Company Reflexivity for Plastics Circularity

The transformative potential of reflexive environmental legislation in the EU

Violet M. Ross

Propositions

1. Transformation of the plastics economy starts with the democratization of corporations.
   (this thesis)

2. Rigid regulatory benchmarks have more potential to drive sustainability transformations than flexible benchmarks.
   (this thesis)

3. One's willingness to learn is more important than one's capacity to learn.

4. The greatest impediment to societal change is our desire for stability in daily life.

5. We reach long-term goals not by making a plan and completing it but by continuously adjusting both the plan and the goal itself.

6. To accelerate societal transformations, sociology should be included in primary and secondary school curricula.

7. Procrastination due to negative feelings only prolongs those feelings.

Propositions belonging to the thesis, entitled

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Company reflexivity for plastics circularity

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Thesis

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“知之为知之，不知为不知，是知也。”

Literal translation: *To know is to know, to not know, is not to know, is to know also.*

Translation: *Real knowledge is to know the extent of one’s ignorance.*

– Confucius (551–479 BCE)

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1

Chapter 1

Introduction

1. Introduction: The transformative potential of reflexive environmental law in the European Union

1.1. The plastics economy and circular transformations

Sustainability transformations have been defined as 'process[es] of change that fundamentally alters interactions and feedback processes between society and the environment'. [1] There is no doubt that the plastics economy, encompassing plastics production, consumption and waste management requires a transformation. The destructive impacts of plastics on the marine ecology and economy, the global climate, and human health are well known,[2] and predicted to worsen unless transformation occurs.[3]

In some ways, the transformation of the plastics economy has already started with the widespread recognition of the need for a transition to circularity for plastics. Broadly defined, the circular economy is a transition to a new economic system through application of a hierarchy of ways to keep materials and energy in circulation (reduction, reuse, recycling) at their highest utility and value, with recycling as a last resort, after other options have been exhausted.[4] The adoption of these concepts by industry and governments with respect to single-use plastics (SUPs) is taking place around the world.[5]

Following decades of more flexible regulation on SUPs,[6] and a rise in public outcry about the effects of SUP pollution,[7] the European Union's (EU) Green Deal introduced a stricter upstream approach in the late 2020s.[8] This approach targets upstream SUP actors in

[1] B. Walker et al., 'Resilience, Adaptability and Transformability in Social–Ecological Systems' (2004) 9(2) *Ecology and Society,* pp.1-9; A. Salomaa & S. Juhola, 'How to Assess Sustainability Transformations: A Review' (2020) 3 *Global Sustainability,* e24, at p. 2.

[2] N. J. Beaumont et al., 'Global Ecological, Social and Economic Impacts of Marine Plastic' (2019) 142 *Marine Pollution Bulletin*, pp. 189-95; H. V. Ford et al., 'The Fundamental Links between Climate Change and Marine Plastic Pollution' (2022) 806(1) *Science of The Total Environment*, article 150392; M. O. Rodrigues et al., 'Impacts of Plastic Products Used in Daily Life on the Environment and Human Health: What Is Known?' (2019) 72 *Environmental Toxicology and Pharmacology,* article 103239.

[3] S. B. Borrelle et al., 'Predicted Growth in Plastic Waste Exceeds Efforts to Mitigate Plastic Pollution' (2020) 369(6510) *Science*, pp. 1515-1518.

[4] J. Kirchherr, D. Reike & M. Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 *Resources, Conservation and Recycling,* pp. 221-232; Ellen MacArthur Foundation, 'The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action' (2017).

[5] United Nations Environment Programme, 'The Role of Packaging Regulations and Standards in Driving the Circular Economy' Online. Available HTTP: (Accessed 3 December 2023) (2019) <https://www.unenvironment.org/resources/report/role-packaging-regulations-and-standards-driving-circular-economy>; G. Nagtzaam et al., *Global Plastic Pollution and Its Regulation: History, Trends, Perspectives* (Edward Elgar Publishing 2023).

[6] Here I refer to vague and flexible terminology used in the Packaging and Packaging Waste Directive which states that 'packaging volume and weight be limited to the minimum adequate amount to maintain the necessary level of safety, hygiene and acceptance for the packed product and for the consumer.' See Directive (EU) 2018/852 of amending Directive 94/62/EC on packaging and packaging waste [2018] OJ L 150.

[7] Environmental knowledge on these impacts was positively influenced by the BBC series Blue Planet II (Episode 7 - Plastics, 2017), see M. E. Dunn, M. Mills & D. Veríssimo, 'Evaluating the Impact of the Documentary Series Blue Planet II on Viewers' Plastic Consumption Behaviors' (2020) 2(10) *Conservation Science and Practice,* article e280.

[8] Communication on The European Green Deal COM(2019) 640 final.

production and consumption, aiming to establish a circular economy for plastics by reducing the production and use of plastics before the end-of-life stage.[9] Such upstream-focused legislation includes revisions to the Packaging and Packaging Waste Directive in 2018,[10] release of the Single-use Plastics Directive (SUPD) in 2019,[11] and proposals for regulations on Ecodesign,[12] and packaging.[13] The EU is considered a global leader in regulation across the plastics lifecycle, and has adopted a similar stance in negotiations for the forthcoming global plastics treaty.[14] This need for prioritizing upstream actions is also advocated by key players in the circular plastics sector, including the Ellen MacArthur Foundation.[15]

1.2. The role of law in scaling sustainability transformations

Legislation are legally binding acts adopted by legislative bodies, such as parliaments. In the governance of sustainability transformations, such as circularity for plastics, legislation are crucial governing mechanisms to control the actions of private companies.[16] This top-down perspective, highlighting the state's central role in sustainability transformations, diverges from long-held perspectives in regulatory theory focusing on the changing role of the state from *controller* to *facilitator* to address complex sustainability challenges. Specifically, new governance theories critique more rigid, traditional forms of regulation administered by legislators. Instead, this theoretical camp argues that more flexible, bottom-up, forms of regulation (such as soft, smart, and procedural approaches) boost the legitimacy and effectiveness of regulation by integrating the knowledge and resources of regulated actors into the act of regulation.[17]

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[9] Ibid.
[10] Directive 94/62/EC, n. 6 above.
[11] Directive 2019/904 on the reduction of the impact of certain plastic products on the environment [2019] OJ L 155.
[12] Proposal for a Regulation establishing a framework for setting eco-design requirements for sustainable products, and repealing Directive 2009/125/EC, COM(2022) 142 final.
[13] Proposal for a Regulation on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC, COM(2022) 677 final.
[14] The EU has positioned itself as a key player pushing for upstream approaches in the global plastics treaty. See Directorate-General for Environment, 'Negotiations towards a New Global Instrument to Combat Plastic Pollution Advance' (20 November 2023) <https://environment.ec.europa.eu/news/negotiations-towards-new-global-instrument-combat-plastic-pollution-advance-2023-11-20_en> accessed 11 December 2023; S. Waldeck, '"High Ambition Coalition": International Divisions over UN Plastic Pollution Treaty Solidify' (23 February 2023) <https://pi.cnsmedia.com/a/aOiLnK6FU0Y=> accessed 11 December 2023.
[15] Ellen MacArthur Foundation and UN Environment Programme, 'The Global Commitment Five Years In Learnings to Accelerate towards a Future without Plastic Waste or Pollution' (2023).
[16] See E. Scotford, 'Legislation and the Stress of Environmental Problems' (2021) 74(1) *Current Legal Problems,* pp. 299-327; S. Eskander, S. Fankhauser & J. Setzer, 'Global Lessons from Climate Change Legislation and Litigation' (2021) 2 *Environmental and Energy Policy and the Economy,* pp. 44-82; B. B. Zhang, L. Yu & C. W. Sun, 'How Does Urban Environmental Legislation Guide the Green Transition of Enterprises? Based on the Perspective of Enterprises' Green Total Factor Productivity' (2022) 110 *Energy Economics,* article 106032; Nagtzaam, n. 5 above.
[17] O. Lobel, 'New Governance as Regulatory Governance' in D Levi-Four (ed), *The Oxford Handbook of Governance* (online edn, Oxford Academic 2012) 8 <https://doi-org.ezproxy.library.wur.nl/10.1093/oxfordhb/9780199560530.013.0005> accessed 10 August 2023; E. W. Orts, 'Reflexive Environmental Law' (1995) 89(4) *Northwestern University Law Review,* pp. 1227-340, at 1258-9 and 1262.

This thesis shares new governance thinking about the need for flexibility and the integration of market actors into the act of regulation. However, recent years has seen a revival in interest and awareness about the need for stricter, rigid legislative tools to both empower and steer private actors towards transformations.[18] In the context of plastics circularity, this rigidity is essential because, without it, 'private companies will likely champion piecemeal change, which will prolong the period before conventional plastic production decreases'.[19] In this thesis, I investigate the potential of legislation as a driver of sustainability transformations in the plastics economy. Insights of this thesis can help regulators and new governance scholars better understand how rigid and flexible complexities of legislation can be harnessed to accelerate transformation in the plastics economy.

Concepts of scaling pathways to sustainability transformations, particularly 'scaling out', 'scaling up' and 'scaling deep' are utilised to understand the role of legislation as a driver of circular plastics transformations. Legislation can be considered tools for scaling out transformations by increasing the numbers of communities, such as economic organisations or industries, who must advance a specific sustainability innovation.[20] In addition, legislation are considered tools for scaling up transformations in cases where they 'address root causes in larger-scale institutions that affected an entire population' and hinder uptake of niche innovations.[21] An example might be legislative changes to government procedures to facilitate a social innovation. However, the interplay between these two transformation pathways in legislation in terms of 'scaling deep', has been little explored. Scaling deep is where the 'hearts and minds' of social actors change through a rethink of their relationships, values or assumptions.[22] Understanding of whether and how legislation leads to scaling deep in the plastics economy would heighten its transformative potential as a tool for scaling out and up. Circularity for plastics necessitates, not only, new niche innovations, including technology or procedural improvements, but also change to the broader systems of production and consumption making up the plastics economy.[23] For instance, new business models, technologies and, more broadly, new ways of thinking about the production, use and

[18] See references at n. 16 above and D. Huitema, 'Inaugural Speech Professor Dave Huitema: "In Sustainability Transformations, We Cannot Ignore Governments"' (*WUR*, 21 September 2023) <https://www.wur.nl/en/newsarticle/inaugural-speech-professor-dave-huitema-in-sustainability-transformations-we-cannot-ignore-governments.htm> accessed 3 December 2023.

[19] A. M. Telesetsky, 'Beyond Existing Legislated Efforts to Control Single-Use Plastics' (2020) 57(1) *California Western Law Review,* pp. 43-80, at 45.

[20] F. Westley et al, 'Five Configurations for Scaling Up Social Innovation: Case Examples of Nonprofit Organizations From Canada' (2014) 50(3) *The Journal of Applied Behavioral Science*, pp. 234-60, at 234; M. L. Moore, D. Riddell & D. Vocisano, 'Scaling Out, Scaling Up, Scaling Deep: Strategies of Non-Profits in Advancing Systemic Social Innovation' (2015) *The Journal of Corporate Citizenship*, pp. 67-84, at 75.

[21] Ibid, Moore, Riddell & Vocisano, p.79.

[22] Ibid, Moore, Riddel & Vicisano, p. 75.

[23] While 'niches' at the micro-level refer to the early development of new innovations, the existing plastics economy relates to the dominating 'socio-technical regime' at the meso-level and 'socio-technical landscape' such as dominant paradigms and values, at the macro-level. See F. W. Geels, 'The Dynamics of Transitions in Socio-Technical Systems: A Multi-Level Analysis of the Transition Pathway from Horse-Drawn Carriages to Automobiles (1860-1930)' (2005) 17(4) *Technology Analysis and Strategic Management,* pp. 445-476, at 449–52.

waste management of plastics in the economy are required.[24] Knowledge on the drivers that push companies to rethink their relationships, values or assumptions in this regard would be a game changer for accelerating the circular plastics transformation.

1.3. Reflexivity and reflexive environmental law (REL)

In this thesis, I use the concept of reflexivity to explore the drivers of scaling deep transformations in the plastics economy. Reflexivity is defined as a learning process whereby an individual, organisation or system reflects on their practices and processes or underlying relationships, values and assumptions and makes (non)improvements based on that reflection.[25] The distinction between learning on core relationships, values or assumptions versus learning that centres around minor changes to existing practices is an important distinction for understanding how to scale transformations in the plastics economy through legislation.

To explore how legislation drives reflexivity for circularity by regulated companies, I focus on the development of reflexive environmental law (REL) theory. REL is a new governance theory[26] but sets itself apart from these perspectives for its focus and underlying assumption that law can stimulate reflexivity in regulated companies.[27] REL derives from the broader theoretical perspective, reflexive law, which goes beyond this external reflexivity by regulated companies and also considers reflexivity by the legal system itself.[28] There are three ways in which this thesis expands on existing REL theory in order to facilitate its application to transformations such as plastics circularity.

First, although REL assumes that the law can drive reflexive learning by regulated companies, the precise responses of these regulated entities remain relatively understudied. Little is known on whether and how REL is successful in driving regulatee reflexivity and, therefore, whether the complex legislative framework for plastics circularity in the EU is stimulating a transformation in the plastics economy or not. To fill this gap, this thesis presents a socio-legal empirical investigation of REL to understand when the potential for company reflexivity created through REL in black-letter (written) law leads to on-the-ground reflexivity. As well as understanding the existing trajectory to the circular plastics

[24] K. Hobson & N. Lynch, 'Diversifying and De-Growing the Circular Economy: Radical Social Transformation in a Resource-Scarce World' (2016) 82 *Futures*, pp. 15-25; J. Kirchherr et al, 'Barriers to the Circular Economy: Evidence From the European Union (EU)' (2018) 150 *Ecological Economics,* pp. 264-72; A. Mah, 'Future-Proofing Capitalism: The Paradox of the Circular Economy for Plastics' (2021) 21 *Global Environmental Politics,* pp. 121-42.

[25] J. Pickering, 'Ecological Reflexivity: Characterising an Elusive Virtue for Governance in the Anthropocene' (2018) 28(7) *Environmental Politics,* pp. 1145-66, at 1151-3; J. S. Dryzek, 'Institutions for the Anthropocene: Governance in a Changing Earth System' (2016) 46(4) *British Journal of Political Science*, pp. 937-56; Orts, n. 17 above, pp. 1254 & 1290.

[26] Lobel, n. 17 above.

[27] Orts, n. 17 above, pp. 1253-4.

[28] G. Teubner, 'Substantive and Reflexive Elements in Modern Law' (1983) 17(2) *The Law and Society Review,* pp. 239-85.

transformation this is important to better shape the regulatory approach and achieve a particular kind of learning for achieving plastics circularity.

Second, to facilitate this socio-legal study of legislation, REL theory requires updating to be able to analyse different types of legislative instrument. REL encompasses public and private regulation but has thus far tended to exclude traditional types of regulation (command-and-control performance- and technology-based standards) claiming they are too rigid and interventionist to stimulate reflexivity.[29] However, as mentioned, the case of plastics circularity in the EU shows a renewed interest in traditional, top-down types of regulation. Though often seen as more rigid, many hard-law instruments now incorporate the innovations associated with reflexive law and therefore may similarly stimulate reflexive responses. In his 1995 work on REL, Orts specifically states that reflexivity can be found in many environmental laws but that these manifestations 'appear almost randomly, without a theory informing them'.[30] Therefore, this thesis aims to determine *how* REL professes to drive reflexivity rather than outright eliminating certain instruments that don't from the outset, both in theory and practice. Such knowledge can facilitate new understanding of legislation as a tool for scaling sustainability transformations, such as circularity for SUPs.

Third, any assessment of the in-practice effects of REL within complex and multi-layered legislative frameworks, such as the EU, must consider the implementation process. Here, I refer to the transposition process of EU directives into Member State regulation which is recognised as impacting elements of reflexive law.[31] By developing a new conceptualisation of REL this thesis must also question how these elements are affected by the implementation processes in EU legal frameworks. Specifically, whether Member State transpositions have the same degree of REL envisaged in the corresponding directive or if lower or higher REL manifests. This influences the eventual effect on company reflexivity and is a crucial step to understanding the transformative potential of REL.

1.4. Objectives and research questions

The objective of this thesis is to contribute *to furthering the understanding of the role of reflexive environmental law (REL) in scaling transformative change to address complex sustainability challenges.* To ground this objective in practice, I focus on the circular economy for plastics as a case of sustainability transformations and adopt a case study approach to analyse the EU's Single Use Plastics Directive (SUPD) and Member State transpositions by France and Germany.[32]

The main research question linked to the thesis objective is as follows:

[29] Orts, n. 17 above, pp. 1253-4.
[30] Orts, n. 17 above, p. 1287.
[31] R. Rogowski, *Reflexive Labour Law in the World Society* (Edward Elgar Publishing 2013), pp. 207–26.
[32] Justification for this case study selection is explained in Chapter 2 on research methodology, and summarised in Chapters 5 and 6 where the case studies are applied.

How does REL facilitate a circular economy for single-use plastics in the EU by driving regulatee reflexivity?

To answer this main research question, I put forward the following four sub research questions:

1. What are the physical and regulatory aspects of the global plastics challenge?

This question is used to understand the depth of change required by REL. Specifically, to gauge the complexities and trajectories of plastics regulation to understand the (reflexive) learning that plastics' transformations encompass. Additionally, it helps understand the choice of EU Member State countries as cases for this thesis – France and Germany.

2. What elements of REL in regulatory instruments increase potential for regulatee reflexivity and to what degree?

This question is answered through the development of a refined framework for REL. This new framework addresses the aforementioned limitation with REL theory that it lacks a clear and nuanced understanding of precisely how any regulatory instrument used in legislation, builds potential for regulatee reflexivity was unclear. The assumption underlying this question is that any regulatory instrument can, in theory, build potential for regulatee reflexivity, albeit to differing degrees.

3. How is the potential for REL to drive regulatee reflexivity in the EU's SUPD affected by the national transposition process for EU directives?

Through a law-in-practice approach I investigate implementation in terms of the transposition of EU directives into Member State regulation which is a prerequisite for all directives. The assumption here is that the potential of REL to drive reflexivity evolves through the multi-layered transposition process in the EU, but exactly how is unclear. To investigate this, I will apply the framework developed to answer the first sub research question to the EU's SUPD and corresponding national transpositions of the two cases – France and Germany.

4. To what extent does the potential for REL in the EU's SUPD drive reflexivity of regulated companies in France and Germany?

I answer this question through a law-in-practice approach to analyse on-the-ground responses of regulated companies to the REL drivers. This approach aims to test some of the assumptions in the framework developed to answer sub research question one, and to understand how the potential for reflexivity stimulated through REL manifests in practice. This is an exploratory study based on an assumption that the REL techniques in the framework introduced to answer the first sub research question drive regulatee reflexivity, while recognizing that there are other elements that could affect this reflexivity.

1.5. Thesis outline

The next chapter of this thesis, Chapter 2, will start by clarifying the methodological decisions that have been made for the research underlying this thesis. This concerns the research design used in this thesis, including the case study selection, methods of data collection and lastly, reflections on research validity.

Chapters 3-6 will deal with each of the sub research questions respectively. This comprises empirical findings to do the following: (1) understand the physical and regulatory aspects of the plastics challenge (Chapter 3); (2) develop a new framework for understanding how REL builds potential to drive regulatee reflexivity with examples from legislation in the EU (Chapter 4); assess how the national transposition process for EU directives affects REL's potential to drive reflexivity (Chapter 5); and understand the extent that REL's potential in the EU's SUPD drives reflexivity in French and German companies (Chapter 6).

The final chapter of this thesis, Chapter 7, summarises the approaches and conclusions of the previous chapters and synthesises these conclusions to answer the main research question, *how does REL facilitate a circular economy for single-use plastics in the EU?* Following this, reflections on how the research has addressed the thesis objective are provided. Lastly, this thesis concludes by discussing overall implications with regards for extensions in future research and implications for law, policy and practice for single-use plastics (SUPs) in the EU.

2

Chapter 2

Methodology

2. Research methodology

In this thesis, the research questions and thesis objective are addressed in the empirical Chapters 3-6, which each include detailed descriptions of the methodologies applied in the respective chapter. This chapter provides an overview of the methodologies and research design for the thesis as a whole to ensure the validity of the research.

I start by reflecting on my positionality as a researcher with regards to understanding knowledge and reality (epistemology and ontology) and the background perspectives underlying this thesis. Following this, the research design is discussed with regards to the case study selection, theory development, approaches to empirical material and analysis, and validity of results.

2.1. Researcher positionality

2.1.1. Epistemology and ontology

The positioning of a researcher with regards to ontology and epistemology has a big impact on the study of worldly phenomenon.[1] Ontological perspectives concern 'the study of being' and how we view the world while epistemological perspectives concern 'understanding and explaining how we know what we know'.[2]

My ontological and epistemological positioning as a researcher, largely aligns with post-structuralism, constructivism, and interpretivism. In attempting to simplify these loaded philosophical terms, this standpoint acknowledges that complete truth is unattainable, and interpretations of worldly phenomena are never fixed but in a constant state of evolution.[3] In practical terms these perspectives mean that any findings cannot be taken to be the truth, but rather my interpretations of the truth based on how I construe the theoretical foundations on reflexive environmental law (REL) and my own lived experiences as a human. To lessen the impact of this unavoidable bias, I explain my research methods in detail and reflexively discuss my own positionality as a researcher in the following sections of this chapter.

I also draw on flat ontological perspectives relevant to the theory of autopoiesis, which forms the basis of reflexive law theory.[4] Both flat ontology and autopoiesis encourage systemic thinking which emphasises connectedness, emergence, and contingency. Flat ontology considers entities and relations as part of a broader system without hierarchical constraints.[5]

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[1] A. G. D. Holmes, 'Researcher Positionality - A Consideration of Its Influence and Place in Qualitative Research - A New Researcher Guide' (2020) 8(4) *Shanlax International Journal of Education,* pp. 1-10, at 1-3.
[2] M. Crotty, *The Foundations of Social Research: Meaning and Perspectives in the Research Process* (London: Sage 2003) pp. 3 and 10.
[3] B. Speed, 'Reality Exists O.K.? An Argument against Constructivism and Social Constructionism' (1991) 13(4) *Journal of Family Therapy,* pp. 395-409, at 396.
[4] Teubner's thinking on autopoiesis in reflexive law derives from Niklas Luhmann, see G. Teubner, 'Substantive and Reflexive Elements in Modern Law' (1983) 17(2) *The Law and Society Review,* pp. 239-85, at 246; N. Luhmann, *Social Systems* (Translated by J. Bednarz & D. Baecker, Stanford University Press, 1996).
[5] J. Ash, 'Flat Ontology and Geography' (2020) 10(3) *Dialogues in Human Geography,* pp. 345-361.

Autopoiesis, in focusing on the self-maintenance of living systems, encourages thinking about how entities themselves evolve through interaction with other evolving systems.[6] When examining how written law affects regulated actors, these evolutionary ideas of changeable interactions among living and non-living entities form a crucial backdrop for this thesis.

In recognizing that Law and regulated actors are only small parts of the interconnected web of entities that make up socio-ecological systems,[7] the findings presented in this thesis offer only a snapshot in time and space seen through my own interpretations. Nonetheless, this thesis contributes a much-needed sociological understanding of Law.[8]

2.1.2. Researcher background

In the interest of transparency and enhancing the validity of this thesis, I present a brief overview of my background positionality.[9]

Originating from Sussex in the UK, I was born in 1992 and come from a middle-class background. I am the second child in a large family and received my education in state institutions, both at the primary and secondary levels. These factors and my early exposure to the workforce, commencing part-time employment at the age of 14, has significantly influenced my perspective on labour and societal structures.

My early academic career at the University of Leeds exposed me to diverse historical, sociological, and political-economic perspectives, notably from Jurgen Habermas[10] and Daniel Defoe.[11] A year in China confronted me with the global waste management crisis, sparking a lasting commitment to global environmental issues. This interdisciplinary foundation cultivated a systemic and critical view, shaping my comprehension of how colonialism, globalisation and culture shape society. Furthering my academic pursuits, an MSc in environmental technology at Imperial College London focused on pollution management technologies and the circular economy. This pragmatic, solutions-oriented focus was complemented by more critical and techno-sceptical modules on environmental policy, law and economics.

Regarding my professional career, hands-on experience before my postgraduate degree as a social care giver for children with learning difficulties and the elderly showcase my commitment to vulnerable populations and just societal transitions. Later, as an

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[6] Luhmann, n. 4 above.
[7] R. Banakar & M. Travers, 'Introduction to Law and Social Theory' in R Banakar and M Travers (eds), *Law and Social Theory* (2nd ed., Bloomsbury Publishing)
[8] R. Cotterrell, 'Why Must Legal Ideas Be Interpreted Sociologically?' (1998) 25(2) *Journal of Law and Society,* pp. 171-92; R. van Gestel & H. W. Micklitz, 'Why Methods Matter in European Legal Scholarship' (2014) 20(3) *European Law Journal,* pp. 292-319, at 310.
[9] Holmes, n. 1 above.
[10] J. Habermas, *The Structural Transformation of the Public Sphere: An Inquiry Into a Category of Bourgeois Society* (T Burger tr, The MIT Press 1992).
[11] D. Defoe, *A Tour Through the Whole Island of Great Britain* (Abridged edition, Penguin Classics 1978).

environmental impact assessment (EIA) consultant in London, I gained 2 years' experience applying EU legislation to aid private companies develop EIA reports and obtain planning permission for large-scale development projects in consultation with local government officials. This experience in the private sector informed the present study by prompting critical reflections on law's effectiveness in stimulating learning by regulated companies.

Lacking religious beliefs, my socialist left-wing perspective critiques neoliberalism. This likely guided my original decision to study public law as a form of reflexive law as opposed to private regulation. My research questions may contain bias towards confirming that public law does effect regulated companies (confirmation bias) by asking 'how' and excluding how it 'does not'.[12] However, the third sub research question focuses on the 'extent' of this effect to also consider how other contextual factors influence this relationship.

As a consumer, I prioritise second-hand purchases over new ones, aligning with my tendency to support degrowth in virgin material industries and growth in reuse and repair. This relates to framing of the circular economy in this thesis. While acknowledging that there are many competing definitions of the circular economy I emphasise a key element of the definition, stemming from a from a highly cited paper, that circularity is the prioritisation of reduction and reuse, before recycling.[13] Despite a potential bias towards reduction and reuse over recycling, my socio-technology training has made me aware that accounting for material use, technical efficiency and socio-economic elements across a product's life cycle are also necessary to determine the best approach.[14]

My position, driven by a desire to reshape the plastics economy, resonates with broader societal recognition of this need, explained in the thesis introduction. Together this informed the thesis's focus on sustainability transformations.

2.2. Research approach

This thesis applies a case study methodology to answer the main research question, how REL drives reflexivity, and address the thesis objective to understand REL's role in scaling sustainability transformations. This section outlines this case study approach, methods of theoretical development and empirical data collection. Lastly, elements concerning research validity for the thesis as a whole are explained.

[12] G. M. Hallihan & L. H. Shu, 'Considering Confirmation Bias in Design and Design Research' (2013) 17(4) *Journal of Integrated Design and Process Science*, pp. 19-35.
[13] J. Kirchherr, D. Reike & M. Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 *Resources, Conservation and Recycling,* pp. 221-232.
[14] R. Malcolm, 'Life Cycle Thinking as a Legal Tool: A Codex Rerum' (2019) 15(2) *Journal of Law, Environment and Development,* pp. 208-224, at 212.

2.2.1. Case study and case selection

This section explains why a case study approach was adopted in this thesis with regards to answering the research question and research objective, and justifies the case study and cases selected.

Defined as an 'intensive study of a single unit with an aim to generalise across a larger set of units', case study research projects are useful to obtain deep understanding of the context of a contemporary phenomenon.[15] This deep understanding is especially valuable 'when the boundaries between phenomenon and context are not clearly evident'[16] which is often the case with regards to law's effect on production and consumption systems due to its deep embeddedness in these systems.[17] Legal empirical scholars consider case studies useful when analysing how regulated actors perceive and react to legal rules and procedures 'and how this influences the effectiveness of those rules, processes and procedures'.[18] This matches the main research question in this thesis to determine *how* REL drives learning for circularity in the EU.

The case study approach in this thesis is used to develop theoretical understanding, first, of REL's manifestation and evolution in multi-level legislative frameworks and, second, REL's effect on regulatee (reflexive) learning processes. This aligns with Flyvbjerg who argues it is possible to begin building theory from a single exploratory case study by strengthening new ideas through analytical generalisability over statistical generalisability.[19] Put differently, the case study serves to allow generalisations to inform theory rather than generalisations across populations or geographies.

An exploratory case study approach was selected for its suitability to investigate under-researched phenomenon, such as reflexive responses to the law, and allow for greater flexibility compared to descriptive or explanatory approaches.[20]

The specific case study selected to meet the research objective in developing REL theory, is the European Union's (EUs) Single-use Plastics Directive (SUPD).[21] As explained in the thesis introduction, the SUPD is part of the EU's new circular plastics legislative framework. The Directive was drafted in response to heightened public awareness regarding the

[15] J. Gerring, 'What Is a Case Study and What Is It Good For?' (2004) 98(2) *American Political Science Review,* pp. 341-354, at 341.
[16] R. K. Yin, *Case Study Research: Design and Methods* (4th ed, Sage 2009), p. 14.
[17] Cotterrell, n. 8 above.
[18] L. Webley, 'Stumbling Blocks in Empirical Legal Research: Case Study Research' (2016) 38(10) *Law and Method,* pp. 1-21, at p. 21.
[19] B. Flyvbjerg, 'Five Misunderstandings about Case-Study Research' (2006) 12(2) *Qualitative Inquiry,* pp. 220-245.
[20] Yin, n. 16 above; T. C. M. Hutchinson, *Research and Writing in Law* (Lawbook Co. 2018), p. 104.
[21] Directive 2019/904 on the reduction of the impact of certain plastic products on the environment [2019] OJ L 155.

considerable ecological impacts of SUPs [22] and their prominence in terms of plastic production.[23] The SUPD was selected as it contains multiple regulatory instruments and regulates a diverse array of SUP companies. This variation facilitates exploration of REL in different regulatory instruments, including traditional command-and-control regulation, and exploration into the effects of REL on a diverse array of companies in terms of products, sector, size, and brand recognition. Moreover, the SUPD is in the context of various other forces that may affect regulatee reflexivity, including upcoming regulations in the EU for packaging, and rising public awareness about the ecological damage caused by SUPs. This makes it a good case study to explore the extent of the effect of the SUPD on regulatee reflexivity compared to other forces, serving to mitigate for selection bias and enhance the validity of the research.[24] These other forces affecting regulatee reflexivity relate to the third sub research questions and are examined in Chapter 6.

Analytically speaking, the SUPD is a case of law addressing a complex sustainability transformation[25] by a transnational and multi-level institution, namely the EU.[26] This means, general patterns and theories from this thesis can be generalised across other cases to understand the drivers of organisational (reflexive) learning through multi-level and transnational regulatory frameworks to achieve sustainability transformations.[27]

With the SUPD as the overarching case study, two cases have been chosen – France and Germany. As with all EU directives, the SUPD must be transposed by Member States into national law, meaning Member States have some discretion in how the goal of the directive is achieved. [28] As these national laws also affect companies' actions, any exploration into the manifestation of REL in a directive and its in-practice effect on regulated companies must also consider its evolution in the Member State transposition process.

France and Germany were selected, first, due to their varied approaches in transposing the SUPD into national law, being considered respectively 'green' and 'amber' rated in their

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[22] Y. Chen et al., 'Single-Use Plastics: Production, Usage, Disposal, and Adverse Impacts' (2021) 752 *Science of The Total Environment,* article 141772, pp. 9–10; M. E. Dunn, M. Mills & D. Veríssimo, 'Evaluating the Impact of the Documentary Series Blue Planet II on Viewers' Plastic Consumption Behaviors' (2020) 2(10) *Conservation Science and Practice,* article e280.

[23] SUPs comprise at least 36% of global production of plastics. United Nation Environment Programme (UNEP), *Plastics: A Roadmap for Sustainability* (2018), pp. 4 and 10.

[24] Webley, n 18 above.

[25] G. Salvia et al., 'The Wicked Problem of Waste Management: An Attention-Based Analysis of Stakeholder Behaviours' (2021) 326 *Journal of Cleaner Production,* article 129200; T. Narancic & K. O'Connor, 'Plastic Waste as a Global Challenge: Are Biodegradable Plastics the Answer to the Plastic Waste Problem?' (2018) 165(2) *Microbiology*, pp. 129-37; S. Sediri et al., 'Transformability as a Wicked Problem: A Cautionary Tale?' (2020) 12(15) *Sustainability*, 5895.

[26] M. Maduro, K. Tuori & S. Sankari (eds), *Transnational Law: Rethinking European Law and Legal Thinking* (Cambridge University Press 2014).

[27] C. Lund, 'Of What Is This a Case?: Analytical Movements in Qualitative Social Science Research' (2014) 73(3) *Human Organization,* pp. 224-34.

[28] European Union, Consolidated version of the Treaty on the Functioning of the European Union, 26 October 2012, OJ L. 326/47-326/390; 26.10.2012, Article 284. The specific benefit of a Directive over a Regulation is the setting of uniform benchmarks at EU level while still allowing for the individual ecological, as well as social and economic, needs of the Member States to be taken into consideration.

transposition of the SUPD.[29] Again, this serves to obtain a greater variation to enhance the development of theory. Second, France and Germany were selected due to their high EU ranking across plastics' lifecycles (production, consumption and waste management) making them important in transforming the plastics economy. Germany and France are ranked the first and third respectively in the EU in terms of plastics converters, or manufacturers, demonstrating their important role in plastics production.[30] In addition, findings from Chapter 3 highlight that both Germany and France are in the top ten list of global exporters and importers of plastic waste demonstrating their prominence in terms of plastics' consumption and waste management.[31] Specifically for recycling and energy recovery, Germany is ranked high in the EU with minimal plastics going to landfill while France has a smaller recycling sector with most plastics waste being incinerated or dumped in landfills.[32] Despite this, France's ambitious goals for the circular economy with the release of its Anti-Waste Law in 2020, was considered good justification for their selection to explore the REL in these laws and its effect.[33] Ultimately, these two cases were considered appropriate to explore the range of REL in legislation and the range of company responses to REL.

