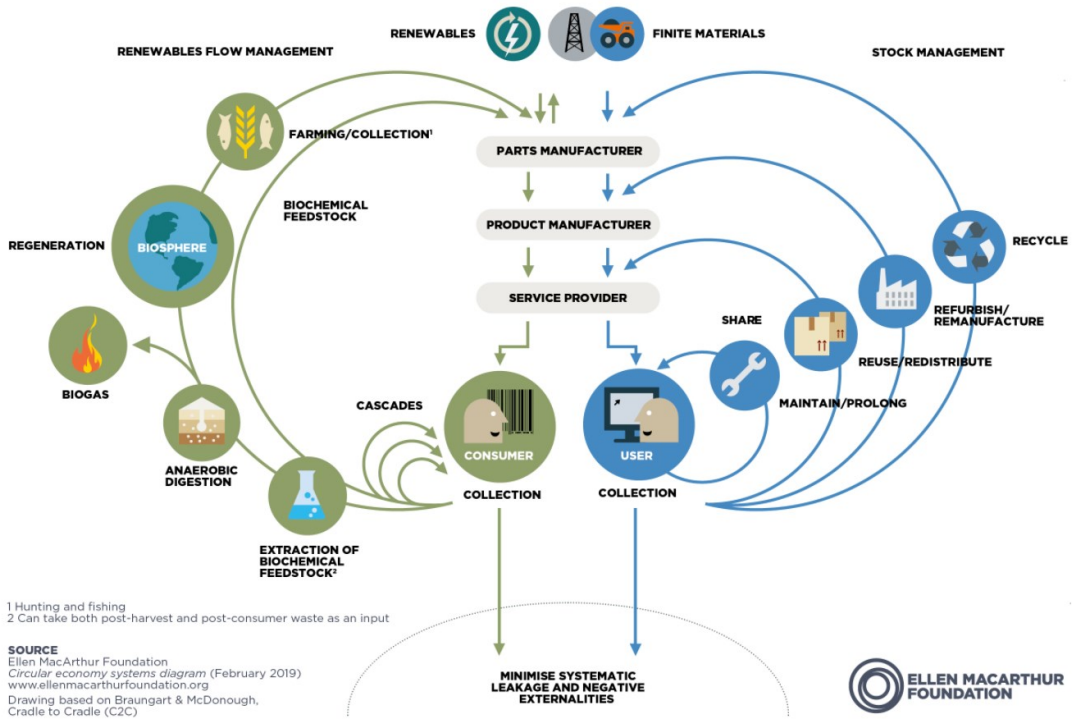

Figure 1 The circular economy butterfly diagram by the Ellen MacArthur Foundation (2019)

3.2.2 The circular economy for plastics

The Ellen MacArthur Foundation (2016) has developed the framework further to consider plastics as a separate entity, due to the economic and environmental losses of the current way of production and consumption of plastics. Plastics, especially plastic packaging, are the perfect example of linear economic activity, as 95 % of the material value of plastic packaging is estimated to be lost after a single use (Ellen MacArthur Foundation, 2016). Circular economy in the context of plastic packaging would mean that all plastic packaging would be reusable, recyclable, or compostable (Ellen MacArthur Foundation, 2016). The reuse and recycling of plastics defines their sustainability: for example, according to the Ellen MacArthur Foundation (2016) the recycling of plastics into lower-value applications is not considered circular nor sustainable (Ellen MacArthur Foundation, 2016).

The targets ideally would be achieved via systemic changes in design, that would make the circular flow of plastics work on a large scale (Ellen MacArthur Foundation, 2016). Moreover, the transition would require phasing out fossil feedstocks in plastics production (Ellen MacArthur Foundation, 2016). The Ellen MacArthur Foundation (2016) plan for plastics, however, considers mostly plastic packaging instead of the entire plastics industry.

The plastics economy at its current state is highly fragmented, lacking cohesive standards and efficiently coordinated systems (Ellen MacArthur Foundation, 2016). The transition towards a circular economy of plastic packaging would require new technology adopted cohesively across the industry, but most of the promising technologies mentioned in *The new plastics economy* -report (Ellen MacArthur Foundation, 2016) were still in their initial stages of development. The more mature technologies, such as biomass-based plastics and automated sorting of plastics by polymer via near-infrared, were still fragmentedly adopted regardless of their feasibility (Ellen MacArthur Foundation, 2016).

The cornerstones of the new plastics economy plan, addressing the plastics issue on a global level, are increasing the efficiency of plastic packaging recycling through cross-value chain system and political incentives, increasing the amount of reusable packaging, and scaling up the production of compostable plastic packaging, all the while reducing material leakage as well as decoupling plastics production from fossil feedstocks (Ellen MacArthur Foundation, 2016). *The New Plastic Economy* -report emphasizes the economic incentives of the increased circularity, all the while maintaining the norms of maximized efficiency and large-scale operations. Similar targets are also set on policy level: the EU strategy for plastics (European Commission, 2018), for example, includes goals to make all the plastic packaging reusable or recyclable, to reduce the use of single-use plastics, and to restrict the intentional use of microplastics by 2030. As Nielsen et al. (2019) point out, recycling and waste management of plastics as policy measures are widely accepted, more so than the restrictions in production and consumption. Within the circular economy context, the separation, collection, and recycling of plastics were the most emphasized research topics, focusing on the end-of-life phase of plastics (Johansen et al., 2021). In their analysis of scholarly arti-

cles on sustainable plastics management in business, Dijkstra et al. (2020) discovered that the most common sustainable business models related to plastics were deriving value from waste and developing renewable variants of plastics, thus focusing on value generation through recycling and replacement.

3.2.3 The contradictory reception of the circular economy model as a solution

The circular economy framework for plastics is gaining international momentum, and has been generally welcomed by governments (e.g. European Commission, 2018; Ministry of the Environment, n.d.). Both the policy, private sector and scholarly representations of the circular economy have a varying conception of the framework's potential regarding sustainability transition, varying from incremental regime reproduction to fundamental change.

The adoption of the circular economy is not straightforward due to the inconsistency of how the framework is understood both among scholars and practitioners. Kirchher et al. (2017) found a scholarly inconsistency in the definition of the circular economy. In some contexts, the circular economy was equated with merely recycling, some had a more holistic understanding of the framework. The authors found that many definitions of the term highlight the economic prosperity, and especially among practitioners the reduction of consumption was excluded from the definition. Kirchher et al. (2017) argued that the limited understanding of the framework risk limiting the potential for a more fundamental change.

Emphasizing heavily on economic and environmental aspects of sustainability, circular economy is criticized for not including the social dimension of sustainability. Schröder et al. (2020), Horvath et al. (2018), and Geissdoerfer et al. (2017) point out the limited application potential in economically developing countries. Horvath et al. (2018) exemplified, that in the countries of lower economic development level, the incoming flow of products close to the end of their life cycle decreases the importance of material recycling and recovery. When contrasting the literature related to sustainability and circular economy, Geissdoerfer et al. (2017) found that circular economy was discussed mostly in the context of environmental performance rather than the economic and social aspects of sustainability. The economic gains in the literature point to a direction of singular, immediate benefits as opposed to the long-term performance characteristic for sustainability (Geissdoerfer et al., 2017). Moreover, the Geissdoerfer et al. (2017) point out that policy inputs directed to circular economy might risk limiting resources dedicated to another, more holistic economic model.

Although Ellen MacArthur Foundation (2013) frames transitioning into a circular economy as a fundamental change, some scholars see the framework as a more incremental change to the established economic system. According to Ragnarsdóttir (2021), circular economy as a framework situates more to the process-centered system over people- or nature-centered position. Thus, the circular economy represents rather the business-as-usual extractive thinking than other, optional economic frameworks (Ragnarsdóttir, 2021). Valenzuela and Böhm (2017) argue that circular economy not only decouples growth from increased

material consumption but also consumption from taking a stand on the ethical issue of capitalism. Valenzuela and Böhm (2017), as well as Valkonen et al. (2019), argue that mastering recycling contributes to increased volumes of waste. Moreover, Ghisellini et al. (2015) found that the circular economy literature concentrated around a few specific disciplines and emphasized recycling and resource efficiency over reuse and decrease in resource consumption.

Although gaining significant traction among policymakers and business practitioners in recent years (Schröder et al., 2020), Korhonen et al. (2017) point out the lack of scientific examination of the concept. Korhonen et al. (2017) established six challenges regarding the circular economy. First, circular material flows do not ensure sustainability, as the processes either require energy flows or investment in renewable energy infrastructure. The sustainability of circular economy could be dependent on spatial or temporal system boundaries: one thing might be beneficial locally, but invalid globally; or a solution that is kept in circulation might be discovered to be unsustainable long-term. Moreover, if economic growth is prioritized, the population growth combined with the increase in the global standards of living will offset the advancements created by resource efficiency (Korhonen et al., 2017).

According to Korhonen et al. (2017), the circular economy innovations will also have to outcompete the more established, locked-in linear models, while the circular economy solutions are marketed as easy-to-apply solutions. Furthermore, the authors point out that the application should be monitored to cover the entire value chain to avoid potential rebound-effects. Korhonen et al. (2017) also point out the lack of interorganizational circular systems and norms. Moreover, the shared social meanings of material flows and waste are dynamic and open for interpretation, which poses a threat to system optimization. According to Ghisellini et al. (2015), there already are regional differences between the application of the circular economy framework, such as the emphasis on waste management in the western world versus the more holistic approach of China.

While the circular economy is stated to decouple economic growth from increased resource consumption, Ghisellini et al. (2015) discuss that circular economy should aim to decouple well-being from increased resource consumption. Ghisellini et al. (2015) conclude that the circular economy framework is not an appropriate tool for economic growth, but rather more suitable for economies pursuing stability or descent. However, the way that the key organization contributing to the circular economy framework, the Ellen MacArthur Foundation, is emphasizing the business potential of and financial profits to be gained from circular economy, simultaneously contradicting the arguments of the aforementioned scholars.

3.3 Media as a transition arena

The media has the power to either enforce or destabilize existing regimes by representation, although media consists of a multitude of representations (Cox,

2012). Moreover, the influence between media and public action is reciprocal, shaping one another: both what is and what is not communicated by the media might impact the decisions taken at a certain time (Lyytimäki et al., 2018). In other words, the media discourses may have impacts materializing on societal level.

The need for research on plastics and media has been noted in the literature. Henderson and Green (2020) suggest that further research on public perceptions of plastics is required, whereas Heidbreder et al. (2019) point out the lack of studies regarding plastics in media within the field of existing literature. Isoaho and Karhunmaa (2019) value media as an appropriate source of data as it simultaneously constructs and reflects public discourse, and thus is suitable for studying socio-technical transitions.

To the best of my knowledge, only one study by Viehöver (2000) has been conducted on media representations of plastics by the time of this study. Viehöver (2000) studied the transition of German waste policy in the 1990s and the discursive forces behind the occurred change, suggesting that the change was due to an external environmental party outside the private packaging sector and the policymakers. Although Viehöver (2000) examined the phenomenon from a historic point-of-view and the perspective of policymaking, the study findings emphasize the point-of-view that discourse is a valid tool for regime destabilization and challenging the system lock-in in the appropriate circumstances.

Although the media representations' impact on transition has not been studied in the context of the plastics economy, the phenomenon has been studied from the viewpoint of other industries. For one, Ganowski and Rolands (2020) examined the impact of media coverage on energy transitions, more specifically energy storage. The authors found out that the significant impact the media had on the transition was the contribution to the technological hype, which adversely affected the adoption of the niche-level energy storage systems due to excessive social anticipations. Ganowski and Rolands (2020) argued that the media representation of energy storage had the potential to affect the public perceptions in each niche, regime, and landscape level. Ganowski and Rolands (2020) state that their findings reaffirm the fact that media, while affecting the social perception of new phenomena, plays a significant role in transitions on a societal level.

Moreover, Lyytimäki et al. (2018) examined the media influence on energy transition and note the interactive relationship between media discourses and public and policy perceptions. What is reported by the media and how may have an impact on what is acted upon and what is not, for example, on investment and policy levels (Lyytimäki et al., 2018). In the case of biogas representation in Finnish newspapers, Lyytimäki et al. (2018) found that the reporting of negative economic impacts of biogas has acted against the energy transition, although the general tone of reporting was interpreted as positive. The authors suggested that this could be due to the centralized energy production regime lock-in.