2.2.2. Theory development

Two fields of theory are developed in this thesis to understand the drivers of reflexivity through REL: (1) the manifestation and evolution of REL in legislative frameworks, and (2) REL's effect on regulatee (reflexive) learning processes. The steps taken to develop these theories are explained below.

Narrative literature reviews were undertaken as the first step in theory development. Narrative reviews enable synthesis of a wide range of information to provide the reader with a comprehensive background for understanding current knowledge and highlighting significant elements of research.[34] This enabled identification of key concepts, variables and relational propositions.[35] Academic databases and search engines relevant for environmental law and sociology were reviewed, including Web of Science, Scopus, JSTOR, Google.

[29] With a 'green' rating France went beyond the SUPD, while Germany's 'amber' rating meant there was little variation beyond the requirements set out in the Directive. Red-rated countries (poorest transpositions) were excluded as they did not have sufficiently complete legislation to base our REL analysis on. Rethink Plastic Alliance, 'Assessment of European Countries' Transposition of the Single Use Plastics Directive' (2022).

[30] Plastics Europe, 'Plastics - the Facts 2022', *Plastics Europe AISBL,* Oct. 2022, available at: https://plasticseurope.org/knowledge-hub/plastics-the-facts-2022/, p. 31.

[31] A. L. Brooks, S. L. Wang & J. R. Jambeck, 'The Chinese Import Ban and Its Impact on Global Plastic Waste Trade' (2018) 4(6) *Science Advances,* article eaat0131.

[32] Plastics Europe, n. 36 above, pp. 49 and 55.

[33] LOI n° 2020-105 du 10 février 2020 relative à la lutte contre le gaspillage et à l'économie circulaire [LAW no. 2020-105 of February 10, 2020 relating to the fight against waste and the circular economy (1)], Ministère de la Transition écologique [Ministry of Ecological Transition], JORF n°0035, February 11, 2020.

[34] M. Pautasso, 'The Structure and Conduct of a Narrative Literature Review', *A Guide to the Scientific Career* (John Wiley & Sons, Ltd 2019), pp. 299–310.

[35] R. Plummer & D. Fennell, 'Exploring Co-Management Theory: Prospects for Sociobiology and Reciprocal Altruism' (2007) 85(4) *Journal of Environmental Management,* pp. 944-955, at 945.

With regards to development of theory regarding REL in legislation, the narrative literature review was complimented by a review of EU environmental legislation. Specifically, Chapters 4 and 5 were written in tandem so that the framework presented in Chapter 4 was already informed by its application as a comparative analytical tool in Chapter 5. Insights gained from the application of the framework to real-world legislation in Chapter 5 prompted iterative adjustments to the framework, ensuring its relevance to the dynamic and multifaceted nature of legislation.[36] Finally, the framework for REL was tested in practice on companies regulated by the SUPD in Chapter 6. This allowed further exploration into the framework's socio-legal effects[37] and based on this, areas for refinement are outlined in the Chapter 6.

Concerning theoretical development to understand the manifestation of reflexivity, the narrative literature review revealed two applicable frameworks. These were merged and used to analyse the responses of companies to REL in the SUPD. Further detail is provided in Section 6.2.2.

2.2.3. Data collection and analysis

Empirically, this thesis is informed by a narrative literature review, content analysis, semi-structured interviews and a review of supplementary documents and literature.

As already discussed, narrative literature reviews were used to develop theoretical frameworks applied in this thesis. Similarly, a narrative review was undertaken to address the first sub research question and explore the physical and regulatory issues with regards to the global plastics challenge (Chapter 3). Academic databases and search engines relevant for environmental sociology, economics and political science were reviewed, including Web of Science, Scopus, Google. This was supplemented by grey literature from reputable governing institutions in the field of plastics. This narrative review centred on the following topics: (1) the different stages of the plastics life cycle, (2) circular economy concepts for plastics, (3) the geopolitics of plastics, and (4) the Basel convention updates to include plastics.

In answering sub research questions 2 and 3, the theoretical framework for REL was iteratively developed through a narrative literature review and content analysis of the SUPD and corresponding legislation from France and Germany. This content analysis, presented in Chapter 5, comprised a thematic coding exercise to identify concepts from REL literature in the SUPD and French and German transpositions. The coding exercise was undertaken manually in Atlas.ti and presented in a table format using excel. A comprehensive list of legislation included in the review can be found in Chapter 5.

[36] K. Charmaz, *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis* (Repr, Sage 2012), p. 131.
[37] C. McCrudden, 'Legal Research and the Social Sciences' (2006) 122 *Law Quarterly Review,* pp. 632-50.

Empirical methods to understand the manifestation of reflexivity in response to the law takes the form of semi-structured interviews and a deductive analysis.[38] Addressing sub research question 4, the results from these interviews are presented in Chapter 6. In general, interviews were considered appropriate by allowing access to information not found in formal documents.[39] Namely, the (reflexive) responses of companies who must comply with the SUPD and French and German transpositions. Considering the aim of exploring the range of company responses to multiple instruments in the SUPD, interviews were considered more appropriate than participatory observation methods because they have a greater breadth of coverage.[40] In addition, interviews fit the profile of targeted respondents: individuals with a higher education background who are accustomed to the interview format.[41] Semi-structured interviews were chosen for flexibility, allowing a balance between standardised questions based on the theoretical frameworks for REL and reflexivity, and open-ended discussion to help develop these frameworks as part of the research findings.[42]

In taking a deductive analytical approach, question formulation and analysis of interview transcripts and notes were based on conceptual frameworks for REL and reflexive learning. These frameworks are both clarified in Chapters 4 and 6. Following each interview, questions were iteratively adjusted to enhance future respondent's comprehension of the question. Transcripts or notes were manually coded for these concepts in Microsoft Word.

The core sample population were companies regulated by the SUPD in France and Germany. However, a diverse range of companies, both large and small, and complying with different instruments in the SUPD were sought after to the achieve the exploratory aim, and enhance research validity. At the individual level, a range of respondents from different hierarchical levels within the companies, including managers and junior positions, were targeted. Additionally, respondents were selected from the broader field of compliance procedures relating to EU circular plastics legislation, including consultants working with the regulated companies and policy workers in France and Germany.

Target respondents were approached by email or via LinkedIn and given information about the research aims and how their participation would be used. Each individual signed a consent form with assurances of anonymity. In total 25 interviews were conducted; 21 were recorded and transcribed; four were manually recorded through note taking. Further explanation, including a list of all interviewees, is provided in Chapter 6.

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[38] A. Bryman, *Social Research Methods* (4th ed, Oxford University Press 2012). For information on semi-structured interviews see pp. 212-3, for information on deductive analysis see pp. 24-7.
[39] R. Hitchings, 'People Can Talk about Their Practices' (2012) 44(1) *Area,* pp. 61-67.
[40] Bryman, n. 44 above, p. 496.
[41] R. Hitchings & A. Latham, 'Qualitative Methods I: On Current Conventions in Interview Research' (2020) 44(2) *Progress in Human Geography,* pp. 389-398.
[42] Bryman, n. 44 above, pp. 212–3.

Another source of data was grey literature and documents used to verify facts obtained through interviews. This included news articles and minutes from the EU comitology register documenting meeting about the development of the SUPD.[43]

2.2.4. Research validity

Validity assesses the extent to which this thesis analyses what it intends to analyse. This is important to ensure the reliability of the research findings, including theoretical contributions. Below I explain how the study addresses external and internal validity. External validity concerns the generalizability of findings beyond the case study context and relies on internal validity concerning the accuracy of the findings constructed in the case study.

External research validity tends to look at statistical generalisation whereby the results can be extrapolated to another population or geography. However, as mentioned in Section 2.2.1, case study approaches do not allow for statistical generalisation of results to another sample population, rather, it is analytical generalisation that is targeted.[44] The analytical generalisation used to inform theory in this thesis is described in Section 2.2.1. The precondition for this external validity to be achieved is internal research validity.

According to Yin, internal validity of case study research can be achieved through a series of traceable and transparent steps: (1) developing a protocol, (2) justifying case selection, (3) defining the unit of analysis, (4) collecting diverse data, (5) linking it logically with theoretical propositions, and (6) interpreting findings.[45] While steps 1-3 and 5-6 are addressed in the thesis introduction, Section 2.2.1 on case study selection and the empirical chapters 4-6, validity through the triangulation of diverse data (step 4) is addressed below.

Data triangulation involves cross-verifying answers to research questions with multiple sources of information to 'permit a holistic examination of the question to see which explanations, if any, remain consistent across all data sources'.[46] It was employed to drive comprehensive development of the REL framework presented in this thesis by corroborating findings across data sources. As already mentioned, this entailed development of the REL framework alongside a doctrinal review of EU legislation (Chapter 5), and through semi-structured interviews (Chapter 6). This allowed a verification of the REL taxonomy framework and the presumed effects of REL in the real-life context[47] which led to an extension of the framework (Chapter 6).

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[43] European Commission, 'Comitology Register: Summary Record (16/09/2021) for the Meeting of the Committee for the Adapatation to Scientific and Technical Progress and Implementation of Directive 2008/98/EC on Waste (Directive on Single-Use-Plastic)' (2021) <https://ec.europa.eu/transparency/comitology-register/screen/documents/077913/1/consult?lang=en> accessed 5 December 2023.
[44] Yin, n. 16 above; Flyvbjerg, n. 20 above.
[45] Yin, ibid, pp. 27-68.
[46] Webley, n. 18 above, p.3; Bryman, n. 44 above, p. 635.
[47] A. Argyrou, 'Making the Case for Case Studies in Empirical Legal Research Special Issue: Methodology of Legal Research: Challenges and Opportunities' (2017) 13(3) *Utrecht Law Review,* pp. 95-113, at 102.

Specifically for the interviews, data triangulation was used to cross-check responses from different interview respondents, not only companies but also with responses from consultants and policy workers, enhancing the robustness of the thesis findings. Another source of data triangulation was through a mixed methods approach whereby facts obtained through interview respondents were checked in grey literature. As mentioned, this includes news articles and minutes from the EU comitology register.[48]

Further steps to enhance the internal validity of the semi-structured interviews are scoping interviews and the sampling strategy. As explained above, the core sample population were companies regulated by the SUPD in France and Germany but scoping interviews were undertaken to define the boundaries of the study and narrow the sample selection to certain companies. These scoping interviews, undertaken with policy makers and consultants, were also useful to refine the interview questions before interviewing the core sample population. Regarding the sample strategy, snowballing methods were applied so initial participants referred others. This selection strategy was employed to access a broader network and uncover diverse perspectives, enhancing the depth of research insights.[49] In addition, regarding the companies, a diversity in terms of size, types of products and public recognition was targeted, and regarding respondents, a diversity in position (manager, junior) and actors from the broader field of plastics circularity (consultants, policy workers) were targeted. These elements of the sample strategy enhanced the representativeness of participants to facilitate triangulation of data.

[48] European Commission, n. 49 above.
[49] Bryman, n. 44 above, p. 203.

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Chapter 3

Plastics:
From resources to waste and back again

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Abstract

Plastics present an almost insurmountable global environmental challenge. Plastic's versatility in terms of use, and its economic competitiveness with other products has made it ubiquitous in almost all types of products, from food packaging to car parts and cosmetics. The possibilities that plastics offer in terms of hygiene and other benefits have made tangible differences in people's quality of life, ranging from better access to clean drinking water to innovative medical equipment. Environmentally however, plastics present real problems: plastic is often more cost-effective than other more sustainable alternatives, and there are as of yet no sustainable solutions for plastic waste. Moreover, recycling continues to be fraught due to contamination and cost.

The geopolitical dimension of regulating plastic waste has undergone important changes over the past decades. Notably, 'receiver' countries of plastic waste are increasingly unwilling to accept plastics, creating significant problems in plastics producing and consuming countries, and have triggered important rethinking of the plastics lifecycle. This chapter discusses the geopolitics of plastics and the domestic and international regulatory developments in this area, specifically those related to the amendments to the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal regarding the categorization of plastics as hazardous waste.

3. Plastics: From resources to waste and back again

Plastics enhance the safety of electronic devices and hygiene of both food and medicine; they are durable, relatively cheap and can be molded into a variety of forms from hard to mailable, depending on their function. The widespread use of plastics, and their slow and incomplete degradation, have created a vast, and seemingly permanent, environmental problem. The presence of microplastics – plastics smaller than 5 mm in diameter – in the world's rivers and oceans, and in human bodies, is a worrying example of the consequences of plastics usage, which are hard to reverse or remedy. Though it is difficult to imagine a complete phasing out of plastics at this stage, the extent of current plastic usage is increasingly called into question.

This chapter highlights the physical and regulatory aspects of plastics. It considers how the physical aspects of plastics inform our regulatory responses regarding production, consumption, waste management and pollution. It also considers the most important shift in regulatory thinking, namely the potential of a circular economy (CE) for plastics, and considers the geopolitics of plastics production, consumption and waste. We discuss the shift toward a more coordinated international approach to plastics that has been developing in recent years, which has cumulated in the inclusion of certain plastics in the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (commonly referred to simply as the Basel Convention). The chapter concludes with reflections on the future outlook of plastics regulation.

3.1. Physical aspects of plastics

The term 'plastics' refers to a diverse group of synthetic materials known as polymers. The varying chemical structures of the polymers and chemical additives used in production lead to a range of physical properties. Broadly, plastics are either thermosoftening, meaning they will soften when heated and can be reshaped, or thermosetting, which means they do not soften with heat (e.g., silicone used in car engines and kettles).[1] Table 3.1 shows the plastic resins, fibres and additives that dominate the plastics market, the typical uses for them, and their annual production.

Highly versatile plastics that can be made strong or mailable are most common and include PP, HDPE and LDPE, some of which are more sensitive to heat increases than others (i.e., LDPE). PVC and PS can also be made both rigid or thin and flexible, but this depends on the additives used, while buoyancy is a key property of PUT. The additives used in plastic production make up approximately 7 percent of non-fibre plastics by mass[2] and, as shown in Table 3.1, 25 million tons of it are produced each year. While some plastics more often fulfil one-time use (e.g., PET and LDPE), others are designed to last several decades (e.g., hard

[1] Plastics Europe, 'Plastics – the Facts 2020' (2020) <https://www.plasticseurope.org/en/resources/publications/4312-plastics-facts-2020> accessed 18 December 2023, p. 6.
[2] R. Geyer, J. Jambeck, & K. Law, 'Production, use, and fate of all plastics ever made' (2017) 3 *Science Advances,* article e1700782, p. 1.

PET and PP). Plastics are almost invariably extremely durable. This also means they do not decompose but accumulate in the environment. Traditionally, plastics are made from the monomers extracted from fossil hydrocarbons: ethylene from natural gas or propylene from crude oil.

Table 3.1 Dominant plastic materials produced globally by the plastics industry with typical use and the estimated annual tonnage[3]

Plastic Resin/Fibre/Additive	Typical Use	Annual Production (Million Tons)
Polypropylene (PP)	Packaging, reusable food containers, car parts	68
Low-density polyethylene (LDPE)	Drink container liner, reusable bags, food packaging film	64
Polyphthalamide fibres (PP&A fibres)	Polyester fabrics	59
High-density polyethylene (HDPE)	Toys, houseware, containers for drinks, hazardous liquids (e.g. bleach)	52
Polyvinyl chloride (PVC)	Soft as packaging, inflatable pools or hard as flooring, pipes, windows	38
Polyethylene terephthalate (PET)	Bottles for drinks, cleaners	33
Polyurethanes (PUR)	Wheels, insulation panels	27
Additives	Stabilisers, plasticizers, lubricants, flame retardants	25
Polystyrene or styrofoam (PS)	Expanded as insulation and packaging, or rigid as disposable cutlery and CD cases	25

Bioplastics – plastics made from bio-based (renewable) feedstock, such as corn starch or wood, and/or plastics that are biodegradable, even if they are made from fossil hydrocarbons – currently represent only 1 percent of market share. However, the use of bioplastics is increasing and diversifying.[4]

3.2. Regulatory aspects of plastics

In order to appreciate the environmental impacts associated with plastics, this section adopts a lifecycle approach that follows plastics through the stages of production, consumption, waste management and, eventually, pollution.

3.2.1. Production

The main environmental impact arising in the plastics production stage concerns the use of polymers in conventional plastics. The monomers extracted from oil and gas to make polymers are residues from natural gas processing and crude oil refining, which explains their

[3] Geyer, Jambeck & Law, n. 2 above.
[4] European Bioplastics 'Bioplastics market data 2019' (2019) *Global Production Capacities of Bioplastic 2019–2024* <https://docs.european-bioplastics.org/publications/market_data/Report_Bioplastics_Market_Data_2019.pdf> accessed 11 January 2021.

over-supply and low cost.[5] This creates a link between the petrochemical and plastics industry, leading plastics markets to fluctuate with oil and gas markets,[6] which have been historically low over the past years. It also means that the phasing out of virgin plastics is complicated by the economic contribution and lobbying power of the petrochemical sector.[7] Recycled plastics often cannot compete with the low prices of virgin plastics.[8] To resolve this, many jurisdictions have introduced targets for recycled content of plastic used in production, including the European Union (EU) and various Association of South-East Asian Nation (ASEAN) countries including Vietnam, Thailand, Indonesia and Malaysia.[9]

The monomers that make plastics and additives achieve desired functions carry potential health, safety and environmental impacts.[10] Various public and private, national and transnational regulations exist that govern the use, trade and information concerning chemicals. This includes national legislation in 15 countries, the Global Harmonized System of Classification and Labelling of Chemicals (GHS) by the UN, and international conventions such as the Stockholm and Basel Conventions.[11] Though bioplastic production does not suffer from the same issues as conventional plastics, it has high water demands and creates potential competition over land use when crops are grown for bioplastics instead of agricultural goods.[12]

Finally, hundreds of types of plastic resins, fibres and additives exist and their categorization is completed in the production stage through the use of coded identification systems. These aim to ease the separation of different polymers for recycling. The dominant system of seven Resin Identification Codes (RICs) was drafted in 1988. However, the expansion of polymer types since then means that RICs fail to capture this growing diversity. New systems aim to

[5] Center for International Environmental Law (CIEL), 'Fueling plastics: How fracked gas, cheap oil, and unburnable coal are driving the plastics boom' (2017) <https://www.ciel.org/wp-content/uploads/2017/09/Fueling-Plastics-How-Fracked-Gas-Cheap-Oil-and-Unburnable-Coal-are-Driving-the-Plastics-Boom.pdf> accessed December 18, 2023; D. M. Sicotte 'From cheap ethane to a plastic planet: Regulating an industrial global production network' 66 *Energy Research and Social Science*, article 101479.

[6] L. Milios et al., 'Plastic recycling in the Nordics: A value chain market analysis' (2018) 76 *Waste Management,* pp. 180-9, at 186

[7] CIEL, n. 5 above; The Pew Charitable Trusts and Systemiq 'Breaking the plastic wave' (2020) <https://www.pewtrusts.org/en/research-and-analysis/articles/2020/07/23/breaking-the-plastic-wave-top-findings> accessed December 18, 2023, p. 31.

[8] Milios, n. 6 above; F. Gu et al., 'Dynamic Linkages between International Oil Price, Plastic Stock Index and Recycle Plastic Markets in China' (2020) 68 International Review of Economics and Finance, pp. 167-79.

[9] United Nations Environment Programme (UNEP), 'The role of packaging regulations and standards in driving the circular economy' (2019) <https://www.unenvironment.org/resources/report/role-packaging-regulations-and-standards-driving-circular-economy> accessed 18 December 2023.

[10] F. Gallo et al., 'Marine litter plastics and microplastics and their toxic chemicals components: The need for urgent preventive measures' (2018) 30(1) *Environmental Sciences Europe,* pp. 1-14; J. N. Hahladakis et al., 'An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling' (2018) 344 *Journal of Hazardous Materials,* pp. 179-99; N. J. Beaumont et al., 'Global ecological, social and economic impacts of marine plastic' (2019) 142 *Marine Pollution Bulletin,* pp. 189-95.

[11] Chem Safety Pro, 'REACH and chemical control laws' (n.d) <https://www.chemsafetypro.com/topics.html> accessed 18 December 2023.

[12] S. Spierling et al., 'Bio-Based Plastics - A Review of Environmental, Social and Economic Impact Assessments' (2018) 185 *Journal of Cleaner Production*, pp. 476-91.

resolve this issue, such as China's system of 140 identification codes.[13] Poor enforcement leaves producers responsible to ensure the inclusion of these codes, which often results in them being missing or incorrect.[14] These elements contribute to confusion on the consumer side, ineffective sorting by both consumers and waste sector, and ultimately lower recycling rates.

3.2.2. Consumption

In many sectors, the use of plastics has become a de facto necessity insofar as it would be excessively costly, or technically impossible, to replicate the same properties in non-plastic products. In light of health and hygiene benefits, the reduction of plastics in such sectors is considered extremely unlikely, and even undesirable, despite the negative consequences. In these sectors, bioplastics are considered the most promising alternative, though they are also imperfect. However, there are equally many sectors where the consumption of plastics is a question of convenience and low cost rather than necessity. The dividing line between convenience and necessity is at times clear cut – for example, the choice between a re-usable cloth bag and a plastic carrier bag – but at times, surprisingly difficult – such as benefits from super absorbent polymers in such products as nappies/diapers compared to reusable or biodegradable alternatives. In making such decisions, a product's utility is weighed up against its environmental impact and available alternatives. Environmental impacts have previously been compared via life cycle analyses (LCAs), but parameters are not standardised and weight is not often given to the societal need of certain products. 'Utility' also has a degree of subjective variation, which has been considered in the EU's new Single-use Plastics Directive (SUPD) whereby 'medical purposes' allow for the lifting of restrictions on certain plastic products (e.g., water bottles).[15] More recently, utility has been weighed against growing data on plastic production and waste generation. Restrictions now increasingly target single-use items and packaging, with the latter comprising approximately 40 percent of all plastics produced and discarded.[16] A range of measures have been put in place to change behaviour and drive demand away from these to promote reuse in the consumer stage. Regulations have taken shape as bans (e.g., to straws and microplastics in cosmetics), charges (taxes) on certain plastic items such as plastics bags, and green procurement plans.[17]

Increased media attention to the negative environmental impacts of plastics consumption has led to higher consumer awareness, and can be linked to the growth in bioplastics and the reuse and repair market. Despite greater concern by consumers, a recent survey of attitudes

[13] Standardization Administration of the People's Republic of China (SAC) [2008] GB16288.
[14] L. Coltro, B. F. Gasparino, & Q. de C. Queiroz, 'Reciclagem de materiais plásticos: A importância da identificação correta' (2008) 18 *Polímeros,* pp. 119-25.
[15] Directive 2019/904 on the reduction of the impact of certain plastic products on the environment [2019] OJ L 155.
[16] Geyer, Jambeck & Law, n. 2 above.
[17] UNEP, n. 9 above.

in Australia shows that many consumers still place primary responsibility on regulators and industry to solve the plastics problem.[18]

3.2.3. Waste management

Most plastics regulation focuses on plastic waste, which has been seen as less controversial than regulating production and consumption.[19] Regulation of production and consumption has led to strong pushback by plastic producers and retailers, while increased regulation on waste has created business opportunities in the waste sector without undermining the existing economic model of 'take-make-use-throw'. Different plastics require different waste management techniques. Conventional plastics are either landfilled, permanently destroyed via incineration (i.e., energy recovery) or recycled. These waste management options are also true for bioplastics, though they could also biodegrade in an anaerobic digester or a (home/industrial) compost facility. In the mid-1990s, spatial limitations sparked a range of policies deterring landfill usage, including bans, taxes and extended producer responsibility (EPR) schemes.[20] These debates also led to the promotion of recycling and recovery technologies and targets, as well as CE policies, by most governments.

Waste management options with regard to technology vary from country to country and income level is largely indicative of the options available. These levels are defined as high-income country (HIC), upper middle income (UMI), lower middle income (LMI) and low income (LI) and are based on 2015 gross national income.[21] Massive investment is required for the high-tech facilities more typical in high- and middle-income countries.[22] Though providing minimal job opportunities, these facilities provide returns through gate fees, whereby incoming waste deposits are charged by weight.

Traditional landfills (dumps) and a large informal waste sector are more characteristic of LMI and LI countries. As an urban common, the informal waste sector is an important contributor to the livelihoods of people in such economies.[23] However, the health impacts from dangerous working environments (e.g., on mismanaged landfills) bring high public health costs due to chemicals, poor hygiene, disease, accidents and psychological harm.[24] With the

[18] L. S. Dilkes-Hoffman et al., 'Public attitudes towards plastics' (2019) 147 *Resources, Conservation and Recycling,* pp. 227-35.
[19] T. Nielsen et al., 'Politics and the plastic crisis: A review throughout the plastic life cycle' (2019) 9 *Wiley Interdisciplinary Reviews: Energy and Environment,* pp. 1-18.
[20] Organisation for Economic Co-operation and Development (OECD) 'Improving plastics management: Trends, policy responses, and the role of international co-operation and trade' (2019) *OECD Policy Paper No. 12.* <https://doi.org/10.1787/c5f7c448-en> accessed 18 December 2023, p. 47.
[21] A. L. Brooks, S. L. Wang & J. R. Jambeck, 'The Chinese Import Ban and Its Impact on Global Plastic Waste Trade' (2018) 4(6) *Science Advances,* article eaat0131.
[22] The Pew Charitable Trusts & Systemic, n. 7 above, pp. 114-6.
[23] P. Zapata & M. J. Zapata Campos, *Producing, appropriating and recreating the myth of the urban commons* (Routledge 2015); C. Hartmann 'Waste picker livelihoods and inclusive neoliberal municipal solid waste management policies: The case of the La Chureca garbage dump site in Managua, Nicaragua' (2018) 71 *Waste Management,* pp. 565-77.
[24] H. Yang et al., 'Waste management, informal recycling, environmental pollution and public health' (2018) 72(3) *Journal of Epidemiology and Community Health*, pp. 237-43.

absence of formalised and centralised waste management systems, recycling of plastics is estimated to be lower than 1 percent in these countries.[25]

Technically speaking, all plastics can be recycled, but the extent that they are depends on the collection, sorting and processing infrastructure in a location. Neither mechanical nor chemical recycling can cope with excess levels of dirt, salt (from marine plastics), chemical additives (added during production) or other polymers, including bioplastics (from poor sorting).[26] These contaminants result in 'downcycling' whereby the original physical properties (e.g., durability, flexibility) degrade following the recycling process and the plastics can only be used in 'lower value' products. In order to prevent downcycling, the sorting and handling of plastic to minimise contamination are crucial. Consumers are primarily responsible for this sorting.

In HICs, household recycling systems can be hindered by improper sorting and/or contamination (e.g., dirt) caused by consumer non-compliance or confusion regarding which plastics should go into recycling or regular waste streams. This confusion can be compounded by differing waste management systems between and within countries; insufficient recycling resources given to consumers (e.g., information, trash bins) to facilitate the desired sorting; and unclear or confusing labelling on plastic products.[27] Debate exists as to whether household separation of plastics should be avoided altogether through the use of mechanical biological waste treatment plants that are used around Europe and retrieve plastic waste directly from municipal solid waste.[28] In UMIs, we see increased household sorting of plastic waste. For instance, the Domestic Waste Classification System Implementation Plan requires 46 urban areas in China to implement a mandatory household waste separation system by 2021. Deposit return schemes for plastic bottles have been effective in some countries, such as Germany and the Netherlands, in increasing waste data.[29] Increasing efforts are also being made on the industry side to improve tracking technology and consumer sorting.[30]

3.2.4. Pollution

Plastics become pollutants when they occur in 'higher-than-normal concentrations […] in the air, water or soil, which may have effects on humans or non-human organisms.'[31] Examples

[25] Woldemar d'Ambrières, 'Plastics recycling worldwide: Current overview and desirable changes' (2019) *Field Actions Science Reports* <http://journals.openedition.org/factsreports/5102> accessed 18 December 2023, pp. 12-21.
[26] L. Alaerts, M. Augustinus & K. van Acker, 'Impact of bio-based plastics on current recycling of plastics' (2018) 10(5) *Sustainability,* pp. 1-15; R. Clift et al., 'Managing plastics: Uses, losses and disposal' (2019) 15(2) *Journal of Law, Environment and Development,* pp. 93–107.
[27] OCED, n. 20 above, p. 26.
[28] A. Feil et al., 'Separate collection of plastic waste, better than technical sorting from municipal solid waste?' 35(2) *Waste Management and Research,* pp. 172-80.
[29] G. Zhou et al., A systematic review of the deposit-refund system for beverage packaging: Operating mode, key parameter and development trend' (2020) 251 *Journal of Cleaner Production,* article 119660.
[30] P&G, 'P&G continues support of HolyGrail with AIM test market (2020) <https://us.pg.com/blogs/HolyGrail/> (accessed 11 January 2021).
[31] J. van Zeben, & A. Rowell, *A Guide to EU Environmental Law* (University of California Press, 2021).

of this include plastics in rivers and oceans, and poisoning or harming birds or fish, but also high concentrations of microplastics in food and/or humans. Plastic pollution is caused by the mismanagement of waste, either in transit or at a landfill or other facility, and waste crimes such as littering and illegal dumping (also called fly tipping), especially in countries that lack centralised collection and disposal systems. While littering and illegal dumping are largely regulated domestically, marine plastics are a global problem, receiving increased attention in research and on the global political stage.[32] The undesirability but large quantities of contaminated plastics have also caused much illegal trade in plastic waste. Plastics and other materials are often mixed with hazardous waste under the guise of plastics recovery to export the regulatory costs associated with hazardous waste.[33]

Plastics' resistance to degradation makes them likely to survive in open air and water for centuries, making them a particularly problematic pollutant. Research shows that plastic pollution negatively impacts almost all marine ecosystem services as well as human wellbeing and local economies by affecting tourism and fisheries.[34] There are also growing concerns around the uncertain impacts of microplastics.[35] These tiny particles leak into the environment through cosmetic products and textiles (primary microplastics) or are formed by the breakdown of larger pieces of plastic (secondary microplastics). Existing, research suggests that they can act as toxic sinks, causing harm to humans and other organisms.[36] Apart from these waste impacts, the plastics lifecycle is responsible for approximately 4 percent of current global carbon emissions.[37]

3.3. Toward a circular economy for plastics

The idea of a circular economy aims for a lifecycle approach to all aspects of the economy, including the plastics sector. At its core the CE calls for systems change to production and consumption processes to reduce reliance on natural resources. It promotes keeping 'products and materials in use' and places greater emphasis on the 'reduce' and 'reuse' of materials, before choosing 'recycling' and energy 'recovery'.[38] A CE specifically for plastics is controversial due to the finite nature of fossil fuels – the main ingredient for conventional plastics. The Ellen MacArthur Foundation is a leading civil society organization on CE

[32] Nielsen et al., n. 19 above, p. 5; J. Jacques 'Pollution and management of oceans and seas: challenges in an unresponsive international system' *Handbook of Global Environmental Politics,* 2nd edn (Routledge 2022).
[33] J. Baird, R. Curry & P. Cruz, 'An overview of waste crime, its characteristics, and the vulnerability of the EU waste sector' (2014) 32(2) *Waste Management and Research,* pp. 97–105, at 99-100; K. Biedenkopf, 'Hazardous waste: fragmented governance and aspirations for environmental justice' *Handbook of Global Environmental Politics,* 2nd edn (Routledge 2022).
[34] Beaumont et al., n. 10 above; Jacques, n. 32 above.
[35] G. E. De-la-Torre, 'Microplastics: An emerging threat to food security and human health' (2020) 57(5) *Journal of Food Science and Technology,* pp. 1601-08.
[36] Gallo et al., n. 10 above; C. S. Lam et al., 'A comprehensive analysis of plastics and microplastic legislation worldwide' (2018) 229(11) *Water, Air, and Soil Pollution,* pp. 1–19.
[37] J. Zheng & S. Suh, 'Strategies to reduce the global carbon footprint of plastics' (2019) 9 *Nature Climate Change,* pp. 374–8.
[38] Ellen MacArthur Foundation, 'The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action' (2017).

research and private regulation. It highlights distinctive issues hindering circular plastics, such as the chemical additives present within plastic products, or on waste plastic and downcycling. Its depiction of 'The New Economy for Plastics' deviates from the standard CE by emphasizing that only those necessary plastics should remain in the economy and should retain as high a utility value as possible.[39] It is thus a big step away from merely focusing on recycling to push for the reduction of unnecessary plastics.

There is diversity in definition of CE and the use of the concept.[40] For plastics, an end-of-pipe focus dominates both legislation and academic material because earlier stages of the lifecycle are not politicised.[41] For instance, early CE policies in China centred on industrial ecology principals, yet more recent policies such as the 'National Sword' ban, and a law for mandatory household waste separation in urban areas, centre around waste.[42] In the United States and EU, too, a focus on recycling and recovery, rather than reduce and reuse, has dominated.[43] However, in the EU, increasing emphasis is being placed on the early stages in the lifecycle, with the new Circular Economy Action Plan (CEAP)[44] and related laws, such as the SUPD.[45] Also, law and policy for plastics is in place and increasing in a number of ASEAN countries. Similar to the EU, Japan, Indonesia and Malaysia have introduced legislation on EPR, which shifts some financial burden of waste management onto the producer, and many ASEAN countries, including Cambodia, Malaysia, Thailand and Vietnam, have policies on minimum recycled content for packaging.[46] Questions are also being raised regarding the export of recyclables, and whether this should be considered pollution transfer or part of the global circular economy.[47]

3.4. Geopolitics of plastics

Having set out the main characteristics of plastics as a resource and pollutant, this section will discuss key factors in the geopolitics of plastics. As mentioned, some plastics are seen as necessary based on the benefits provided to society. However, the politics of how to define what is 'necessary,' who produces and consumes this plastic, and who then receives the plastic at the end of its lifecycle, are complex. Moreover, the power dynamics in these relationships are changing, particularly regarding the responsibility for plastics pollution.

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[39] Ellen MacArthur Foundation, 'A vision of a circular economy for plastic' (2019) < https://www.ellenmacarthurfoundation.org/topics/plastics/overview> accessed 18 December 2023.
[40] J. Kirchherr, D. Reike & M. Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 *Resources, Conservation and Recycling,* pp. 221-232.
[41] Nielsen et al., n. 19 above, p. 11.
[42] Brooks, Wang & Jambeck, n. 21 above.
[43] Nielsen et al., n. 19 above; D. M. Sicotte & J. L. Seamon, 'Solving the plastics problem: Moving the U.S. from recycling to reduction' (2020) 34(3) *Society & Natural Resources,* pp. 1–10.
[44] Communication on A new Circular Economy Action Plan For a cleaner and more competitive Europe, COM(2020)98 final.
[45] Directive 2019/904, n. 15 above.
[46] UNEP, n. 9 above, p. 8.
[47] Z. Liu, M. Adams & T. R. Walker, 'Are exports of recyclables from developed to developing countries waste pollution transfer or part of the global circular economy?' (2018) 136 *Resources, Conservation and Recycling,* pp. 22–23.

3.4.1. Responsibilities of producers, consumers and receiver countries

Producer countries are those involved in the production of polymer resins and fibres (i.e., virgin plastics) from oil and gas monomers – and countries converting these resins into plastic products. In 2018, approximately 359 million tons of plastics were produced globally which increased to 368 million in 2019.[48] Currently, virgin plastic is predominantly made in North America (19 percent), Europe (16 percent) and Asia (51 percent, with China accounting for 31 percent).[49] Specifically, China produces 28 percent of global resin and 68 percent of global PP&A fibres.[50] The sheer amount produced in recent years is highlighted in a study by Geyer, Jambeck & Law who found that half of the total amount of plastic resins and fibres manufactured from 1950 to 2015 were produced in the past 13 years.[51]

Oil and gas extraction is an essential step that precedes virgin production. As a result large petrochemical companies dominate this sector, including some of the major oil and gas extraction companies.[52] This makes it hard to disconnect key oil and gas supplier countries including Norway, Russia, Saudi Arabia and Venezuela, from linkage to plastics supply chains. Polymer resins, often in the form of pellets, go to converters around the world – there is limited data on their specific geographical diffusion – who manufacture products. The most common final products are produced by the packaging industry (42 percent of all non-fibre plastics, primarily PE, PP and PET), followed by the building and construction sector (19 percent), consumer and institutional products (12 percent) and 'other' (13 percent) which includes transportation (8 percent), furniture, industrial machinery and textiles.[53]

Consumer countries are locations where plastic products are used and, when disposed, contribute to waste generation figures. The dominant regions consuming plastics in 2016 were North America, consuming approximately 21 percent, followed by China (20 percent), Western Europe (18 percent), Latin America and the Caribbean (8 percent) and the rest of Asia (8 percent).[54] The generation of plastic waste globally has been estimated at 300 million tons in 2015[55] and of this, only 4 percent was exported legally.[56] However, the differences between countries vary significantly; countries such as the United Kingdom and Germany export a high proportion (40 percent) of their waste, while other countries, like Bulgaria, export far less (5 percent).[57]

[48] Plastics Europe, n. 1 above.
[49] Ibid, p. 17.
[50] Geyer, Jambeck & Law, n. 2 above, p. 1.
[51] Ibid.
[52] CIEL, n. 5 above.
[53] Geyer, Jambeck & Law, n. 2 above, p. 1.
[54] Statistica 2021 'Distribution of plastic consumption worldwide in 2016, by region' (2021) <https://www.statista.com/statistics/1002005/distribution-plastic-consumption-worldwide-by-region/> accessed 18 December 2023.
[55] Geyer, Jambeck & Law, n. 2 above.
[56] OECD, n. 20 above, p. 9.
[57] Ibid, suffix 47.

The ten top exporting countries are listed in Table 3.2. These exporters correspond with the dominant plastic consuming countries mentioned above, with North America, China and Western Europe dominating. The majority of exporters are HIC which is also true for the importers, with the exception of Mexico, China and Hong Kong SAR which are UMI countries and India which is a LMI. It must be noted that shipments of illegal plastic waste are not counted in these figures, which, according to best estimates from 2017, amount to 56,000 tons.[58]

Table 3.2 Top ten cumulative exporters and importers of plastic waste from 1988-2016[59]

Exporters	
Reporter in Order of Rank	*Percent of Global Exports*
China, Hong Kong SAR[a]	26.1
United States	12.4
Japan	10.3
Germany	8.22
Mexico	4.90
UK	4.31
Netherlands	3.59
France	3.52
Belgium	2.99
Canada	1.81
Importers	
Reporter in order of rank	*Percent of global imports*
China	45.1
China, Hong Kong SAR[a]	27.3
United States	3.60
Netherlands	2.72
Germany	2.27
Belgium	1.76
Canada	1.62
Italy	1.41
India	1.31
Other Asia, nes[b]	1.01

[a] Special Administrative Region.

[b] Other Asia, not elsewhere specified (nes) is 1 of 16 UN areas nes. These areas are used (i) for low-value trade or (ii) if the partner designation was unknown to the country or if an error was made in the partner assignment. The reporting country does not send details of the trading partner in these cases, sometimes to protect company information.

[58] No authors listed, 'Plastic waste trafficking: An ever-growing environmental crime that needs to be tackled' (2020) 38(11) *Waste Management & Research,* pp. 1187-8, at 1187.

[59] Brooks, Wang & Jambeck, n. 21 above.

The receiver countries are those importing plastic waste. Table 3.2 shows the top ten cumulative importers from 1988-2016 with China and the SAR of Hong Kong taking an overwhelming majority at 72.4 percent combined. China's infamous ban, known as 'The National Sword,' drastically pivoted the direction of global plastic waste imports when it came into force in 2018. To demonstrate this, in 2017 between 5.8 and 8.3 Mt of plastic waste entered China while in 2018 this was reduced to 52 kt.[60] Instead, total global exports decreased and imports to various other countries increased, including Malaysia, Thailand, Vietnam, Turkey and Taiwan.[61]

The mismanagement of plastic waste and its negative environmental impacts have become increasingly documented and promulgated. Though data limitations exist, current information shows that dominant regions that mismanage plastic waste are East Asia and the Pacific (60.1 percent), South Asia (12.1 percent) and Sub Saharan Africa (10.6 percent) and the main sources of marine pollution are mis-managed and un-regulated landfills in Asian countries.[62] However, global environmental problems with plastic pollution are a collective concern as they are affecting ecosystems and biodiversity crucial to human existence on the planet.[63]

Much denial and debate exists on the sources of plastic pollution and who should shoulder the financial and environmental responsibility regarding the management of this waste.[64] Following the 2018 China ban, where waste was redirected to various other countries, strong correlations have been shown between import-export and the income level of a country and plastic waste acceptance, with LMI and LI countries more likely to act as importers of plastic waste, and HMI and UMI countries as exporters.[65] Many South-East Asian countries, whose imports have increased due to the China ban, have become critical of this situation and strengthened their regulations because of it.[66] Though receivers benefit financially from importing plastic waste, it has become increasing clear that they do not have sufficient capacity with regard to space, technology or infrastructure to process plastics in an environmentally sound manner.

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[60] Y. Liang et al., 'An analysis of the plastic waste trade and management in Asia' (2021) 119 *Waste Management,* pp. 242-53.
[61] Principles for Responsible Investment (PRI), 'The plastics landscape: Risks and opportunities along the value chain' (2019) <https://www.unpri.org/plastics/risks-and-opportunities-along-the-plastics-value-chain/4774.article> accessed 18 December 2023.
[62] J. R. Jambeck et al., 'Plastic waste inputs from land into the ocean' (2015) 347(6223) *Science,* pp. 768-71; S. Qu et al., 'Implications of China's foreign waste ban on the global circular economy' (2019) 144 *Resources, Conservation and Recycling,* pp. 252-5.
[63] P. Villarrubia-Gómez, S. E. Cornell & J Fabres, 'Marine plastic pollution as a planetary boundary threat – The drifting piece in the sustainability puzzle' (2018) 96 *Marine Policy,* pp. 213-20; S. J. Barnes, 'Understanding plastics pollution: The role of economic development and technological research' (2019) 249 *Environmental Pollution,* pp. 812-21.
[64] Nielsen et al., n. 19 above, pp. 5-6
[65] PRI, n. 61 above, p. 20.
[66] Brooks, Wang & Jambeck, n. 21 above; Qu et al., n. 62 above, p. 72; S. Sasaki, 'The effects on Thailand of China's import restrictions on waste: measures and challenges related to the international recycling of waste plastic and e-waste' (2020) 23 *Journal of Material Cycles and Waste Management,* pp. 77-83.

This raises the question as to why consumer countries export so much waste. First, it is due to the sheer amount of plastic. Globalization has reinforced the 'take-make-use-throw' culture despite stricter waste regulations. Second, waste export is due to the poor quality of most plastic waste and the inability of recycling infrastructure to handle high contamination levels complicate waste management. Rather than cleaning, sorting and pre-treatment, it has been easier and cheaper to offset the problem and export the low-quality waste. Linked to this is the aforementioned illegal trade of contaminated plastic waste which continues to burden importers. The China ban was pivotal in illuminating such contamination as it only banned low quality recyclables, including eight types of plastic.[67] The sustainability of plastic waste exports has come under severe public scrutiny, especially as the mis-management of plastic waste in LMI and LI income countries has led to dire global problems. Questions of responsibility are not dissimilar to those in climate justice debates whereby more developed nations are larger historical contributors of greenhouse gases, have reaped more benefits and arguably have more responsibility in resolving related issues.[68] With this perspective, not only do the consuming countries have greater resources and higher quality infrastructure to process plastics in an environmentally sound manner, but arguably, 'disposal' else ware is not in keeping with their emphasis on sustainability and circularity. Facts pertain that both the trade and pollution of plastics is complex and transnational and recognition of the need for an integrated global approach has developed.

3.4.2. Toward an international approach to plastics

In recent years, recognition of the need for an integrated global approach to solutions around plastics, and plastic waste, has grown. This is first due to the increased awareness and understanding of the plastics crisis through increased media coverage of poorly constructed landfills in LMI and LI countries and the great pacific garbage patch. This raised concern from consumers in HIC and UMI countries who before then, had largely been shielded from the extent of the plastics problem. With this, the global nature of plastics supply chains has become increasingly researched and recognised as linked to plastics pollution.[69] Alternately, the illegal trafficking of plastics is still not widely known or understood.[70]

International law[71] plays a role in such global approaches to manage plastics. Nielsen et al. identify 11 global agreements related to plastics.[72] Aside from the Stockholm Convention, which regulates persistent organic pollutants,[73] these agreements predominantly focus on

[67] Brooks, Wang & Jambeck, n. 21 above.
[68] H. Nyseth Brehm & D. N. Pellow, 'Environmental justice: Pollution, poverty and marginalized communities' *Handbook of Global Environmental Politics,* 2nd edn (Routledge 2022).
[69] Nielsen et al., n. 19 above.
[70] No authors listed, n. 58 above.
[71] D. B. Hunter, 'International environmental law: Sources, principles and innovations' *Handbook of Global Environmental Politics,* 2nd edn (Routledge 2022).
[72] Nielsen et al., n. 19 above, pp. 12-4.
[73] D. Downie & J. Templeton, 'Persistent organic pollutants: Managing threats to human health and the environment' *Handbook of Global Environmental Politics,* 2nd edn (Routledge 2022).

marine plastic pollution.[74] All have thus far proven unsuccessful in reducing the negative effects from the over production and consumption of plastic, and in reducing the trade of hazardous waste.[75] However, international law is not the only mechanism that can be used in achieving a global approach. Non-binding coordinated approaches in global private regulation such as the Global Commitment and Global Plastic Action Partnership have come about since 2018. These mechanisms emphasise the need to address systems change on a global and local scale by integrating efforts from governments, industry and community actors.[76]

3.4.3. Plastics as hazardous waste under the Basel Convention

The 1989 Basel Convention is an international treaty on hazardous waste aiming to minimise the trade and enhance the proper management of hazardous waste.[77] Stemming from concern over the transfer of waste pollution problems to developing countries, it recognises 'the right of a country to ban the entry or disposal of foreign hazardous wastes and other wastes in its territory.'[78] Annex I lists the 48 types of wastes originally included and categorised as Y codes.

In 2017, China made notifications to the World Trade Organization (WTO) and the Basel Convention banning 24 categories of waste imports, including some plastics, and placed restrictions on the minimum acceptable level of contamination for imports, including plastics.[79] These and previous undocumented restrictions in 2013 were enforced against a backdrop of decreasing landfill capacity and CE policy in China, and targeted improvements to the quality of waste imports and stopping illegal waste trafficking and smuggling.[80] The implications of the ban were three-fold. First, it significantly reduced the amount of waste being exported globally with the big exporters increasing domestic stockpiling and strengthening domestic waste policy.[81] For instance plastic waste exports from the EU decreased 39 percent from 2016 to 2018.[82] Second, it caused a complete reshuffle of the global trade in plastic waste, highlighting 'the fragility of global dependence on a single importer'.[83] And third, it resulted in increased illegal trafficking and smuggling of plastic waste.[84]

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[74] Jacques, n. 32 above.
[75] S. Yang, 'Trade for the environment: Transboundary hazardous waste movements after the Basel Convention' (2020) 37(5) *Review of Policy Research,* 713-38, at 314.
[76] Nielsen et al., n. 19 above, p. 10-1.
[77] Biedenkopf, n. 33 above.
[78] UNEP 'The Basel Convention on the control of transboundary movement of hazardous wastes and their disposal' [2011] Text and Annexes, p. 6.
[79] OECD, n. 20 above, p. 10.
[80] Brooks, Wang & Jambeck, n. 21 above, p. 1.
[81] OECD, n. 20 above, p. 10.
[82] Plastics Europe, n. 1 above, p. 30.
[83] Brooks, Wang & Jambeck, n. 21 above, p. 1; Q. Huang et al., 'Modelling the global impact of China's ban on plastic waste imports' (2020) 154(1) *Resources, Conservation and Recycling,* article 104607.
[84] No authors listed, n. 58 above; Sasaki, n. 66 above.

Following the Chinese ban, the UN Environment Assembly on plastic pollution was held in March 2019. As a result of this meeting, the 14th meeting of the Basel Convention announced amendments to three annexes, leading plastic waste to be included in its provisions on hazardous waste. The amendments have come into effect on 1 January 2021, and they stipulate which plastic waste requires the completion of a PIC procedure. If a PIC is required, exporting countries must receive the consent that importing countries accept the waste, and they must ensure that the importing countries have the capacity to manage the plastic waste in an environmentally sound manner.[85] The three amendments are as follows:

- Annex II: Y48, plastic waste, including mixtures of such wastes will be subject to the Prior informed Consent (PIC) procedure (excluding those that would fall under A3210 or B3011).
- Annex VIII: A3210, clarifies the scope of plastic waste presumed to be hazardous and therefore subject to the PIC procedure.
- Annex IX: B3011, plastic waste destined for recycling and almost free from contamination and other types of waste that remain excluded from the PIC procedure (certain single polymers or mixture of PE, PP and/or PET).

These amendments stipulate that plastic waste to be subject to PIC are mixes of various polymers or are hazardous, and that excluded plastic waste is that which is made from single polymers or mixtures of PE, PP and/or PET. The amendments will be the first international legally binding mechanism to date related to plastic waste and will likely increase the transparency and availability of data on the global plastics trade and strengthen regulations on exported waste.[86] As such, the amendments affect the illegal waste trade, as plastic waste that was purposefully covered in hazardous substances to hide the illegal trafficking of such substances, are anticipated to be easier to track and prevent. Moreover, the amendments only affect contaminated or not easily recycled plastics, which means that easily recycled plastics in support of a CE are minimally affected.

In addition, these amendments are likely to have positive repercussions for a number of other areas not originally targeted. For instance, the new processes are likely to enhance collaboration between international organizations on the problem of plastics as organizations like the WTO and the International Criminal Police Organization (Interpol) expand and harmonise their jurisdiction over plastic waste. Second, the amendments have the potential to reduce the generation of waste in the first place and boost circularity. The China ban was shown to reduce the amount of plastic waste exports globally,[87] and matched with an increase in ‘start-of-pipe’ policies already mentioned, future plastics policies will no doubt increase steer toward ‘reduce’ and ‘reuse’ measures and encourage trade toward capable countries. In

[85] Basel Convention ‘Plastic waste amendments FAQs’ (n.d) <http://www.basel.int/Implementation/Plasticwaste/PlasticWasteAmendments/FAQs/tabid/8427/Default.aspx> accessed December 18 2023.
[86] Nielsen et al., n. 19 above, p. 11.
[87] OECD, n. 20 above, p. 10.

relation to this, the amendments may also accelerate enhancements to domestic waste management technologies and infrastructure – one means to reduce plastic pollution.[88] In HIC countries, where collection and sorting infrastructure tends to be more advanced, the amendments and need to reduce exports may push further development. While in LMI and LI countries, the amendments may lead to developments in collection, sorting infrastructure as well as technologies. The amendments also come with guidance on how best to reduce and manage plastic waste further aiding these developments.[89] And finally, the amendments may improve the harmonization and effectiveness of identification codes for plastic resins. Currently, no coherent set of resin or fibre codes are used and the predominant one (RICs) are too limited for plastics' diversity and not enforced effectively. Coordination brought by these amendments have potential to influence the codes' development, and therein, improve data collection and processing to better manage and separate waste polymers and increase recyclability.

The Basel Convention, however, is not without its flaws and critique exists regarding the limitations of its remit and country categorization, lack of incentives for capable handlers, and lack of assistance in building effective regulation in capacity poor areas.[90] Nevertheless, the amendments have led to international legal recognition of the plastics problem and pave the way for more regulatory development.

3.5. Conclusion

The outlook for plastics regulation is fast-changing, with many uncertainties. Awareness of the global nature of plastic supply chains and dangers to human health and the environment caused by mismanagement of plastic waste has increased impetus to resolve the plastics crisis. As consuming countries increase domestic capacity to better manage plastic waste, receiving countries are also looking for improvements. The growing number of CE policies for plastics, including LMI and LI countries, are sure to see continued infrastructural and technological development in the already fast-changing field. But the conflicting use of CE concepts and diverse material properties of plastics raise questions about what kind of changes will be seen. Information gaps and a lack of data transparency in each stage of the life cycle are evident and calls for measures to remedy these are getting louder. Such information is vital to enhance communication and circularity and reduce the illegal trafficking of plastic waste.

The aims of the Basel Convention amendments relate to these broad issues by supporting recycling and boosting global corporation on plastics and hazardous waste to reduce illegal waste trafficking and increase information transparency. Furthermore, the amendments increase pressure on nations to improve waste management infrastructure and technologies.

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[88] Barnes, n. 63 above.

[89] Basel Convention 'Guidance and awareness raising' (2019) Online. <http://www.basel.int/Implementation/Plasticwaste/Guidance/tabid/8333/Default.aspx> accessed December 18 2023.

[90] Yang, n. 75 above; Biedenkopf, n. 33 above.

Yet this is still overshadowed by uncertainty about whether a system's perspective on reduce and reuse will be enhanced.

What is clear is that holistic, international solutions are needed to amalgamate the disjointed strategies around plastics from both governments and private or civil society actors.[91] Despite the growing involvement and interest of the international community[92] national, local, and community levels continue to play a central role in transforming the plastics economy.[93]

[91] P. Dauvergne, 'Why is the global governance of plastic failing the oceans?' (2018) 51 *Global Environmental Change,* pp. 22-31.
[92] Nielsen et al., n. 19 above.
[93] J. Vince & B. D. Hardesty, 'Governance solutions to the tragedy of the commons that marine plastics have become' (2018) 5 *Frontiers in Marine Science,* article 214.

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Chapter 4

Refining reflexive environmental law by nature and nurture: Autonomy, accountability, and adjustability

Forthcoming as:
V. Ross & L. de Almeida, 'Refining Reflexive Environmental Law by Nature and Nurture: Autonomy, accountability, and adjustability' Journal of Transnational Environmental Law'.

Abstract

Reflexive environmental law (REL) enables understanding of how Law builds potential for private company reflexivity. Reflexivity helps avoid lock-in and enhances learning and self-organization to resolve complex sustainability challenges. Thus far, REL theory has excluded traditional command-and-control regulation as a form of REL. This limits REL's potential to understand how legislation can drive reflexivity and create more effective governance.

Our framework expands the definition of REL and sets out six types of regulatory instruments found in legislation that may, or may not, constitute forms of REL. The framework comprises three reflexive drivers – autonomy, accountability and adjustability – and, under these, eleven REL techniques. Through examples taken from European environmental legislation, we explain the drivers' relationship to different regulatory instruments. This taxonomy empowers regulators and scholars to understand both the reflexive potential of regulatory instruments and the possibility to make instruments more reflexive in specific contexts.

4. Refining reflexive environmental law by nature and nurture: Autonomy, accountability, and adjustability

4.1. Introduction

Private companies, including transnational corporations, play a crucial role in tackling complex and global sustainability challenges, such as the wicked problems of climate change, human health, and waste and pollution management.[1] Not only is their knowledge on their own products and services fundamental to resolving end-of-pipe environmental impacts,[2] companies play a role in accelerating sustainable innovation,[3] technical or procedural efficiency,[4] and the implementation of private regulatory initiatives.[5] Nonetheless, sustainability challenges persist and companies' actions must be guided and steered towards sustainability.

Legislation (legal acts issued by legislative bodies such as parliaments) remains a crucial governance mechanism to shape the actions of private companies and help combat today's sustainability challenges.[6] Consisting of detailed documents which often contain a plethora of regulatory instruments to steer companies' behaviours, the most common legislative instruments used in public regulation are command-and-control rules that prescribe a specific technology or performance for companies to adopt. However, other forms of regulatory instruments exist and are increasingly common, including: market-based rules which incentivise companies to abate pollution; disclosure-based instruments that promote

[1] For a review of governance by transnational corporations see T. Bartley, 'Transnational Corporations and Global Governance' (2018) 44(1) *Annual Review of Sociology,* pp. 145-65. For details on these wicked environmental problems see W. Steffen, 'A Truly Complex and Diabolical Policy Problem', in S. Dryzek, R. Norgaard & D. Schlosberg (eds), *The Oxford Handbook of Climate Change and Society* (Oxford University Press, 2011), pp. 21-37; G. Salvia et al., 'The Wicked Problem of Waste Management: An Attention-Based Analysis of Stakeholder Behaviours' (2021) 326 *Journal of Cleaner Production*, article 129200; T. Narancic & K. O'Connor, 'Plastic Waste as a Global Challenge: Are Biodegradable Plastics the Answer to the Plastic Waste Problem?' (2018) 165(2) *Microbiology*, pp. 129-37. Also, some solutions to address these problems, e.g., the circular economy, are argued to be wicked/complex problems, see S. Sediri et al., 'Transformability as a Wicked Problem: A Cautionary Tale?' (2020) 12(15) *Sustainability*, article 5895.

[2] K. Ladeur, 'Coping with Uncertainty: Ecological Risks and the Proceduralization of Environmental Law', in G. Teubner, L. Farmer & D. Murphy (eds), *Environmental Law and Ecological Responsibility* (John Wiley & Sons, 1994), pp. 299-366 at 322-9.

[3] R. Dangelico, P. Pontrandolfo & D. Pujari, 'Developing Sustainable New Products in the Textile and Upholstered Furniture Industries: Role of External Integrative Capabilities' (2013) 30(4) *Journal of Product Innovation Managemen*t, pp. 642-58.

[4] J. Carrillo-Hermosilla, P. del Río & T. Könnölä, 'Diversity of Eco-Innovations: Reflections from Selected Case Studies' (2010) 18(10) J*ournal of Cleaner Production*, pp. 1073-83; R. Adams et al., 'Sustainability-Oriented Innovation: A Systematic Review' (2016) 18(2) *International Journal of Management Reviews*, pp. 180-205.

[5] N. Schmid et al., 'Governing Complex Societal Problems: The Impact of Private on Public Regulation through Technological Change' (2021) 15(3) *Regulation & Governance*, pp. 840-55.

[6] See E. Scotford, 'Legislation and the Stress of Environmental Problems' (2021) 74(1) *Current Legal Problems*, pp. 299-327; S. Eskander, S. Fankhauser & J. Setzer, 'Global Lessons from Climate Change Legislation and Litigation' (2021) 2(1) *Environmental and Energy Policy and the Economy,* pp. 44-82; I. Conti et al., 'Legislation to Limit the Environmental Plastic and Microplastic Pollution and Their Influence on Human Exposure' (2021) 288 *Environmental Pollution,* article 117708; B.B. Zhang, L. Yu & C.W. Sun, 'How Does Urban Environmental Legislation Guide the Green Transition of Enterprises? Based on the Perspective of Enterprises' Green Total Factor Productivity' (2022) 110(June) *Energy Economics,* article 106032.

improved cooperation through transparency;[7] procedure-based instruments which establish procedures for company self-assessment and sustainability improvements;[8] and instruments requiring self-regulatory initiatives to be established by the private sector (hereafter, self-regulation-based instruments).[9]

Reflexive law theory is based on a critique of command-and-control, technology- and performance-based instruments, claiming they are ineffective and illegitimate in governing complex societal challenges, such as sustainability.[10] The conceptual starting point that categorises certain regulatory instruments as reflexive while discounting others, has been maintained in later theories of reflexive environmental law (REL)[11] and reflexive regulation.[12] The same goes for other new governance theories, such as regulatory governance[13] and smart regulation,[14] which do not differentiate between traditional types of regulation but label all technology- and performance-based instruments as rigid and non-participatory.

We argue that this starting point needs to be revisited. So-called reflexive forms of regulation (for example, self-regulation, disclosure- and procedure-based instruments) have proven to be just as susceptible to market capture and ossification as traditional regulation.[15] Moreover, as today's sustainability crises become increasingly dire, critique of softer forms of law (one indicator of reflexive law)[16] to govern these challenges is increasing, as is exemplified by the Paris Agreement.[17] At the same time there is a renewed interest in so-called non-reflexive,

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[7] R.M. Friedman, D. Downing & E.M. Gunn, 'Environmental Policy Instrument Choice: The Challenge of Competing Goals' (2000) 10(2) *Duke Environmental Law and Policy Forum*, pp. 327-88, at 336; R. Baldwin, M. Cave & M. Lodge, *Understanding Regulation: Theory, Strategy, and Practice* (2nd edn, Oxford University Press, 2011).

[8] Such as in the EU's environmental impact assessment (EIA) Directive 2014/52/EU amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment [2014] OJ L 124/1.

[9] R. Fairman & C. Yapp, 'Enforced Self-Regulation, Prescription, and Conceptions of Compliance within Small Businesses: The Impact of Enforcement' (2005) 27(4) *Law and Policy*, pp. 491-519, at 493.

[10] G. Teubner, 'Substantive and Reflexive Elements in Modern Law' (1983) 17(2) *The Law and Society Review*, pp. 239-85.

[11] E.W. Orts, 'Reflexive Environmental Law' (1995) 89(4) *Northwestern University Law Review,* pp. 1227-340.

[12] M. Aalders & T. Wilthagen, 'Moving beyond Command-and-Control: Reflexivity in the Regulation of Occupational Safety and Health and the Environment' (1997) 19(4) *Law and Policy,* pp. 415-43.

[13] O. Lobel, 'New Governance as Regulatory Governance', in D. Levi-Faur (ed.), *The Oxford Handbook of Governance* (Oxford University Press 2012), pp. 65-82, at 71-2.

[14] N. Gunningham & D. Sinclair, 'Smart regulation', in P. Drahos (ed.), *Regulatory Theory* (ANU Press, 2017), pp. 133-48, at 134.

[15] See, e.g., T. Hickmann, 'Private Authority in Global Climate Governance: The Case of the Clean Development Mechanism' (2013) 5(1) *Climate and Development*, pp. 46-54; M. Isailovic & P. Pattberg, 'Private Governance', in C. Ansell & J. Torfing (eds), *Handbook on Theories of Governance* (Edward Elgar, 2016), pp. 468-76; L. Vigneau & C.A. Adams, 'The Failure of Transparency as Self-Regulation' (2023) 14(4) *Sustainability Accounting, Management and Policy Journal*, pp. 852-76.

[16] Reflexive law is not exclusively soft law as reflexive instruments can be command-and-control enforced, but notably, reflexive law 'softens law's substantive rigor'. See S.E. Gaines, 'Reflexive Law as a Legal Paradigm for Sustainable Development' (2002) 10(1) *Buffalo Environmental Law Journal,* pp. 1-24, at 3.

[17] Paris (France), 12 Dec. 2015, in force 4 Nov. 2016, available at: http://unfccc.int/paris_agreement/items/9485.php. See also. P. Lawrence & D. Wong, 'Soft Law in the Paris Climate Agreement: Strength or Weakness?' (2017) 26(3) *Review of European, Comparative & International Environmental Law,* pp. 276-86.

traditional command-and-control instruments to regulate sustainability, both academically[18] and in practice. For instance, the European Union (EU) has numerous traditional regulatory approaches on the horizon, for such issues as product durability, greenwashing and greenhouse gas emissions.[19] We put forward the assumption that traditional regulation may also be designed and applied to include certain reflexive law functionalities. However, we also recognise that the effectiveness of both traditional and reflexive approaches in steering companies towards sustainability have been questioned in light of the continued sustainability crises.

To address both these questions, we develop a new taxonomy for REL theory which centres on understanding the drivers of company reflexivity.[20] Reflexivity is defined as the process where a regulated actor self-critically reflects on their performance and then self-organises to make (non-)improvements to that performance based on the reflection.[21] Importantly, this goes beyond incremental learning and changes to technological practices and processes, and also concerns more transformative changes to functions, goals or values behind decision-making and behaviour.[22]

As regulated companies play a crucial role in addressing complex sustainability challenges, understanding not only *how* they participate, but *what* their object and depth of learning is while they participate, is a crucial steering tool at regulators' disposal. Better understanding of the regulatory drivers of reflexivity allows for regulations to better steer companies towards more transformative reflexive responses. As such, an enriched REL framework has great potential to understand fundamental issues of effectiveness in resolving complex sustainability challenges.

For this potential to be realised, the foundations of REL and reflexive law theories must be revisited to capture what it is precisely in law that has potential to drive corporate reflexivity. Through a critical review of REL literature, the taxonomy presented in this paper refines the

[18] See n. 6 above. These recent studies help demonstrate the increasing focus on legislation which utilise traditional regulatory instruments in governing complex sustainability challenges.
[19] European Parliament, 'Parliament Backs New Rules for Sustainable, Durable Products and No Greenwashing', *European Parliament*, 11 May 2023, available at: https://www.europarl.europa.eu/news/en/press-room/20230505IPR85011/parliament-backs-new-rules-for-sustainable-durable-products-and-no-greenwashing; European Parliament, 'Fit for 55: Deal on Stricter Rules for Member States' Greenhouse Gas Emissions', 8 Nov. 2022, available at: https://www.europarl.europa.eu/news/en/press-room/20221107IPR49205/fit-for-55-deal-on-stricter-rules-for-member-states-greenhouse-gas-emissions.
[20] Teubner's reflexive law theory makes the distinction between internal legal reflexivity by the legal system itself and external reflexivity by wider society (e.g., regulated actors). These two are linked (e.g., the disclosure-based approaches used to drive reflexivity externally among wider society also feeds into legal system reflexivity), however, we follow Eric Orts' REL theory and focus on the external element specific to regulated private entities. See Teubner, n. 10 above, p. 255; Orts, n. 11 above.
[21] J. Pickering, 'Ecological Reflexivity: Characterising an Elusive Virtue for Governance in the Anthropocene' (2018) 28(7) *Environmental Politics,* pp. 1145-66, at 1151-3; J.S. Dryzek, 'Institutions for the Anthropocene: Governance in a Changing Earth System' (2016) 46(4) *British Journal of Political Science*, pp. 937-56; Orts, n. 11 above, pp. 1254, 1290.
[22] Pickering, ibid.

definition of REL through centring on the legal drivers of regulatee reflexivity.[23] This refining is essential for the future of REL by improving accuracy in recognizing how any instrument drives reflexivity in regulated actors (understanding REL's potential), and empowering regulators to effectively integrate or avoid certain REL elements according to context (understanding the possibilities of REL). Lastly, we consider the framework a starting point for future empirical studies of REL to test whether regulatee reflexivity occurred in practice.

Whether a REL approach is always needed, or desirable, depends on various contextual factors.[24] Our proposed taxonomy acts as a starting point for enhancing the application of REL through providing a more nuanced definition of REL to enhance its scope and usability.[25] This would also enrich socio-legal and governance scholarship, where research has traditionally focused on the reflexive capacities of economic and state actors, or reflexivity as a process rather than the (legal) drivers of organizational reflexivity.[26]

In terms of the methodology underpinning this chapter, the framework was developed iteratively by reviewing literature on REL, building a conceptual framework, and then testing and adapting the framework through exploring the concepts in EU directives – a recognised form of transnational law.[27] The majority of examples we present come from three EU directives: the Waste Framework Directive (WFD),[28] the Single-use Plastics Directive

[23] By 'drivers' we refer to institutional mechanisms which build the appropriate context to allow for improvements (e.g., reflexivity) in another organization. We consider drivers as distinct from 'enablers' and 'motivations' which also contribute to organizational reflexivity. Enablers are the variables that condition, facilitate or hinder, the effects between the drivers and the improvement outcomes. For the distinction between drivers and enablers see M. Kaye & R. Anderson, 'Continuous Improvement: The Ten Essential Criteria' (1999) 16(5) *International Journal of Quality & Reliability Management*, pp. 485-509. We consider motivations to be the 'expectations or pursued goals' that an organization has, see J. González-Benito & Ó. González-Benito, 'A Study of the Motivations for the Environmental Transformation of Companies' (2005) 34(5) *Industrial Marketing Management*, pp. 462-75, at 466.
[24] F. Saurwein, 'Regulatory Choice for Alternative Modes of Regulation: How Context Matters' (2011) 33(3) *Law and Policy*, pp. 334-66.
[25] Chapters 5 and 6 of this thesis present two upcoming publications that further do this by testing this framework through an empirical methodology: V. Ross et al., 'Reflexive EU Environmental Law: Divergence in the French and German Transposition of the Single-Use Plastics Directive' [manuscript submitted] at Chapter 5; and V. Ross & J. van Leeuwen, 'Reducing the Tide of Single-Use Plastic Pollution: How the EU's Single-use Plastic Directive does (not) drive private company reflexivity' [manuscript submitted], at Chapter 6.
[26] Pickering, n. 21 above, G. Lynch-Wood & D. Williamson, 'The Receptive Capacity of Firms: Why Differences Matter' (2011) 23(3) *Journal of Environmental Law*, pp. 383-413; N. Kamil, S.R. Bush & A. Gupta, 'Does Climate Transparency Enhance the Reflexive Capacity of State Actors to Improve Mitigation Performance? The Case of Indonesia' (2021) 9 *Earth System Governanc*e, article 100111.
[27] M. Maduro, K. Tuori & S. Sankari (eds), *Transnational Law: Rethinking European Law and Legal Thinking* (Cambridge University Press 2014).
[28] Directive 2008/98/EC on Waste and repealing certain Directives [2008] OJ L 312/3.