Similar interpretations were made by Libertson (2021) about the locked-in centralized energy production system of Sweden. Libertson (2021) concluded in his media analysis that the media discourse emphasized the centralized energy production narrative. The study pointed out how the potentially more sustaina-

ble decentralized energy production system was consequently receiving less attention, both in the media and policy. Libertson (2021) concluded that the media emphasis on the centralized system was a consequence of a socio-technological lock-in, which disabled the development of alternative energy production systems.

These studies enforce the idea that it is meaningful what is reported in the media and how phenomena are framed. However, the media coverage contributes to the discourses, defining the regime and landscape understanding of the world, which, according to Rosenbloom et al. (2016) can be polyphonic. The discursive construction of reality contributes to the developmental decisions taken. Thus, it is important to understand what is communicated via media and how it might impact the development pathway of a phenomenon, which is exactly the purpose of this study in the context of the plastics economy.

4 RESEARCH METHODOLOGY

This chapter provides a closer look into the research method of discourse analysis, and more specifically, the interpretative Foucauldian discourse analysis. Thereafter the data and research method of this study are presented.

4.1 Discourse analysis as a research method

The method to conduct this study is qualitative discourse analysis. Wetherell et al. (2001, p. 3) identify the study of discourse as "the study of language in use" as well as "the study of human meaning-making". Broadly defined discourse analysis is identifying patterns in language (Taylor, 2001a). The purpose of discourse analysis is to understand the world through language, in its societal and cultural contexts (Pynnönen, 2013). The main interest in discourse analytic research is not to establish 'truths', but rather examine which linguistic interpretations are dominant, marginal, and completely unrepresented and why (Pynnönen, 2013). According to Jokinen et al. (2016), the research data itself forms the spatial and temporal context for the research: the findings need to be put in perspective of the time and place of the source material.

The discourse analytic reality is socially constructed and produces knowledge that is of structuralist nature. The theoretical and methodological background of discourse analysis is based on social constructivism, as meanings and understanding are considered to be born from the social interaction of texts and spoken language (Pynnönen, 2013). According to Jokinen et al. (2016) discourse analysis is more of a loose theoretical framework than a strict methodology. Jokinen et al. (2016) mention the unifying feature of discourse analysis to be the conception of language: language is considered as a building block of socially constructed reality. Moreover, language is considered as active and consequential - conceptual meanings might partly overlap and compete within language, reacting in relation with the context (Jokinen et al., 2016). Discourse scholars agree that the constructivist view is the only way to examine shared meanings and individual conceptions of reality (Eriksson & Kovalainen, 2015). The purpose of discourse analysis is to challenge and question the things considered as 'normal'. The more a discourse is considered a reflection of reality, the harder it is to challenge (Pynnönen, 2013). Pynnönen (2013) exemplified newspaper articles as a way to build reality, which further validates the choice of the research data.

Dominant discourses have power, as they limit the ways to interpret and understand, canceling other competing ways for meaning-making (Pynnönen, 2013). Thus, for discourse analysts, it is of interest to examine also the interpretations left out from the dominant discourse (Pynnönen, 2013). Representation of a phenomenon is always a choice of what to include and what to leave out: the

representations involve building reality, evaluations, and reasoning, forming a specific way to produce meanings (Pynnönen, 2013).

For a discourse analyst, it is necessary to address the limitation of the results by addressing the situatedness, contingency, and potential biases of the analysis visible to the reader. However, this is not seen to be because of poor research practices, but rather the epistemological point-of-view considering all knowledge (Taylor, 2001a). Thus, the potential biases of the chosen data context and the personal attributes of the analyst affecting the outcome should be addressed. The limiting factors are addressed in the limitations in the final chapter.

In the context of this study, the discourses are examined as reactive with the surrounding society and from the viewpoint of sustainability. Discourses have the potential to shape development towards previously unimaginable realities, acting as catalysts for change (Feola & Jaworska, 2019). According to Feola and Jaworska (2019) discourses have a significant role in transitions by affecting both the political governance of a transition as well as the social definition of reality and the possibilities of change.

4.2 Foucauldian discourse analysis

The discourse analytic process starts from a micro-level context and the search for textual patterns, from where it expands to macro-level cultural context (Pynnönen, 2013). The analysis can be extended from interpretative to critical analysis, which aims at pin-pointing inequalities and injustice created by language use and meaning-making (Pynnönen, 2013). This study will, however, be conducted interpretatively via Foucauldian discourse analysis. In interpretative discourse analysis, the main goal is to identify the discourses that create and maintain the most dominant meanings, to identify how discourse is formed, and how it frames the phenomenon described (Pynnönen, 2013).

From the Foucauldian perspective, a discourse is formed by coherent meanings that further produce meanings and meanings that produce social consequences (Eriksson & Kovalainen, 2015). According to the Foucauldian point of view, there is no such thing as the absolute truth, but rather what is considered as truth varies historically and situationally due to the discursive construction of truth (Hall, 1997). In accordance, this study is not meant to study the language itself but rather the wider cultural representation of the sustainability transition of the plastics economy through language in the relevant written content. Foucauldian discourse study considers discourses intertwined with knowledge and power, meaning that the discourse analyst can find discourses that are comparatively stronger and more hegemonic than others (Carabine, 2001).

According to the Foucauldian definition of discourse, discourses transmit the social consensus on reality in a specific context (Pynnönen, 2013). As discourses can be interpreted in multiple ways, a discourse analyst has to identify and explain the way they choose to analyze the discourse (Pynnönen, 2013). The different levels of the context impact the analysis: the personal attributes of the

analyst, the situational factors, the established ways of communication and the societal, historical factors of meaning-making (Pynnönen, 2013). In this study, spatiotemporal limitations consist of Finland, the news format, the plastics-specificity of the data articles and the recent publication timing relative to the study.

4.3 Data & method

As in discourse analysis typically, the found material strongly guided the direction of research. The examined articles were limited to those discussing the phenomena around plastics and the sustainability transition of the plastics economy. More concretely, the articles examined were related to plastics, either the material itself, its replacements, recycling, or other issues connecting plastics and sustainability. As this study related to plastics is the first of its kind, no overlapping with existing literature is to be anticipated related to the examined material.

The data was collected from the single most-read newspaper in Finland, Helsingin Sanomat (Media Audit Finland, 2019). The selection of Helsingin Sanomat was based on the popularity of the newspaper, providing potentially a society-wide representation of the studied phenomenon. The research data was gathered using the database of The National Archives of Finland, which provided access to the articles of Helsingin Sanomat dated from January 2017 to September 2020 at the time of data collection in November 2020.

The initial search term for relevant articles in The National Archives of Finland database was muovi* (plastic in Finnish, the asterisk in the end enabling all the inflections of the word to be included in the search results). However, this term proved to be too general as it produced hundreds of search results, many of which were irrelevant, such as advertisements. After this the asterisk was removed, leaving only the word muovi, which narrowed down the number of articles. The search phrase consisted of frequently discussed plastics applications and plastics-specific terminology related to the circular economy, such as recycled plastic and plastic collection, finally forming the following search phrase:

> muovi (plastic) OR mikromuovi (microplastic) OR biomuovi (biobased plastic) OR biohajoava (biodegradable) OR muovinkeräys (plastic collection) OR muovijäte (plastic waste) OR muovipullo (plastic bottle) OR muoviroska (plastic waste) OR muovistrategia (plastic strategy) OR uusiomuovi (recycled plastic) OR kierrätysmuovi (recycled plastic) OR muovipilli (plastic straw) OR muovipussi (plastic bag) OR muovipakkaus (plastic packaging)

This phrase produced approximately 1700 search results in The National Archives of Finland within the 2017-2020 publication period. The search results were narrowed down to 177 articles according to the relevance of the article, forming the data for this study. The relevance was defined subjectively, limiting the data to the articles concentrating on plastics economy and its operations or

the articles including some evaluative phrases regarding plastics. Articles discussing plastics only in a descriptive manner (e.g. a brief mention regarding the material of a product) were left out. This enabled the examination of how plastics and the plastics economy are framed in the media representation. By analysing these framings discourses about the sustainability transition of the plastics economy could be identified.

The chosen articles were both examined at the general context of the topic of the article as well as at a micro-level of frequency of the plastic-related terms. The analysis was conducted using the Atlas.TI qualitative data management software. The news language was examined for patterns and themes related to plastics, producing a total of 73 codes related to recycling, replacement, reduction of consumption and production, reuse, and waste management of plastics. Furthermore, coding was used to identify the problem framing around plastics as well as potential trade-offs for suggested actions. Coding was also conducted on which plastics applications were discussed to examine which types of plastics were the most represented in the media framings. The codes were further classified into categories, which heavily related to the circular economy principles.

5 RESULTS

This chapter presents the results of the analysis, starting from the problem framing of plastics and the plastics economy in the data. The problem framing, as for example Viehöver (2000) and Libertson (2021) pointed out, contribute to the definition of solutions sought. In the case of this study, the suggested plastics-specific solutions materialize in the form of discourses presented in the latter part of this chapter.

5.1 Overview on the news representation of plastics and the plastics economy

Some general trends in the news framing could be identified. Plastics were a seemingly topical news topic during the examined period, peaking with 72 plastics-related articles in 2018. The reporting over plastics-related policies was dominant during 2018 likely due to the introduction of new plastics-related policies that year. The context of the news was very Finland-centered, and a bias towards the Helsinki metropolitan area could be detected, especially in the news coverage on the municipal plastic waste management systems. The framing of the Finnish plastics economy was very contradictory: the data included equal amounts of positive and negative comments over the Finnish situation regarding the plastics economy. In some framings, Finland was an active contributor to the global plastic waste issue, whereas in other framings the pioneers of recycling and circular plastics economy (e.g. the long-established drinking bottle collection). Furthermore, the plastics-related articles were biased towards single-use consumer goods, such as packaging, and most significantly plastic bags. Only the plastics used in the construction industry were another specific plastics application represented in the data.

The word plastic had an inconsistent meaning in the news language, suggesting the term does not have a shared, universal meaning. Plastics were commonly referred to as a homogenous substance and almost exclusively spoken of in a singular tense. In some framings this inconsistency was problematized, pointing out the diversity of applications plastics represent:

> *"When we are speaking of metals, we separate aluminum, copper and gold. Plastic is always spoken of just plastic."* (Sirén 20.6.2018)

> *"One problem is that plastics are seen often as one thing, even when in reality it's a generic term for tens of technical applications."* (Turunen 13.6.2020)

Some articles, however, differentiated between different polymers. The qualities of different polymers were mostly discussed in the context of the poor

recyclability of multi-layer packaging containing several polymers and the trade-offs related to layering and recycling. This terminological inconsistency potentially contributed to the complexity of the problem definition, thus impacting the solutions represented.

The news represented three key actors contributing to the change of the plastics economy: the policymakers, the consumers, and the private sector. Although non-governmental organizations were mentioned in the data a few times, their role remained insignificant in relation to the transition. Some inconsistencies within the actor role representations occurred. Consumers were framed to both be cautious consumers while still having the benefit of convenience, as the following citations exemplify:

> *"Consumers have significant power. The products are made for us consumers, and if we vote via buying only according to a sustainable lifestyle, it will be reflected to the company sales."* (Lehmuskoski 26.5.2019)

> *"If theecycling is made too hard for the consumer, one starts to wonder if it makes any sense. Plastic separation should not be rocket science."* (Gronow 30.1.2020)

Albeit the private sector was framed as the key actor in developing technology for sustainability, the private sector was frequently framed only as reactive to the consumer choices and policy changes:

> *"We are decreasing plastic consumption simultaneously on many fronts. The most significant factor for our successes is, nevertheless, our customers. People are increasingly transitioning into making smarter and more sustainable choices."* (Luukka 15.2.2018)"

> *"We have been asked to give up plastic bags altogether. So far we have couldn't have done that. The customer is the one making the decisions."* (Moilanen 17.12.2018)

Policymakers' main responsibility was framed to be setting limitations to the private sector. Albeit restrictions on the production of single-use plastic goods were reported to be imposed, the demand for new restrictions reoccur:

> *"As long as governments and politicians are not doing anything, plastics will not be reduced"* (Mikkonen, 1.10.2018)

To summarize, the private sector was framed as the developer the technology that is seen necessary for the transition. The consumers, however, were required to be aware enough to demand it without, however, having to trouble themselves too much. The policymakers were framed to be responsible for setting limitations to the private sector.