(SUPD),[29] and the aforementioned EIA Directive,[30] as well as the national transpositions of these Directives by France.[31]

The structure of this chapter is as follows. Section 4.2 presents a critical review of distinctions in REL literature regarding regulatory instruments having either formal, substantive, or reflexive legal rationalities. Based on this, in Section 4.3 we present our refined taxonomy for REL comprising three overarching drivers of reflexivity – autonomy, accountability and adjustability – and 11 REL techniques which have a higher, medium, or lower degree of potential to drive company reflexivity. This includes examples of the REL techniques in aforementioned EU legislation. In Section 4.4, we use the framework to highlight which of the six core types of regulatory instruments mentioned in REL literature (self-regulation-based, disclosure-based, procedure-based, market-based, performance-based, and technology-based) are inherently REL by nature for having one or more of the REL techniques 'embedded' within them. Section 4.5 concludes the chapter by discussing the significance of this framework in enabling understanding of the *potential* of a regulatory instrument to drive company reflexivity by their nature, and the various *possibilities* for REL techniques to be considered at the design stage to encourage reflexive responses in different contexts.

4.2. Revisiting formal, substantive or reflexive rationalities

According to REL's precursor reflexive law, there are three evolutionary stages of law: formally and substantively rational law put forward by traditional legal philosophers, such as Weber,[32] and reflexively rational law set out by Teubner.[33] Following this, Orts used these distinction between these three rationalities to define what reflexive law is by highlighting various shortcomings in the former two that hinder regulatee reflexivity[34] and explore how certain regulatory instruments utilised by public institutions fit into these three categories.[35] Below we present these definitions of formally, substantively and reflexively rational regulatory instruments by Orts, highlighting inconsistencies in this thinking by showing how each regulatory instrument has shortcomings and strengths in driving reflexivity according to the very definitions provided in reflexive law literature. By examining these points, we begin to reveal the precise elements of REL within different regulatory instruments that build

[29] Directive (EU) 2019/904 on the Reduction of the Impact of Certain Plastic Products on the Environment [2019] OJ L 155/1.
[30] Directive 2014/52/EU, n. 8 above.
[31] France was chosen as an example due to the authors' familiarity with its legislation. Our framework focuses on the effect of law on companies' actions; however, EU directives do not have direct effect, meaning they do not apply directly to private companies but must be transposed into national law to give discretion to Member States on how they are to be achieved. As such, there were certain cases where a directive did not provide the detail required to identify our theoretical concepts. In these cases, we also reviewed transpositions by France. See Consolidated version of the Treaty on the Functioning of the European Union, 26 Oct. 2012, OJ L 326/47, Art. 284.
[32] M. Weber, *The Methodology of the Social Sciences* (Translated by E. Shils & H. A. Finch, Free Press, 1949), pp. 91-112.
[33] Teubner, n. 10 above.
[34] Orts, n. 11 above, pp. 1252-68. For the overall aim of REL as driving regulatee reflexivity see p. 1268.
[35] Ibid, pp. 1252–4.

potential for regulatee learning and self-organization to address complex sustainability challenges.

4.2.1. Formally rational law

According to Weber's distinctions, the first stage of law utilised a 'formal legal rationality' by 'establishing basic rules by which private parties orient their affairs and resolve disputes'.[36] This type of free-market law focuses less on detail and more on general rules that private actors (re)orientate themselves around, such as general rules governing the allocation of property rights or contractual relationships.

Orts highlights how the autonomy allotted to private actors through certain regulatory instruments is indicative of formally rational law.[37] For Orts, legal structures for regulatee autonomy are useful in the regulation of complex sustainability challenges by placing less reliance on the legal system's limited knowledge, power and resources, and focusing more on company self-learning and improvements.[38] This is based on earlier reflexive law thinking which recognised that legal system limitations, including its knowledge, ability to exert control and ability to gather and process information, are inevitable due to the 'semi-autonomous' nature of social subsystems.[39] As such, reflexive law strives for 'regulated autonomy', whereby the regulator gives a degree of autonomy to regulatees so it can tap into local knowledge and additional resources to address sustainability more effectively.[40] Examples of instruments highlighted by Orts that are indicative of Weber's formal law include pollution taxes or pollution trading schemes.[41] Such instruments push companies to compare the costs of pollution abatement against the costs of continuing with the status quo, but the specific method of abating pollution is left to the company in light of social, environmental or technical advancements.[42]

Nonetheless, the degree of autonomy given to private companies by formally rational law creates a strong risk strong risk of market capture. This is because the values and motivations of market actors as regulators is questionable (for example, prioritizing profit only), and means reflexivity for social goals (for example, sustainability) is not a given.[43] In particular, pollution trading systems may result in design flaws that induce market distortion, such as

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[36] Teubner, n. 10 above, pp. 282–3; Orts, n. 11 above, p. 1255.
[37] We emphasise that Orts does not claim that these instruments are examples of formal law but, rather, that they 'roughly correspond' to the formal evolutionary stage of the law for reasons we elaborate on in this section, see Orts n. 11 above, p. 1254.
[38] Ibid., Orts makes various references to these limitations, see pp. 1241, 1258–9 and 1262.
[39] Teubner's view on 'semi-autonomous subsystems' comes from Luhmann's theory of autopoiesis which perceives society as a network of interconnected subsystems, such as the legal system, politics, religion, and the market economy. Though connected, each subsystem retains a degree of autonomy by having their own logic, discourses, values, and internal processes of learning and communication. See N. Luhmann, *Social Systems* (Translated by Bednarz J, Jr with Baecker D, Stanford University Press 1996); Teubner n. 10 above, pp. 246 and 277.
[40] Teubner, n. 10 above, pp. 254-5; Orts, n. 11 above, p. 1260.
[41] Orts, n. 11 above, p. 1272.
[42] Ibid, p. 1245.
[43] L. Breunung & J. Nocke, 'Environmental Officers: A Viable Concept for Ecological Management?', in Teubner, Farmer & Murphy (eds), n. 2 above, pp. 267-95.

monopolization by powerful companies.[44] Most importantly however, these regulatory instruments still rely on the legal system's limited capacity to decide on any peripheral rules set (for example, type of self-regulation proposed or economic rules set). Orts himself highlights the difficulty in knowing the 'right' price for pollution or the number of tradable pollution permits,[45] which is variable, case-specific, and requires adjustability and knowledge from on-the-ground actors.

4.2.2. Substantively rational law

Substantively rational law is law characteristic of the regulatory state which dominated when Teubner first wrote about reflexive law in the late 1980s and, for the most part, still dominates today. Such laws are detailed, heavy-handed regulation focusing on the substance of the regulated issue. Examples in the environmental field are command-and-control rules prescribing either performance-based benchmarks/standards for polluters, commonly issued through permits to pollute, or uniform technology-based benchmarks for certain activities, for example, requiring catalyst converters on machinery or air pollution filters on smoke stacks.[46]

Despite recognition of their need in certain circumstances,[47] substantively rational laws are considered a particularly poor match for driving company reflexivity. Firstly, substantively rational laws require a high-level of intervention by the state and regulatory agencies in (re)formulating the substantive details in the law and monitoring of compliance. This is argued to be economically inefficient due to the aforementioned limitations of the legal system and minimal autonomy given to non-state actors to integrate their knowledge and build legitimacy in the regulatory approach.[48] Secondly, it is claimed that these laws are both too specific and too broad, as their detailed nature does not account for differences in local circumstances and, at the same time, increases the amount of space for regulated actors to find loopholes.[49] Thirdly, from the standpoint of evolutionary theory,[50] substantively rational instruments are deemed inadequate due to the continuous evolution of society and the natural

[44] C. Flachsland et al., 'How to Avoid History Repeating Itself: The Case for an EU Emissions Trading System (EU ETS) Price Floor Revisited' (2020) 20(1) *Climate Policy*, pp. 133-42; N. Boucquey, 'Hot Spots in the Bubble: Ecological Liability in Markets for Pollution Rights', in Teubner, Farmer & Murphy (eds), n. 2 above, pp. 49-74, at 58.

[45] Orts, n. 11 above, pp. 1268–71.

[46] Ibid, p. 1235.

[47] E.W. Orts, 'A Reflexive Model of Environmental Regulation' (1995) 5(4) *Business Ethics Quarterly,* pp. 779-94, at 783.

[48] Ibid., pp. 781–2; Orts, n. 11 above, p. 1241. Orts also highlights that the motivations of regulatory agencies to properly enforce instruments can vary and are susceptible to political forces, including politicians and private companies, see pp. 1237-8.

[49] Teubner, n. 10 above, p. 240; Orts, n. 11 above, p. 1241.

[50] This evolutionary perspective is an old tradition in the sociology of law. According to Niklas Luhmann, society and all its complexities are in continuous state of flux precisely because of the continuously evolving environment it sits within. See N. Luhmann, 'Evolution und Geschichte', in N. Luhmann (ed.), *Soziologische Aufklärung 2* (VS Verlag für Sozialwissenschaften, 1975), pp. 150-69; N. Luhmann, 'Evolution des Rechts', *Rechtstheorie*, vol 1 (1970); P. Nonet and P. Selznick, *Law and Society in Transition: Towards Responsive Law* (Harper and Row 1978); Teubner, n. 10 above, p. 241.

environment, driving the continuous change in knowledge, norms, values etc.[51] For Orts, substantive law instruments prescribe detailed performance- and technology-based standards which can only by updated via traditional legislative channels; channels that are commonly critiqued as slow and rigid.[52] Such standards are not prescribed in formally rational law instruments, which grants regulatees flexibility in choosing the best option for any given place or space in time.

Performance- and technology-based instruments are considered to have most potential to stunt company reflexivity and innovation. However, hints of more appropriate types of substantively rational law that do affect company reflexivity for sustainability have been highlighted by Hirsch. Firstly, through the best available technique (BAT) standard, whereby the regulator sets a performance-benchmark and may propose the BAT but allows companies to choose how they meet the benchmark.[53] Here we see an example of some autonomy and adjustability being prescribed to the regulated actor in a performance-based instrument. Secondly, in the case of hazardous waste disposal, exceptionally high standards on end-of-pipe compliance technologies motivated upstream innovation whereby companies took themselves 'outside the scope of the regulatory scheme'.[54] Thirdly, the threat of regulation has been known to create 'anticipatory compliance' and stimulate self-organization in companies.[55] Hirsch explains that this has been particularly effective among companies upgrading or building new facilities as they over-comply to avoid expensive retrofits in the future.[56]

4.2.3. Reflexively rational law

Reflexively rational law is less detailed and direct than substantively rational law, but it goes beyond the general rules of formally rational law. Regulatory instruments in this category aim to build 'democratic structures and procedures in companies in order to strengthen business' learning capacity and reflexive processes'.[57]

One way this is done is by focusing regulation on procedures for self-assessment rather than the substance of the regulated issue. Such procedures force companies to assess their own performance against certain goals (such as sustainability) but give them autonomy to decide the improvements to match those goals themselves.[58] A recent example is the EIA Directive, which is command-and-control enforced and requires companies to undertake procedures of

[51] P. Capps & H. P. Olsen, 'Legal Autonomy and Reflexive Rationality in Complex Societies' (2002) 11(4) *Social & Legal Studies,* pp. 547-68, at 559.
[52] Orts, n. 47 above, pp. 781–2; Orts, n. 11 above, pp. 1252–68.
[53] D.D. Hirsch, 'Green Business and the Importance of Reflexive Law: What Michael Porter Didn't Say' (2010) 62(4) *Administrative Law Review,* pp. 1063-126, at 1094.
[54] Ibid., p. 1096.
[55] Ibid., pp. 1083-4
[56] Ibid.
[57] Aalders & Wilthagen, n. 12 above, p. 432.
[58] Orts, n. 11 above, pp. 1254 and 1290.

self-assessment and reporting of environmental performance against a benchmark.[59] Alike to formally rational law, companies decide on the improvements rather than relying on the state to set these ex ante. Moreover, the performance benchmarks are also not prescribed in the legislation but are determined ex post, case-by-case. For instance, Article 4(4) of the EIA Directive states: 'the developer shall provide information on the characteristics of the project and its *likely significant effects* on the environment'.[60] This outsourcing avoids reliance on aforementioned (limited) legal system knowledge, and is an avenue for more democratic formulation of regulation because companies and third parties can be involved in prescribing these benchmarks and other substantive details of the regulatory instrument. Moreover, procedure-based instruments do not rely on traditional, formal legal processes to be updated, so they can be adjusted more easily In line with the evolving needs of society and the environment.[61]

The aforementioned 'democratic structures' are not limited to companies, but aim to enlist wider society into the act of regulation to affect company reflexivity. Here 'wider society' refers to citizens, civil society, or other market actors who might put pressure on regulated companies. According to earlier reflexive law thinking, this rationality to involve other stakeholders, enhances the legitimacy of the legal approach and stimulates reflexivity by forcing regulated companies to incorporate more diverse values into their decision making, such as social or environmental values.[62] Orts highlights how obligations for regulated actors to publicly disclose information is a means to expose company actions and decision-making to wider society to reduce state administration and make companies become 'environmentally responsible'.[63] For Orts, the EU's Eco-Management and Audit Scheme (EMAS),[64] is an example of an instrument with 'disclosure at its heart'[65] through its obligations that push companies to 'collect and disseminate information about their environmental performance',[66] as well as the requirements for such information to be audited by a third party.[67]

[59] Directive 2014/52/EU, n. 8 above.
[60] Ibid. Emphasis added to show the use of a vague benchmark which is not prescribed and, therefore, adjusts externally to the formal legal system.
[61] Luhmann (1975), n. 50 above.
[62] This is based on Habermas' theories on communication and democratic legitimacy which argues that the involvement of wider society (i.e., non-public, non-private actors) builds legitimacy by resolving value disparities between subsystems which are a result of their autonomous nature. See J. Habermas, *Theorie Des Kommunikativen Handelns* (Suhrkamp 1981); J. Habermas, 'Historical Materialism and the Development of Normative Structure', *Communication and the Evolution of Society* (Beacon 1979); Orts, n. 11 above, pp. 1254 & 1258; and L. Farmer & G. Teubner, 'Ecological Self-Organization', in Teubner, Farmer & Murphy (eds), n. 2 above, pp. 3-13, at 4.
[63] Orts, n. 11 above, p. 1312.
[64] Regulation (EC) No 1221/2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC [2009] OJ L 342.
[65] Orts, n. 11 above, p. 1306.
[66] Hirsch, n. 53 above, p. 1112.
[67] Orts, n. 47 above, p. 787. Additional examples of third-party verification as a reflexive driver can be seen in the ISO 14001 standards for sustainability, see Gaines, n. 16 above, p. 11.

However, disclosure-based instruments alone do not guarantee sustainability improvements. Their effectiveness on driving reflexivity depends on the extent to which the receivers of information are environmentally conscious[68] and capable of reacting upon the information, such as by not investing in or purchasing from non-sustainable companies. Power also asserts that, though disclosure is crucial to any reflexive legal approach, they 'always run the risk of being ineffective (decoupled), over-imperialistic (colonizing) or captured (colonised) in particular organizational settings'.[69]

REL departs from the assumption that regulation with a reflexive rationality builds greater potential for regulatee reflexivity to address sustainability than formally and substantively rational regulation. However, all three rationalities have potential for shortcomings and strengths in this regard. Therefore, to revisit this defining assumption in REL and improve REL assessments of any type of regulatory instrument, including instruments characteristic of formal or substantively rational law, the next section presents a refined taxonomy framework based on the theoretical underpinnings of reflexive law theory.

4.3. Framework of reflexive drivers and REL techniques

The framework for REL presented in this section assumes that any regulatory instrument can build potential or create possibilities for regulatee reflexivity and to varying degrees. Such reflexivity is desirable to address complex sustainability challenges. This section presents a refined taxonomy framework to define REL. Such a framework is an important analytical tool for regulators and academics to understand not only the potential of legislation to drive reflexivity, but also how to tweak specific regulatory instruments within legislation to drive more reflexive responses and better address sustainability issues.

The framework is comprised of three overarching reflexive drivers – autonomy, accountability, and adjustability – and under these, eleven REL techniques (three to five techniques per driver).[70] Each driver connects to broader theoretical ideas underpinning REL theory which were introduced in the previous section. The REL techniques can be tangibly identified and used within regulatory instruments in legislation, and are derived from the elements of formally, substantively, and reflexively rational regulation described above in Section 4.2. Below we explain a) which techniques sit under each driver; b) how each technique has either a lower, medium, or higher degree of potential to drive reflexivity in regulated companies for sustainability; and c) how these techniques can be tangibly identified in legislation. This is not an exhaustive list of REL techniques, but rather act a starting point

[68] Orts, ibid.
[69] M. Power, 'Constructing the Responsible Organisation: Accounting and Environmental Representation', in Teubner, Farmer & Murphy (eds), n. 2 above, pp. 369-92, at 375–6.
[70] Conceptually, we call the drivers 'reflexive' and the techniques 'REL' as the drivers are a broader means for one social institution to drive reflexivity in another therefore, they are usable beyond a purely legal discipline. Alternatively, the techniques specifically focus on elements public regulation which build potential for regulatee reflexivity.

for the improved identification and assessment of REL's potential to drive regulatee reflexivity in any legislative act.

4.3.1. Autonomy

As explained in Section 4.2, Orts highlights how formal law gives autonomy to the market, and that certain regulatory instruments also do this whereby regulated actors are given some freedom to self-organise and learn.[71] For Teubner, the external function of reflexive law is to create structures that support social autonomy, or 'regulated autonomy'.[72] Thus, it is not full autonomy that is expected or targeted but a degree of autonomy. Through this driver, social learning is stimulated to enhance the legitimacy and effectiveness of social regulation by allowing the incorporation of local actor knowledge and resources into the regulatory approach.[73]

Based on a review of the reflexive law literature, Table 4.1 below highlights three techniques for the driver autonomy: explicit options, autonomous choice, and participation in (re)formulation. These are elaborated below with legislative examples from the EU's WFD[74] and France's Environmental Code.[75]

[71] Orts, n. 11 above, pp. 1265–6.
[72] Teubner, n. 10 above, pp. 254-5.
[73] G. Teubner, 'Social Order from Legislative Noise? Autopoietic Closure as a Problem for Legal Regulation' in G. Teubner and A. Febbrajo (eds), *State, Law, and Economy as Autopoietc Systems: Regulation and Autonomy in a New Perspective* (Giuffrè 1992), pp. 618–22.
[74] Directive 2008/98/EC, n. 28 above.
[75] Code de l'environnement [Environmental Code] Journal Officiel de la République Française [J.O.] [Official Gazette of France], version 2.12.2022

Table 4.1: Potential of REL techniques for driving private company reflexivity for sustainability

Potential to drive reflexivity for sustainability	Reflexive environmental law (REL) techniques for each reflexive driver			
	AUTONOMY	ACCOUNTABILITY		ADJUSTABILITY
Higher ⇧	**Participation in (re)formulation** of substantive details in the law	**Third-party participation in (re)formulation** of substantive details in the law		**External adjustments** to substantive details in the law
Medium ⇨	**Autonomous choice** of technical improvements	**Third-party verification** on decision-making or performance	**Public disclosure** on decision-making or performance	**Threat of regulation** on regulated issue
Lower ⇩	**Explicit options** on substantive details in the law	**Awareness raising** on regulated issue		**Scheduled adjustments** to substantive details in the law
		Self-monitoring and reporting on decision-making or performance		

* Based on the literature review, higher-, medium- and lower-levels are designated according to the potential of the REL technique to drive reflexivity in regulated companies regarding their sustainability performance. More potential makes for a higher level.

The autonomy technique with lower potential to drive company reflexivity for sustainability is explicit options, which builds flexibility into the regulatory approach by giving regulated actors a choice between two or more options.[76] An example is Article L541-15-10 (III) of France's Environmental Code, which allows for regulated actors to make a choice between offering reusable or recyclable containers when serving food based on the actor's business model and needs. The autonomy allotted to companies to choose between two options creates potential for the law's outcome to be more variable and case-specific.[77] However, as the options are still formulated by the regulator, companies' responses are locked into the prescribed options, which is why it is lower on the spectrum.[78]

Next, the medium-level technique – autonomous choice – is identified by vague terminology on the specific technical requirements required by regulatees prescribed in the law.[79] This gives freedom to companies to choose the sustainability improvements that best suit their context, or even to come up with new innovations in terms of procedures or technologies.[80] As well as identified through vague terminology, this technique can be deduced by the

[76] A. Koukiadaki, 'Reflexive law and the reformulation of EC-level employee consultation norms in the British systems of labour law and industrial relations' (2009) 5(4) *International Journal of Law in Context*, pp. 393-416, at 391.
[77] Choice is seen as a reflexive feature of some market-based instruments, see Orts, n. 11 above, p. 1269.
[78] G. Teubner, *Law as an Autopoietic System* (G. Teubner ed, Oxford/Cambridge, Blackwell Publishers 1993), pp. 93–5.
[79] L. B. Edelman, 'Legal Ambiguity and Symbolic Structures: Organizational Mediation of Civil Rights Law' (1992) 97(6) *American Journal of Sociology,* pp. 1531-76.
[80] Orts, n. 11 above, p. 1267.

absence of specific technical benchmarks, such as through market-based instruments.[81] An example of this can be seen in Article L.541-10-12 of France's Environmental Code which requires 'Five-year waste-prevention and improvement plan to be submitted by producers individually or collectively' but, notably, leaves the choice of sustainability improvements to the regulated company.

Lastly, the autonomy technique with the highest potential to drive company reflexivity for sustainability is participation in the (re)formulation of substantive details in the law through the involvement of companies in decision-making on such regulatory elements as benchmarks or implementation procedures. This participation in (re)formulation technique is embedded in self-, or private regulation, as such regulation is developed by private actors themselves. The technique has a higher potential to promote reflexivity because it fosters collective self-organization of companies to decide the best means to achieve broader legislative aims.[82] According to reflexive law, this participation fosters reflexivity through knowledge exchange or even companies out competing each other.[83]

An example of such participation can be identified in the EU's WFD, where Article 8a.4I on extended producer responsibility (EPR) states that '…costs shall be established in a transparent way between the actors concerned'. This example involves regulated companies in decision-making on the economic benchmarks in the instrument. Though important, this higher degree of autonomy runs the risk of market capture and a lack of reflexivity, which could stagnate sustainability improvements.[84] To resolve this, participation in (re)formulation can be paired with an accountability technique (more on this in the accountability section below).

4.3.2. Accountability

The second driver – accountability – also addresses the limitations of the legal system by exposing the decision-making and activities of regulated actors to wider society, including citizens and civil society. For Teubner, the purpose of opening-up decision-making is not increasing participation and neutralizing power structures, but driving 'the internal reflexion of social identity'.[85] In other words, the increased participation of broader societal actors in legal processes serves to enhance regulatee reflexivity.

Accountability techniques are elements in legislation that enlist civil society or the public to act as intermediaries between the market and the state.[86] Such techniques build structures for

[81] Ibid, p. 1271.
[82] Teubner, n. 10 above, pp. 251 and 272–9.
[83] Ibid, p. 251; S. Deakin, 'Two Types of Regulatory Competition: Competitive Federalism Versus Reflexive Harmonisation. A Law and Economics Perspective on Centros' (1999) 2 *Cambridge Yearbook of European Legal Studies,* pp. 231-60, at 245.
[84] J. P. Voß, B. Bornemann, 'The Politics of Reflexive Governance: Challenges for Designing Adaptive Management and Transition Management' (2011) 16(2) *Ecology and Society*, article 9, at p. 12.
[85] Teubner, n. 10 above, p. 273.
[86] Ibid, p. 273-5; Orts, n. 11 above, p. 1254.

'discursive decision processes, and consensus orientated procedures of negotiation and decision' between regulated actors and stakeholders.[87] According to REL thinking, this impacts company reflexivity for sustainability by pressuring companies to enhance the accuracy of disclosed information and through the incorporation of more diverse values into company decision making.[88] Within the REL literature, common characteristics that involve stakeholders into the act of regulation to drive company reflexivity for sustainability are presented as five accountability techniques in Table 4.1 above. Such techniques build accountability on a) company compliance with legislative requirements, b) the individual actions of companies, or c) collective participation in the (re)formulation of substantive details by companies. These techniques for accountability are exemplified below with examples from the EU's WFD.[89]

Lower-level techniques for accountability are awareness raising and self-monitoring and reporting. Awareness raising is defined as requirements in legislation for market or state actors to raise awareness of legislated issue among citizens/civil society, and an example is found in Article 9(m) WFD, requiring Member States to 'develop and support information campaigns to raise awareness about waste prevention and littering'. This technique affects reflexivity through building anticipation in companies for long-term changes in public concern for a sustainability issue, incentivizing regulated companies to reflect on the long-term viability of their existing practices. Moreover, awareness raising also makes public disclosure (medium-level accountability technique) more effective by increasing the environmental consciousness of the receivers of information.[90] However, as companies are not guaranteed to reflect or take action in light of self-monitoring activities, this technique has the least potential for reflexivity.

The next lower-level technique is self-monitoring and reporting, defined as self-auditing by companies and reporting to the state. For instance, Article 8aI WFD on EPR requires that 'a reporting system is in place to gather data on the products placed on the market…by the producers'. This technique is a precursor to medium- and higher-level techniques for accountability as there can be no public disclosure of information without self-monitoring. However, used alone this technique has limited reflexive potential as it may simply become a tick-box exercise. This means there is less pressure on companies to reflexively improve reported information or their sustainability strategy.

Next are the two medium-level techniques: public disclosure and third-party verification of information. According to the literature, these are key techniques that reflexively rational laws (namely, procedure- and disclosure-based laws) use to build accountability while reducing state monitoring.[91] These two techniques are placed next to each other (rather than

[87] Habermas (1981), n. 62 above, p.554.
[88] Farmer & Teubner, n. 63 above, p. 4.
[89] Directive 2008/98/EC, n. 28 above.
[90] Orts, n. 47 above, p. 785.
[91] Hirsch, n. 53 above, pp. 1121–2; Orts, n. 11 above, pp. 1322–3.

one on top of another) in Table 4.1, as they both have benefits and negatives with regards to driving reflexivity and their potential depends on their suitability to the context of an issue. An example of public disclosure is found in Article 8a.3I WFD on EPR whereby information on 'ownership and membership…[and] the financial contributions paid' must be made publicly available.

According to REL, public disclosure has potential to open companies up to public scrutiny, and therefore increase pressure to be reflexive. [92] However, if a company or industry is not in the public eye they are less susceptible to this scrutiny, reducing this technique's potential to drive reflexivity.[93] Meanwhile, third-party verification can be found in Article 8a.3(d) WFD, which requires 'regular independent audits' to appraise the financial management of the EPR system. This technique guarantees that reported information is checked and feedback is provided to the company, which in turn lightens the regulators compliance burden,[94] and is useful in scenarios where companies are less willing to disclose information publicly. However, requirements for accredited verifiers place expensive burdens on small- and medium-sized entities which may hinder reflexivity.[95] Moreover, verifiers work for both the market and state, making them susceptible to bias or capture, which could affect company reflexivity.

Lastly, third-party participation on substantive details (such as benchmarks or implementation) is considered a higher technique because it is crucial to building accountability on any decision-making that companies are involved in. It relates to the higher-level autonomy technique – participation in (re)formulation. In essence, if companies are involved in decision-making on regulatory details, so too should other non-state actors. Such third-party participation might include involving citizens or civil society actors in decision-making processes.[96] This participation is key because it drives companies to consider the third parties' values in decision-making, preventing market capture and boosting mutual learning and positive competition to build potential for reflexivity.[97] A tangible example in legislation is Article 8a.4I WFD which requires costs for the new EPR system to be established 'between the actors concerned' including public, private and civil entities.

[92] Orts, n. 11 above, pp. 1241–46; R. B. Stewart, 'A New Generation of Environmental Regulation The National Symposium on Second Generation Environmental Policy and the Law' (2001) 29(1) *Capital University Law Review,* pp. 21-182, at 132.
[93] Saurwein, n. 24 above, pp. 342–3.
[94] Orts, n. 11 above, pp. 1306–9.
[95] Ibid, p. 1300.
[96] J. Steffek & P. Nanz, 'Emergent Patterns of Civil Society Participation in Global and European Governance' in J. Steffek, C. Kissling & P. Nanz (eds), *Civil Society Participation in European and Global Governance: A Cure for the Democratic Deficit?* (Palgrave Macmillan UK 2008); OECD, 'Innovative Citizen Participation' (n.d.) <https://www.oecd.org/governance/innovative-citizen-participation/> accessed 17 August 2023.
[97] Orts, n. 11 above, pp. 1241–46; Stewart, n. 92 above, p. 132.

4.3.3. Adjustability

The last driver concerns how legislative flexibility affects companies' anticipation for change as a driver of reflexivity. REL takes an evolutionary perspective[98] and adjustability in the law seeks to stimulate reflexive self-organization by regulated entities by building anticipation in them for future regulatory adjustments. This is intended to deter companies to continue with the status quo and to encourage reflexivity and self-organization to improve their performance.[99]

Specific techniques for adjustability aim to address the rigidity of the law which can lock-in companies or can lead to companies seeking out legislative loopholes. Table 4.1 above highlights three techniques for the driver adjustability. These are explained below, drawing from examples in the EU's SUPD[100] and EIA Directive.[101]

The lower-level technique – scheduled adjustments – is any mention of planned updates to substantive details, such as benchmarks or implementation requirements, in legislation. This can be identified in Article 6.5 SUPD, which requires the percentage of recycled polyethylene terephthalate (PET) in certain beverage bottles to be at least 25% by 2025, adjusting to 30% by 2030. Though still building anticipation for change in regulated companies, this is considered to have the least potential to drive reflexivity as they still rely on the legal system to formulate the substantive details, including the timing of such adjustments.

The medium-level technique for adjustability – threat of regulation – aims to drive self-organization by regulated actors through the threat of future state intervention. This can be identified in legislation as any suggestion or insinuation that more or stronger regulation can be expected in the future if the policy objectives are not accomplished. For instance, Article 15 SUPD states that the evaluation of the Directive 'shall be accompanied by a legislative proposal' and if appropriate, shall 'set binding quantitative consumption reduction targets…' if targets are not met. This technique drives reflexivity by building anticipation in companies for additional, future legislation which may lead to over-compliance to avoid expensive retrofits further down the line.[102]

Lastly, the higher-level adjustability technique – external adjustments – is where substantive details of a regulatory instrument sit outside of traditional, formal legislative procedures and thus can be updated more easily than the legislation. This is considered to have the greatest potential for reflexivity as regulated actors are continuously anticipating adjustments due to the open-ended timeline of the adjustment procedure. Such adjustability is an embedded feature of self-regulatory initiatives which are not formally controlled/updated by the public

[98] See n. 50 above.
[99] Hirsch, n. 53 above, pp. 1083–4.
[100] Directive (EU) 2019/904, n. 29 above.
[101] Directive 2014/52/EU, n. 8 above.
[102] Hirsch, n. 53 above, p. 1096.

law system.[103] An indicator of this technique is an instrument's use of vague terminology for performance benchmarks (such as 'significant' or 'minimum adequate amount'), because the regulator did not set a precise benchmark. This is the case with the previously mentioned Article 4.4 of the EIA Directive, which requires developers to identify the 'likely significant effects' of certain development projects. In this example, the precise benchmarks are (re)formulated by public and private entities and presented in supporting documents for each environmental topic (for instance, air, water noise). Another example is where a legislative instrument requires companies to create their own self-regulating policy objectives and continuously update them, such as yearly improvement plans.[104]

The framework presented In this section Is a rethink of the very foundations of REL theory. Instead of categorizing certain regulatory instruments as reflexive and others not, the framework of reflexive drivers and REL techniques provides a new way to think about what REL is and how it stimulates reflexivity in regulated actors. With this broader theoretical definition, REL can be applied to any legislative instrument which enhances our understanding of the potential and possibility of legislation to address complex sustainability challenges. This point is elaborated in Section 4.5.

In the next section we explain which of the eleven techniques (and corresponding drivers) are embedded in six types of regulatory instruments commonly used in legislation.

4.4. Reflexive nature of six regulatory instruments

Previously, REL scholarship argued that certain forms of law (private regulation, law encouraging disclosure, and procedures for self-evaluation) inherently embody a reflexive rationality. These were assumed to have greater potential to drive reflexivity in regulated companies than more common types of regulatory instruments (market-based, performance-based, technology-based instruments), which are more characteristic of formally or substantively rational legal approaches. However, this distinction between more/less reflexively rational legislative instruments had not advanced since REL was first introduced the 1990's, thereby limiting the theories' potential application to understand the governance of sustainability challenges, which often make use of so-called less reflexive regulatory instruments. In this section we move past this foundational definition of REL to enable a more nuanced explanation of why six types of regulatory instruments used in legislation can be considered REL and why.[105] We define the six instruments through a description of their

[103] We acknowledge that self-regulation is not fully autonomous of the legal system as these initiatives are often influenced by policy or social trends. However, this technique focuses on whether the *update* of a law needs to go through the formal legislative channels or not.
[104] Orts, n. 11 above, p. 1299.
[105] We recognise there is greater diversity in regulatory instruments than the six instruments we focus on (e.g., see n. 7 above), however we followed definitions of instruments from Orts (Orts, n. 11 above) and built six regulatory categories based on the relationship of these six instrument with the drivers and techniques in our framework. These relationships will be explained in this section.

core function and examples and explain the nature of each instrument according to their relationship with the 11 REL techniques presented in Section 4.3.

The first Instrument category, self-regulation-based instruments, consists of articles in public legislation that establish a voluntary, private regulatory initiative, such as industry standards.[106] Functionally, they let companies 'determine and implement their own internal rules and procedures to fulfil the regulator's policy objectives'.[107] Thus, such instruments do not directly regulate the economic activities of companies, but rather push for these companies to work with other private actors and regulate the issue themselves.

As shown in Table 4.2 below, no accountability techniques are embedded in self-regulation-based instruments. However, this instrument has three embedded techniques relating to autonomy and adjustability.

Table 4.2: Embedded REL techniques within the different regulatory instruments

Regulatory instrument in legislation	Autonomy			Accountability					Adjustability		
	Higher	Medium	Lower	Higher	Medium		Lower		Higher	Medium	Lower
	Participation	Autonomous choice	Explicit options	Third-party participation	Public disclosure	Third-party verification	Aware-ness raising	Self-monitoring and reporting	External adjustments	Threat of regulation	Scheduled adjustments
Self-regulation-based	X	X							X		
Disclosure-based		X			X						
Procedure-based		X							X		
Market-based		X									
Performance-based		X									
Technology-based											

Key: 'X' denotes where a REL technique is embedded within an instrument.

Regarding autonomy, higher-level and medium-level techniques are embedded. This is because, if companies decide to establish a private regulatory initiative, they control the substantive details of the initiative (participation in (re)formulation) and individual sustainability improvements (autonomous choice). Thus, self-regulation-based instruments are considered to have a high-degree of autonomy by nature. Regarding adjustability, the

[106] Orts, n. 11 above, pp. 1287–8.
[107] Fairman & Yapp, n. 9 above, p. 493.

higher-level adjustability technique (external adjustments) is also embedded in this category of instruments because any updates to the self-regulatory initiative are autonomous and need not go through formal legislative procedures.

The second Instrument category, disclosure-based instruments, are defined as requirements for voluntary or mandatory public disclosure of information on internal company processes or practices. Examples include emission reporting, eco-labelling, or mandatory labelling of environmentally harmful products.[108] Functionally, these instruments use transparency to encourage more environmentally responsible behaviour by companies.[109] Thus, they do not directly regulate economic activities, but instead focus on the disclosure of information to pressure companies to improve their performance.

Table 4.2 shows that, by their very nature, these instruments have links with the autonomy and accountability drivers. For autonomy, the medium-level technique (autonomous choice) is embedded due to the informational nature of this instrument. Rather than prescribing specific sustainability improvements, the choice is left open to regulated companies. For accountability, public disclosure (medium-level technique) is embedded, making this this only instrument with embedded accountability.

The third instrument category, procedure-based instruments, consists of voluntary or mandatory obligations for regulated companies to self-evaluate their performance against vague performance benchmarks with further detail sitting outside the law. Functionally, such instruments work by (re)structuring companies' internal decision-making procedures 'to promote continuous improvements in the environmental performance of industrial activities.'[110] Thus, procedure-based instruments directly regulate companies' procedural activities as opposed to their economic activities. An example of a voluntary procedure-based instrument is the EU's EMAS,[111] while a mandatory, command-and-control enforced example can be found in the aforementioned EIA obligations whereby development projects over a certain size must self-assess their development to ensure they do not exceed 'significant' levels of environmental effects. This is the defining feature that sets this instrument apart from the performance-based instrument (discussed below). Namely, that the performance benchmarks, or standards, which companies must self-evaluate their performance against are either vague (for example, 'significant' impacts in the EIA Directive), or not prescribed. This means the precise benchmarks sit outside the formal legislative system.

[108] Our categorization of eco-labelling as a disclosure-based instrument differs from Orts who categorised them as market-based. We consider that all disclosure-based instruments affect the market (to different degrees) but notably they do this through public disclosure, while market-based instruments do not have transparency embedded in their nature. See Orts, n. 11 above, pp. 1246–51.
[109] Ibid, p. 1246; Stewart, n. 92 above, p. 31.
[110] Teubner, n. 10 above, p. 257; Orts, n. 11 above, p. 1290.
[111] The EMAS is a voluntary scheme but has potential to be mandatory, see Orts, n. 11 above, pp. 1292 & 1312.

Table 4.2 highlights the nature of procedure-based instruments with regards to embedded REL techniques for autonomy and adjustability. Firstly, medium-level autonomy (autonomous choice) is embedded because the choice of sustainability improvements is left to the regulated company. Secondly, higher-level adjustability (external adjustments) because the substantive details on the technological/performance assessment benchmarks sit outside of the formal legal update system. In his study discussing the EMAS, Orts highlighted that an important element in the instrument is accountability through public disclosure (higher-level) and third-party verification (medium level). These are also features for the EIA Directive. However, rather than these being embedded in the very nature of procedure-based instruments, we consider these to be nurtured, or designed-in, and optional. Therefore, they are not included in Table 4.2.

The fourth instrument category, market-based instruments, consists of voluntary or mandatory financial rules that establish or transform costs relating to pollution. In terms of their core function, these conceive negative environmental impacts as economic 'externalities', or external costs, and aim to artificially structure the market to make polluting companies account for these costs.[112] According to REL, the three main market-based instruments applied in legislation are: pollution charges and taxes, financial incentives to encourage pollution abatement, (for example, tax breaks), and pollution permit and trading schemes (for example, the EU's Emissions Trading System (EU ETS)).[113]

As shown in Table 4.2, market-based instruments only have the medium-level autonomy technique (autonomous choice) embedded in their nature, as specific sustainability improvements are not prescribed. Instead, these instruments work by making companies reflect on the costs of pollution abatement against the costs of continuing with the status quo and paying for it either as taxes, lack of any incentives or buying pollution permits.[114]

The fifth instrument category is performance-based instruments. These are mandatory rules prescribing a performance standard, or benchmark, for polluters, such as maximum emission levels that may be issued through a permit to pollute.[115] These instrument do not tell companies precisely how to achieve the performance benchmark but may be supplemented with an obligation to adopt BAT.[116] In a functional sense, performance-based instruments are 'purposive, goal-orientated' regulation, meaning the legislator prescribes a benchmark and regulates company activities through the threat of a penalty.[117] Alike to all other instruments described above, performance-based instruments give autonomy to the regulated companies to decide on the sustainability improvements themselves. In other words, 'a race to the top is

[112] Ibid, p. 1242.
[113] Ibid, pp. 1243–4. Regarding the EU ETS we refer to Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC [2003] OJ L 275.
[114] Orts, n. 11 above, p.1271.
[115] Ibid, p. 1235.
[116] Hirsch, n. 53 above, p. 1094.
[117] For example, fines or imprisonment: Orts, n. 10 above, p. 240.

implicitly encouraged'.[118] Therefore, autonomous choice (medium-level autonomy) is embedded in this type of instrument.

Lastly, technology-based instruments are command-and-control instruments which directly affect companies' economic activities by prescribing mandatory rules for companies to meet specific technological benchmarks. A classic example is requiring catalyst converters or air pollution filters on smokestacks.[119] Similar to performance-based instruments, regulatees must implement the technology to avoid a penalty.[120] This is the only instrument that does not have any embedded REL techniques, as shown in Table 4.2 above.

In summary, the taxonomy presented in this section transcends traditional reflexive law distinctions of instrument classification, allowing for a more nuanced understanding of when specific legislative instruments can be considered REL and why. In the following section, we will delve into how this new taxonomy enhances our understanding of the potential and possibilities of each instrument with regards to stimulating regulatee reflexivity.

4.5. The potential and possibilities for reflexivity through legislation

This thesis chapter presents a refined taxonomy of reflexive drivers and REL techniques. The framework moves beyond previous REL approaches outlined in Section 4.2, which used a binary categorization of regulatory instruments as being REL or not. Our new framework for defining REL is based on a broader theoretical underpinning to reflexive law. As shown in Section 4.4, this framework provides a clearer taxonomy for understanding how regulatory instruments used in legislation can be considered REL based on whether any REL techniques are embedded within them. We argue that this is an improved basis for categorizing some regulatory instruments as REL, and others not, and understanding their effectiveness in driving reflexivity.

This section outlines the practical and theoretical value of refining REL through the framework of autonomy, accountability, and adjustability, in two respects. Firstly, understanding the *potential* of each instrument to drive company reflexivity with regards to their nature and how this differs from previous categorizations of instruments. Secondly, understanding the *possibilities* of each instrument to drive reflexivity, depending on which drivers can or should be nurtured into their design. Based on these insights, we invite scholars to test the taxonomy in different empirical contexts to explore the transformative potential of REL.[121]

[118] S. Deakin, 'Reflexive Governance and European Company Law' (2009) 15(2) *European Law Journal,* pp. 224-45, at 229.
[119] Orts, n. 11 above, p. 1235.
[120] Teubner, n. 10 above, p. 240.
[121] Such studies are already underway, see n. 25 above.

4.5.1. The potential for reflexivity by nature

Our framework improves understanding of when specific public law instruments qualify as REL, and when they do not. Firstly, we have shown why those instruments traditionally seen as REL (self-regulation-, disclosure-and procedure-based) are, in fact, REL based on the techniques that characterize these instruments. For instance, self-regulation based and procedure-based instruments both have embedded techniques for autonomy and adjustability, while disclosure-based instruments have embedded techniques for autonomy and accountability. This is a more schematic justification for why they are considered REL than previously understood. Secondly, the framework provides explanation as to why an instrument is, or is not, REL. Specifically, technology-based instruments are the only instrument without embedded techniques. Thus, this matches REL literature that such instruments are not REL by nature.[122] Lastly, and different to the REL scholarship, two instruments not traditionally seen as REL (market-based and performance-based), both have a REL technique embedded in their nature (autonomous choice) which builds potential for reflexivity through autonomy. Therefore, our framework has shown how these instruments not traditionally seen of as reflexive law, contain elements that have potential to drive reflexivity based on REL theory.

In addition to understanding whether an instrument incorporates REL techniques, the framework allows one to judge the nature of an instrument in even more nuanced ways. For instance, all instruments other than technology-based, have just a medium-level of autonomy embedded within them, while self-regulation-based instruments also have the higher-level of autonomy. Therefore, it is now possible to explain through comparison, how legislative requirements for self-regulation to be established give the most autonomy to regulated actors. Regarding the other drivers, only one instrument (disclosure-based instruments) has accountability embedded in its nature, while for adjustability, both self-regulation-based and procedure-based instruments have the higher-level adjustability technique embedded. This detailed assessment is important because it enables an understanding of the baseline characteristics of these regulatory instruments, to know where their strengths are in terms of suitability to govern a particular issue, and what other techniques might be needed to fill any imbalances that these embedded techniques create.

4.5.2. The possibilities for reflexivity by nurture

The framework enables an understanding of the possibilities of each instrument to nurture, or design REL into regulation to foster reflexivity. This is done through identifying which reflexive drivers should be targeted to balance any embedded techniques and the varying levels of potential of each REL technique in driving reflexivity. As explained in Section 4.3, each embedded technique links to an overarching driver (autonomy, accountability, adjustability). This enables a higher-level view to understand which drivers are fostered by

[122] Teubner, n. 11 above, pp. 1235–40.

an instrument and, according to the context of the sustainability challenge being governed, whether gaps in other drivers need filling to increase the potential of the law to drive company reflexivity. For instance, all techniques except technology-based have some degree of autonomy, but most fell short in terms of accountability or adjustability. Therefore, this indicates certain imbalances or gaps that may warrant attention to address challenges presented by autonomy.[123] Likewise, technology-based instruments have no embedded drivers, so they are the least reflexive and at risk of failure to incorporate wider knowledge and resources into the regulatory approach, and account for societal evolution.

We consider that stimulating reflexivity through law rests on an appropriate balance between the three reflexive drivers. Some initial assumptions about the appropriate balance between these drivers can be made. For instance, a degree of autonomy needs to be matched with a similar degree of accountability. In Section 4.3 we highlighted how the higher-level autonomy technique (participation in (re)formulation) should be matched with the higher-level accountability technique (third-party participation). Additionally, situations with less autonomy could be balanced with more adjustability. Less autonomy indicates more state control on the substantive details in the law, and some form of adjustability may be able to rectify problems that arise from the limitations of the state in deciding these details.[124] However, assumptions regarding the balancing of these drivers are context-dependent; governing market actors through law is a challenge,[125] and even selecting an effective regulatory instrument involves context-based evaluations.[126] Although, in theory, the level of autonomy should be balanced with accountability or adjustability, determining which technique might be most effective necessitates a contextual evaluation.

A study from Saurwein provides the starting point for this contextual assessment.[127] He highlights 11 contextual factors which are important considerations in deciding what kind of a REL approach is suitable. Such factors include economic benefits for the industry, reputational sensitivity of the industry, capacities of the industry or government actors to address the regulatory issue and the severity of the regulatory issue. Assumptions about the effect of these contextual factors on the effectiveness of the reflexive drivers and REL techniques can already be deduced. For instance, the factor 'reputational sensitivity of the industry' has links with accountability techniques. Specifically, if an industry has a highly sensitive reputation, comprising well-known brands, then the medium-level accountability technique (public disclosure) is more likely to be effective than in an industry that is not public facing. In the latter case, other accountability techniques are more suitable. If regulatory requirements bring 'economic benefits for the industry', or if the 'capacities of

[123] These challenges were outlined in Section 4.2.
[124] Teubner, n. 10 above, pp. 254-5; Orts, n. 11 above, p. 1260.
[125] M. Mölders, 'Irritation Design: Updating Steering Theory in the Age of Governance' (2021) 9(2) *Politics and Governance,* pp. 393-402.
[126] Friedman, Downing & Gunn, n. 7 above, pp. 380–6.
[127] Saurwein, n. 24 above.

private actors' to assume these requirements are high, then autonomy techniques are likely to be effective.

Additionally, certain contextual scenarios might indicate that a REL approach is not appropriate, but the framework still has value in such instances. For example, in exceptionally dire situations with a 'need for urgent action' but 'high scientific uncertainty' and 'low capacities of public actors' to assume regulatory tasks, the regulator could build a bespoke approach and select a lower- or higher-level technique more in tune with the context. For example, setting a technical benchmark to ensure the urgency of the issue is addressed, but allowing regulated entities to participate in formulating/deciding the precise technology (higher-level autonomy), or incorporating some form of adjustability to account for scientific knowledge gaps. In this scenario, the balance between drivers is the key element of the bespoke approach. Alternatively, an approach might focus on the specifics of a technique. For example, regarding the sensitivity of the industry to public opinion, the industry may not be sensitive to consumers but more sensitive to upstream suppliers, therefore, disclosure platforms (medium-level accountability) could be orientated towards the upstream suppliers.

Moreover, bespoke regulatory approaches can utilise the scaling of REL techniques in our framework, as having a higher-, medium- or lower-level of potential to drive reflexivity, to enhance REL's usability. This scaling enabling comparison between the techniques. In practical terms, it allows regulators to dial up or dial down the reflexive drivers according to the context. In other words, in contexts where a higher-level technique is not likely to be effective, a medium- or lower-level technique can be selected.

In other cases where a lower degree of REL appears to suit the context of the regulatory issue, our framework enables regulators not only to avoid higher-level techniques when building an instrument but to also change the type of instrument, or even to focus efforts on building a more suitable context for the reflexive drivers and techniques to work.

In summary, our framework not only narrows reflexive law in a theoretical sense, through tangible and adjustable REL techniques, but also broadens its scope through the umbrella concepts of the reflexive drivers. This creates a path for future research to apply reflexive law thinking more broadly to any private or public law tool; whether in a more detailed sense by looking at the techniques, or broadly by looking at the overarching drivers and the governance of reflexivity. Ultimately, this means REL does not have to remain restricted to the EU and United States but can be applied to new jurisdictions.

4.6. Conclusion

The world is currently facing numerous overlapping complex sustainability challenges, such as climate change, biodiversity decline, food provision and water and waste management. Legislation continues to play a fundamental role in the governance of such transnational challenges and the driving of reflexivity by regulated companies is an important tool at the regulators disposable to help address these challenges.

Our refined framework revisits a core element of REL. In moving past previously restrictive categorizations of regulatory instruments as formally, substantively, or reflexively rational, we have used these definitions and underlying reflexive law theories to get to the heart of how law actually builds potential for regulatee reflexivity. This more nuanced approach, based on three reflexive drivers and eleven REL techniques, develops an understanding of why certain instruments are capable of driving reflexivity, and at the same time, the limitations these instruments have in doing so based on their nature and how they are designed. This unlocks the potential of reflexive law as a theoretical tool to understand how regulated companies, including transnational companies, can be driven towards more reflexive responses to better address sustainability challenges.

In navigating the complexities of our global environmental challenges, REL stands as a powerful force for change, and the framework outlined in this Chapter is a crucial first step in determining whether to use or avoid REL according to the context of the regulated issue. However, REL's success as a transformative tool to address global sustainability crises rests on whether it leads to reflexivity by regulated actors, or mere incremental responses to the law. Therefore, REL's true potential, can only be fully realised through continued and rigorous research. The call is clear: further investigation into REL's implementation in legislative frameworks and in-practice effects on reflexivity will not only refine our understanding of REL but also amplify its role as a catalyst for transformative environmental action on a global scale.

5

Chapter 5

Reflexive EU environmental law: Divergence in the French and German transposition of the single-use plastics directive

Submitted as:
V. Ross, L. de Almeida, J. van Leeuwen & J. van Zeben,
'Reflexive EU Environmental Law: Divergence in the French and German transposition of the Single-use Plastics Directive.'

Abstract

Reflexive environmental law (REL) techniques create potential for reflexivity by regulated companies. This reflexivity is fundamental to overcoming various regulatory hurdles posed by complex and dynamic sustainability challenges, such as plastics circularity. However, even when EU environmental legislation incorporates REL techniques, Member State transposition may either undermine or enhance these techniques' potential for driving regulatee reflexivity.

This article examines REL's evolution within complex, transnational legislative frameworks, taking the EU's Single-use Plastics Directive 2019/904 (SUPD) as a case study. It compares reflexivity techniques in the SUPD to those in transpositions by France and Germany.

Our analysis is based on the coding of eleven REL techniques and three overarching reflexive drivers – autonomy, accountability, and adjustability – within four SUPD instruments. Identifying divergence in the potential for reflexivity between the SUPD and Member State transpositions allows us to highlight three ways for legislators to maximize the potential of REL in EU directives.

5. Reflexive EU environmental law: Divergence in the French and German transposition of the single-use plastics directive

5.1. Introduction

The European Union (EU) is a key contributor to global plastic waste,[1] as well as a legislative front runner in relation to plastics circularity.[2] Recent legislative initiatives for governing plastics further up the supply chain include the introduction of the Single-use Plastics Directive (SUPD),[3] and revisions to the Plastic Bags Directive,[4] the Packaging and Packaging Waste Directive[5] and the Ecodesign Directive.[6] To effectively regulate for plastics circularity, the EU must grapple with the sheer complexity of a circular plastics economy. This includes coming to grips with a great diversity and dynamicity with regards to plastic polymers, products and supply chains; new technologies; producer and consumer needs and motivations; the transnational regulatory context; and the very definition of circularity.[7]

The premise of this article is that application of reflexive environmental law (REL) in the area of plastics circularity would result in regulatory benefits.[8] Specifically, REL fosters reflexivity in regulated actors, such as companies, which would help overcome some of the regulatory hurdles posed by complex sustainability challenges. Reflexivity is a process by which an individual, organisation or system undertakes self-critical rethinking on their practices,[9] and/or how these relate to underlying values, discourses and social functions,

[1] A. L. Brooks, S. L. Wang & J. R. Jambeck, 'The Chinese Import Ban and Its Impact on Global Plastic Waste Trade' (2018) 4(6) *Science Advances,* article eaat0131.
[2] The EU considers plastics circularity as part of its Green Deal economic model where circular materials and product systems should enable an infinite (re)use of resources, thus alleviating resource scarcity, climate change, pollution, and biodiversity loss, while maintaining job security. See Communication on A new Circular Economy Action Plan For a cleaner and more competitive Europe, COM(2020)98 final.
[3] Directive 2019/904 on the reduction of the impact of certain plastic products on the environment [2019] OJ L 155.
[4] Directive 2015/720 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags [2015] OJ L 115.
[5] Directive 94/62/EC on packaging and packaging waste [1994] OJ L 365.
[6] Directive 2009/125/EC establishing a framework for the setting of eco-design requirements for energy-related products [2009] OJ L 285. The proposal is to expand its scope, so it covers the broadest possible range of products, see Proposal for a Regulation establishing a framework for setting eco-design requirements for sustainable products and repealing Directive 2009/125/EC, COM(2022) 142 final.
[7] For the former points see D. Masi, S. Day & J. Godsell, 'Supply Chain Configurations in the Circular Economy: A Systematic Literature Review' (2017) 9(9) *Sustainability,* article 1602. For the latter challenge of defining 'circular' see J. Kirchherr, D. Reike & M. Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 *Resources, Conservation and Recycling,* pp. 221-232.
[8] The aim of this contribution is not to determine the desirability of REL with respect to plastics regulation. This important question has been discussed extensively within the literature, and we believe that the answer is context-specific. See also F. Saurwein 'Regulatory Choice for Alternative Modes of Regulation: How Context Matters'. (2011) 33(3) *Law and Policy,* pp. 334–66.
[9] E. W. Orts, 'Reflexive Environmental Law' (1995) 89(4) *Northwestern University Law Review,* pp. 1227-340, pp. 1254 and 1290.

against a certain goal (e.g., circularity).[10] This rethinking results in a (non)response to reformulate underlying values and objectives and/or to change practices accordingly.[11]

According to reflexive law thinking, the characteristics of complex sustainability challenges, such as plastics, makes legal system knowledge and resource gaps inevitable.[12] As a result, regulators cannot always identify the most appropriate regulatory approach.[13] In the case of plastics there are multiple overlapping actors and impacts across the various stages of each product's life cycle, and fast-moving technological innovation and social norms. What is 'most circular' at any given time/location is product-specific and dynamic, and the legal system will always have some form of knowledge and capacity deficiencies.[14] Therefore, espousing reflexivity in regulatees can help fill these deficiencies by 'providing new information, reporting new scientific findings, and coming up with new ideas and new technologies that are not only profitable, but contribute to more efficient and effective environmental protection.'[15]

Law builds potential for reflexivity by finding a balance between three overarching reflexive drivers: *autonomy* of the regulatee to decide the best outcomes and approaches themselves; *accountability* on the performance/decision-making of the regulatee so they also consider broader societal goals, and; *adjustability* of regulatory instruments to build anticipation in regulated entities for change through the adaptation of the law. We build on earlier theoretical work on these drivers and eleven corresponding REL techniques which have either a higher, medium or lower degree of potential to drive regulatee reflexivity.[16] In this present study, we move a step further and apply the framework to EU environmental law in practice.

This study focusses on the implementation of REL in EU directives into Member State law through transposition.[17] First, the focus on legislation is an important contribution to the field

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[10] J. Pickering, 'Ecological Reflexivity: Characterising an Elusive Virtue for Governance in the Anthropocene' (2018) 28(7) *Environmental Politics,* pp. 1145-66.

[11] A response (e.g., a change in practices) is not always necessary as there may be cases where a nonresponse is considered the more sustainable option. See ibid.

[12] In socio-legal terminology complexity is a result of functional differentiation in society, and the continuously evolving nature of society and its environment. This is further magnified by the scale of global environmental challenges. See N. Luhmann, 'Evolution und Geschichte', in N. Luhmann (ed.), *Soziologische Aufklärung 2* (VS Verlag für Sozialwissenschaften, 1975), pp. 150-69; G. Teubner, 'Substantive and Reflexive Elements in Modern Law' (1983) 17(2) *The Law and Society Review,* pp. 239-85, at 246.

[13] These limitations relate to information asymmetries between regulating and regulated systems and resource capacities of the legal system in resolving the regulated issue. See Teubner, n. 12 above, pp. 267–8; Orts, n. 9 above, pp. 1241, 1258–9 and 1262.

[14] This is based on the theory of functional differentiation and the operational closure of one social system (e.g., the legal system) to another (e.g., industry). See N. Luhmann, 'Law As a Social System' (1988) 83(1&2) *Northwestern University Law Review,* pp. 136-50; Teubner, n. 12 above, p. 246.

[15] Orts, n. 9 above, 1333 and 1336.

[16] V. Ross & L. de Almeida, 'Refining Reflexive Environmental Law by Nature and Nurture: Autonomy, accountability, and adjustability' [forthcoming] *Transnational Environmental Law*, at Chapter 4.

[17] The efficiency and effectiveness of REL regulatory approaches are context dependent. For instance, accountability through public disclosure of information is likely to be less effective in contexts where private companies have limited reputational sensitivity, or adjustability of the law may not be suitable when there is need and certainty for a non-reversable rule, e.g., like the banning of oxo-degradable plastics. For a detailed review of the contextual factors that affect the efficiency and efficacy of reflexive law see Saurwein, n. 8 above..

of reflexive law, and new governance more broadly, as legislations comprise various regulatory instruments some of which have long been considered less reflexive[18] but remain fundamental in the governance of complex global challenges such as plastics.[19] Second, the EU has issued various new directives or updates to directives to regulate plastics circularity. Different from regulations, directives are binding as to their result, while leaving discretion to the Member States as to how that result is to be achieved.[20] However, as with much of EU law, the success of directives depends heavily on the quality of Member State transposition; if a Member State decides to abuse its discretion in order to implement less ambitious rules this can damage the integrity of the legislative regime that the directive is aiming for.[21] In relation to reflexivity, it is therefore insufficient to solely analyse the reflexive properties of a specific EU directive, as much of the eventual reflexivity of the regulatory regime depends on its national transposition.

Thus, this study seeks to understand the ways in which REL for plastics circularity is executed in practice in the EU and its potential to drive regulatee reflexivity.[22] The REL literature focuses on reflexivity by regulated companies. While our focus on transposition recognises that directives only indirectly regulate companies, we continue this REL tradition and use the term 'regulated companies' but acknowledge that this term is under inclusive as REL may also impact reflexivity by Member States or other actors regulated by a directive.

Based on the REL framework (Sections 4.3 and 5.2) and background information on the EU's SUPD (Section 5.3) we undertake a coding exercise of instruments in the SUPD[23] and

[18] According to Eric Orts, who coined REL, more 'traditional' hard forms of law which regulate the substance of the issue, such as performance- or technology-based regulatory instruments (e.g., permits to pollute or technical standards), are too administrative and inflexible to effectively match complex challenges. While more soft forms of law such as procedure- and disclosure-based regulations (e.g., EU's procedure-based Eco Management and Audit Scheme and the US's disclosure-based Toxic Pollution Inventory) are argued to stimulate learning by their nature. We dispute these distinctions and instead undertake a more nuanced assessment of regulatory instruments based on a framework from Ross and de Almeida, n. 16 above. For detail on the traditional distinctions of regulatory instruments in REL literature and new governance scholarship more broadly see Orts, n. 9 above; Teubner, n. 12 above; and O. Lobel, 'New Governance as Regulatory Governance' in D. Levi-Four (ed), *The Oxford Handbook of Governance* (online edn, Oxford Academic 2012) <https://doi-org.ezproxy.library.wur.nl/10.1093/oxfordhb/9780199560530.013.0005> accessed 10 August 2023.

[19] K. Syberg et al., 'Regulation of Plastic from a Circular Economy Perspective' (2021) 29 *Current Opinion in Green and Sustainable Chemistry,* article 100462; E. Scotford, 'Legislation and the Stress of Environmental Problems' (2021) 74(1) *Current Legal Problems,* pp. 299-327.

[20] European Union, Consolidated version of the Treaty on the Functioning of the European Union [2012] OJ L 326/47-326/390, Article 284. The specific benefit of a Directive over a Regulation is the setting of uniform benchmarks at EU level while still allowing for the individual ecological, as well as social and economic, needs of the Member States to be taken into consideration.

[21] Naturally, proper transposition is no guarantee for proper compliance with the directive as the Member State can also decide not to invest in enforcement, creating a very similar problem at a later point in the regulatory chain.

[22] REL literature focuses on reflexivity by companies. We understand that directives only indirectly address companies since we have the question of transposition. We continue this REL tradition and use the term 'companies' in this paper but acknowledge that this term is under inclusive as REL may also impact reflexivity by Member States or other actors regulated by a directive.

[23] The SUPD was selected as it forms a core part of the EU's Plastic Strategy under the Green Deal, and as measures have a distinct upstream (circular) focus on reduction and reduce. See European Commission, A European Strategy for Plastics in a Circular Economy [2018] COM/2018/028.

corresponding legislation from two Member States – France and Germany (Section 5.4). These countries were chosen for the reasons outlined in the Section 2.2.1 of this thesis.

We consider how and whether the potential for reflexivity identified in the instruments of the SUPD is altered in the transposition process and how this might differ between the Member State case studies.[24] Through this, we show that the reflexive potential of a law need not be, and often is not, uniform between the different courses of action it mandates. Instruments in the SUPD provide a particularly good case study for this as the Directive does not always specify which instrument ought to be adopted, so divergence in the instruments chosen and how the REL potential is transposed are evident. In discussing our results (Section 5.5), we reflect on whether the reflexive level of the SUPD gives rise to equally reflexive national implementation or whether something may be gained or lost in translation and why. Conclusions aim to help legislators maximise the potential of REL in implementation and ensure that the necessary discretion of Member States in transposition does not come at the expense of reflexivity set out in the directive.

5.2. Conceptual framework: Identifying reflexive environmental law (REL) in legislation

This section summarises a conceptual framework, developed in previous work,[25] for coding reflexivity within specific legislative instruments. For the purposes of this contribution, we will introduce two aspects of our methodology: a) the three reflexive drivers and corresponding REL techniques which have varying potential to drive company reflexivity, and b) the four types of regulatory instruments included in the analysis and their relation to the REL techniques.[26] These two aspects are the foundation of our coding exercise of instruments within the SUPD presented in Section 5.4.

5.2.1. Reflexive drivers and REL techniques

Understanding the reflexivity of a legislative act requires coding of the REL techniques in each instrument. The REL techniques correspond to three reflexive drivers – autonomy, accountability and adjustability – which can be understood as broader conceptual areas that increase the potential of one social institution/actor to push another to undertake reflexivity.[27]

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[24] Our study on the transposition of reflexive law adds to the already established field of divergence and convergence of Member State transposition of EU legislation. See A. Dimitrova & B. Steunenberg, 'The Search for Convergence of National Policies in the European Union: An Impossible Quest?' (2000) 1(2) *European Union Politics,* pp. 201-26; D. Dimitrakopoulos, 'The Transposition of EU Law: "Post-Decisional Politics" and Institutional Autonomy' (2001) 7(4) *European Law Journal,* pp. 442-58; S. Deakin, 'Legal Diversity and Regulatory Competition: Which Model for Europe?' (2006) 12(4) *European Law Journal,* pp. 440-54; O. Treib, 'Implementing and Complying with EU Governance Outputs' (2014) 9(1) *Living Reviews in European Governance,* pp. 1-47.

[25] Ross and de Almeida, n 16 above.

[26] A deeper discussion of this theoretical framework can be found in forthcoming work at ibid.

[27] Various contextual enablers also come into play in affecting the potential for an actor to undertake reflexivity as well as the internal motivations of actors to be reflexive. See M. Kaye & R. Anderson, 'Continuous Improvement: The Ten Essential Criteria' (1999) 16(5) *International Journal of Quality & Reliability Management,* pp. 485-509; J. González-Benito & Ó. González-Benito, 'A Study of the Motivations for the Environmental Transformation of Companies' (2005) 34(5) *Industrial Marketing Management,* pp. 462-75.

The REL techniques are concrete mechanisms used in environmental laws (e.g., legislation, private regulatory standards) to foster these drivers.

Table 5.1 below shows which techniques correspond to the three drivers and how the different techniques have a higher, medium or lower level of potential to drive reflexivity on sustainability issues (such as circularity) in regulated companies. We define these drivers and techniques in more detail below by explaining their relation to four types of legislative instruments.

Table 5.1: Potential of REL techniques for driving private company reflexivity for sustainability[28]

<table>
<tr><th rowspan="2">Potential to drive reflexivity for sustainability</th><th colspan="3">Reflexive environmental law (REL) techniques for each reflexive driver</th></tr>
<tr><th>AUTONOMY</th><th colspan="2">ACCOUNTABILITY</th><th>ADJUSTABILITY</th></tr>
<tr><td>Higher ⇧</td><td>Participation in (re)formulation of substantive details in the law</td><td colspan="2">Third-party participation in (re)formulation of substantive details in the law</td><td>External adjustments to substantive details in the law</td></tr>
<tr><td>Medium ⇨</td><td>Autonomous choice of technical improvements</td><td>Third-party verification on decision-making or performance</td><td>Public disclosure on decision-making or performance</td><td>Threat of regulation on regulated issue</td></tr>
<tr><td rowspan="2">Lower ⇩</td><td rowspan="2">Explicit options on substantive details in the law</td><td colspan="2">Awareness raising on regulated issue</td><td rowspan="2">Scheduled adjustments to substantive details in the law</td></tr>
<tr><td colspan="2">Self-monitoring and reporting on decision-making or performance</td></tr>
</table>

* Higher-, medium- and lower-levels are designated according to the potential of the REL technique to drive reflexivity in regulated companies regarding their sustainability performance. More potential makes for a higher level.

5.2.2. Reflexive nature of four regulatory instruments

The REL literature distinguishes between six key types of regulatory instruments which, based on their nature, have varying abilities to drive reflexivity in regulatees: self-regulation-based, procedure-based, disclosure-based, market-based, performance-based and technology-based.[29] A single legislative act, such as a directive, will usually contain several categories of these instruments. However, the more common instruments in public legislation[30] (and those used in the SUPD) are disclosure-based, market-based, performance-

[28] Ross and de Almeida, n 16 above.
[29] Ibid.
[30] R. Pacheco-Vega, 'Environmental Regulation, Governance, and Policy Instruments, 20 Years after the Stick, Carrot, and Sermon Typology' (2020) 22(5) *Journal of Environmental Policy & Planning*, pp. 620-35; C. Halpern, 'Governing Despite Its Instruments? Instrumentation in EU Environmental Policy' (2010) 33(1) *West European Politics,* pp. 39-57.

based and technology-based. We describe these four instruments below, detailing their core function and examples.