5.2 The media problem framing of plastics and the plastics economy

As in the scientific literature and policy, in the news representations plastics and the plastics economy were heavily problematized. The linear plastics economy and the modern production and consumption regime of plastics were frequently questioned and denounced in the data. The media highlighted the same sustainability issues as the plastics-related literature and policies. The short life cycle of single-use products and the consequent waste generation; the fossil raw material and the consequent carbon emissions; and the practical non-degradation were frequently included in the news problem framing. Plastics were framed first and foremost as a waste problem and secondarily a problem related to the fossil economy.

Plastics were framed mostly negatively: terms present in the news such as '*the anti-plastic frontline*' (Kause, 12.3.2018) and '*plastics panic*' (Siren 20.6.2018; Mikkonen, 1.10.2018) emphasized plastics as something faulty requiring change. The frequent negative framing of plastics use as a problem in many contexts had undoubtedly contributed to the public discussion about the new ways of including plastics in society.

The codes related to the problem framing constructed the largest category of the data. The most covered topics of the plastics-related news articles were related to waste pollution and waste management. The news representations of waste pollution, both macro- and microplastics pollution, emphasized the consequential environmental harms especially related to oceans and other waterways. The negative impacts were also quite frequently framed to relate to human health. Problematizing plastics for the consequent generation of waste was the prominent news representation. Moreover, the news hardly questioned the standard of generating waste, but presented it as a status quo. The problematization of the fossil raw material and the consequent carbon emissions and climate impact was less frequent.

Although plastics were mostly represented in a negative light, they were also defended for their convenient physical qualities and high material efficiency, which supports the suggestion of the locked-in status of efficiency and convenience of plastics by Evans et al. (2020). Avoiding plastics was framed as extremely difficult or even impossible, due to the through-cutting nature of plastics applications in society and the unrivalled qualities of the material:

> *"A life completely without plastic is practically impossible. Plastic is used to package drinks, food and a majority of goods. Plastic is included in for example clothes, cosmetics and electronics."* (Kivimäki & Mikkonen, 14.1.2018)

Even though the news problem framing established a need for a change in the current plastics economy, the frequently presented trade-offs are the eco-

nomic losses of the industry due to the transition and the affordability of conventional plastics. Whereas the economic material losses of the linear system went largely unaddressed, the changes required for increased sustainability were in many cases represented as a threat to the economy:

> *"All the solutions crystallize to this: they cost money. The report from Material Economics (2019) estimates that opting for net-zero emissions would mean 20-80 % bigger costs for the businesses in the industry."* (Elonen, 24.10.2019)

Nevertheless, a few win-win scenarios, in which the environmental and economic benefits united, were also represented:

> *"The required (plastic refining) technology already exists in Finland, so here is a thousand-dollar opportunity to be involved in a global, growing market."* (Viljanen, 17.7.2020)

5.3 The circular economy as the overarching discourse

According to Libertson (2021) discursive narrative development continues from problem and consequence framing to suggesting solutions. As the defined plastics related problems were waste generation and, secondarily, the plastics related emissions from the fossil raw material, the solutions provided heavily addressed these issues. The solutions presented, as presumed, featured several features in common with the circular economy framework. The overarching discourse identified from the data is the circular economy discourse, constructed by the *recycling*, *improving waste management*, *replacement*, *reduction of production and consumption* and *reuse* sub-discourses (Figure 2). First, this chapter discusses the general features of the circular economy discourse, after which the sub-discourses will be discussed in their own chapters.

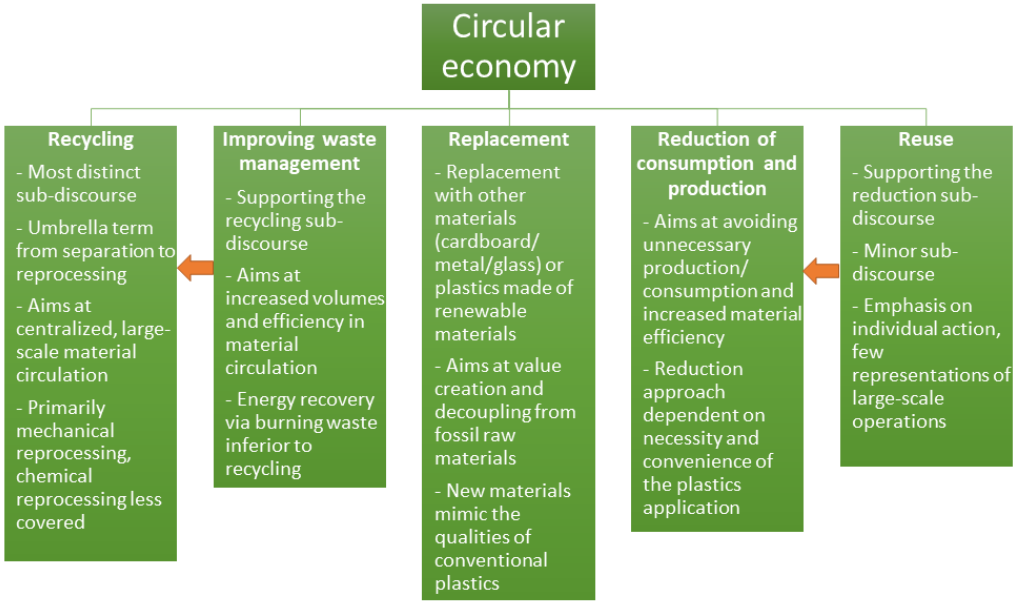

Figure 2 The sub-discourses contributing to the circular plastics economy narrative

Not only were the suggested activities regarding the sustainability transition highly aligned with the circular economy principles, but the term 'circular economy' frequented in the data. Furthermore, many of the professionals interviewed in the data articles were presented as circular economy experts. The connotation of circular economy was mostly positive, and few remarks were made regarding the framework's viability, which inclines that it has been accepted as the right way of development:

> *"The solution for the waste problems is not burning waste for energy but circular economy."* (Arola, 15.1.2018)

The focus in the discussion over the circular economy was closing the material loops for increased material efficiency and reduced need for natural resources. Furthermore, the news frequently discussed plastics concerning their material life cycle, especially in the context of single-use products. The following quotes emphasize the circular material flow framing on plastics:

> *"As long as the plastic is in use the emissions from its disposal are not generated."* (Elonen, 24.10.2019)

> *"According to the slogan, those useless gadgets are useful 20 minutes on average, after which they remain in the environment for 600 years."* (Kivipelto 17.11.2019)

Albeit the circular economy was framed as the favored way of development, none of the identified sub-discourses were without internal contradictions and trade-offs. The sustainability gaps addressed in the data were the circulation into

lower-value applications; the mismatching demand-and-supply of post-consumer plastic waste and recycled materials; the economic unviability of the circular economy innovations; and the unrecyclable varieties of plastics and the leakage outside of the material circle due to that. The trade-offs were framed to relate to mostly technology and economic potential, of which several examples will be provided in the following chapters.

5.3.1 Recycling

The single most distinct circular economy sub-discourse in the data was recycling. In the news language, the term recycling covered a multitude of actions: the separation of different waste streams, depositing them into the dedicated container as well as the reprocessing of plastics into new raw material and producing products from the reprocessed granules or polymers. The news discussed increasing the recycling of plastics as a favored direction of development, as well as a policy target to provide resources for the circular production:

> *"According to Vasara, instead of trying to get rid of plastic, it should be recycled more efficiently."* (Viljanen, 17.7.2020)

> *"Finland means to increase the recycling rate of plastic packaging five times the current amount until 2020."* (Lehtinen, 23.1.2017)

> *"The demand for recycled plastics is increasing at such a pace that the recycling enthusiasm of the Finns is threatening to not be enough."* (Varpula 1.2.2019)

The news had a focus on the beginning of the recycling process, more specifically on individual level waste separation and the municipal waste collection system and infrastructure. Separating plastic waste from other household waste was framed as a normative virtue.

> *"If you do not recycle, you will feel like a bad person"* (Nykänen 11.11.2018)

> *"One must make sure that waste separation is done properly at home and packaging is recycled. That is the most important thing. - - I understand, if one uses single-use products at the summer house, but one should nevertheless put packaging to the bin and preferably to the recycling bin"* (Elonen 24.10.2019)

The actual reprocessing of plastics had less coverage, although increasingly towards the end of the examined data period. The reprocessing of the post-consumer plastics was almost exclusively reported to take place in one, centralized large-scale reprocessing facility in Finland. Furthermore, the news discussed building new reprocessing facilities to achieve the national recycling targets. The core target of inciting citizen recycling and providing more reprocessing facilities was to minimize the amount of resources ending up outside the circular material flow loop.

The standard way of representing the circulation of plastics was processing them into granules and further selling them in the industry as a raw material of plastic products. However, in a few occasions also an alternative way of chemical reprocessing, in which the polymers are broken down to a polymer level, was represented (e.g. Turunen 23.6.2020; Viljanen 17.7.2020). Chemical recycling was mostly discussed in the context of fuel production. Regardless of the method of reprocessing, recycling was framed as a centralized, large-scale industrial operation. The fundamental goal of recycling processes framed was to maximize the efficiency of the operations and volumes of material flow.

Whereas plastics in general were discussed negatively, the recycled varieties of plastics did not share the stigma. The positive connotation of the recycling of plastics was not dependent on what was produced of the reprocessed raw material - the recycled varieties had intrinsic value:

> *"If plastic is recycled, it is necessarily not so bad of a material."* (Gronow 30.1.2020)

Recycling as an operation was framed mostly positively but some negative trade-offs related to the process were addressed. The only exception was the minor framing of individual reprocessing of plastic waste via 3D-printing. Although the collection of post-consumer plastic waste focuses on packaging in Finland, the news reported them being reprocessed into other applications. The reprocessing of material into lower-value applications is stated to be against the circular economy principles. The explicitly mentioned applications made of recycled plastics consisted of durable plastic items and plastic bags. Moreover, the imperfection of closing the plastics material flow due to the quality losses from the recycling process was pointed out. These trade-offs, the lost value of circulating plastic into inferior, non-necessary applications and degrading quality of the recycled variety, was addressed in the data a few times:

> *"Recycled plastic cannot be used in food packaging. That's why the significant industrial users of recycled plastic are various plastic goods and objects producers."* (Turunen, 23.6.2020)

> *"Bottles are single-use products because the quality of plastic in them decreases each time it gets reprocessed. After use bottles go into fleece fabric and carpet materials."* (Kähkönen 17.4.2018)

5.3.2 Improving waste management

As the main problem concerning the plastics economy was framed to be about the consequent waste generation, it is no great surprise that waste management was a heavily emphasized topic in the data. Due to the variety of meanings for the term 'recycling' in the news language, the discourse of improving waste management overlaps with and complements the recycling discourse. However, improving waste management was such a reoccurring news topic that it was treated as its own entity. The recently established separate waste collection system for

household plastics in 2016 (Kärhä, 2014) might have contributed to the frequent news coverage. Moreover, the frequent news coverage on the waste management system contributes to the emphasis on the beginning of the recycling process at the expense of focusing on what is reprocessed over the collected material.

In the data, waste generation was framed inevitable. Thus, improved waste management was framed as an essential part of the circular economy transition. The news provided advice for individuals for improved waste separation as well as discussed the efficiency of the municipal collection and transport system. The development of the waste management systems was considered necessary both in the western and developing world, instead of questioning the amount of waste produced:

> *"Circular economy aims at solving the global waste problem – To get closer to the circular economy, plenty of new waste management infrastructure must be built in the western world. - - Plastic waste ends up in illegal landfills or to be burned because the ability to process it properly in the Asian countries is by no means adequate."* (Tervonen, 13.6.2019)

The development of the waste infrastructure was argued to supply more raw material for the reprocessing industry, and thus improve the efficiency of material circulation. The frequently presented, concrete solutions for plastic waste management improvement were increasing the number of plastics-specific waste collection containers to cover a larger area, thus contributing to the convenience of plastic waste separation and increased material circulation:

> *"According to Karvinen, the waste collection infrastructure should cover a significantly larger area as well as the bins emptied more often"* (Pajuriutta, 23.1.2018)

The main driver for improving the plastic waste management was framed to be the policy changes: plastic waste separation was framed as a responsibility and the private sector and individuals were expected to comply. Nevertheless, the news also framed individuals and the private sector to engage in the waste separation activities enthusiastically, presuming it is made convenient enough:

> *"If recycling is made too hard for the consumer, one might start to wonder whether it makes any sense"* (Gronow 30.1.2020)

Some of the collected plastic was framed to leak out from the material circulation, in which case they are reported to be burned to produce energy. Energy recovery from plastic waste via burning was framed as secondary option to recycling:

> *"HSY is campaigning for the separation of plastics because in that way it can be recycled into new material instead of just burning it"* (Aalto, 18.9.2019)

Even though presented as a secondary action for recycling, burning was presented as the only viable option for non-recyclable waste and superior to landfilling and discarding plastics into the environment.