First, disclosure-based instruments are informational in nature and use transparency to push companies to make more environmentally responsible decisions.[31] Examples include regulations for transparency registers for emission reporting, eco-labelling, factual labelling and negative labelling of harmful substances in products.[32] Second, market-based are legal mechanisms that focus on the artificial restructuring of the market to make companies account for negative externalities.[33] Examples are cap-and-trade market systems, pollution taxes and financial incentives to encourage pollution abatement.[34] Third, performance-based instruments focus on the substance of the regulated issue by prescribing mandatory rules for companies to meet specific performance benchmarks.[35] Such benchmarks, which implicitly encourage a race to the top,[36] might be maximum emission levels or restrictions on types of materials used. Lastly, technology-based instruments, similar to performance-based instruments, focus on the direct regulation of company activities in concrete situations.[37] However, they are distinct as they specify the precise technology which must be adopted to avoid penalties, meaning they do not give autonomous choice to companies on the precise technological improvements to be adopted.[38] Examples include mandatory requirements for the installation of air filters on smokestacks[39] or certain products or infrastructure to be made available to the public.[40]

The baseline potential for each instrument to drive reflexivity is gained through understanding the embedded REL techniques for each instrument. Embedded techniques (coded 'X' in Table 5.2 below) are where a technique is always present due to the instrument's nature. As shown, there are five instances of embedded techniques mostly concerning medium-level autonomy (autonomous choice) which is a feature of disclosure-based, market-based and performance-based instruments. These instruments do not prescribe

[31] Orts, n. 9 above, p. 1246; R. B. Stewart, 'A New Generation of Environmental Regulation The National Symposium on Second Generation Environmental Policy and the Law' (2001) 29(1) *Capital University Law Review,* pp. 21-182, at 31.
[32] In his 1995 works, Orts, n. 9 above, categorised all labelling requirements as market-based, however, these are now more commonly seen as disclosure-based. See N. O. Keohane, R. L. Revesz & R. N. Stavins, 'The Choice of Regulatory Instruments in Environmental Policy', *Environmental Law* (Routledge 2002); Orts, n. 9 above, pp. 1246-51.
[33] Orts, n. 9 above, p. 1242.
[34] Ibid, PP. 1243-44.
[35] Ibid, p. 1235.
[36] S. Deakin, 'Reflexive Governance and European Company Law' (2009) 15(2) *European Law Journal*, pp. 224-45, at 229.
[37] Teubner, n. 12 above, p. 240.
[38] Here we refer to the Oxford University definition of technology as "The application of knowledge to facilitate the obtaining and transformation of natural materials. Technology involves the creation of material instruments (such as machines) used in human interactions with nature."
[39] Orts, n. 9, p. 1235.
[40] These latter examples overlap with some forms of behavioural instruments targeted changed consumer behaviour, however, as we focus on company behaviour such distinction is not necessary. For definitions of different behavioural instruments see A. Rowell, 'Behavioral Instruments in Environmental Regulation' in K. Richards & J. Van Zeben (eds), *Policy instruments in environmental law* (Edward Elgar Publishing 2020).

specific technological improvements (i.e., mandatory abatement technologies) but instead focus on information, pricing, or input/output performance targets. Thus, a degree of autonomy is allotted to companies to decide case-specific technologies for sustainability improvements themselves. In contrast, technology-based do not have this REL technique embedded as they do prescribe a specific technology. The other embedded technique in an instrument is public disclosure (medium-level accountability) embedded in disclosure-based instruments due to their focus on information transparency.

Table 5.2: Embedded REL techniques within four regulatory instruments[41]

Regulatory instrument in legislation	Autonomy			Accountability					Adjustability		
	Higher	Medium	Lower	Higher	Medium		Lower		Higher	Medium	Lower
	Participation	Autonomous choice	Explicit options	Third-party participation	Public disclosure	Third-party verification	Aware-ness raising	Self-monitoring and reporting	External adjustments	Threat of regulation	Scheduled adjustments
Disclosure-based		X			X						
Market-based		X									
Performance-based		X									
Technology-based											

X = REL technique embedded within instrument

Overall, the REL framework helps to understand the minimum reflexive potential of each instrument as well as the type of REL approach that has been designed-in. Through this, certain imbalances between the reflexive drivers – autonomy, accountability and adjustability – can be identified and where necessary, addressed. In particular, techniques for autonomy have been known to lead to market capture or ossification as companies often limit themselves to the minimum threshold prescribed and do not undertake reflexivity.[42] Increasing the balance of accountability and/or adjustability creates much needed safeguards to mitigate this.[43] Conversely, there may be scenarios where techniques for accountability or adjustability hamper reflexivity by being too burdensome. In the following Section 5.3 we

[41] Ross and de Almeida, n. 16.
[42] M. A. Livermore, 'Reviving Environmental Protection: Preference-Directed Regulation and Regulatory Ossification' (2007) 25(3) *Virginia Environmental Law Journal,* pp. 311-86.
[43] O. D. Schutter & S. Deakin, 'Reflexive Governance and the Dilemmas of Social Regulation' in *Social Rights and Market Forces: is the Open Coordination of Employment and Social Policies the Future of Social Europe?* (Bruylant 2005).

provide background on the laws that will be coded for their REL potential according to this framework.

5.3. Transposition of the single-use plastics directive (SUPD)

This section introduces the SUPD and national transpositions by France and Germany. We will, first, briefly discuss the implementation needs of the SUPD, the motivation of our case selection of SUPD instruments and list all laws included in the coding review.

5.3.1. The SUPD and Member State transpositions

Plastics are a diverse group of synthetic polymers which present one of the most complex and pressing sustainability challenges of our time.[44] From a regulatory perspective, the longevity of plastics is a distinct and very challenging characteristic. The difficulty – if not impossibility – to remove plastics once they have been produced has increased the push for circular economy regulatory approaches at global and national levels.[45]

The SUPD entered into force on 3 July 2019 with Member States being required to transpose the legislation into national law by July 2021. The SUPD comprises a variety of measures that affect different plastic products at various stages of the lifecycle and come into force at different dates. Table 5.3 below details the specific measures in the SUPD and the corresponding type of regulatory instrument.

[44] Plastics are having disastrous effects on natural ecosystems and human health and affect other crises such as climate change. See H. Wiesinger, Z. Wang & S. Hellweg, 'Deep Dive into Plastic Monomers, Additives, and Processing Aids' (2021) 55(13) *Environmental Science & Technology,* pp. 9339–51; M. C. Shen et al., '(Micro)Plastic Crisis: Un-Ignorable Contribution to Global Greenhouse Gas Emissions and Climate Change' (2020) 254 *Journal of Cleaner Production,* article 120138.

[45] Syberg et al., n 19 above; J. van Zeben & V. Ross, 'Plastics: From Resources to Waste and Back Again', *Handbook of Global Environmental Politics (2nd edition)* (Routledge 2022), at Chapter 3.

Table 5.3: Summary of measures in the Single-use Plastics Directive (SUPD) with regulatory instrument categorisation

SUPD Article	Measure, product, and timeframe	Type of instrument
Article 4	An ambitious and sustained reduction in consumption of single-use plastic cups and food containers compared to 2022 by 2026	Choice of instrument left to Member State (MS) discretion, but market-, technology- and disclosure-based instruments are suggested[46]
Article 5	Market restrictions (i.e., bans) on expanded polystyrene food and beverage containers, cotton bud sticks, cutlery, plates, drink stirrers, straws, sticks for balloons and oxo-degradable plastic products by 2021	Performance-based
Article 6	Lids and caps to stay on drinks containers and bottles of up to 3 litres by 2024	Performance-based
Article 6	All plastic bottles made of at least 30% recycled material by 2030	Performance-based
Article 7	Labelling requirements for cups, wet wipes, sanitary pads, tampons and applicators, and tobacco products with filters, highlighting the plastic content, recommended disposal methods and environmental risks by 2021	Disclosure-based
Article 8	Extended producer responsibility (EPR) schemes that establish either a take-back scheme or annual fees from producers of food and beverage containers including the caps and lids, packets and wrappers, tobacco products with filters, lightweight plastic carrier bags, wet wipes, fishing gear containing plastic by 2024	Market-based
Article 9	Plastics bottles made of PET to contain 25% recycled plastic, and 77% of plastic bottles to be collected separately by 2025	Performance-based
Article 9	90% of plastic bottles to be separately collected by 2029	Performance-based

To provide sufficient detail in our analysis, we focus on four of these measures: consumption reduction (Article 4), market restrictions (Article 5), marking requirements (Article 7), extended producer responsibility (EPR) (Article 8). These were chosen, first, because they represent the four types of instruments related to the SUPD (market-based, performance-based, technology-based and disclosure-based).[47] Second, as performance-based instruments appeared more than once in the SUPD, we selected one that did not have many REL techniques to test/show how this was implemented by the selected Member States in transposition. This contrasts with the other three instruments which each utilised at least one REL technique.

[46] Specifically, Article 4 states: "The measures may include national consumption reduction targets, measures ensuring that re-usable alternatives to the single-use plastic products […] are made available at the point of sale to the final consumer, economic instruments such as instruments ensuring that those single-use plastic products are not provided free of charge at the point of sale to the final consumer and […] Member States may impose marketing restrictions […] to ensure that they are substituted with alternatives that are re-usable or do not contain plastic."
[47] Though technology-based instruments are only suggested in the SUPD, they are utilised by the Member States in transposition.

France and Germany were selected as case studies for reasons outlined in Section 2.2.1 and Section 5.1. Table 5.4 below shows all implementing legislation included in the analysis and their relation to SUPD Articles 4, 5, 7 and 8. As well as transpositions by France and Germany, certain EU implementing regulations were included if related to the selected SUPD articles and if relevant to the coding of REL.

Table 5.4: Implementing legislation for SUPD Articles 4, 5, 7, and 8

Year	Abbreviation for law	Key article/section and linked legislation (if applicable)	Linked SUPD article
France			
2020	Anti-Waste Law[48]	Article 62 linked to Article L541-10 to L541-10-17 of the Environmental Code	Articles 4, 5 and 8
		Article 13 linked to Article L.541-9-1 of the Environmental Code	Article 7
		Article 17 linked to Article L541-9-3 of the Environmental Code	Article 7
2022 draft	Extruded Plastics (draft) Decree[49]	Linked to Article L.541-9 (I) of the Environmental Code	Article 5
2021	Labelling Decree[50]	Linked to Article R.541-335 of the Environmental Code	Article 7
Germany			
2012 and 2021	VerpackG[51]	Section 31 and 33	Article 4
		Section 2	Article 8
2012 and 2021	KrWG[52]	Section 30	Article 5

[48] LOI n° 2020-105 du 10 février 2020 relative à la lutte contre le gaspillage et à l'économie circulaire [LAW no. 2020-105 of February 10, 2020 relating to the fight against waste and the circular economy (1)], Ministère de la Transition écologique [Ministry of Ecological Transition], JORF n°0035, February 11, 2020.

[49] Décret n° (draft) du relatif à l'interdiction de certains récipients pour aliments en plastique à usage unique constitués de plastique expansé ou extrude [Decree No. (draft) of prohibiting certain single-use plastic food containers made of expanded or extruded plastics], 2022, Ministère de la Transition écologique [Ministry of Ecological Transition], NOR: TREP2207857D.

[50] Décret n° 2021-1279 du 30 septembre 2021 relatif au marquage de certains produits en plastique à usage unique circulaire [Decree 2020-105 of September 30, 2021 relating to the marking of certain single-use plastic products], Journal Officiel de la République Française [J.O.] [Official Gazette of France], JORF n°0230, October 2 2021

[51] Gesetz über das Inverkehrbringen, die Rücknahme und die hochwertige Verwertung von Verpackungen vom 5. Juli 2017 (BGBl. I S. 2234), das zuletzt durch Artikel 2 des Gesetzes vom 22. September 2021 (BGBl. I S. 4363) (VerpackG), [Law on the placing on the market, return and high-quality recycling of packaging of July 5, 2017 (German Federal Law Gazette I p. 2234), last amended by Article 2 of the law of September 22, 2021 (German Federal Law Gazette I, 4363) (VerpackG)].

[52] Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Bewirtschaftung von Abfällen vom 24. Februar 2012 (BGBl. I S. 212), das zuletzt durch Artikel 20 des Gesetzes vom 10. August 2021 (BGBl. I S. 3436) (Kreislaufwirtschaftsgesetz - KrWG) [Law to promote the circular economy and to ensure environmentally compatible waste management of February 24, 2012 (German Federal Law Gazette I p. 212), which was last amended by Article 20 of the law of August 10, 2021 (German Federal Law Gazette I, 3436) (Circular Economy Act - KrWG)].

2020	EWKVerbotsV[53]	Linked to KrWG Section 30	Article 5
2021	EWKKennzV [54]	Section 4	Article 7
2022	(Draft) EWKFondsG-E[55]	Article 1	Article 8
2021	Contract between BMUV, certain manufacturers of fishing gear, NABU and port operator[56] (hereafter the Contract)	N/A	Article 8
Additional EU legislation			
2019	Directive (EU) 2019/883 [57]	N/A	Article 8
2020	Implementing Regulation (EU) 2020/2151[58]	N/A	Article 7
2021	Implementing Regulation (EU) 2021/1752[59]	N/A	Article 4
2022	Implementing Regulation (EU) 2022/162[60]	N/A	Article 4

[53] Verordnung über das Verbot des Inverkehrbringens von bestimmten Einwegkunststoffprodukten und von Produkten aus oxo-abbaubarem Kunststoff (Einwegkunststoffverbotsverordnung - EWKVerbotsV) vom 20. Januar 2021 (BGBl. I S. 95) [Ordinance on the prohibition of placing on the market certain single-use plastic products and products made from oxo-degradable plastic (Single-use plastic ban ordinance - EWKVerbotsV) of January 20, 2021 (German Federal Law Gazette I, 95)]

[54] Verordnung über die Beschaffenheit und Kennzeichnung von bestimmten Einwegkunststoffprodukten (Einwegkunststoffkennzeichnungsverordnung - EWKKennzV) vom 24. Juni 2021 (BGBl. I S. 2024), [Regulation on the nature and labelling of certain single-use plastic products (Disposable Plastic Labelling Ordinance - EWKKennzV) of June 24, 2021 (German Federal Law Gazette I, 2024)]

[55] Referentenentwurf des Bundesministeriums für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz Gesetz zur Umsetzung bestimmter Regelungen der EU-Einwegkunststoffrichtlinie (Einwegkunststofffondsgesetz – EWKFondsG), Bearbeitungsstand: 23.03.2022 [Law (draft) of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and consumer protection to implement certain regulations of the EU Single-Use Plastics Directive (Single-use plastic fund law – EWKFondsG), Processing status: 03/23/2022]

[56] Bekanntmachung eines Vertrages zwischen dem Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (BMUV), bestimmten Herstellern von kunststoffhaltigen Fischfanggeräten, dem Naturschutzbund Deutschland e. V. (NABU) und den Betreibern von bestimmten Häfen auf der Grundlage des Artikels 8 Absatz 8 und 9 der Richtlinie (EU) 2019/904 vom 5. Juni 2019 (ABl. L 155 vom 12.6.2019, S. 1) über die Verringerung der Auswirkungen bestimmter Kunststoffprodukte auf die Umwelt Vom 6. Dezember 2021. [Announcement of a contract between the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, certain manufacturers of fishing gear containing plastic, the Naturschutzbund Deutschland e. V. (NABU) and the operators of certain ports on the basis of Article 8 paragraphs 8 and 9 of Directive 2019/904 of 5 June 2019 on reducing the impact of certain plastic products the environment.]

[57] Directive 2019/883 on port reception facilities for the delivery of waste from ships, amending Directive 2010/65/EU and repealing Directive 2000/59/EC [2019] OJ L 151.

[58] Commission Implementing Regulation 2020/2151 laying down rules on harmonised marking specifications on single-use plastic products listed in Part D of the Annex to Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment [2020] OJ L 428.

[59] Commission Implementing Decision 2021/1752 laying down rules for the application of Directive (EU) 2019/904 as regards the calculation, verification and reporting of data on the separate collection of waste single-use plastic beverage bottles [2021] OJ L 349.

[60] Commission Implementing Decision 2022/162 laying down rules for the application of Directive (EU) 2019/904 as regards the calculation, verification and reporting on the reduction in the consumption of certain single-use plastic products and the measures taken by Member States to achieve such reduction [2022] OJ L 26.

In the next section, we present the summary of findings on the coding of REL techniques in Articles 4, 5, 7 and 8 of the SUPD and compare this with implementation by France and Germany through national transposition. The Supplementary Material show the detailed results with clarification of the exact text coded in the referenced articles.

5.4. Transposing REL

In this section we show results applying the REL framework presented in Section 5.2, to four instruments in the SUPD and their transposition within France and Germany, our two case studies.

5.4.1. Article 4: Technology- and market-based instruments for consumption reduction

Consumption reduction measures are prescribed in Article 4 of the SUPD. This article gives agency to Member States to choose the necessary instruments 'to achieve an ambitious and sustained reduction' in the consumption of beverage and food containers. As already mentioned, the SUPD suggests the use of market-, performance- and technology-based instruments, however, implementing laws by France and Germany only utilise market-based and technology-based instruments. Table 5.5 below presents the results of the coding of autonomy, accountability and adjustability techniques for REL in Article 4 and implementing legislation.

Article 4 of the SUPD contains no techniques for autonomy, two lower-level accountability techniques (awareness raising and self-monitoring and reporting) and the medium-level adjustability technique (threat of regulation). National legislations transposing for this article comprises four instruments in France's Anti-Waste Law (Article 62 linked to Environmental Code Article L541-15-10 (III)), and two in Germany's VerpackG (Sections 31 and 33). With regards to autonomy, the two German transposing instruments mirror the SUPD as they do not prescribe any techniques for autonomy. However, three out of four of France's instruments go beyond the reflexive potential of the SUPD by including higher- or lower-level autonomy techniques. The higher-level technique (participation in (re)formulation of substantive details) is identified in the market-based instrument which requires take-away beverage retailers to provide an incentive for customers to buy a reuse item but allows retailers themselves to decide on the price of the incentive. Therefore, participation by companies relates to decision-making on the financial aspects of the instrument. Two of France's technology-based instruments use the lower-level autonomy technique by allowing catering and drinking establishments to choose between explicit options on substantive details of the instrument. First, the instrument requiring provision of reusable take-out food containers gives retailers a choice between offering consumers a reusable container or one made from recyclable materials, and second; the instrument requiring retailers to notify customers that free drinking water can be requested, allows retailers to choose between displaying the notification on their menu or on a display space. This was not the case for the

same measures by Germany who specified exactly how to notify customers about reusable options (Section 33 of VerpackG).

Concerning accountability, both France and Germany mirror the lower-level autonomy techniques prescribed in the SUPD (self-monitoring and reporting and awareness raising). In addition, Germany's market-based instrument goes beyond this by also prescribing the medium-level technique – public disclosure. Specifically, the instrument comprises rules on product labelling (Sections 31 and 32.1) and online publishing of 'information for the end consumer on the return and collection system for deposit-required one-way beverage containers and on the recovery of the returned packaging' (Section 32.1).

Regarding adjustability, neither transpositions by France nor Germany matched the medium-level technique (threat of future regulation) used in the SUPD. Specifically, SUPD Article 4.1 states that reporting by companies is to be submitted by Member States to the commission '…with a view to the establishment of binding quantitative Union targets for consumption reduction.' No other techniques for adjustability were identified.

Table 5.5: Coding of REL techniques in instruments relating to SUPD Article 4 on consumption reduction

Regulator, law, article	Measures, instrument type	Autonomy techniques			Accountability techniques					Adjustability techniques		
		Participation	Autonomous choice	Explicit options	Third-party participation	Public disclosure	Third-party verification	Awareness raising	Self-monitoring and reporting	External adjustments	Threat of regulation	Scheduled adjustments
EU's SUPD: Art. 4	Reduction of single-use beverages cups and food containers*							Art. 10	Art. 4.2		Art. 4.1	
France's Anti-Waste Law: Art. 62	Economic incentives for takeaway beverage cup reuse (market-based)	Art. L.541-15-10 (III) of Enviro. Code	X					Art. 24 linked to Art. L.312-19 of the Edu. Code	SUPD Art. 4.2 linked to Regulation (EU) 2021/1752 and (EU) 2022/162			
	Provision of reuse take-out food containers (tech-based)			Art. L.541-15-10 (III) of Enviro. Code								
	Provision of reuse cups, cutlery, plates and containers used for home meal delivery services (tech-based)											
	Notification of free drinking water availability (tech-based)			Art. L.541-15-10 (III)				Art. L.541-15-10 (III) Art. 24 linked to Art. L.312-19 of the Edu. Code				
Germany's VerpackG: §31	Deposit and return for beverage bottles (market-based)		X			§31 §31 §32.1		KrWG §30.6(10) VerpackG §14.3	§31.5 SUPD Art. 4.2 linked to Regulation (EU) 2021/1752 and (EU) 2022/162			
Germany's VerpackG: §33	Reuse for food packaging and beverage bottles (tech-based)								SUPD Art 4.2 linked to Regulation (EU) 2022/162			

* The precise choice of instrument was left to Member State discretion but market-, performance- and technology-based instruments were suggested.

5.4.2. Article 5: Performance-based instruments for market restrictions

As shown in Table 5.6 below, measures for market restrictions in SUPD Article 5 relate to nine categories of products. While Germany stuck to the same products covered by the SUPD, France banned seven additional categories of single-use plastic products, including a decree specifically for extruded and expanded polystyrene to make up for a legislative gap in the SUPD.[61]

These instruments are performance-based as they prescribe a specific benchmark for companies to meet but do not specify any explicit technology to achieve it. Regarding the coding of REL in this Article, most of the products are supported by the lower-level accountability technique awareness raising (Article 10). No other techniques (aside from the embedded medium-level technique for autonomy) are present.

[61] The SUPD only banned 'expanded' polystyrene containers which led to companies circumventing the law by making/using containers made of 'extruded' polystyrene. See M. D. C. Troya, O. P. Power & K. Kopke, 'Is It All About the Data? How Extruded Polystyrene Escaped Single-Use Plastic Directive Market Restrictions' (2022) 8 8 *Frontiers in Marine Science,* article 817707.

Table 5.6: Coding of REL techniques in performance-based instruments relating to SUPD Article 5 on market restrictions

Regulator, law and article	Scope	Autonomy			Accountability					Adjustability		
		Participation	Autonomous choice	Explicit options	Third-party participation	Public disclosure	Third-party verification	Awareness raising	Self-monitoring and reporting	External adjustments	Threat of regulation	Scheduled adjustments
EU's SUPD Art. 5	Expanded polystyrene food and drink containers, plates, straws*, cutlery, stirrers, balloon sticks, cotton bud sticks*		X					Art. 10				
	Oxo degradable plastic products		X									
France's Anti-Waste Law: Art. 62, linked to Enviro. Code Art. L541-15-10	Beverage containers and lids, expanded polystyrene food and drink containers, plates, straws*, steak sticks, cutlery, stirrers, balloon sticks, cotton bud sticks*, plastic cooking, reheating and serving food containers in education establishments, plastic water bottles in schools and festivals*, fresh fruit and veg packaging*, non-biodegradable plastic and herbal tea bags, non-recyclable styrene or copolymers, give-away promotional products, oxo degradable plastic products.		X					Art. 24 linked to Art. L.312-19 of the Edu. Code				
France's Extruded Plastics (draft) Decree, linked to Enviro. Code Art. L.541-9 (I)	Expanded and extruded polystyrene food containers		X									
Germany's EWKVerbotsV: Art. 3	Expanded polystyrene food and drink containers, plates, straws*, cutlery, stirrers, balloon sticks, cotton bud sticks*, oxo degradable plastic products		X					KrWG §30.6(10) VerpackG §14.3				

* With exemptions.
X = Embedded REL techniques, meaning they are naturally occurring in an instrument due to the nature of the instrument.

5.4.3. Article 7: Disclosure-based instruments for marking requirements

Marking requirements, or labelling, of single-use plastic products are prescribed in Article 7 of the SUPD. It covers sanitary products including tampons and applicators, wet wipes, tobacco products and filters, and beverage cups. This disclosure-based instrument requires that labelling is used to inform consumers on the presence of plastics in these products. The exact labels are prescribed in Implementation Regulation (EU) 2020/215 and, depending on the type of product, must be displayed either on the product themselves or the packaging.

As shown in Table 5.7 below, Article 7 has the following techniques: explicit choice (low-level autonomy), awareness raising (lower-level accountability) and embedded accountability techniques – public disclosure and self-monitoring and reporting. Regarding transposition, France has two implementing instruments (the Labelling Decree and Article 13 of the Anti-Waste Law) while Germany has one (Section 4 of EWKKennzV). For the most part, these two instruments match the potential for company reflexivity, with minor divergences explained below.

For autonomy, the German and French transposing instruments match the SUPD's low-level technique (explicit choice), however, precisely what the choices relate to vary. For the French and German instruments that specifically transpose the SUPD, the choice given to regulated companies concerns the where the label is placed on a product (either horizontally on the external front or top surface). However, for France's second disclosure-based instrument which relates to all waste generating products (Article L.541-9-1), companies can choose between the type of disclosure 'by means of marking, labelling, display or any other appropriate process'.

Regarding accountability, all three implementing instruments have medium-level accountability (public disclosure), and the embedded technique for accountability (public disclosure), thereby mirroring the SUPD's potential to drive reflexivity.

Lastly, for adjustability, neither the SUPD nor implementing regulations have any adjustability techniques for REL.

Table 5.7: Coding of REL techniques in disclosure-based instruments relating to SUPD Article 7 on labelling requirements

Regulator, law and article	Instrument, measures, scope	Autonomy			Accountability					Adjustability		
		Participation	Autonomous choice	Explicit options	Third-party participation	Public disclosure	Third-party verification	Awareness raising	Self-monitoring and reporting	External adjustments	Threat of regulation	Scheduled adjustments
EU's SUPD: Art. 7 and Commission Implementing Regulation (EU) 2020/2151	Sanitary pads, tampons and tampon applicators, wet wipes, tobacco product filters, beverage cups		X	Regulation (EU) 2020/2151		X Art. 7		Art. 10				
France's Labelling decree	Sanitary pads, tampons and applicators, wet wipes, tobacco product filters, beverage cups		X			X SUPD Art. 7 linked to Regulation (EU) 2020/215		Art. 24 linked to Art. L.312-19 of the Edu. Code				
France's Anti-Waste Law: Art. 13	Waste-generating products		X Art. L.541-9-1 of Enviro. Code	Art. L.541-9-1 of Enviro. Code		X Art. L.541-9-1 of Enviro. Code		Art. 24 linked to Art. L.312-19 of the Edu. Code				
Germany's EWKKennzV: §4	Sanitary pads, tampons and tampon applicators, wet wipes, tobacco product filters, beverage cups		X	Regulation (EU) 2020/2151		X SUPD Art. 7 linked to Regulation (EU) 2020/215		KrWG §30.6(10): VerpackG §14.3				

X = Embedded REL techniques, meaning they are naturally occurring in an instrument due to the nature of the instrument.

5.4.4. Article 8: Market-based instruments for EPR

Table 5.8 below shows the coding of Article 8 in the SUPD relating to EPR obligations in Articles 8 and 8a of the Waste Framework Directive (WFD).[62] Measures cover eight products in total and require that producers pay a tax to cover the costs of waste management of their products and/or establish take-back schemes to recycle their products. There are some divergences between requirements for seven of the plastic products and those covering fishing gear containing plastic, therefore, these are coded as two separate instruments.

As can be seen in Table 5.8, the instrument covering seven products in SUPD Article 8 has nearly all REL techniques for autonomy, accountability and adjustability. The two techniques missing are lower-level autonomy (explicit options) and medium-level adjustability (the threat of regulation). The other SUPD instrument governing fishing gear does not use the higher-level accountability technique (third-party participation) and only has the medium-level technique for adjustability (threat of regulation).

Transpositions by France comprise two market-based instruments and one disclosure-based instrument, while Germany chose three market-based instruments (including one private regulatory contract). These transpositions match the Directive in the sense that the REL techniques are present, however, a closer look shows that Member States give far more clarity on practical details for implementing the techniques. Moreover, there are divergences between French and German approaches regarding a) whether public or private entities are given authority to undertake the REL technique; b) the scope of what is covered by the REL technique; and c) creative applications in making an embedded REL technique more explicit. These are explained below for each of the reflexive drivers.

Regarding autonomy, the higher-level technique (participation of companies in (re)formulating substantive details) is prescribed in the Article 8.4 of the SUPD where the 'actors concerned' are required to be involved in the (re)formulation of 'costs' relating to the EPR system. However, transpositions by France and Germany implement this in different ways. In the French transposition companies are part of a stakeholder committee responsible for a variety of decision-making tasks (Anti-Waste Law Articles 17 and 65). While Germany's transposition allows the opinions of the parties involved to be heard (i.e., of companies) but the ultimate decision-maker is Germany's environment agency, the Umweltbundesamt (draft EWKFondsG-E).

Divergences also concern the scope of decision-making relating to this higher-level autonomy technique. The legislative scope concerns participation in decision-making on costs of the EPR system, however, France also gives company's some autonomy in decision-making on standards for of reusable packaging (Anti-waste Law Article 65), product labelling (Anti-waste Law Article 17) and specifics relating EPR for fishing gear

[62] Directive 2008/98/EC on waste and repealing certain Directives [2008] OJ L 312.

(Environmental Code Article L.541-10-1 (22°)). While for Germany this decision-making extends to developing recommendations for recycling of the products (VerpackG Section 28.5 and the Contract Section 8.3) and enhancing the 'cooperation of municipalities and systems' (VerpackG Section 28.5). As shown in Table 5.8, these articles were also coded as higher-level accountability techniques (participation of third-parties) because third-parties are included in this decision-making.

Secondly, with regards to the medium-level autonomy technique (autonomous choice), the French transposition goes to great lengths to proceduralise this even though it is already embedded in market- and disclosure-based instruments. These instances in the Environmental Code are as follows: 1) Article L.541-10-4 and 5 require that '...each producer in an individual system creates a fund dedicated to finance [repair], reuse and reemploy'; 2) Article L.541-10-12 requires that producers submit 'a five year waste-prevention and improvement plan' 'individually or collectively', and; 3) Article L.541-10-12 states that 'a prevention and eco-design plan' is required by each producer. Through these examples, regulated companies are pushed to continuously reflect on the best sustainability improvements for their context, rather than leaving such autonomous choice as voluntary. Thus, France's transposition surpasses both the SUPD and German transpositions which do not have such creative applications of this embedded autonomy technique.

Lastly, with regards to lower-level autonomy (explicit options on substantive details), this is used in French and German transpositions, but the scope varies. For France, companies are given options on the placement of labelling on EPR products (Environmental Code Article L541-9-3) while for Germany options concern the type of collection system adopted (VerpackG § 14.1).

Table 5.8: Coding of REL techniques in instruments relating to SUPD Article 8 on EPR

Regulator, law and article	Scope, instrument	Autonomy			Accountability					Adjustability		
		Participation	Autonomous choice	Explicit options	Third-party participation	Public disclosure	Third-party verification	Awareness raising	Self-monitoring and reporting	External adjustments	Threat of regulation	Scheduled adjustments
EU's SUPD: Art. 8	Food and beverage containers, cups, packets and wrappers, tobacco product filters, lightweight plastic carrier bags, wet wipes (market-based)	SUPD Art. 8.4	X		Art. 8.4	WFD Art. 8a(3.e)	WFD Art. 8a(3.d)	Art. 10	WFD Art. 8a(3.d)	Art. 8.4		Art. 8.4
	Fishing gear (market-based)	Art. 8.9 Art. 5 of Directive (EU) 2019/883	X						SUPD Art. 8.8 WFD Art. 8a(3.d)		Art. 8.8	
France's Anti-Waste Law: Arts. 17 62 and 65	Packaging used to market products consumed by households or professionals, tobacco product with filters, non-biodegradable chewing gums, sanitary textiles including wipes (market-based)	Art. L.541-10 (I) Art. L.541-10-4 and 5 Arts. L.541-10-1 para. 1 and 2:	X Art. L.541-10-4 and 5 Art. L.541-10-12 Art. L.541-10-12		Art. L.541-10 (I) Art. L.541-10-1 Art. L.541-10-1 para. 1 and 2	Art. L.541-9 (VI) Art. L.541-9-1 Art. L.541-10-14 Art. L.541-10-15	Art. L.541-10 (II)	Art. L.541-10-2-1 Art. L541-15-10 Art. 24 linked to Art. L312-19 of the Edu. code	Art. L.541-10 (II) Art. L.541-10-6 (III) linked to Arts. L.541-10-13, 14 and 15	Art. L.541-10 (II) Art. L.541-10-3		Art. L.541-10 (II) Art. L.541-10-3 Art. L.541-10-3

	Fishing gear (market-based)	Art. L.541-10-1 (22°)	X			Art. L.541-10-14 Art. L.541-10-15	Art. L.541-10 (II)	Art. L541-15-10	Art. L.541-10 (II)	Art. L.541-10 (II)		Art. L.541-10 (II)
France's Anti-Waste Law: Art. 17	Packaging used to market products consumed by households covered by Art. L.541-10-1 (disclosure-based)	Art. L541-9-3	X	Art. L541-9-3	Art. L541-9-3	X Art. L541-9-3 Art. L541-9-1		Art. L541-9-3 Art. 24 linked to Art. L312-19 of the Edu. Code				Art. L541-9-3
Germany's VerpackG: §2 et al	Food and beverage containers, cups, packets and wrappers, light-weight carrier bags (market-based)	§28.4 §28.5 §21	X	§14.1	§28.4 §26.1(23) §28.5	§9.4 §14.4 §26.1.6	§8.1 §11 §17.1-2 §27	§14.3 §32. 1 KrWG §30.6(10)	§7.1 §11.1 §15.3	§26.1		
Germany's EWKFondsG-E (draft): Art. 1	To-go food containers, beverage cups and containers, plastic carrier bags with thickness under 50µm, wet wipes, balloons, tobacco product filters (market-based)	§ 23.1	X		§23.1	§7.4 §10.2	§7 §10.1		§10.1	Page 82		§13
Germany's Contract	Fishing gear (market-based)	§5.1 §8.3 §8.3	X		§5.2		§2.2 §8.2	§1.2 §3.2 §4.2 §6	§8.2	§8.3		

X = Embedded techniques, meaning they are naturally occurring in an instrument due to the nature of the instrument.

Table 5.8 above also shows the accountability techniques identified in the SUPD and national transpositions. As mentioned, Article 8.4 of the SUPD requires that 'actors concerned' participate in decision making on costs. Thus, higher-level technique (third-party participation) is present.

Next are the two medium-level accountability techniques: public disclosure of information and third-party verification. Regarding the former, the EU requires disclosure on four elements: how EPR systems meet waste management targets, details on 'its ownership and membership […] the financial contributions [...] and the selection procedure for waste management operators' (WFD Article 8a(3.e)). Transpositions by France meet these disclosure requirements. Germany's two state-led instruments, however, are lacking the requirement for disclosure on attainment of the targets, and the private regulatory contract does not contain any requirements for public disclosure.

Regarding third-party verification, the EU requires 'regular independent audits' on the financial management, compliance and quality of data collected and reported by the EPR systems (WFD Article 8a(3.d)). As shown in Table 5.8, France's two market-based instruments have this technique but it's disclosure-based instrument does not. For Germany, all three market-based instruments match the EU requirements. This coding of third-party verification also means the technique self-monitoring and reporting (lower-level accountability) is present.

The final lower-level accountability technique – awareness raising – is present in the SUPD (Article 10) and is matched by French and German implementing laws. However, a distinction between French and German transpositions concerns whether public or private entities are responsible for fulfilling this obligation. For France, the EPR system (comprised of public and private representatives) must raise awareness through labelling of EPR products (Article L541-15-10 of the Environmental Code) while other French measures for awareness raising in schools (Article 24 of the Anti-Waste Law) and through inter-sector communication (Art. L.541-10-2-1 of Environmental Code) are the responsibility of public entities. For Germany, there are some requirements for public-led awareness raising (e.g., through federal waste management plans in KrWG § 30.6(10)), but specifically for EPR is that the EPR system is required to raise awareness through labelling on beverage bottles (VerpackG § 32. 1) and inform the public on the impact of littering and prevention (VerpackG § 14.3). Furthermore, the last German market-based instrument (the Contract) gives responsibility of awareness raising measures to port operators and manufacturers (Sections 4.2 and 6).

Lastly, Table 5.8 above shows the adjustability techniques present in the SUPD. The higher-level REL technique (external adjustments) is present through requirements for costs relating to the EPR system to be developed 'by the actors concerned' in a 'cost efficient' and 'proportionate way'. Therefore, this substantive detail of the EPR regulations is not set by the regulator and can be updated more easily outside of traditional legislative procedures. This technique is matched by transpositions by France and Germany, except for France's

disclosure-based instrument relating to EPR. The medium-level adjustability technique (threat of regulation) is only present in SUPD market-based instrument for fishing gear (Article 8.8). This is not transposed in the implementing laws by France and Germany. Lastly, the lower-level adjustability technique (scheduled adjustments) was present in the SUPD's market-based EPR covering seven products. This technique is used in all of France's implementing legislation, however, for Germany, it is only present in the (draft) EPR law, EWKFondsG-E (Section 13).

5.5. Divergence and the potential of REL

Our case study of the EU's SUPD illustrates how the transposition of a legislative instrument with REL potential, is crucial in achieving that potential, and that the actual reflexivity will likely diverge depending on implementation methods. In this section, we discuss the effects of transposition on reflexive potential and how regulators can maximise this potential of laws.

The results of our study show that all REL techniques, aside from medium-level adjustability – threat of regulation – were transposed by France and Germany into their national legislation. Thus, for the most part, the potential for reflexivity in the SUPD was matched or increased through transposition. Overall, we found that France had a stronger approach to REL by utilising more techniques and doing so more creatively.

An important explanatory factor for the close match between SUPD requirements and transpositions in German and French laws is the nature of the obligations and addressees of EU directives and national implementation measures respectively. EU directives primarily place obligations on Member States, while national transpositions of such directives can, and often do, place direct obligations on private companies – the target of REL. The majority of REL techniques directly affect the actions of companies, and as such, national implementation can provide a level of detail that is not always necessary or possible in EU directives. Unsurprisingly therefore, national implementing laws are crucial for the achievement of any reflexive potential in EU directives, or more generally in international law. By extension, this also means that to earmark EU environmental law (especially when created through directives) and international environmental law more generally, as REL, national legislation that transposes and/or implements such provisions must be considered. In the absence of such an analysis, one can only speak of the reflexive potential of the legislative regime in question.

Against the backdrop of these formal differences and constrains, the first conclusion of our study is that close attention must be paid to REL techniques that do not require direct action from companies. While most techniques regulate companies' practices directly, some do not. Namely, awareness raising (lower-level accountability) usually places obligations on Member States, and accountability techniques threat of regulation and scheduled adjustments (medium- and lower-levels) concern updates to the law. Such techniques may not be transposed in the same laws that apply to companies and/or may not be transposed at all, meaning companies are not aware and affected by them. This would undermine the REL

approach envisaged by the EU regulator in its directives. Our results confirmed that the technique, 'threat of regulation', was coded twice in the SUPD (Articles 8 and 4) yet neither France nor Germany carried this technique over into implementing legislation, thereby lessening its potential to affect company reflexivity.

Our second conclusion builds on the two instances where national implementation diverged from the Directive, resulting in experimentation by the Member States and increased potential for reflexivity.[63] First, Article 4 on consumption reduction leaves the choice of regulatory instrument up to the Member States. In transposing this Article, France adopted four instruments, three of which went beyond the SUPD Article's reflexive level for autonomy while Germany adopted two instruments, one of which went beyond the Directive's reflexive level for accountability. We consider this significant because it was the only instance in the results where Germany's transposition went beyond the REL level in the Directive. From a study on the SUPD's transposition by Rethink Plastic Alliance we conclude that Germany's transposition generally does not go beyond SUPD requirements.[64] In transposing Article 4, Germany did not just copy the Directive but there was some experimentation manifesting as a stronger approach to accountability. This suggests that Member State discretion can increase the likelihood of stronger REL approaches in implementation, or at the very least, experimentation.

Second, in Article 8 of the SUPD the EU regulator used multiple, higher-level reflexivity techniques. This led to two experimental applications of REL techniques by France. First, the two market-based instruments were unique for allowing companies to participate in decision-making and having both scheduled and external adjustments. Article L.541-10 (II) of the Environmental code states that 'The eco-organizations and individual systems are approved for a maximum of six years, renewable if they [...] have the technical capacity, governance and financial and organizational means'. In other words, these eco-organisations must provide proof of their capabilities every six years to be able to renew their EPR scheme. This encourages companies to anticipate the need for continuous adjustment while giving them autonomy on the substantive details of their EPR system.

The second notable application was France's creative use of medium-level autonomy technique, which made autonomous choice of technological improvements explicit instead of just embedded. These measures established procedures to strengthen self-organization by companies in the long term, similar to CSR reporting.[65] Specifically, the measures required each producer to create a fund dedicated to financing repair, reuse, and re-employment; draft

[63] Here we refer to literature on experimentalism and case-specific learning by Member States through transposition. See C. F. Sabel & J. Zeitlin, 'Learning from Difference: The New Architecture of Experimentalist Governance in the EU' (2008) 14(3) *European Law Journal*, pp. 271-327.
[64] Overall, Germany's transposition of the SUPD was rated 'amber' meaning there was little variation beyond the requirements set out in the Directive. See Rethink Plastic Alliance, 'Assessment of European Countries' Transposition of the Single Use Plastics Directive' (2022).
[65] K. Buhmann, 'The Danish CSR Reporting Requirement as Reflexive Law: Employing CSR as a Modality to Promote Public Policy Objectives through Law' (2013) 24(2) *European Business Law Review.* pp. 187-216.

an individual or collective five-year waste-prevention and improvement plan; and draw up and implement a prevention and eco-design plan to reduce the use of non-renewable resources, increase the use of recycled materials, and improve product recyclability.[66] This helps address a fundamental flaw in regulatory instruments, where market actors tend to choose the lowest-cost option, leading to ossification and regulatory lock-in.[67] The 112roceduralization of medium-level autonomy in France's Anti-Waste Law builds potential to overcome this challenge by making it explicit rather than leaving it entirely 'to the market'. We would be cautious to suggest that such procedural elements in market-based instruments (and other instruments with the technique autonomous choice embedded) are a perfect solution to ossification as corporate monitoring and reporting must also address underlying biases in such reporting.[68] Rather we highlight that they push companies to create space to reflexivity self-organise. This increases the potential for beyond compliance and innovation and means, where suitable to the context, such CSR reporting requirements can be used to support any regulatory instrument, including the most rigid technology-based instruments.

Both scenarios led to experimentation in the transposition of REL that resulted in higher than stipulated reflexivity originally designed in the SUPD. Conversely, the French and German transpositions of Articles 5 and 7 in the SUPD were shown to diverge far less from the Directive than Articles 4 and 8. Articles 5 and 7 did not leave the choice of instrument up to Member States (unlike Article 4) nor did they utilise higher-level techniques (unlike Article 8). We believe this provides the justification for increased divergence from the Directive and stronger REL potential resulting from Articles 4 and 8, and more convergence with the Directive and less overall REL potential in transpositions of Articles 5 and 7. The EU regulator could utilise these two strategies (leaving instrument choice up to Member States and utilising higher-level techniques) to stimulate future creative applications of REL through transposition, or avoid them in cases where experimentation in transposition and reflexivity is less desired. However, in accordance with article 5(3) of the Treaty on European Union, the EU regulator must give due consideration to the proportionality principle and make sure that any restriction of Member States' competencies (e.g., on the choice of instrument) is not excessive.[69]

The final ©mplication of our study"conc'rns the balance between the reflexive drivers: autonomy, accountability and adjustability. Through several examples below, we show how a general balance between the overarching reflexive drivers addresses some of well-known issues with more specific (and less reflexive) forms of regulation.

SUPD Articles 5 and 7, nor their national transpositions, did not utilise any techniques for adjustability and only had embedded or lower-level techniques for autonomy. This decreases

[66] Environmental Code Articles L.541-10-4 and 5, and Article L.541-10-12.
[67] Livermore, n. 42 above; J. Pelkmans & A. Renda, 'Does EU Regulation Hinder or Stimulate Innovation?' (2014) 96 *CEPS Special Report*, pp. 1-13.
[68] O. Marnet, 'History Repeats Itself: The Failure of Rational Choice Models in Corporate Governance' (2007) 18(2) *Critical Perspectives on Accounting,* pp. 191-210.
[69] Consolidated version of the Treaty on the European Union [2016] OJ C 202.

the likelihood of reflexivity and, as mentioned in the case of Article 5, led to companies finding loopholes in the legislation.[70] Wider research acknowledges the link between increased adjustability and enhanced innovation by businesses,[71] but even if adjustability techniques were not considered appropriate in this context (e.g., due to a high regulatory burden of updating measures), EU regulators could have increased the level of autonomy to better integrate industry knowledge into the regulatory requirement to avoid this circumvention of the law. This example underlines a key strength of reflexive law in recognising that some technical knowledge may be in the hands of the regulatee not the regulator and how such knowledge can be incorporated into regulatory requirements to increase their effectiveness in governing complexity.[72]

Another example can be found in the new strategy for negative product labelling in SUPD Article 7, which focuses labelling on facts about the product (i.e., that they contain plastic) rather than more variable 'how-to' labels about the end-of-life management of the product.[73] However, in practice, its speedy timeline created confusion and critique from industry.[74] Increasing the balance of autonomy or adjustability would have created a pathway to facilitate reflexive feedback between regulatee and regulator to resolve issues. France's disclosure-based instrument transposing Article 8 on EPR provides a useful example of such an alternative approach; it prescribes high-level autonomy and lower-level adjustability to allow companies to participate in standardising the labels within a specific time.[75]

With regards to implementation and the balance between autonomy, accountability and adjustability, there were two key divergences between the French and German transpositions. Of those instruments that became more reflexive through national implementation (i.e., where REL techniques were not coded in the Directive but were present in Member State transpositions) Germany's transpositions predominantly focused on accountability,[76] while France focussed on autonomy.[77] These tentative conclusions are strengthened by the

[70] As mentioned, the rigid nature of Article 5 on market restrictions led to negative reflexivity whereby companies circumvented the requirements and used 'extruded' verses 'expanded' polystyrene. This loophole is being filled with more legislation, e.g., France's Extruded Plastics (draft) Decree, which creates administrative burdens for the regulator Troya, Power & Kopke, n. 61 above.
[71] Pelkmans & Renda, n. 67 above.
[72] For reference to this in reflexive law literature see Teubner, n. 12 above, p. 277; Orts n. 9 above, p. 1333.
[73] S. D. Burrows et al., 'The Message on the Bottle: Rethinking Plastic Labelling to Better Encourage Sustainable Use' (2022) 132 *Environmental Science & Policy,* pp. 109-18.
[74] O. Buchholz, 'Implementation of the Single-Use Plastics Directive or How to Create a Legislative Hotchpotch' (*European Bioplastics e.V.*) <https://www.european-bioplastics.org/implementation-of-the-single-use-plastics-directive-or-how-to-create-a-legislative-hotchpotch/> accessed 10 March 2023.
[75] "The eco-organisation […] shall ensure that the information on household packaging specifying the sorting or disposal methods for waste from the product is standardised once more than 50% of the population is covered by a harmonised system". Environmental Code Article L.541-9-3
[76] Germany had a stronger REL approach than the Directive and France using medium-level accountability techniques implementing SUPD Articles 4 and 8 (public disclosure in Table 5.5 and third-party verification in Table 5.8). The German approach was also stronger than the Directive (not France) in the use of lower-level autonomy (explicit options) implementing Article 8.
[77] France had a stronger REL approach than the Directive on five occasions all relating to autonomy techniques in Articles 4, 7 and 8. Four out of five of these were also stronger than the German approach to autonomy.

experiences with the implementation of the higher-level autonomy technique (company participation in (re)formulation) in Article 8 on EPR. In Germany, companies may participate by giving opinions, but overall decision-making is left to the state, while in France, participating companies are given a higher degree of autonomy in decision-making. This suggests that the REL approach by Germany centres more on increasing oversight on companies to build potential for reflexivity while France is more focused on giving actors autonomy as the key driver. Whether these approaches are indeed the best fit for the regulatory context of each Member State is a contextual question that goes beyond the scope of this article.

To conclude, transitioning towards a circular plastic economy requires a multifaceted approach that considers the complexities and dynamicity of the material and user characteristics of plastics. Specifically, REL techniques for autonomy, accountability and adjustability can help resolve information asymmetries between government and society and make laws more flexible in response to changing circumstances. Our case study of four articles and their corresponding regulatory instruments in the SUPD provides a detailed example of how EU law can drive the transition to circular economy through REL. This study shows that it does so by, first, building varying degrees of potential for regulatee reflexivity in the different regulatory instruments within its legislation, and second, through the effect of Member state transposition of EU directives which further shapes REL in practice. Our study confirms that the circular transition depends on the interplay between EU regulatory ambition – as expressed in the SUPD – and Member State implementation of this vision – through national implementing legislation.

Beyond plastics circularity, REL can be beneficial in the governance of any complex sustainability challenges where informational asymmetries exist and multi-faceted and dynamic governance approaches are required (e.g., biodiversity loss, marine governance, climate change, human health). Moreover, our REL framework may be transferrable to other regulatory contexts where transposition is required, including ratification processes in international law.

6

Chapter 6

Reducing the tide of single-use plastic pollution: How the EU's single-use plastic directive does (not) drive private company reflexivity

Submitted as:
V. Ross and J. van Leeuwen, 'Reducing the Tide of Single-Use Plastic Pollution: How the EU's Single-use Plastic Directive does (not) drive private company reflexivity'.

Abstract

Single-use plastics are having catastrophic effects on marine environments. However, establishing effective reduction and circularity strategies is a complex challenge which necessitates a reflexive legal approach. Through various techniques for autonomy, accountability, and adjustability, the EU's Single-use Plastics Directive 2019/904 (SUPD) builds potential for reflexivity by regulated companies. Such reflexivity helps regulators drive more transformative changes upstream to tackle plastic pollution at its source. However, it is not known when the potential for reflexivity built through legislation succeeds in driving reflexive responses that aid the transition to plastics' circularity.

Through interviews with companies who must comply with the SUPD in France and Germany, this chapter explores how reflexive law drivers: autonomy, accountability, and adjustability, affect company reflexivity. The study reveals four types of responses: negative, single-loop adaptive, double-loop reflexive and triple-loop reflexive, with single-loop adaptive and double-loop reflexive responses to the SUPD being the most prominent. However, reflexivity is inhibited by institutional, organisational and market factors. This chapter therefore concludes that better understanding of the dynamics between reflexive drivers within law(s) and the institutional, organisational and market characteristics of regulated actors is needed so that policymakers can design more effective regulations to facilitate transitioning to a sustainable circular plastics economy.

6. Reducing the tide of single-use plastic pollution: How the EU's single-use plastic directive does (not) drive private company reflexivity

6.1. Introduction

Single-use plastics make up the biggest proportion of waste in the marine environment.[1] In 2019, the European Union (EU) issued the Single-use Plastics Directive 2019/904 (SUPD) to target plastic products commonly found on EU beaches.[2] Sitting under the EU's new Circular Economy Action Plan[3] the SUPD adopts a circular approach to reduce marine plastic pollution by targeting both upstream producers as well as downstream actors, to increase reduction, reuse and recycling of regulated plastics.[4]

Though sustainability improvements, such as technical or organisational innovations, are improving possibilities for plastics circularity, the prioritisation of reduction, reuse and then recycling remains fiendishly difficult to achieve. Regulators must grapple with the great diversity and dynamicity with regards to: plastic polymers, products and supply chains; new innovations; consumer demands; and the very definition of circularity.[5] This complex nature of circularity for single-use plastics (SUPs) means the EU regulator is bound by knowledge and resource limitations[6] so must work with plastic industry actors to drive circularity forward.

However, the market is powerful and locked into the linier take-make-use economic model which is a key barrier to circularity transformations.[7] Reflexivity by companies who comply with the SUPD has great potential to accelerate the circular plastics transition. Defined as the introspective process whereby a social actor (e.g., individual, organisation or system) undergoes a process of learning and reflection on their own performance and then adapts their performance (or not), accordingly,[8] reflexivity provides a way to understand the

[1] Y. Chen et al., 'Single-Use Plastics: Production, Usage, Disposal, and Adverse Impacts' (2021) 752 *Science of The Total Environment*, article 141772.
[2] Directive 2019/904 on the reduction of the impact of certain plastic products on the environment [2019] OJ L 155.
[3] Communication on A new Circular Economy Action Plan For a cleaner and more competitive Europe, COM(2020)98 final.
[4] Ellen MacArthur Foundation, 'The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action' (2017).
[5] O. Alhawari et al., 'Insights from Circular Economy Literature: A Review of Extant Definitions and Unravelling Paths to Future Research' (2021) 13(2) *Sustainability,* 859; J. J. Klemeš, Y. Van Fan & P. Jiang, 'Plastics: Friends or Foes? The Circularity and Plastic Waste Footprint' (2021) 43(13) *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, pp. 1549-1565.
[6] G. Teubner, 'Substantive and Reflexive Elements in Modern Law' (1983) 17(2) *The Law and Society Review,* pp. 239-285, at 254-5. E. W. Orts, 'Reflexive Environmental Law' (1995) 89(4) *Northwestern University Law Review,* pp. 1227-340, at 1267.
[7] J. Kirchherr et al., 'Barriers to the Circular Economy: Evidence From the European Union (EU)' (2018) 150 *Ecological Economics,* pp. 264-72; A. Mah, *Plastic Unlimited: How Corporations Are Fuelling the Ecological Crisis and What We Can Do About It* (John Wiley & Sons 2022).
[8] J. Pickering, 'Ecological Reflexivity: Characterising an Elusive Virtue for Governance in the Anthropocene' (2018) 28(7) *Environmental Politics,* pp. 1145-66, at 1151-3; J.S. Dryzek, 'Institutions for the Anthropocene: Governance in a Changing Earth System' (2016) 46(4) *British Journal of Political Science*, pp. 937-56; Orts, n. 6 above, pp. 1254 & 1290.

potential of companies to 'question their own foundations-rather than just modify their practices'.[9] From a regulatory perspective, this reflexivity helps address knowledge and resource gaps by increasing participation to build 'more efficient and effective environmental protection'.[10] Thus, deeper understanding of company reflexivity holds potential to avoid regulatory and market lock-ins and achieve more transformative change in the plastics economy.[11]

Recent work in the field of reflexive environmental law (REL) claims various techniques in regulatory instruments build potential for company reflexivity to different degrees.[12] More broadly, these techniques fit under three reflexive law drivers: a) giving a degree of *autonomy* to regulated companies; b) building *accountability* on companies' actions, and; c) building *adjustability* into regulatory instruments.[13] However, empirical investigation into the *de facto* effects of these drivers on learning and reflexive responses by regulated companies is missing. This limits understanding of how autonomy, accountability and adjustability drive market actor reflexivity to help stimulate truly transformative change.

To fill this gap, this study aims to provide a first empirical exploration to broaden conceptual understanding of the different types of (reflexive) responses to REL and why these responses manifested. Through an explorative case study of the SUPD in France and Germany, this study applies a combined framework from ecological reflexivity and organisational learning literature to categorise responses into four innovative typologies: negative, single-loop adaptive, double-loop reflexive and triple-loop reflexive. Though one legislative act does not drive reflexivity alone, legislations are powerful tools shaping companies' sustainability trajectories.[14] The SUPD is an interesting case as its product-specific measures regulate according to different R strategies with some considered more transformative (reduction and reuse) and others less transformative (recycling). [15]

Ultimately, results showed that reflexive drivers within the SUPD do lead to learning but that single-loop adaptive and double-loop reflexive responses were the most common responses. The analysis focused on the links between autonomy, accountability and adjustability and the reflexive responses. Through this we determine where REL techniques in the SUPD did lead to reflexivity, where these links were blocked by other, contextual factors and where autonomy, accountability and adjustability beyond the SUPD drove reflexivity. The

[9] J. S. Dryzek & J. Pickering, 'Deliberation as a Catalyst for Reflexive Environmental Governance' (2017) 131 *Ecological Economics,* pp. 353–60, at 353.
[10] Teubner, n. 6 above; Orts, n. 6 above, pp. 1333 and 1336.
[11] Å. Johannessen et al., 'Transforming Urban Water Governance through Social (Triple-loop) Learning' (2019) 29(2) *Environmental Policy and Governance,* pp. 144-54, at 152.
[12] V. Ross & L. de Almeida, 'Refining Reflexive Environmental Law by Nature and Nurture: Autonomy, accountability, and adjustability' [forthcoming] *Transnational Environmental Law*, at Chapter 4.
[13] ibid.
[14] J. Similä, 'Pollution Regulation and Its Effects on Technological Innovations' (2002) 14(2) *Journal of Environmental Law,* pp. 143-160; E. Scotford, 'Legislation and the Stress of Environmental Problems' (2021) 74(1) *Current Legal Problems,* pp. 299-327.
[15] J. Kirchherr, D. Reike & M. Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 *Resources, Conservation and Recycling,* pp. 221-232, at 224.

discussion focuses on the extent to which REL in legislative acts is driving reflexivity to transform the plastics economy. Practically, these insights help to improve regulation to avoid negative responses and stimulate more reflexive responses to accelerate the circular economy transition.

The following section provides further detail on the frameworks of reflexive drivers and reflexivity. Section 6.3 then presents the case study method, followed by results on the reflexive drivers in the SUPD (Section 6.4) and reflexive responses of companies complying with measures (Section 6.5). Lastly, the results are synthesised in Section 6.6 where insights on the relationship between REL and reflexivity to maximise the transformative potential of Law to transition to plastics circularity are discussed. The chapter ends with the main conclusions in Section 6.7.

6.2. Law's potential to affect reflexivity

This study analysis the reflexivity and learning processes resulting from drivers in the law. This section expands, first, on the reflexive drivers that reflexive environmental law literature identifies, and then discusses the process of reflexivity and learning and their relevance for exploring the effects of the SUPD in France and Germany to accelerate the circular plastics transition.

6.2.1. Reflexive environmental law (REL)

As a new governance regulatory theory, reflexive law recognises the limitations of the legal system and focuses on governing mechanisms that harness the participation of regulated companies and broader societal actors (e.g., citizens, civil society) to increase mechanisms' effectiveness and legitimacy.[16] However, REL is distinct because it places the drivers of regulated company reflexivity and corresponding REL techniques at the centre of analysis. Moreover, the three drivers – autonomy, accountability and adjustability – interact and can manifest in regulatory instruments to varying degrees.[17]

The first driver, autonomy, concerns integrating companies' knowledge and resources into the regulatory approach. Letting the market 'do its thing' and decide the best technologies or other sustainability improvements helps address legal system limitations.[18] However, it is well documented that market autonomy has its limitations. For example, industry actors may focus on the easiest or most profitable innovations[19] or do the bare minimum to comply and not respond reflexively.[20] Nonetheless, companies' responses to law will always be

[16] Teubner and Orts, n. 6 above; O. Lobel, 'New Governance as Regulatory Governance' in D Levi-Four (ed), *The Oxford Handbook of Governance* (online edn, Oxford Academic 2012) <https://doi-org.ezproxy.library.wur.nl/10.1093/oxfordhb/9780199560530.013.0005> accessed 10 August 2023.
[17] V. Ross et al, 'Reflexive EU Environmental Law: Divergence in the French and German transposition of the Single-use Plastics Directive' [forthcoming] at Chapter 5.
[18] Orts, n. 6 above, pp. 1236–41.
[19] Similä, n. 14 above.
[20] M. A. Livermore, 'Reviving Environmental Protection: Preference-Directed Regulation and Regulatory Ossification' (2007) 25(3) *Virginia Environmental Law Journal,* pp. 311-86.

somewhat autonomous.[21] The REL framework helps to a) explain precisely how regulation gives the market space to address the regulated issue, and b) understand legal elements that can counteract the negative effects of market autonomy through techniques for accountability or adjustability.[22]

Accountability concerns the democratisation of society[23] and includes techniques that involve other (non-legal) societal actors in the law's formulation or implementation to pressure companies to improve their performance and make up for legal system gaps.[24] Such pressure drives reflexivity by companies through enhanced self-monitoring and disclosure and importantly, by incorporating more diverse values into decision making, i.e., social or environmental values.[25]

Lastly, adjustability, drives reflexivity by increasing the flexibility of regulatory measures. This driver seeks to address rigidity in the law which can lock-in companies to certain technologies or practices or 'lead to companies finding regulatory loopholes that do not get filled quickly'.[26] Adjustability also builds potential for reflexivity by instilling the anticipation for change in regulated companies.[27]

Legislative acts, such as EU directives, comprise various regulatory instruments. For instance, the SUPD contains a disclosure-based instrument (Article 7 on labelling), market-based instruments (e.g., Article 8 on extended producer responsibility (EPR)) and various performance-based instruments (e.g., Article 9 on the bans). Different regulatory instruments can utilise the reflexive drivers to different degrees (i.e., higher, medium, lower), through the use of eleven corresponding REL techniques which can be concretely identified in regulatory instruments.[28] Table 6.1 below shows which techniques correspond to each driver and how the different techniques have a greater or lesser influence on driving reflexivity in private companies. For further elaboration on these techniques we refer to Ross and de Almeida.[29]

[21] L. B. Edelman, 'Legal Ambiguity and Symbolic Structures: Organizational Mediation of Civil Rights Law' (1992) 97(6) *American Journal of Sociology,* pp. 1531-1576.
[22] Ross & de Almeida, n. 12 above.
[23] J. Habermas, *Theorie Des Kommunikativen Handelns* (Suhrkamp 1981).
[24] Teubner, n. 6 above, p. 273.
[25] Ross & de Almeida, n. 12 above; P. Selznick, 'Self-Regulation and the Theory of Institutions' in G. Teubner, L. Farmer & D. Murphy (eds), *Environmental Law and Ecological Responsibility: The Concept and Practice of Ecological Self-Organization* (John Wiley & Sons Ltd 1994).
[26] Ross & de Almeida, n. 12 above.
[27] D. D. Hirsch, 'Green Business and the Importance of Reflexive Law: What Michael Porter Didn't Say' (2010) 62(4) *Administrative Law Review,* pp. 1063-1126, at 1096.
[28] Ross & de Almeida, n. 12 above.
[29] Ross & de Almeida, n. 12 above.

Table 6.1: Potential of REL techniques for driving private company reflexivity for sustainability[30]

Potential to drive reflexivity for sustainability	Reflexive environmental law (REL) techniques for each reflexive driver			
	AUTONOMY	ACCOUNTABILITY		ADJUSTABILITY
Higher ⇧	**Participation in (re)formulation** of substantive details in the law	**Third-party participation in (re)formulation** of substantive details in the law		**External adjustments** to substantive details in the law
Medium ⇨	**Autonomous choice** of technical improvements	**Third-party verification** on decision-making or performance	**Public disclosure** on decision-making or performance	**Threat of regulation** on regulated issue
Lower ⇩	**Explicit options** on substantive details in the law	**Awareness raising** on regulated issue		**Scheduled adjustments** to substantive details in the law
		Self-monitoring and reporting on decision-making or performance		

* Higher-, medium- and lower-levels are designated according to the potential of the REL technique to drive reflexivity in regulated companies regarding their sustainability performance. More potential makes for a higher level.

6.2.2. Reflexive responses

Though a concept deeply rooted in sociology [31] and environmental sociology, [32] what reflexivity is and how to measure it is still evolving. [33] In sustainability scholarship, definitions refer to an actor's capacity to undertake an introspective process comprising self-reflection on performance and (non)improvements to that performance. [34] Rather than emphasising capacity, we focus on the learning process which according to Pickering is broken down into three stages: 1) *recognition* of impacts through awareness, monitoring, and anticipation; 2) *rethinking* to learn from past experiences, critique core values and practices, and envision possible futures, and; 3) *response*, comprising changes to practices and processes or core aims (e.g., business strategies), values and discourses.[35]

Pickering asserts that reflexivity requires cognitive or conscious effort which is why the first two stages (recognition and rethinking) involve active learning.[36] The final action-orientated stage (response) is only conscious (and reflexive) when recognition and rethinking takes place. Hence, not all responses are reflexive; some are merely automated.

[30] Ross & de Almeida, n. 12 above.
[31] N. Luhmann, 'Selbstreflexion Des Rechtssystems. Rechtstheorie in Gesellschaftstheoretischer Perspektive' [1979] *Rechtstheorie,* pp. 159-185; n. 22 above.
[32] A. Giddens, U. Beck & S. Lash, *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order* (Stanford University Press 1994).
[33] M. Lynch, 'Against Reflexivity as an Academic Virtue and Source of Privileged Knowledge' (2000) 17(3) *Theory, Culture & Society,* pp. 26-54.
[34] Dryzek & Pickering, n. 9 above.
[35] Pickering, n. 8 above.
[36] Ibid, p. 1150.

To more accurately define and identify these learning stages of reflexivity and build a typology of responses we follow van Leeuwen et al (this special issue) and merge Pickering's framework with a framework on single-, double- and triple-loop learning from Argyris and Schön.[37] Single-loop-level responses relate to situations that can fit into existing patterns and schemes. Thus, regulations that do not conflict much with existing business practices/strategies are likely to lead to these responses. Though the most common form of learning[38] they are only adaptive because they do not exert the cognitive/conscious stages of reflexivity. Responses are automated without proper assessment of alternatives or exploration into new knowledge bases. This connects to what Hillman and Hitt describe as transactional responses, as opposed to relational.[39]

Next, double-loop learning often stems from new situations that are difficult to fit into existing patterns and schemes.[40] This means they require longer-term thinking. Related responses are reflexive because, although still based on error detection and correction.[41] They are not automated but follow from conscious/cognitive learning processes. Indicators of recognition and rethinking include monitoring and assessment of status quo impacts against new options and new knowledge bases for companies (e.g., through new assessment tools, such as life cycle analyses (LCA), or through collaboration/decision-making with other actors). It is assumed that these new knowledge bases reframe existing assumptions/norms/values which spark changes to guiding objectives/goals/policies.[42] However, there is no conscious reflection on underlying assumption/norms/values.[43] Thus, signs of double-loop reflexivity would be learning related to technological/administrative information needed to evaluate existing goals.

Lastly, responses at the triple-loop level also require cognitive/conscious learning making them reflexive. Argyris and Schön term this 'meta learning' at it concerns reflection and conscious changes to guiding norms, values and paradigms that underpin single- and double-loop learning.[44] Signs of this response include data collection and assessments of decision-making processes relating to single- or double-loop levels and/or updates to these processes.[45]

[37] C. Argyris & D. A. Schön, *Organizational Learning: A Theory of Action Perspective. Reading, MA: Addison-Wesley* (Addison-Wesley 1978).
[38] Johannessen, n. 11 above.
[39] A. J. Hillman and M. A. Hitt, 'Corporate Political Strategy Formulation: A Model of Approach, Participation, and Strategy Decisions' (1999) 24 *The Academy of Management Review*, pp. 825-842, at 829.
[40] Johannessen, n. 11 above.
[41] Ibid.
[42] Ibid.
[43] P. Tosey, M. Visser & M. N. K. Saunders, 'The Origins and Conceptualizations of "Triple-Loop" Learning: A Critical Review' (2012) 43(3) *Management Learning,* pp. 291-307.
[44] Ibid; Argyris & Schön, n. 37 above.
[45] Argyris & Schön, ibid; Johannessen, n. 11 above.

The last response we distinguish are negative responses to legislation, defined as instances where companies circumvented requirements or adopted less-circular practices in response to the regulatory instrument.

Distinguishing reflexive double- or triple-loop responses from automated single-loop ones is vital for understanding the extent that economic actors are progressing towards circularity. Currently, companies operate within the existing linier economic system, but the circular economy vision requires a transformation of this system to reduce natural resource use and eliminate waste. The framework distinguishes between smaller steps to the circular economy, recently termed by industry as 'circular-ish' innovations;[46] and bigger steps, e.g., new business strategies that indicate changes to industry goals or the values and assumptions underlying these. Recognizing these distinctions helps grasp society's trajectory towards circularity.