> *"Of the plastic waste coming into the Fortum plastics refinery approximately 75% is recycled. The rest is burned - - Energy and heat can be harvested from the burned plastic, so it does not go completely to waste"* (Nalbantoglu, 8.1.2019)

Nevertheless, in the context of burning waste for energy, the relation of plastics and the fossil raw material was more visibly problematized:

> *"Recycling plastics is a good solution for the environment. Even if it works as a good fuel in burning mixed waste, it is nevertheless oil-based, in other words, fossil."* (Kantola 5.2.2018)

These findings are both according to the waste hierarchy (European Commission, n.d.), in which energy recovery is inferior to recycling, as well as the circular economy principles (Ellen MacArthur Foundation, 2013) which aims at minimizing material leakage out from the circulation.

5.3.3 Replacement

In addition to the commonly referred three Rs of circular economy, *reduce*, *reuse* and *recycle* (Johansen, 2022), *replacement* was prominent in the plastics-specific data. Replacement of plastics was represented both by replacing them with other materials, such as cardboard, glass, and metal, and by replacing conventional plastics with plastics made of renewable materials. The replacement of conventional, fossil plastics was framed as valuable regardless of what it was replaced with.

The novel materials represented in the data included both the bio-based and biodegradable varieties of plastics. Whereas the replacement with other materials was discussed both as an individual choice as well as a private sector initiative, the novel varieties of plastics, unsurprisingly, were almost exclusively discussed in the context of the industry. When the news discussed developing replacement materials for plastics, the main emphasis was on developing materials with the same qualities as plastics without the fossil raw material. The qualities of plastics, the durability, plasticity, and light weight, were so well-established and appreciated that the favored direction of developing the new varieties was imitating these qualities.

Even though the novel replacement materials for plastics were reported to imitate the qualities of conventional plastics, the differentiation of the replacing materials from the conventional variety was framed as essential to generate additional value. For example, if the replacement material was at risk to be mixed with the conventional, fossil resource-based plastics, the difference was reported

to be made clear via marketing. This finding spoke for the intrinsic value of replacing conventional plastics as well as the general negative connotation regarding plastics:

> *"According to him, the campaign was required because the biodegradable and compostable replacement material looks exactly like plastic on the shelf."* (Mikkonen 1.10.2018)

> *"Kaminen explains that the material is, actually, more transparent than the current one* (plastic)*, so a consumer might not notice the difference. "We have to work on it in marketing so that the superior environmental friendliness is made clear for the consumer.""* (Luukka, 13.11.2018)

The *replacement* sub-discourse addressed the waste issue by replacing plastics with materials with a more established recycling system or biodegradable materials. The replacement of plastics with biodegradable materials was framed to address the waste problem generated by plastics. Biodegradable plastics were framed desirable and essential especially in countries with 'limited waste management':

> *"Haimi is developing an alternative for plastics so that the world would not drown in waste. - - There* (in Asia) *nothing else helps but that the material is really biodegradable."* (Vasama 18.11.2017)

A stand-out industry discussed in the context of novel replacement materials for plastics was the forest industry. This was framed as a great economic opportunity, which speaks for the continuation of the use of plastics as usual:

> *"We are starting from the point that when time passes it will be possible to replace plastic-based products with recyclable, wood-based products"* (Luukka 22.12.2018)

> *"Harlin has specialized in studying how to replace plastics. He says his task is to think what to produce out of pulp when the reprocessing into paper decreases"* (Arola 16.10.2018)

However, also trade-offs with other materials as well as the new replacement materials were brought up. The sustainability of the materials was discussed in the context of the material life cycle and environmental impact. Moreover, the non-biodegradability of some bio-based plastics was addressed, and their sustainability was questioned in comparison of the conventional oil-based plastics, speaking for the adoption of a more systemic material perception:

> *"- - all materials replacing plastic are not necessarily much more environmentally friendly than plastic. - - Bio-based plastics are produced out of renewable materials, such as pulp, wool or starch, but they are necessarily not biodegradable"* (Mikkonen 1.10.2018)

"If all plastic packaging would be replaced with cardboard, it would mean multiplying the carbon emissions and water consumption" (Turunen 13.6.2020)

The replacement discourse not only addressed the waste problem but also the carbon emissions problem, by attempting to decouple plastics from the fossil raw material. The emissions problem was addressed more specifically in the *replacement* sub-discourse than in the other sub-discourses:

"The key thing in this situation is that the packaging is produced out of renewable material, unlike oil - -" (Luukka 13.11.2018)

5.3.4 Reduction in consumption and production

The *reduction of consumption and production* sub-discourse was the second most prominent of the identified discourses. Albeit the *recycling* sub-discourse was the most distinct in the data due to its frequency, *reduction of consumption and production* was in many cases framed as the most important method for solving the issue:

"First and foremost the consumption and production of plastic should be reduced." (Seppälä, 26.10.2018)

"To solve the plastic issue the key factor is the reduction of plastic consumption." (El Kamel 8.6.2018)

The two key means to reduce plastics consumption and production represented in the data were increased material efficiency and avoiding the consumption/production of plastics. The avoidance of consumption and production was mostly discussed in the context of single-use plastic products and framed to occur through policy changes. Politics was universally framed as a key contributor for plastics use reduction:

"According to her one way (to prevent waste cumulation) *is to limit the production of single-use plastic products more strictly"* (Rimaila 30.7.2019)

"The European Commission presents new, union-wide rules, which would ban ten different single-use plastic products" (Paakkanen 28.5.2018)

"As long as governments and politicians are not doing anything, plastics will not be reduced" (Mikkonen, 1.10.2018)

In addition to policy decisions, the private sector and individuals were framed to take part in the reduction of plastics production and consumption. The means to achieve reductions consisted of the previously mentioned material efficiency and avoiding unnecessary plastics:

"We are buying yoghurt in liter cartons instead of small plastic cups. We aim at buying bread in as big of a package as possible to reduce the amount of bags." (Rouvinen 18.2.2019)

"Kangas-Heiska explains that the factory has now reduced the height of the bottleneck by four millimeters. The reduction achieved in the Finnish plastic consumption in packaging equals 24 million bottles annually." (Rouvinen 6.10.2019)

"Christmas gift buyers had been previously studied. Almost half of the respondents had decided not to buy Legos due to worries related to waste." (Paukku, 31.3.2020)

"- - it's time for a plastic-free phase. In the future all the products could be packaged in cardboard or be left unpacked." (Sirén 3.9.2018)

The reduction discourse was partially biased towards specific applications. Reductions were discussed especially often concerning single-use plastic products, especially plastic bags. In the context of applications regarded as necessities, such as packaging, the reduction was more commonly framed to occur through material efficiency. Reduction as a method was framed to be applicable mostly when it would not cause excessive inconvenience.

5.3.5 Reuse

Reuse was a significantly less prominent sub-discourse than the other identified sub-discourses discussed above. Although in the data reuse was framed as a marginal phenomenon, it is included in the circular economy framework and thus separated as its own entity. The *reuse* sub-discourse partially overlapped with the *reduction of consumption and production* sub-discourse, as reusing plastic items was many times discussed in the context of reducing individual plastics consumption. Moreover, the *reuse* sub-discourse was biased towards specific plastic applications, especially plastic bags. The individual plastics reuse was framed to be incentivized with economic savings.

"Okkonen, however, reminds that reusable bag pays itself back as it can be used multiple times." (Rouvinen 18.2.2019)

"In Britain, some of the coffee store chains offer a discount for customers taking their beverage to a personal cup." (Reuters-HS 5.1.2018)

The only represented large-scale reuse scheme was the long-established drinking bottle collection and reuse scheme of Finland. This is significant, because unlike reuse operations, recycling was almost exclusively framed to occur in centralized, industrial-level systems. The lack of representation of a large-scale reuse scheme regarding plastics consumption is a shortcoming in the realization of the circular economy framework and further emphasizes the single-use culture built around plastics.

5.4 The positions of the circular economy sub-discourses

The circular economy was identified as the overarching discourse of the analysis, and the favored direction of development. The overarching circular economy discourse can be thus presented as the discursive regime in the news representation of the plastics economy. Nevertheless, the sub-discourses included in the discursive regime were incoherent, both supplementing, slightly overlapping, and contradicting with each other. Even though media frames the circular economy as the goal, there was no consensus in the media on how to get to the goal. This chapter examines the complex, multilateral positioning of the identified sub-discourses, illustrated in Figure 3.

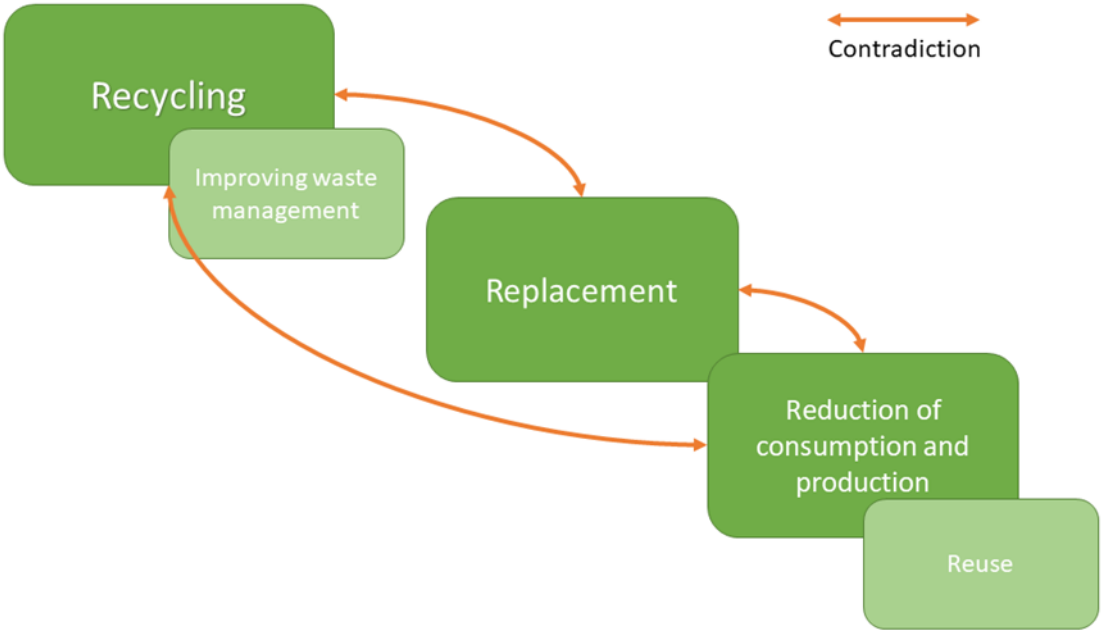

Figure 3 The mutual positioning of the circular economy sub-discourses

There were two significant overlaps within the identified sub-discourses. The *improving waste management* sub-discourse both complemented and overlapped with the *recycling* sub-discourse, however focusing specifically in the first stages of the recycling process. Moreover, the *reuse* sub-discourse mostly complemented the *reduction of production and consumption* sub-discourse, as plastic product reuse was framed first and foremost as a way to reduce personal plastics consumption. Furthermore, the *reduction of consumption and production* and *replacement* sub-discourses overlapped slightly, as the reductions discussed in production and consumption were plastics-specific and didn't extend to resource use in general. Thus, the *replacement* sub-discourse overlaps with the *reduction of production and consumption* sub-discourse by contributing to conventional plastics use reductions. Some framings questioned the plastics-specific reduction, calling for a more systemic change:

> *"Should the plastic lid for a take-away coffee mug be replaced by a biodegradable one made of wood pulp – or could one live completely without a lid."* (Nykänen, 11.11.2018)

Furthermore, several contradictions between the sub-discourses could be identified. The *reduction of consumption and production* sub-discourse somewhat contradicts with most of the other sub-discourses and the *recycling* and the *replacement* sub-discourses partially cancel each other out. The positioning between the *reduction of consumption and production* and the *recycling* sub-discourses was inconsistent in the data. Although recycling was the most prominent circular economy activity covered in the data, and mostly framed as the right way of development, some framings were made of it being only complementary to the overall reduction of plastics consumption:

> *"According to Wilkins recycling is tinkering in the problem consisting of single-use plastic goods production."* (Seppälä, 26.10.2018)

Furthermore, in some framings, the two actions, the reduction and the recycling, excluded each other in the attempt for increased sustainability. The reduction via increased material efficiency by using unrecyclable, multi-layer plastics was at times framed superior to less material-efficient, recyclable solutions:

> *"From an environmental point-of-view producing more material-efficient packaging is a better solution than producing a recyclable plastic package."* (Nalbantoglu 8.1.2019)

While recycling and improving waste management were mostly discussed as favored activities, the approach attracted some criticism in a few framings. The viability of recycling as a tool for increased sustainability was inconsistently represented. The maximized efficiency of material circulation of plastics, as Valkonen et al. (2019) argued, might risk increasing the amount of waste generated. The contradiction of the *reduction of consumption and production* and the *recycling* sub-discourses, as well as the inability to permanently close the material loop within the current system, was put into words in the following citation:

> *"Recycling is a good thing, but even more natural resources would be saved in not producing plastics - - Majority of the plastic recycled is reused only once"* (Syrjälä 20.5.2017)

The *reduction of consumption and production* and the *replacement* sub-discourses not only slightly overlapped but also contradicted each other. The material improvements in the replacement discourse provided a mandate to continue consumption as usual: for example, the biodegradability of the replacing materials was framed to negate the waste issue related to plastics:

"At the moment plastic replacement materials that are also biodegradable in the marine environment are being developed." (Mikkonen 23.3.2018)

"The single-use plastic cups used by the competition visitors are replaced by biodegradable options." (Virtanen 24.10.2018)

In addition to the *reduction of consumption and production* sub-discourse, the *recycling* sub-discourse contradicts the *replacement* sub-discourse. The bio-based and bio-degradable varieties were discussed to conflict with the recycling ambitions, as the novel polymers cannot be circulated as the ones in conventional plastics. In many cases, the bio-based and biodegradable plastics and recyclability were reported to cancel each other out:

"A biodegradable product is good if it is available and a threat exists that the product might end up in the nature and the plastic is not meant to be recycled." (Seppälä 26.10.2018)

*"Composite is a strong and durable material but many of the products made of it cannot be recycled."(*Turunen 13.6.2020)

Similarly as with the *reduction of consumption and production* and *recycling* sub-discourses, the positioning of the *recycling* and *replacement* sub-discourses were not entirely cohesive. In some framings biodegradability is presented as a superior option and in others as an inferior option to recycling:

"We are not yet in biodegradable packaging materials, but we are working for recyclability." (Juupaluoma 29.3.2020)

"Cardboard bottle could be a welcome solution in countries without deposit system and where the plastic from plastic bottles can't be reused." (Takala 17.7.2019)

The results support the finding of Kohvakka and Lehtinen (2019), who described the news coverage on plastics in Finland confusing and potentially misleading. Based on the findings of this study, it is evident that there is no commonly accepted hierarchy for the circular economy activities in the plastics economy.

6 DISCUSSION

The strong problem framing around the plastics economy in the media, as well as in policy and research, has generated a need for a change. As Roberts (2017) and Loorbach et al. (2016) theorized, reoccurring regime problems generate discourses challenging it. The established plastics economy regime has been contested, and the heavy problematization has contributed to the development of the dominant circular economy discourse identified from the data. Whether the discourse contributes to the realization of the circular economy framework or the development of a sustainable plastics economy will be discussed in this chapter.

First, the preconditions for the sustainability transition of the plastics economy set by the dominant discourse are discussed, mirroring the results of the analysis to transitional theory. The chapter continues the discussion by contrasting the analysis results against the circular economy framework.

6.1 Framing sustainability through incremental optimization

Although the circular economy sub-discourses representing the different plastics-related actions were framed inconsistently throughout the data, common features could be identified. These common features incline that the media conceptualization of circular economy might lack the holistic perception, as Kirchher et al. (2017) suggested, leading more or less to incremental changes in the economic system. The general features in the discursive representation were that the changes to the plastics economy were framed to be market-driven: the changes would come to be through consumption and production, provided they would be economically viable. Moreover, the changes would aim at maximized efficiency, carried out through large-scale, centralized operations. Finally, the framed changes would optimize the established system, targeting the problems of waste and fossil raw material over the underlying problem of consumption and production.

An uncontested discursive presumption is that the upcoming transition towards sustainability would be market-driven. The changes were framed to occur through the economy, via demand and supply. This was highlighted regarding the positioning of the actor roles: the consumers were expected to consume sustainably and demand for improved plastics-related technology, which the private sector was framed to supply. The finding fits in with the theoretical notion of Feola and Jaworska (2019) who identified that the economic system is commonly considered as the entry point for sustainability transitions. However, as Loorbach et al. (2016) theorized, the policymakers and incumbent businesses are deeply rooted in the existing system, which creates an unlikely environment for truly disruptive changes.

Based on the analysis, the news framed economic viability as a precondition to the transition. The economic viability was framed to originate from large-scale operations. The data frequently pointed out that a change was valid only when it was proven economically profitable and could be practiced large-scale:

> *"For now, wood-based plastics are quite expensive in comparison to oil-based ones, so in that sense, wood-based plastics fit into some luxury products. On a large scale this is not a solution."* (Elonen 24.10.2019)

This framing narrows down the selection of available options, excluding the economically less profitable/smaller-scale options. Furthermore, some activities for improved sustainability were framed as an economic risk. This framing, as Lyytimäki et al. (2018) found in their study on biogas, might prevent the adoption of the more sustainable technology. Moreover, the finding resonates with the concept of profit lock-in by Westley et al. (2011), a socio-technical state in which some innovations are unable to proceed further from a niche level due to the pre-condition of profitability. The profit lock-in is well exemplified in the following, where economic viability overrules the superior sustainability:

> *"Since the beginning, we have started from developing economically viable and environmentally superior products compared to the current products than aiming to develop perfect products, that are not worth commercializing"* (Luukka, 13.11.2018)

The circular economy discourse gave a great importance to technological advancements along the journey towards sustainability. Operational optimization through technology development was a common feature in almost all the sub-discourses, aiming at large-scale, centralized, maximized efficiency operations. The *recycling* sub-discourse framed the development towards increased reprocessing volumes in centralized reprocessing centers. Consequently, the *improving waste management* sub-discourse contributed to the increased recycling volumes by aiming at perfecting the separation and collection of plastic waste instead of targeting the prevention of waste generation. This finding supports the theorization of Valkonen et al. (2019) and Valenzuela and Böhm (2017), who suggested that improved circulation contributes to the increase of waste volumes. The following citation condenses this way of thinking aptly:

> *"The circulation of plastics requires a steady flow of material to function rationally and economically viably. The machinery should not be off."* (Gronow, 30.1.2020)

The *replacement* sub-discourse framed a change in materials to more easily recyclable varieties or enabling linear consumption through biodegradability. By solving the waste problem through biodegradability and the fossil raw material problem through alternating raw materials mimicking the qualities of conventional plastics, the *replacement* sub-discourse avoids problematizing the established consumption and production patterns. Even the *reduction of consumption*

and production sub-discourse focused on improving material efficiency or, alternatively, reducing plastics-specific resource use over resource use in general, hardly criticizing the current ways of consumption and production.

As the dominant discourse does not fundamentally question the role and the consumption or production of plastics, the finding contributes to the locked-in societal plastics-specific values of efficiency and convenience by Evans et al. (2020). Fundamentally, the problem framing around plastics target the symptoms of the dysfunctional system, the waste generation and atmospheric emissions consequent from the fossil raw material, over the underlaying cause of excessive consumption. The focus on symptom treatment, as Loorbach et al. (2016) argued, contributes to recurrent problems and sets the regime more vulnerable for contesting discourses.

Based on the analysis, the sustainability transition of the plastics economy was framed to occur via technological advancements attempting to optimize the prevailing system by reducing resource consumption while maintaining the habits of consumption/production. Even when the regime has been challenged by frequent problem framings through the media and other parties, the transition inclined is taking the form of a fit-and-conform change defined by Raven et al. (2015), providing solutions that fit into the established system over trying to challenge the system more fundamentally. The incremental optimization is hardly an adequate solution for a sustainability issue as deeply rooted and complex as the one of the modern plastics economy.

To further highlight the dominance of the circular economy discourse, as Pynnönen (2013) presented, one can identify the less or non-represented discourses. The data provided few discourses that contested the representation of the sustainability transition of plastics taking place with incremental changes in the current economic system. However, a few differing, albeit marginal, framings were represented in the data.

Contrasting against the market-driven transition approach, a significantly more minor representation was the change that did not require increasing or decreasing production/consumption, but rather questioning ownership and the modern consumption habits:

> *"One side of the story is that industrialized countries set the standards of a good life for the rest of the world: does it include plastic bottles and packaging and a lot of traveling - -"* (Elonen 24.10.2019)

In comparison to the large-scale, maximized efficiency paradigm, few representations over dispersed material circulation systems existed in the data. These included the personal repurposing of plastics by 3D printing and the dispersed, small-scale waste recycling schemes in foreign countries.

The narrative completely missing was the one questioning the prevailing system, that contributes to the necessity of plastics, such as the global supply chains making plastics necessary. Moreover, albeit the framing through economic viability was frequent, the data did not address the economic and material losses of the prevailing linear system.

6.2 The circular economy discourse and the circular economy framework

In addition to framing the circular economy sub-discourses inconsistently, the data set differing emphasis on the circular economy activities than the circular economy framework. In addition to the commonly referred R's of circular economy, *reduce*, *reuse* and *recycle* (Johansen et al., 2022), the data presented the replacement of plastics as a prominent circular activity. Replacement as a circular economy activity was also prominent in the Ellen MacArthur plastics economy specific plan (2016), where plastics were detached from fossil feedstocks and transmitted to the renewable resource circulation. However, the replacement of plastics served many framings as an enabler for the established, linear ways of consumption, ultimately acting against the circular economy principles.

The recycling, reduction and reuse as activities were represented disproportionally in comparison to the circular economy framework. Ghisellini et al. (2015) arrived at the same conclusion, stating that the circular economy related literature had an emphasis on recycling over the overall reduction and reuse of plastics. Whereas in the data the *recycling* sub-discourse was highlighted, in the circular economy framework it is the least favored option before energy harvesting. Furthermore, the examples of systemic, large-scale sharing and reuse of plastics were practically unrepresented in the data. This is against the circular economy principles, where sharing and reuse were framed as superior circulation routes to recycling (Ellen MacArthur Foundation, 2019). Based on the media discourse analysis, the reprocessing of plastics back to the level of raw material is the prioritized way of action over maintaining the value of the resource by reusing. Nevertheless, the recycling of plastics was also framed to cause leakage of material out of circulation as well as the production of recycled, lower-value products. Neither of these consequences is in accordance with the circular economy principles.

Furthermore, the circular economy discourse was lacking the overall problematization of consumption. The lack of emphasis on the reduction on overall consumption was found common in the circular economy definitions, especially by practitioners (Kirchher et al., 2017), which might reflect on the news discourse. As Ghisellini et al. (2015) presented, the circular economy is not a valid framework for economic growth, but rather stability. However, as Kirchher et al. (2017) noted in many definitions, the circular economy discourse was mostly framed as a tool for economic growth. Nevertheless, the news represents few examples of win-win situations regarding the sustainability of the plastics economy but rather reports on the trade-offs between the environmental and economic points of view. The juxtaposition might contribute to a lack of investment in the circular economy applications.

The circular material flow framing has, however, penetrated the news discourse, as the sustainability of plastics was in many cases discussed in the context of the material life cycle. This crystallizes in the way in which the single-use

goods are almost exclusively framed negatively. The life cycle thinking itself provides an opportunity for a more holistic understanding of the sustainability of the plastics economy.

Based on the analysis, the circular economy framework will not be applied fully to the plastics economy to harness its potential for fundamental change. Even though circular economy was defined as the dominant discourse of this analysis, it was framed to be applied limited by the established regime of efficiency and economic growth. Thus, the transition pathway for plastics economy framed by the media seems to reproduce itself by incrementally applying circular economy activities at places where they do not disturb the regime.

7 CONCLUSIONS

This study set out to identify discourses related to the sustainability transition of the plastics economy in the Finnish news media. The media defines plastics and the current, linear plastics economy as highly problematic, framing the key problems to be the consequent waste generation and, secondarily, the carbon emissions caused by the fossil raw material of plastics. The findings point out that the media, as well as scientific literature and many public policies, frame the transition to develop towards a circular economy to address the framed plastics-related problems.

The circular economy was the dominant, overarching discourse discovered via the analysis, consisting of the sub-discourses of *recycling*, *improving waste management*, *replacement*, *reduction of consumption and production*, and *reuse*. *Recycling*, the most distinct sub-discourse in the data, worked as the umbrella term in the news language for the entire circulation process from household waste separation to producing new goods from recycled plastics. The common way to reprocess plastics was framed as a large-scale, centralized operation. The *improving waste management* sub-discourse was highly complementary to the recycling discourse, emphasizing improving the efficiency and volumes of material circulation. The *replacement* sub-discourse discussed replacing plastics with other materials, such as glass, metal, and cardboard, as well as developing bio-based and biodegradable plastics-like substances to replace conventional, oil-based plastics with for value generation.

The *reduction of consumption and production* sub-discourse framed the reduction of overall plastics to occur via increased material efficiency and avoidance of unnecessary, mostly single-use, plastics consumption. The *reuse* sub-discourse, although an important part of the circular economy framework, represented only a minor discourse in the data. Reuse was mostly discussed as a tool for individual plastics use reduction, complementing mostly the reduction discourse.

None of the circular economy sub-discourses were represented without sustainability trade-offs, such as the recycling plastics into lower-value applications. Furthermore, the identified circular economy sub-discourses were multilaterally inconsistent: they overlapped, contradicted, and have incoherent prioritization within the discourse. The finding speaks for the lack of universal hierarchy on the plastics-related circular economy activities, which is a potential consequence of and contribution to the inconsistent understanding of the circular economy framework.

The circular economy represented in the data was not entirely according to the original framework. The circular economy identified from the data represented more incremental changes to the plastics economy, maintaining the existing system that emphasizes economic growth and maximized efficiency. Circular economy was mostly presented as a tool for economic growth, lacking criticism towards consumption. The circular economy of plastics economy was framed to

occur through operational optimization through technological developments rather than a changing the socio-cultural context of plastics consumption. The dominance of the circular economy discourse is further emphasized by the lack of contesting discourses. The media frames the sustainability transition of the plastics economy to materialize via incremental changes, reproducing the existing system dominated by both the profit lock-in (Westley et al., 2011) and the locked-in values of efficiency and convenience (Evans et al., 2020). The identified discursive representation of the media is unlikely to contribute to solving an issue as complex and societally through-cutting as the modern plastics economy.

Limitations

As Taylor (2001a) expresses, a discourse analyst studies 'regularities within an imperfect system'. The constantly developing system limits the applicability of the results of this study, tying them to the place and moment of the study. Thus, the results of this analysis can be outdated even within a short period. Moreover, this study focused on only one, commercial news outlet, thus excluding potential other discourses in other news outlets.

Another limitation to discourse analysis, and this study, is that it cannot be said to produce results, but rather narrations (Wetherell, 2001b). The interpretations in the analysis are always impacted by the analyst's construction of reality (Pynnönen, 2013). Thus, another analyst could produce completely different narrations of the same data.

The topic would benefit from further research, for example setting the discourse analysis related to plastics and the plastics economy into other spatial and temporal contexts. The media content analysis could benefit from quantitative examination, such as the frequency of certain representations in the media. This would contribute to the salience of the analysis and the estimation of the societal impacts of the news representations.

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APPENDIX

Articles published in Helsingin Sanomat newspaper or online news platform used as the data:

23.1.2017 Lehtinen, Toni
Muovinkierrätyksen piti alkaa kunnolla viime vuonna mutta toisin kävi – tavoitteena viisi kiloa vuodessa jokaiselta suomalaiselta

10.2.2017 Malmberg, Lari
Roskaa ja ryönää ahmivia hökötyksiä lasketaan mereen Helsingin edustalle – Kelluvilla roskakoreilla yritetään siivota maailman meriä

13.2.2017 Heikkinen, Kirsi
Jäämeri kohta kuin kaatopaikka – roskien määrä on jopa 20-kertaistunut kymmenessä vuodessa

19.3.2017 Pajari, Katariina
”Olet juuri tehnyt elämäsi typerimmän ostoksen” – yksittäispakatut mansikat raivostuttavat Hongkongissa

23.4.2017 Kettunen, Niko
Jäämerestä on tullut muovijätteen kaatopaikka, vaikka napa-alueilla ei pitäisi olla roskan lähteitä

24.4.2017 Kettunen, Niko
Tutkijat löysivät muovia syövän perhosen toukan – tuntematon entsyymi voisi auttaa muovijätteen hävittämisessä

27.4.2017 Fröman, Fanny
Perhonen voi auttaa muovin hävittämisessä

16.5.2017 Kettunen, Niko
Asumaton paratiisisaari hukkuu muoviroskaan, tutkijat järkyttyivät: ”Kauimmaisetkaan kolkat eivät ole suojassa”

20.5.2017 Syrjälä, Hanna
Kauppatieteiden opiskelija havahtui turhanpäiväiseen kulutukseensa ja alkoi vältellä kaikkea muoviin pakattua – nyt hän tekee jopa deodoranttinsa itse

1.6.2017 Ristmeri, Aliisa
Vaatekauppojen muovikasseista tuli maksullisia Ruotsissa – Suomi seurannee perässä

8.6.2017 Rimaila, Elisa
Muoviroska, ilmastonmuutos, liikakalastus, saasteet – maailman meriä koettelevat monet uhat

20.7.2017 Onali, Alma
Nyt se on laskettu: maailmassa on tuotettu 8,3 miljardia tonnia muovia ja peräti puolet siitä kolmentoista viime vuoden aikana – silti tuotanto vain lisääntyy entisestään

24.7.2017 Vuorio, Jukka
Viisilapsisen perheen äiti Aino Kämäräinen tekee itse hammastahnansa, välttää vihannespusseja ja elää heinäkuun ilman muovia – näin sinäkin voit vähentää muovijätettäsi

28.8.2017 HS-Reuters
Tiukka muovipussilaku voimaan Keniassa – maksimirangaistus jopa neljä vuotta vankeutta

31.8.2017 Pölkki, Minna; Palttala, Pipsa
Frozen-sukissa syöpävaarallisia aineita, Hello Kitty -paidassa hedelmättömyyttä aiheuttavia ftalaatteja – Kuinka välttyä vaatteiden näkymättömiltä kemikaaleilta?

1.9.2017 HS-AFP
Sri Lanka kielsi muovipussit – taustalla 32 ihmisen kuolema

9.9.2017 Viljamaa, Anne
Tutkijat Guardian-lehdessä: Muovi on saastuttanut jo merisuolankin – ”Muovia on ilmassa, vedessä, merenelävissä, oluessa ja käyttämässämme pöytäsuolassa”

19.9.2017 Bäckgren, Noona
Keinokuituvaatteet tuhoavat meriä ja voivat vaarantaa ihmisen terveyden, mutta moni ei tiedä sitä – ”Fleece on erityisen haitallista”

24.9.2017 Ervasti, Anu-Elina
Jäämerellä purjehtinut tutkimusryhmä kertoo löytäneensä yllättäen muovia keskeltä avomerta – se kertoo siitä, kuinka pitkälle muovisaaste on levinnyt

28.9.2017 Kettunen, Niko
Ennennäkemätöntä: tsunamin mereen pyyhkäisemä muoviroska kuljetti Japanista satoja vieraslajeja Yhdysvaltain rannikolle

23.10.2017 Hakkarainen, Kaisa
Suomalaisten lajitteluinto laahaa pahasti tavoitteista: Yli puolet kotien sekajätteestä on biojätettä tai kierrätyskelpoista muovia

12.11.2017 Niemeläinen, Jussi; Kunnas, Kaja
Latviassa pullojen ja tölkkien kierrätys on pitkälti roskia tonkivien kodittomien ja jätekeskusten käsinlajittelun varassa – Nyt maahan yritetään perustaa pullojen ja tölkkien panttijärjestelmä

14.11.2017 Kempas, Karla
Täytettävä juomapullo on nyt trendiasuste, mutta onko se kertakäyttöistä pulloa ekologisempi tai edes terveellisempi?

18.11.2017 Vasama, Tanja
Suvi Haimi kypsyi muovijätteen määrään kylpyhuoneessaan – syntyi uraauurtava keksintö, joka kiinnostaa jo kansainvälisiä kosmetiikkabrändejä

20.11.2017 Luukka, Teemu
Metsäjätti UPM aikoo myös kemianjätiksi – Uusi tehdas tulisi Saksaan, joka päihitti Suomen sijaintipaikkana

24.11.2017 Nalbantoglu, Minna
Vanha Barbie kierrättimeen ja muovista uusia leluja – suomalaisyritys etsii ratkaisua muovijätteeseen, katso miten kierrätin toimii

13.12.2017 Kettunen, Niko
Tutkimus: Meren eliöt voivat silputa kaupan muovipussin miljooniksi pieneksi palasiksi mereen

14.12.2017 Niemeläinen, Jussi
Latvian iso kaatopaikkapalo herätti keskustelun siitä, kuinka rikkaat EU-maat työntävät roskiaan köyhempiin – suomalaista jätettä kaatopaikalla ei tiettävästi ollut

14.12.2017 Paakkanen, Mikko
Suomen Luonto -lehden vuoden turhake on fleece-kangas

27.12.2017 Pajuriutta, Satu
Kierrätyspisteet muuttuivat surullisiksi roskavuoriksi, törkyä heitetään yltympäriinsä jopa pusikoihin – ”Kyllä on masentava näky”

3.1.2018 Rimaila, Elisa
Helsingin eniten turisteja vastaanottavan tienpätkän varrelta puuttuvat roskapöntöt – lopputulos kelluu läheisessä merialtaassa

3.1.2018 Vihavainen, Suvi
Inkeri Pekkanen on kerännyt viime huhtikuun jälkeen 11800 roskaa Hangon rannoilta – mitä ovat pikkuruiset muovipelletit, joita ei voi edes siivota?

5.1.2018 Reuters-HS
Britannian parlamentti vaatii: Kertakäyttömukeille ”lattevero”

14.1.2018 Kivimäki, Tuija; Mikkonen, Minttu
Muovia on merissä kohta jopa enemmän kuin kalaa, ja osa siitä päätyy ruoka-aineisiin – HS:n grafiikat kertovat, mitä se tarkoittaa eläimille ja ihmisille

15.1.2018 Arola, Heikki
Kaatopaikalle menee enää murto-osa jätteistä – katso miten nopeasti polttaminen nousi hallitsevaksi jätteen käsittelytavaksi

16.1.2018 Mykkänen, Pekka
Muovi päätyy mereen, kaloihin ja ihmisiin – EU haluaa että kaikki muovi voidaan kierrättää tai käyttää uudelleen

23.1.2018 Pajuriutta, Satu
Törkyiset kierrätysastiat tursuavat kaduille ja pusikoihin Helsingin ympäristössä – muovin kierrätyksestä tuli sekasotku

24.1.2018 Pajuriutta, Satu
”Skandaali”, tuohtui pormestari Jan Vapaavuori kaduille ja pusikoihin tursuavista jätteistä – Anni Sinnemäki lupaa muovinkeräysastioita Helsingin vuokrataloihin

5.2.2018 Kantola, Anne
Pitääkö jogurttipurkki pestä tai hedelmäpussin metalliosa irrottaa? Asiantuntija vastaa yhdeksään kysymykseen muovin kierrättämisestä

6.2.2018 Vallinkoski, Anu
Onko hammastahnassasi muovia? Monista kylpyhuoneen perustarpeista löytyy tuhoisia mikromuoveja – näin selvität, onko niitä käyttämissäsi tuotteissa

9.2.2018 Arola, Heikki; Teittinen, Paavo
Energiayhtiö Neste löysi uuden toimitusjohtajan kolmensadan ehdokkaan joukosta – Peter Vanacker vie yhtiön uuteen biomateriaalien kauteen

15.2.2018 Luukka, Teemu
Muovikassien käyttö jyrkässä laskussa Sokoksissa – Ihmiset tuovat taas omia kassejaan kauppaan

23.2.2018 Mikkonen, Minttu
Matkustin kahdeksaksi päiväksi Sambiaan, ja näin ilmasto siitä kärsi – lennot, muovipullot ja hotellimajoitus ovat ilmastotaakka

3.3.2018 Kallionpää, Katri
Tuhannet yrittävät pärjätä maaliskuun ilman muovia – Vessa on muovittoman elämän murheenkryyni, sanoo bloggaaja ja antaa 13 vinkkiä onnistumiseen

6.3.2018 Nalbantoglu, Minna
Petteri Orpo väläyttää muoviveroa tai kertakäyttöisten muovituotteiden kieltoa

11.3.2018 Kantola, Anne
Biohajoava muovi tulisi kieltää kuluttajilta jopa kokonaan, sanovat asiantuntijat – ”Ei ole ekologisempi ratkaisu tai vastaus ympäristöongelmiin”

12.3.2018 Kause, Pilvikki
Portugalissa auringonottaja tökkää varpaansa yhä useammin muovimoskaan – kilometrin rantapätkältä löytyi 5000 pumpulipuikkoa

14.3.2018 Kempas, Karla
Talous kasvaa, mutta hallituksen linja pysyy tiukkana, sanoo Petteri Orpo – ”Huuman ei saa nyt antaa hämätä”

23.3.2018 Mikkonen, Minttu
Maailman merissä velloo viisi valtavaa jätepyörrettä – Mitä muovijätteelle voi tehdä?

4.4.2018 Kivipelto, Arja
Hollantilainen teini keksi kenties kunnianhimoisimman tavan puhdistaa valtamerten roskapyörteet – suursiivous alkaa tänä kesänä

7.4.2018 Kantola, Anne
Maatuvatko biojätepussit ja minne laitan sekajätteen, jos siirryn ostoksille kangaskasseihin? HS kysyi asiantuntijoilta, kuinka kierrättää oikein

9.4.2018 Kantola, Anne
Hyviä uutisia muovinkulutuksesta: Muovipussit muuttuivat maksullisiksi vuosi sitten, ja S-ryhmän kaupoissa tuloksena oli 4,5 miljoonaa pussia vähemmän

17.4.2018 Kähkönen, Virve
Muovia syövä entsyymi herättää toiveita jäteongelman ratkaisusta – tutkijat saivat entsyymin ahmimaan pullojätettä vahingossa

19.4.2018 Hannula, Tommi
Jokainen britti käyttää keskimäärin yli 200 vanupuikkoa vuodessa – nyt muovivartiset vanupuikot aiotaan kieltää lailla

3.5.2018 Merimaa, Juha
Puu sulaa ja muovautuu – ihmeliuottimen avulla sellusta voidaan saada korvaaja sekä puuvillalle että muoville

5.5.2018 Nousiainen, Anu
Ikuinen ongelma

22.5.2018 Rantanen, Kalevi
Kodin jäte voi pian muuttua leluiksi tai käyttöesineiksi – Tältä näyttää 3d-tulostuksen tulevaisuus, joka mullistaa muovin kierrättämisen

25.5.2018 Salomaa, Marja
Fortum suunnittelee Ämmässuolle lämpövoimalaa – polttoaineena haketta ja purkupuuta

28.5.2018 Pakkanen, Mikko
EU puuttuu muovijätteen tuottamiseen: komissio kieltämässä kertakäyttöiset ruokailuvälineet, pillit ja vanupuikot

1.6.2018 Fröman, Fanny
EU haluaa kieltää muoviset pillit

1.6.2018 Luukka, Teemu
Toimitusjohtaja Carl Haglund jättää Kaidin, vaikka Kemin biopolttoainetehtaan tulevaisuus näyttää valoisammalta kuin aikoihin

5.6.2018 Kivipelto, Arja
Suomalaistutkijat jäljittävät pikkuisen muovisälän reittejä Itämeressä – keksivät raastaa legopalikoita eliöille

6.6.2018 El Kamel, Sonia
Muovipakkausten lajittelu sujuu mallikkaasti pääkaupunkiseudulla, mutta sekajätteestä yli puolet on yhä kierrätettävää tavaraa

6.6.2018 El Kamel, Sonia
Suomessa tutkittiin ensimmäisen kerran järven mikromuovipitoisuuksia – Kallavedellä pienempien hiukkasten pitoisuudet ovat jopa satakertaisia Itämereen verrattaessa

8.6.2018 El Kamel, Sonia
Muoviroskat ovat muuttamassa Välimeren valtavaksi muovimereksi – Välimeren mikromuovipitoisuus on jopa nelinkertainen Tyynenmeren jätepyörteeseen verrattuna

9.6.2018 Huhtamäki, Hanna
Ikea lopettaa kertakäyttöisten muovituotteiden myymisen

20.6.2018 Siren, Ines
Muovia paheksutaan jo melkein tupakan tavoin – näin perinteikäs suomalainen muovipussitehdas aikoo selviytyä

27.6.2018 Kempas, Karla
Kasvua metsämarkkinoille

7.7.2018 Loula, Pihla
Kansallispuistojen pitkospuiden tilalle tuli metallia ja retkeilijät harmistuivat – Nyt Metsähallitus kertoo, miksi muutos on tehtävä

16.7.2018 Laine, Linda
Britit kokeilevat pullonpalautusta – päivässä saa palauttaa enintään 20 pulloa tai tölkkiä

23.7.2018 Sirén, Ines
Neste korvaa pian raakaöljyä jätemuovilla

4.8.2018 Sajari, Petri
Nesteen pörssikurssi on seitsenkertaistunut Matti Lievosen aikana – Öljy-yhtiöstä on tullut myös ilmastonmuutoksen torjuja

8.8.2018 Malmberg, Katarina
Lasten muoviastioita voi turvallisesti käyttää mikrossa – Ulkomailta ostettujen astioiden merkinnät kannattaa tarkistaa

19.8.2018 Kempas, Karla
Allekirjoitukset täyteen viimeisenä mahdollisena päivänä: Kansalaisaloite mikromuovien kieltämisestä kosmetiikassa eduskuntaan

21.8.2018 Grönholm, Pauliina
Suomalaistutkija mukana selvittämässä uutta havaintoa: Uv-säteily hajottaa muovia meressä – tieto on merkittävä mikromuoviongelman hillitsemisessä

3.9.2018 Sirén, Ines
Turun Sinappi antoi opetuksen Unileverille – ”Teimme juuri niin kuin ei pitäisi tehdä”, sanoo Euroopan-johtaja

14.9.2018 Salomaa, Marja
Taloyhtiöiden muovinkeräyksestä on tulossa pakollista Helsingin seudulla

19.9.2018 Kettunen, Niko
Mikromuovia löytyi jo hyttysistäkin – vesistöissä kasvavat toukat imevät muovia itseensä, ja aikuisista hyttysistä muovi päätyy lintuihin

1.10.2018 Mikkonen, Minttu
Hollantilainen kauppaketju nousi maailmanmaineeseen muovittomalla myyntikäytävällä – mutta ovatko muovin korvaajat oikeasti ympäristöystävällisiä?

9.10.2018 Nalbantoglu, Minna
Suomalaiset käyttävät kaksi miljoonaa muovipussia päivässä – Moni potee huonoa omaatuntoa, mutta ovatko muovikassien vaihtoehdot ympäristölle parempia?

16.10.2018 Arola, Heikki
Uusi selvitys ehdottaa: Muovi verolle, Suomeen uusia muovijalostamoja ja rakennustyömaiden ja maatalouden muovit talteen

23.10.2018 Repo, Päivi
Mikromuovia löytyy myös ihmisten sisältä, uusi tutkimus havaitsi

24.10.2018 Virtanen, Ari
Rukan maailmancupkilpailu pienentää muovijätteen määrää noin 60 prosentilla – pulloveden tilalle ”Kuusamon kirkasta” pohjavettä

24.10.2018 Virtanen, Jenni; Pölkki, Minna
Ei enää muovihaarukoita, pillejä tai ilmapallon pidiketikkuja – EU haluaa kertakäyttömuovin kokonaan pois kaupan hyllyltä

26.10.2018 Fröman, Fanny
Ei enää muovipusseja! – Alakoululaiset aloittivat kansalaisaloitteen muovipussien kieltämiseksi

26.10.2018 Pölkki, Minna
Suomalaiset innostuivat kierrättämään muovia – lähes kaikki keräysmuovi menee kotimaisille valmistajille uusiksi tiskiharjoiksi ja kastelukannuiksi

26.10.2018 Seppälä, Lauri
Muoviongelman ydin on tämä: Pullot eivät kierrä, sillä uusi muovi on halpaa

2.11.2018 Takala, Anna
Led-kynttilä muuttuu haudalla hetkessä ongelmajätteeksi – ”Oletamme, että omaiset huolehtivat omaisuudestaan”

5.11.2018 Huusko, Marja (Rakennuslehti)
Rakennusala käyttää Suomessa kulutetusta muovista jopa yli neljänneksen, mutta kukaan ei tiedä, mihin muovi menee – ministeriö aloittanut selvityksen

6.11.2018 Lassila, Anni
Suomessa myydään vuosittain jopa 17 miljoonaa kuulakynää – Yksi lähde kynätulvalle on hotelleissa, jotka havahtuivat aiheuttamaansa ympäristöongelmaan

8.11.2018 Mikkonen, Minttu
Kiina ei enää halua olla maailman kaatopaikka – ja se on syöksemässä länsimaat kaaokseen muovijätteen kanssa

11.11.2018 Moilanen, Kaisu
Jätteenkierrätyksestä tulee pian yhä useamman espoolaisen velvollisuus, mutta nyt kaupunki haluaa lykätä lajittelun aloittamista

11.11.2018 Nykänen, Anna-Stina
Me sen teimme

13.11.2018 Luukka, Teemu
Uudet materiaalit muistuttavat niin paljon muovia, että kuluttaja saattaa tehdä ekoteon huomaamattaan – Kaupan tuore-yrtit pääsevät pian puupohjaiseen, läpinäkyvään pakkaukseen

16.11.2018 Luukka, Teemu
Alvar Aallon suunnittelema sellutehdas oli tuomittu tuhoon, mutta sitten suuri johtaja lausui yllättävät sanat – Pelastus löytyi puun ihmeaineesta, joka saattaa pian tuottaa enemmän kuin sellu

19.11.2018 Kettunen, Niko
Muovinpalasia löytyi jo Amazonin piraijoistakin

28.11.2018 Harju, Jukka
Suomalaiset tutkijat saattoivat löytää ratkaisun merten muovijäteongelmaan: Mikrobit, jotka hajottavat ja jopa syövät muovia

9.12.2018 HS-työryhmä
Viisi uutista, viisi villapaitaa

12.12.2018 Malmberg, Katarina
Kun raskaus ei vain ala – Yhä useampi pari joutuu turvautumaan hedelmöitys-hoitoihin, eikä syy ole pelkkä lasta haluavien iäkkyys

12.12.2018 Vartiainen, Niko
Nesteeltä jättimäinen investointi Singaporeen – Tavoitteena tehdä polttoainetta yhä huonompilaatuisista jätteistä ja tähteistä

17.12.2018 Moilanen, Kaisu
Helsinkiläinen ruokakauppa alkoi lainata kauppakasseja panttia vastaan – ”Toivon, että pääsemme eroon muovipusseista”, sanoo 5000 kangaskassia ostanut kauppias

22.12.2018 Luukka, Teemu
Vuonna 1890 Brooklynissa tehtiin nerokas keksintö, jota ilman maailmantalous ei pyörisi: Pahvilaatikko

8.1.2019 Nalbantoglu, Minna
Riitta Pesola suivaantui mustista muovi-pakkauksista, sillä niitä ei voi kierrättää – Suostuvatko liha-yritykset luopumaan mustasta, vaikka liha näyttää siinä parhaalta?

27.1.2019 Juntunen, Esa
Kenialaiset rakensivat muovijätteestä purjealuksen – sandaaleista ja muovipulloista kasattu FlipFlopi lähtee merille varoittamaan roskaamisesta

1.2.2019 Varpula, Salla
Sinituote tekee vessaharjoja muovisista jauheliha-pakkauksista – Suomalaisten kierrätys-into ei tahdo pysyä perässä, kun yritykset lisäävät jätemuovin käyttöä raaka-aineena

2.2.2019 Juupaluoma, Johanna
Espoossa ja Kauniaisissa taloyhtiöt ovat kaikkein ahkerimmin lisänneet omatoimista muovinkeräystä – Pian muovinkeräys on taloyhtiöille pakollista kaikkialla Helsingin seudulla

18.2.2019 Rouvinen, Mia
Kerava julistaa hankkiutuvansa eroon muovipusseista

21.3.2019 Partanen, Minttu-Maaria
3d-printteri takoo hevosille kenkiä ja iskuja vaimentavia ”lenkkitossuja” Vantaalla

27.3.2019 Pölkki, Minna
Hyvästi muovipillit: EU-parlamentti hyväksyi kertakäyttömuoveja kieltävän direktiivin

31.3.2019 Lehmuskoski, Susanna; Huotari, Päivi
Sormet multaan

6.4.2019 Mäkelä, Arttu
Selvitys: Viidesosa Suomessa käytetystä muovista menee rakennuksiin

7.4.2019 Mikkonen, Minttu
Biohajoavia dildoja ja vegaanisia kondomeja: Myös seksivälineitä myydään nyt ympäristösyillä

24.4.2019 Kettunen, Niko
Ensimmäinen muovisiima löytyi merestä Islannissa 1957 – sen jälkeen meret ovat täyttyneet roskasta ja mikromuovia lentää jo ilmavirroissakin

4.5.2019 Saavalainen, Heli
EU aikoo rajoittaa mikromuovien käyttöä kosmetiikassa, pesuaineissa ja lannoitteissa

11.5.2019 STT-AFP
Muovijätteen viemistä köyhiin maihin rajoitetaan uudella sopimuksella – Yhdysvallat hankasi vastaan

16.5.2019 Vainio, Sara
Syrjäisten Kookossaarten rannoilta löytyi 414 miljoonaa muovinpalasta – muovijätteen määrä maailmassa on arvioitu dramaattisesti pieleen, varoittavat tutkijat

23.5.2019 Petäjä, Jukka
Pitäisikö kirjaston kirjojen päällystäminen muovilla lopettaa ympäristösyistä? Kuopio kokeilee, Helsingissä ei innostuta

24.5.2019 Rantavaara, Minja
Helsinki kaatoi talvella suoraan mereen 20 000 kuormallista lunta, ja lohduttomat kuvat paljastavat sen sisältämän ryönän määrän

26.5.2019 Lehmuskoski, Susanna
”Ennen kehotin ostamaan. Enää en sitä tekisi”, sanoo Suomen johtava sisustusstailisti

5.6.2019 Onali, Alma
Ihminen nielee kymmeniä tuhansia mikromuovikappaleita vuodessa, arvioi tuore kanadalaistutkimus

13.6.2019 Tervonen, Tuukka
Osa Suomenkin muoviroskista valuu Aasiaan, jossa maa toisensa jälkeen on saamassa vyörystä tarpeekseen: Asiantuntija ennustaa ”jätesotaa”

16.6.2019 Pasanen, Anni
Muovi on pyhän lehmän roskaruokaa

26.6.2019 Hartikainen, Jarno
Jyrki Katainen on Brysselin toiseksi lobatuin EU-komissaari

3.7.2019 Tervonen, Tuukka
Maailma tuottaa vuodessa 2,1 miljardia tonnia yhdyskuntajätettä, mutta USA on ylivoimainen ”jätekukkulan kuningas”

15.7.2019 Koskinen, Matti
Tunnetut mikromuovit kulkevat ihmisen ruoansulatuksen läpi ilman ongelmia, mutta kaikkein pienimpien vaikutuksia ei tunneta

17.7.2019 Takala, Anna
Espoolaismies onnistui kehittämään toimivan pahvisen juomapullon: onko keksinnöstä muovipullon haastajaksi?

23.7.2019 Hiilamo, Elli-Alina
UPM ilmoitti historiansa isoimmasta investoinnista Uruguayn-tehtaaseen, osake kallistui 10 prosenttia

25.7.2019 Uusitupa, Ismo
EU ei olekaan kieltämässä kumirouhetta jalkapallokentiltä: ”Tutkimme, miten rouheesta saisi ympäristöystävällisempää”

30.7.2019 Rimaila, Elisa
Unescon maailmanperintökohteesta tuli jopa planeetan roskaisin paikka – asumattoman korallisaaren rannat pursuavat muovijätettä

9.8.2019 Rinta-Jouppi, Anton
Kontaktimuovi syntyy Suomen Lapissa: ”Olemme kummajainen muovialalla”

23.8.2019 Repo, Päivi
Riski saada juomavedestä mikromuoveja on pieni, WHO havaitsi

16.9.2019 Latvala, Johanna
Suomalaiset käyttivät viime vuonna satoja miljoonia muovikasseja, tätä vauhtia muovipusseista päästään eroon 2040-luvulla

18.9.2019 Aalto, Maija
Kaikista Helsingin jäteautoista tulee liikkuvia taideteoksia: Ensi viikolla liikkeelle lähtevä citykettu muistuttaa muovien lajittelusta

19.9.2019 Niskakangas, Tuomas
Hampurilaisketju Burger King luopuu muovileluista

26.9.2019 Viljamaa, Anne
Maailman kolmanneksi suurin risteilyvarustamo luopuu muovipulloista: ”Asteikolla 1-10 muovipullojen merkitys on 2”, sanoo meribiologi

28.9.2019 Merimaa, Juha
Laadukkaina markkinoiduista ”luksusteepusseista” liukeneekin miljardeittain mikromuovia, tutkijat havaitsivat

5.10.2019 Hiilamo, Elli-Alina
”Suomessa tehdään liian paljon bulkkituotantoa”, sanoo ilmastoministeri Krista Mikkonen

6.10.2019 Rouvinen, Mia
Keravalla tehdään Suomen Coca-Colat: yksikään ihminen Suomessa ei tiedä klassikkojuoman reseptiä

8.10.2019 Pesonen-Smith, Anna (STT); Sebany, Miia (STT)
Suomalaiset roskaavat merimaisemaansa tupakantumpein, kun muualla rannalle heitetään ilmapalloja ja terveyssiteitä

24.10.2019 Elonen, Piia
Tavarataivas

17.11.2019 Nykänen, Anna-Stina
Ei jätä kylmäksi

20.11.2019 Mölsä, Seppo (Rakennuslehti); Rautanen, Sari (Rakennuslehti)
Taloja tehdään osmankäämistä, savesta ja oljista, jotta rakentamisen päästöt vähenisivät

28.11.2019 Varmavuori, Marjaana
Minna Mäkinen käyttää elämästään satoja tunteja, jotta unohtuneiden tunkioiden Malmi olisi edes hivenen siistimpi

5.12.2019 Kettunen, Niko
Sadattuhannet erakkoravut kömpivät jonossa muovipulloihin ja kuolevat: ”Karmiva ketjureaktio”

8.12.2019 Pölkki, Minna
Keskustelu muovista saa kuluttajat pohtimaan ostoksiaan, mutta näkyykö se joulukaupassa?

10.1.2020 Häkkinen, Henri
Kuudesluokkalaiset innostuivat ilmastoteoista ja saivat perheensäkin toimimaan ympäristöystävällisemmin

11.1.2020 Tarvonen, Hanne-Mari
Borneolla pääsee seuraamaan paikallista arkea sademetsän sydämessä – mutta turistien määrää rajoitetaan jo

15.1.2020 Pajari, Katariina
Kierrätä tai häpeä

30.1.2020 Gronow, Kira
Muovi kiertoon

14.2.2020 Sirén, Vesa
Moni kuvittelee, että cd-levyistä luopuminen on ympäristöteko – Tutkija selvitti, että musiikin kuuntelun hiilijalanjälki on nyt suurempi kuin koskaan

28.2.2020 Pikkarainen, Elina
Kalifornialainen ympäristöjärjestö haastoi muun muassa Coca-Colan ja Pepsin oikeuteen mereen päätyvien muoviroskien takia

12.3.2020 Merimaa, Juha
Mikromuovia irtoaa vaatteista käytössä enemmän kuin pesuissa, ja kuitumäärät lasketaan miljoonissa

26.3.2020 Saavalainen, Heli
Tieliikenne on suurin mikromuovin lähde Suomen merialueilla: autonrenkaiden kulumisesta syntyy jopa 10 000 tonnia päästöjä vuodessa

28.3.2020 Saavalainen, Heli
Minne jätteet menevät?

29.3.2020 Juupaluoma, Johanna
Espoolaisen peltomaiseman keskellä on tehdas, josta putkahtaa jatkuvalla syötöllä tavaraa liki jokaisen naisen meikkipussiin

31.3.2020 Paukku, Timo
Legopalikka säilyy merivedessä jopa tuhat vuotta ennen kuin murenee

7.4.2020 Ikola, Vilma
Miten kaikkia nappeja voi koskea hygieenisesti kaupungilla? 19-vuotias vantaalaisopiskelija keksi tulostettavan ratkaisun

20.4.2020 Räisänen, Kari
Fortum kehitti kahvan, johon ei tarvitse koskea käsin – koekäyttö alkoi ruokakaupassa Helsingissä

29.4.2020 Paukku, Timo
Oppiva tekoäly löytää satelliittikuvista meressä kelluvan muoviroskan

10.5.2020 Luukka, Teemu
Jätteiden kierrätys tiukkenee merkittävästi – Hallituksessa löytyi sopu jätelaista pitkän kiistelyn jälkeen

12.5.2020 Varmavuori, Marjaana
Roskakaaos levisi kadulle Kannelmäessä, kun uusi muovinkeräysastia sai taloyhtiön asukkaiden pasmat sekaisin

13.6.2020 Turunen, Joonas
Mereen päätyneestä muovista tuli kansainvälinen ongelma – Nyt tutkijat kertovat, miksi muovin käytin kieltäminen olisi ympäristön kannalta järjetön ajatus

23.6.2020 Turunen, Joonas
EU:n asettamasta kovasta kierrätystavoitteesta voi tulla Suomelle murheenkryyni – Tiedätkö, minne kierrättämäsi muovi päätyy?

16.7.2020 Mäki, Elise
Monessa perheessä kannattaa suosia muovikassia kestokassin sijaan – Näin tiedät, mikä kassi sinulle on järkevin valinta

17.7.2020 Viljanen, Miina
Viisi teknologiaa, jotka pelastavat maailman ja Suomen: VTT:n toimitusjohtaja listaa asiat, joihin meidän nyt pitäisi panostaa

23.7.2020 Elonen, Piia
Puuttuva palanen

24.7.2020 Mäki, Elise
Kaikkia biopusseja ei saa laittaa biojätteeseen – Asiantuntija kertoo, millainen pussi on aina varma valinta

24.7.2020 Welling, Roosa
Tutkimus: Meriin päätyvä muoviroska saattaa kolminkertaistua vuoteen 2040 mennessä, jos mitään ei tehdä

1.8.2020 Turunen, Joonas
EU:n kiistelty muovimaksu tulee voimaan ensi vuoden alussa – ”Tämä on Suomen kannalta hyvä ratkaisu”, sanoo Tytti Tuppurainen

13.8.2020 Tarvonen, Hanne-Mari
HS seurasi jätteenkerääjän työtä Johannesburgissa, jossa tuhannet raapivat kasaan muutaman euron päivässä – pandemia romahdutti kierrätysmuovin hinnan ja kerääjien tulot

19.8.2020 Juusti, Tytti
Tutkimus: Mikromuovia voi olla Atlantin valtameressä paljon aiemmin arvioitua enemmän

20.8.2020 Liukkonen, Meri
Tässä on kone, johon voi kerralla kaataa kaikki palautuspullot – Laitteen ostanut kauppias hukkuu ylistävään palautteeseen Vantaalla

24.8.2020 Saatsi, Samu (STT)
Mikromuovia on Suomen vesistöissä kaikkialla – ahvenista muovia löytyi enemmän kuin silakoista

26.8.2020 Rantanen, Kalevi
Auton renkaista irronneita hiukkasia lentää kauas, sillä niitä löytyy jopa Grand Canyonista, yhdysvaltalainen tutkimus kertoo – britit kehittivät hiukkaskerääjän renkaisiin

22.9.2020 Ervasti, Anu-Elina
Työpaikkoja karsiva Neste tekee miljarditulosta jätteistä tehdyllä polttoaineella, mutta rahahana uhkaa pian ehtyä – ”Rajat tulevat vastaan”, arvioi professori

29.9.2020 Turunen, Joonas
Metsä Group ja Fortum sijoittavat kymmeniä miljoonia tutkimukseen, jonka tarkoitus on mullistaa puukuidun käyttö kuluttajatuotteissa