6.3. Methods

This chapter is based on a case study of responses to the SUPD and its transposition laws in France and Germany. It uses an explorative case study approach to study the phenomenon of how REL drives reflexive responses in regulated companies to accelerate plastics circularity. The SUPD and interviews with regulated companies who comply with the Directive provides a snapshot of this phenomenon to delve into the nuances of REL's effect on reflexivity.[47] In addition to the SUPD itself, we also reviewed national transpositions of the SUPD by France and Germany. This is necessary because EU directives must be transposed into Member State legislation meaning these national laws affect companies' actions. France and Germany were selected not only for their importance as producers and consumers of plastics in the EU, but also due to their varied approaches in transposing the SUPD into national law [48]. Rather than an in-depth comparative case study, this variation facilitates a broader understanding of the ways in which REL can affect company reflexivity.

Qualitative data were collected from May 2022 to September 2023 from two sources: an analysis of the SUPD and relevant policy documents and semi-structured interviews. First, the legal analysis followed on from a REL review of four instruments in the SUPD based on their framework described in Section 6.2.1.[49] The detailed review of three other SUPD instruments – caps and lids, recycled content, collection – and corresponding transpositions by France and Germany are included as supplementary material. To obtain the averages of REL in the SUPD and French and German transpositions, we shifted the three-point scale

[46] Ellen MacArthur Foundation, 'Circular-Ish: Embracing the Messy Reality of Circular Economy Innovation' (2022) <https://ellenmacarthurfoundation.org/articles/circular-ish-embracing-the-messy-reality-of-circular-economy-innovation> accessed 28 March 2023.
[47] A. Bryman, *Social Research Methods*. 4th edn, (Oxford University Press 2012).
[48] Rethink Plastic Alliance, 'Assessment of European Countries' Transposition of the Single Use Plastics Directive' (2022) <https://rethinkplasticalliance.eu/wp-content/uploads/2022/09/SUP-Implemetation-Assessment-Report.pdf> accessed 12 December 2023.
[49] V. Ross et al., 'Reflexive EU Environmental Law: Divergence in the French and German transposition of the Single-use Plastics Directive' [forthcoming] at Chapter 5.

(lower-, medium- and higher-level REL techniques described in Section 6.2.1) to a five-point scale. Also, in instances where two categories of techniques were identified in one instrument (e.g., lower and higher) the higher technique was coded.

In addition, a review of broader policy framework for plastics circularity in the EU and case study countries was undertaken to provide context. This included CE plastics policy documents in the EU, France and Germany. Documents and regulations were reviewed in English using DeepL translation software where necessary.

Semi-structured interviews[50] enabled understanding of companies' responses to the law. This comprised 17 anonymous interviews with companies who comply with SUPD requirements in France and Germany and eight experts who assisted these companies in meeting compliance requirements, such as consultancy businesses and policy officers working on SUPD implementation. A list of interviewee sample data is presented in Table 6.2 below. All interviews were held in English and followed a protocol that explored (a) companies' object of learnings with regards to circularity (e.g., objectives/goals or decision-making procedures), (b) effects of specific measures in the SUPD on these, and (c) effects of other governance elements on their circularity trajectories. Interviews were obtained using online sources (e.g., LinkedIn, Google) and through snowballing methods. Written consent was obtained for all participants.[51] Most interviews were digitally recorded and transcribed for analysis but four with retailers in France were manually recorded through notetaking. Data analysis comprised exploratory exercises to summarise and code concepts in the interviews (via word and excel) from fields of ecological reflexivity and organisational learning (Section 6.2.2). This resulted in the iterative development of the four categories of responses presented in Section 6.2.2.

[50] Bryman, n. 47 above.

[51] We confirm that the topic of research was not of a sensitive nature and that anonymous interviewees are not exposed to physical, emotional, social, political or legal risks by participating in this research. As a result, this research did not require ethical approval according to the guidelines of the Wageningen University's Social Sciences Ethics Committee.

Table 6.2: Sample data from interviewees

ID	Category	Core product(s)	Interviewee role in company	Relevant SUPD measures (N/A if no direct link applies)	Interview methods (in person location /online, date)
D1	Distributor	SUPs	1. General and Sales Manager 2. Purchasing and Logistics Manager	Reuse, bans, labelling, EPR	Germany, March 2023
D2	Distributor, sourcer, manufacturer	SUPs	Sustainability R&D Manager	Reuse, bans, labelling, EPR	The Netherlands, April 2023 and online interview April 2023
M1	Manufacturer	SUPs	Sales	Reuse, bans, labelling, EPR	Online, March 2023
M2	Consultancy, manufacturer	Reusable packaging	Co-Founder	Reuse	Online, March 2023
M3	Manufacturer	SUPs	R&D	Bans, caps & lids, recycled content	Online, May 2023
M4	Manufacturer	SUPs, food & beverage, cosmetics, household	R&D	Bans, labelling, EPR, caps & lids, recycled content, collection	Online, April 2023
M5	Manufacturer, retailer	Food & beverage	Global Sustainability R&D Manager	Reuse, caps & lids, EPR, recycled content, collection	Online, May 2023
M6	Manufacturer	SUPs, food & beverage, cosmetics, household	Global Sustainability R&D Manager	Bans, labelling, EPR, caps & lids, recycled content, collection	Online, June 2023
M7	Manufacturer retailer	Food & beverage	Sustainability R&D Manager	Reuse, caps & lids, EPR, recycled content, collection	The Netherlands, June 2023
M8	Manufacturer	SUPs, food & beverage, cosmetics, household	Global Corporate Affairs Manager	Labelling, EPR, caps & lids, recycled content, collection	Online, Sept 2023
A1	Industry association	SUPs	1. Communications Manager 2. Communications	Caps & lids, recycled content, EPR, collection	Online, July 2022
A2	Industry association	Food & beverage	Communications	Caps & lids, recycled content, EPR, collection	Online, May and July 2023
A3	Industry association	Beverages	Advisory and Communications Manager	Reuse, caps & lids, EPR, recycled content, collection	Online, June and July 2023
R1	Retailer	Food & beverage	Owner	Reuse, bans	France, May 2023
R2	Retailer	Food & beverage	Owner	Reuse, bans	France, May 2023
R3	Retailer	Food & beverage	Server	Reuse, bans	France, May 2023
R4	Retailer	Food & beverage	Server	Reuse, bans	France, May 2023
Supplementary interviews					

P1	Plastics Policy	Knowledge	EU circular economy policy	All	Online, May and June 2022
P2	Plastics policy	Knowledge	EU circular economy policy	All	Online June 2022
C1	Consultancy	Knowledge	Sustainability advisor	N/A	Online, May 2022 and June 2022
C2	Consultancy	Knowledge	Sustainability advisor	N/A	Online, June 2022
C4	Consultancy	Knowledge	R&D manager	N/A	Online, June 2022
C3	Consultancy	Knowledge	Packaging advisor	Reuse, collection, recycled content	Online, June 2022
C5	Consultancy	Knowledge	Product passport software expert	Reuse	Online, May 2023
T1	Tech researcher	Knowledge	Plastics circularity researcher	N/A	Online, June 2022

6.4. Reflexive drivers in the single-use plastics directive (SUPD)

This section explains the seven regulatory instruments in the SUPD and presents averages of the REL review of these instruments and corresponding French and German transpositions. These averages form the base to understand and test effects of the reflexive drivers – autonomy, accountability and adjustability – in the legal framework.

Aiming to reduce marine plastic pollution, the SUPD contains various articles that affect different SUP products and come into force at different dates. These articles are categorised into the following seven key instruments:

Reuse:	Ambitious and sustained reduction in takeaway food and beverage containers from 2022-2026 (Article 4)
Bans:	Market restrictions on various SUP products (including cotton bud sticks, cutlery, plates) by 2021 (Article 5)
Caps & lids:	Caps and lids must remain attached to drinks containers and bottles of up to 3 litres by 2024 (Article 6)
Recycled content:	Plastics bottles made of PET must contain 25% recycled plastic by 2025 (Article 9), and all plastic bottles to contain at least 30% recycled material by 2030 (Article 6)
Labelling:	Various products (e.g., cups, wet wipes, sanitary pads) must display ‘product contains plastic’ labels highlighting disposal methods and environmental risks, by 2021 (Article 7)
EPR:	Various products (e.g., food and beverage containers, wet wipes, fishing gear, bottles) to sign up to extended producer responsibility (EPR) schemes in accordance with the Waste Framework Directive (2008/98/EC) by 2024 (Article 8)
Collection:	25% of bottles to be separately collected by 2025, increasing to 90% by 2029 (Article 9)

Table 6.3 below shows the averages of the SUPD REL review and corresponding regulations in France and Germany. This enables an overall assessment on the extent each instrument builds potential for the market to 'do its thing' (autonomy), 'internalise wiser societal values' (accountability) or 'anticipate changes' (adjustability).

Table 6.3: Averages of reflexive drivers in SUPD instruments and corresponding French and German transpositions

SUPD instrument	Averages of REL in the Directive and Member State transpositions		
	Autonomy	Accountability	Adjustability
Bans			–
Labelling			–
EPR			
Recycled content		–	
Collection			
Caps and lids			–
Reuse			–

Key:	
Higher potential	
Medium potential	
Lower potential	
No techniques	–

Broadly speaking, all instruments have at least a medium-level autonomy, meaning companies were all free to choose specific technologies to adopt and in some cases were able to participate in the (re)formulation of regulatory measures. Accountability and adjustability techniques are more varied. For accountability, one instrument (recycled content) has no techniques, but three instruments had higher-level techniques which involved third-parties in the (re)formulation of regulatory measures (EPR, caps and lids, collection). The medium-level technique public disclosure is included in the labelling and EPR instruments. Adjustability was the least present driver with lower-level techniques (scheduled adjustments) being present in recycled content and collection instruments, higher-level techniques (external adjustments) included in EPR, and no medium-level techniques (threat of regulation) identified.

Most instruments transposed by France and Germany had the same degrees of autonomy, accountability, and adjustability as the Directive. However, instruments for collection and reuse had some minor variations (indicated by the slanted arrows in Table 6.3).

6.5. Company responses to the SUPD

Table 6.4 below shows the four categories of responses to the SUPD instruments. First, negative responses are instances where companies circumvented requirements or adopted

less-circular practices in response to the regulatory instrument. Second, single-loop adaptative responses were not preceded by the conscious/cognitive stages of learning (recognition and rethinking). Ultimately these are situations where companies did not go beyond basic compliance requirements. Lastly, double- and triple-loop reflexive responses were preceded with recognition and rethinking. These were often linked to new knowledge bases, while triple-loop responses relate to long-termer strategies/thinking by companies.

In addition, interviews revealed that double-loop responses to the instruments for collection and recycled content were linked. This was because the incorporation of recycled content into a product is only possible and economically viable so long as high-quality plastics are collected, sorted and recycled (A1, A2, A3).

The next section explores, first, how these responses were affected by autonomy, accountability and adjustability drivers in the SUPD instrument; second where the effects of these reflexive drivers were disrupted due to other, contextual, factors and; third, where reflexive drivers stemming from the broader legal and market environment (i.e., market competition, consumer pressure, other law/policy) stimulated reflexivity.

Table 6.4: Company responses to each SUPD instrument

<table>
<tr><th rowspan="2">Instrument</th><th colspan="4">Responses</th></tr>
<tr><th>Negative</th><th>Single-loop adaptative</th><th>Double-loop reflexive</th><th>Triple-loop reflexive</th></tr>
<tr><td>Labelling</td><td>Product characteristics adjusted (with no/low SUP reduction) to fall outside regulatory scope.</td><td>SUP label added to products.</td><td>–</td><td>–</td></tr>
<tr><td>Bans</td><td>Marketing labels or product characteristics adjusted (with no/low SUP reduction) to fall outside regulatory scope.</td><td>Alternative materials used for the same product. Production discontinued.</td><td>Alternative materials used/explored for the same product through new knowledge bases.</td><td>–</td></tr>
<tr><td>EPR</td><td>–</td><td>EPR tax paid in accordance with Waste Framework Directive (WFD).</td><td>–</td><td>–</td></tr>
<tr><td>Caps & lids</td><td>–</td><td>Designs for caps and lids altered through new knowledge base.</td><td>Designs for caps and lids altered through new knowledge base.
Caps and lids removed.
Consumers educated about regulatory requirements</td><td>–</td></tr>
<tr><td>Recycled content</td><td>–</td><td>Recycled plastics (PET) used in SUP bottle production.</td><td rowspan="2">SUP bottle collection and recycling systems explored through new knowledge base.
New business models explored to reduce SUP bottles, e.g., bulk supply.
Industry goal for recycled content in SUP bottles adjusted to 100%.</td><td rowspan="2">–</td></tr>
<tr><td>Collection</td><td>–</td><td>–</td></tr>
<tr><td>Reuse</td><td>Existing reuse strategy discontinued as not</td><td>Portfolio expanded to</td><td>New business models explored to supply core</td><td>New decision-making policy explored to</td></tr>
</table>

	included in regulatory scope.	include reuse items.	product differently (e.g., bulk supply).	increase approval of riskier but long-term sustainability innovations.

6.5.1. Driving reflexivity through SUPD instruments

The analysis reveals a relationship between the presence or lack of REL techniques and responses by regulated companies. All instruments had at least a medium level of autonomy, meaning specific technologies were not prescribed but companies could experiment/decide themselves. As each instrument had multiple responses, we cannot draw a direct link between the autonomy techniques and the response, yet those reflexive responses relating to technologies would not have been possible without this autonomy. For instance, though most responses to the bans were single-loop adaptive, some companies took the initiative to establish new knowledge bases to develop non-plastic alternatives for the banned products, e.g., through using decision-making tools such as the 10R framework, LCA and the snail model from the Ellen MacArthur Foundation or through collaboration with the local technical university. Also, for caps & lids which had a higher level of autonomy and more double-loop responses than the bans, companies investigated a whole host of technical options, including designing themselves out of the regulation by removing the caps & lids completely (M7). The ongoing, explorative responses showed signs of recognition and rethinking and would not have been possible if no autonomy was allotted in the instruments.

We also see a link between the reflexive responses and instruments that balanced higher-level autonomy with higher-level accountability techniques. These techniques created spaces for mutual learning as companies and third-parties were obliged to work together to formulate substantive details of the instrument. Specifically, caps & lids required new industry standards developed, with input from companies and third-parties, to ensure caps & lids stay attached to beverage containers. To avoid being forced into a standard that didn't suit their products, companies engaged in recognition and rethinking by exploring options, e.g., numerous innovation trails and assessments, and an attempt to over comply by removing the caps entirely (M7). For the collection instrument, companies helped formulate the bottle collection system through participation in various consultations and regular evaluations to assess different options.[52]

The interaction between the instruments for collection and recycled content meant higher-level autonomy and accountability techniques in the collection instrument transferred to the recycled content instrument. In addition, upstream manufacturers and downstream waste experts took part in the consultation and evaluation procedures to help raise and address various linked challenges with meeting the compliance obligations, such as health-related issues associated with using recycled plastics in certain products (M7, A2, A3). Such cross-

[52] ADAME, 'Réduction, Réemploi et Recyclage Des Emballages Ménagers: L'ADEME Présente 8 Nouvelles Études' (ADEME Presse, 2023) <https://presse.ademe.fr/2023/06/reduction-reemploi-et-recyclage-des-emballages-menagers-lademe-presente-8-nouvelles-etudes.html> accessed 10 August 2023.

sectoral collaboration was previously a rare occurrence (D2, M7). These higher-level REL techniques exposed companies to new knowledge bases and stimulated mutual learning which expanded companies' compliance options.

Adjustability was the least prominent driver in the SUPD (see Table 6.4), but the results show that the lower-level technique (scheduled adjustments) in recycled content fostered a reflexive response by building anticipation for regulatory changes. The instrument had adjustable targets of 25% recycled plastic content in PET bottles by 2025 and 30% recycled content for all bottles by 2030. Companies not only aimed for the higher target but have gone beyond this, aiming for an (unofficial) industry target of 100% recycled content (A1, A2, M5, M6). This was because many industry front-runners already had low virgin-plastic targets, so the SUPD tied to existing market competition. Moreover, future policy to strengthen recycled content was anticipated so it was more economical to aim higher then fall behind later (M6, A2).

6.5.2. Contextual disruption to reflexivity

While a relationship exists between REL techniques and reflexive responses, the results also show that this is not always a one-to-one relationship. The results point to various contextual factors that inhibit the translation of autonomy, accountability and adjustability within the SUPD into reflexive responses by companies. The example of EPR highlights this as it contained many techniques (including higher-level ones) which should have stimulated reflexivity. However, responses were only adaptive with companies signing up to pay the waste management fee rather than exploring recycling or even reuse options.[53]

The broader regulatory context beyond the SUPD meant that the higher-level techniques for EPR in the SUPD did not drive reflexivity as expected. Specifically, the REL review of EPR (Section 6.4) predicted that companies would participate in formulating the EPR system (higher-level autonomy) also with third-parties (higher-level accountability) to stimulate company reflexivity. However, because the EPR system was already established by the EU's Waste Framework Directive (2008/98/EC) (WFD),[54] in practice, no such participation occurred and reflexivity was not stimulated. Higher-level adjustability (external adjustments) was also identified in the REL review for EPR. This technique was predicted to drive reflexivity by building anticipation in companies for continuous adjustments to the EPR system. This is because the administrative management of the EPR system is external to the legislative system so it is quicker and easier to adjust then traditional regulations. However, in practice, respondents commented on the closed and rigid nature of the EPR system (D1,

[53] Reflexive responses were observed for only two products regulated under EPR but this was, according to respondents (D1, D2, M5, M6, A2, A3) in response to collection and recycled content instruments (for bottles) and reuse instrument (for takeaway containers). These respondents made a clear distinction between compliance with EPR and these other instruments.
[54] Directive 2008/98/EC on waste and repealing certain Directives [2008] OJ L 312.

D2, P1). This meant they had no anticipation that the system would adjust, and any chance of reflexivity was blocked.

Second, the public disclosure technique (medium-level accountability) was identified in EPR and labelling requirements. Instead of pressuring regulated companies to reflexively enhance circularity, information requested did not match company contexts and no reflexivity manifested. Specifically, for EPR, only confirmation of company participation in the EPR system was disclosed which, according to one interviewee, did not affect circularity strategies and may even look good for marketing (D2). Here, disclosed information didn't align with the context needed to compel companies to be more responsible for litter. For the labelling instrument, companies spoke of the necessity of products (e.g., sanitary products, or to-go coffee cups) and the fact many regulated companies were 'face-less' brands (D1, D2, P1, P2). As one policy officer put it: 'do you know the name of the company making disposable cups for your office? No' (P2). This illustrates that public disclosure is unlikely to stimulate consumer pressure to drive company reflexivity in contexts where the company is not consumer facing and/or where the social need for a product is high.

Without these techniques working, the option to pay the EPR tax compared to more circular take-back schemes became too attractive and labelling requirements became another tick-box compliance procedure. Thus, companies responded in a short-term transactional way, rather than undertaking longer-term, reflexive learning processes.

Lastly, companies' core product, or primary source of revenue, is important as it indicates ties to single-use business models. Data shows a greater breadth of exploration in the cognitive/conscious stages of learning among companies whose core products are food/beverage/household/cosmetic items inside SUPs (rather than SUP packaging/product itself). These non-SUP companies are less dependent on disposability as a business model which expanded their consideration of alternatives beyond single-use in the rethinking learning stage. For instance, beverage manufacturers explored alternative means of supply, e.g., bulk packaging or fountains (M5, M6, A3). This wider scope of exploration was based on critiques and changing assumptions about 'risky' single-use models, also indicating a greater depth of rethinking. Alternatively, companies relating to SUPs themselves, focused on alternative products and materials under the single-use model, even in cases of reflexive responses. For example, one SUP company started a reflexive collaboration with a local university but focused on alternatives to polystyrene takeaway boxes (D1). Despite the lack of exploration beyond existing business models, SUP companies acknowledged the end-of-life impacts of their reusable and compostable alternatives (D1, D2, M1). Thus, the SUPD was diverting SUP companies away from one problem and towards another. Moreover, we observed that companies who intentionally loopholed around compliance requirements were

SUP companies.[55] This indicates a link between negative responses and companies whose core product/business model is more tied to the regulated issue.

6.5.3. Drivers beyond the SUPD

Finally, the analysis shows how reflexive drivers not only in the SUPD, but also within the market, and from society or policy change more generally, contributed to the reflexivity observed. Autonomy drivers beyond the SUPD are private regulation or other market forces that drive reflexivity on related SUP products. A previous example highlighted the new unofficial industry standard for 100% recycled content for SUP bottles which, though linked to adjustable targets in the SUPD, cannot be directly attributed to it. Instead, front-runner companies targeted the highest percentage possible (A2, A3, M5, M8) which spiralled into an unofficial industry-wide goal as companies did not want to risk falling behind (A2). Market competition also had the reverse effect, i.e., driving negative responses. For example, one company responded negatively to the SUPD by halting their reuse strategy because their products were not included in the scope of the reuse instrument. For this company, continuing with the reflexive development of their reuse strategy was too great a risk, as they did not want to stick out from the crowd (M6). Here, the lack of policy support did not raise the bar and the market competition necessary to drive reflexivity was missing.

The results also reveal that consumer pressure was an accountability driver on its own. The only example of triple-loop reflexivity came from a Multi-National Corporation (MNC) (M5) who had to comply with five different instruments (reuse, caps and lids, EPR, recycled content and collection). When asked if the triple-loop response (changes to internal R&D decision-making policy) could be directly attributed to the SUPD, the respondent said that it was not the only driver. Another was accountability from citizens and civil society. In their words: 'as good corporate citizen we must demonstrate that we deliver against our commitments and also show pro-activity in various areas' (M5). Here accountability is an integral part of the corporate conscience[56] and links to the REL technique awareness raising which drives reflexivity though building recognition in companies that consumer preferences for greater circularity are likely to increase in the long-term.

Secondly, this triple-loop reflexive response was affected by adjustability in broader policy and societal norms beyond the SUPD. The company (M5) stated that frustration with in-house R&D decision making also stemmed from awareness of fast-moving changes to consumer demand and broader policy visions, stating: '…we have to adapt to the changing environment' (M5). Another MNC commented on adjustability between the different Member State approaches, and how the company had adopted the most stringent measures from France due to anticipation that these would become EU wide standards (M6). We also found that adjustability shows potential to drive negative responses which detract from reflexivity. France's targets were considered by industry as too high and at times conflicting

[55] See negative responses to the labelling and bans in Table 6.4.
[56] Selznick, n. 25 above, p. 398.

and assessments to prove this were underway. This indicated that lobbying to adjust the targets downwards may be detracting from reflexive responses to actually meet them (A1, A2). Nonetheless, many respondents were focused on upcoming regulatory adjustments, e.g., upcoming EU packaging regulations or reuse more generally, which were directing their learning and circularity strategies moving forward (D2, D5, C5, M6, M7).

6.6. Discussion

This paper explored the effects of the reflexive drivers – autonomy, accountability and adjustability – on the reflexivity of companies who comply with the SUPD through a case study of companies in France and Germany. The results show that all four types of responses were identified, with multiple responses to the same instrument, sometimes even within one company. Moreover, results show that autonomy, accountability and adjustability embedded in the SUPD did affect reflexivity to different degrees depending on the strength of the REL techniques. In particular, the combination of higher-level autonomy and accountability techniques in the caps & lids and collection (also linked to recycled content) instruments stimulated reflexivity. Additionally, there was a connection between the lower-level adjustability and accountability techniques (scheduled adjustments and awareness raising) in building anticipation in companies for increasingly stringent circular policy directions and consumer preferences in the future. This anticipation contributed to reflexive learning focused on developing more long-term planning and innovation strategies. However, the analysis shows that there is no one-to-one relationship between the REL techniques and the response as contextual and other factors affected the response, either enhancing or blocking effects of the REL techniques. In this section, we discuss three theoretical implications for understanding the relationship between REL and reflexivity.

First, the results reveal another regulatory driver of reflexivity beyond the framework of REL techniques. This is the broader vision and policy aim that the instrument seeks to implement. Instruments setting a trajectory for companies towards future technologies or systems (e.g., reuse, caps and lids, collection, and recycled content) stimulated more cognitive/conscious learning to rethink company goals and objectives, than instruments regulating existing ones (e.g., bans, labelling, and EPR). In the analysis, the reuse instrument had the most circular (highest R-strategy) future-orientated vision, the widest reach in terms of companies it affected, and the greatest variation in responses. The regulator can build reflexive parts of the law, but if the vision/goal is not a strong enough ‘change agent’ then company reflexivity may be limited.[57] This highlights Law’s role as a boundary setter and considers the problem known as ossification where companies do not go beyond minimum requirements.[58] The scope of inclusion in the vision boundary is also important as shown by the example of a negative response by a company not included in the scope of the reuse instrument. We propose such ‘visions of future technologies or systems’ to be a new higher-level adjustability

[57] J. P. Voss, D. Bauknecht & R. Kemp (eds), *Reflexive Governance for Sustainable Development* (Edward Elgar 2006), p. 422.
[58] Livermore, n. 20 above.

REL technique (to incorporate into Table 6.1). These build anticipation in companies for continuous progress towards a long-term policy goal which forces companies to focus learning efforts on a future trajectory.[59] Moreover, these visions could focus less on individual circularity goals and more on transforming the market itself to address deeper-rooted barriers to circularity[60] and focus reflexive learning on the assumptions/norms/values underpinning business.

Second, understanding the way in which REL drives reflexivity requires not just the analysis of individual instruments and the degree of autonomy, accountability and adjustability these contain. The results show how interaction taking place between instruments and laws also fosters reflexivity. Reflexivity is sometimes a response to a combined set of instruments or laws, rather than one. For example, connection between collection and recycled content instruments meant the REL techniques and their effects carried over. Here, the higher-level autonomy technique brought stakeholders from different parts of the value chain together to find a solution to the compliance challenges. Production and waste sectors were brought together to reincorporate waste back into production[61] but beyond this, mutual learning about conflicts between requirements for recycled content and health and safety rules for SUP beverage bottles was stimulated (A1, A2). Thus, this REL strategy addressed 'obstructing laws and regulations' which is a key barrier to circularity.[62] The higher-level autonomy technique combined with this smart regulatory mix brought different industry actors together to account for the variation in market actor contexts; maximising the chance of mutual learning and a positive effect (i.e., reflexivity).[63] Another example is the connection between EPR in the SUPD and WFD which blocked the predicted reflexivity from manifesting. Moreover, harsher legislation in France and upcoming packaging regulations in the EU built anticipation which drove reflexive learning as companies wanted to keep up with the changing times. Therefore, although REL takes a systems-thinking view and acknowledges the broader governance network,[64] the analysis shows how REL reviews of legislation must move beyond the boundaries of one law and understand how interconnections between regulations affect the drivers of reflexivity.

Third, responses to the SUPD differ across companies, which brings up the question whose reflexivity is being driven. Results indicate that characteristics of companies matter, such as the size, the role of motivated individuals, whether a company is consumer facing or not and their core product/source of revenue. This is in line with institutional perspectives recognising that context shapes companies' sustainability responses generally and,

[59] N. 26 above, pp. 1083-4.
[60] K. Hobson and N. Lynch, 'Diversifying and De-Growing the Circular Economy: Radical Social Transformation in a Resource-Scarce World' (2016) 82 *Futures,* pp. 15-25; Mah, n. 7 above.
[61] Kirchherr, n. 15 above.
[62] Kirchherr, n. 7 above.
[63] N. Gunningham & D. Sinclair, 'Smart Regulation' in P. Drahos (ed), *Regulatory Theory* (ANU Press 2017).
[64] Orts, n. 6 above, p. 1232.

specifically, in response to reflexive law.[65] Well-known consumer-facing brands tend to be more concerned with societal and market pressure to live up to their commitments and develop more circular business models. For these companies, REL techniques relating to citizens are important drivers (e.g., public disclosure and awareness raising techniques). On the other hand, non-consumer-facing SUP companies did not respond to such pressure but are responsive to the threat of regulation (medium-level adjustability) and participation in formulating details of the regulation with pressure from third-parties (higher-level autonomy and accountability). Additionally, larger MNCs were reflexive at the organisational level through ongoing procedures for sustainability (and in one case, triple-loop reflexive changes to the procedures), while for smaller SUP companies, reflexivity seemed to be instigated by key passionate individuals who established new knowledge bases which shaped circularity strategies.

6.7. Conclusion

This chapter assesses a legal solution to the root cause of marine plastic pollution by investigating how upstream actors are (or are not) driven by Law, in particular the SUPD, to engage in learning and reflexive responses. The study used a combined conceptual framework to identify reflexive drivers within SUPD instruments and instances of social learning and reflexive responses by regulated companies. The framework distinguishes between negative responses, adaptive responses (based on single-loop learning), and reflexive responses (based on double- and triple-loop learning) with greater potential to transform companies towards circularity.

The results show a diverse array of responses to each instrument and even multiple responses by one company to an instrument. While most responses were adaptive and double-loop reflexive, some triple-loop and negative responses were observed. The analysis confirms that company reflexive responses can be enhanced using reflexive drivers in Law. Notably results show how higher-level autonomy and accountability, and lower-level accountability and adjustability techniques contributed to reflexive learning and more long-term planning for circularity by companies. Nonetheless, we observed that the effect of reflexive law drivers is bound by the broader institutional, organisational and market environment in which regulated companies are embedded.

We conclude that legislators aren't just enforcers but play a crucial role in the effective application of the reflexive drivers by selecting those best aligning with broader contexts to stimulate reflexivity. By better understanding the dynamics between reflexive drivers within (multiple, mutually reinforcing) laws and the institutional, organisational and market

[65] Selznick, n. 25 above; F. Saurwein 'Regulatory Choice for Alternative Modes of Regulation: How Context Matters'. (2011) 33(3) *Law and Policy,* pp. 334–66; J. van Leeuwen & C. S. A. van Koppen, 'Moving Sustainable Shipping Forward: The Potential of Market-Based Mechanisms to Reduce CO2 Emissions from Shipping' (2016) 3(2) *The Journal of Sustainable Mobility,* pp. 42-66.

characteristics of regulated actors, policymakers can design more effective regulations to facilitate double- and triple-loop reflexivity in transitioning to a sustainable circular economy.

Future empirical research is needed to continue evaluating assumptions behind the strengths of the different REL techniques based on how they affect companies across different institutional and market environments. Moreover, these studies can extend to different regulatory and governance instruments to explore the breadth of reflexive governance across society and issue areas. Such research should focus on the interplay between autonomy, accountability and adjustability across instruments, and the regulatees' broader context to foster reflexivity and social learning.

7

Chapter 7

Conclusion

7. Conclusions

The introduction of this thesis explained why the plastics economy is in dire need of a transformation and how reflexivity by private actors within the plastics economy is a pathway to this transformation. Within this process, I highlighted the increasing demand for rigid, public regulatory approaches, or legislation, to direct private companies towards circularity for plastics in the European Union (EU) and beyond. These interrelated developments led me to question the potential of legislation as a driver of reflexivity for circularity by regulated companies. Through a case study of the EU's Single-use Plastics' Directive (SUPD), I set out the objective *to understand the role of reflexive environmental law (REL) in scaling transformative change to address complex sustainability challenges.*

In this final chapter, each sub research question is answered through a summary of the approaches and conclusions of the previous chapters (Section 7.1). Next, I synthesise these conclusions to answer the main research question, *how does REL facilitate a circular economy for single-use plastics in the EU?* (Section 7.2) and discuss what this means for the thesis objective, *understanding the role of REL in scaling transformative change to address complex sustainability challenges* (Section 7.3). Lastly, to illustrate how these conclusions, syntheses and contributions can be put to work, I reflect on their implications for future research and implications for law, policy and practice for single-use plastics (SUPs) in the EU (Section 7.4).

7.1. Answering the sub research questions

This section presents succinct answers to the four sub research questions set out in the thesis introduction, followed by a summary of the approaches and conclusions of the preceding chapters to obtain these answers.

7.1.1. Sub-question 1: What are the physical and regulatory aspects of the global plastics challenge?

The physical and regulatory aspects of plastics vary at the production, use, waste management and pollution stages of the plastics life cycle. This variation includes technological, environmental, economic and political aspects which build a complex array of interconnected challenges across plastics' life cycles.

Chapter 3 shows that the physical characteristics of plastics, such as their diversity, durability, and derivation from fossil fuels, create various regulatory challenges which interconnect and evolve across the plastics' life cycle. This makes weaning off plastics challenging, not only due to the strong political force that is the petrochemical industry,[1] but also as recycling and

[1] A. Mah, *Plastic Unlimited: How Corporations Are Fuelling the Ecological Crisis and What We Can Do About It* (John Wiley & Sons 2022).

biodegradable alternatives are more resource-intensive to produce than conventional plastics.[2]

Circular economy approaches are gaining attention as tools to steer consumers and industry actors in plastic production, use and waste to resolve the plastics crisis. However, numerous data and transparency gaps exist across the plastics life cycle which stifle the communication and coordination necessary for regulating and actualising circularity. Such data gaps have started to be addressed through international legal means, including updates to the Basel Convention on hazardous waste which included contaminated plastics into its Prior Informed Consent (PIC) procedure as of 2021.

The transboundary nature of plastics pollution introduces geopolitical factors that demand tailored regulatory approaches based on a country's role as a producer, consumer, and/or recipient of plastic pollution. Producer and consumer nations must prioritise reducing plastic supply and demand, while recipient countries need effective waste management technologies to prevent environmental harm. Specific industries within a country further influence regulatory strategies, emphasizing the need for tailored measures to navigate the intricate challenges of the plastics life cycle on a global scale.

7.1.2. Sub-question 2: What elements of REL in regulatory instruments build potential for regulatee reflexivity and to what degree?

REL builds potential for regulatee reflexivity by finding an appropriate balance of techniques for autonomy, accountability, and adjustability in regulatory instruments according to context. These techniques have higher, medium or lower degrees of potential to drive reflexivity and are either embedded in the nature of a regulatory instrument or can be designed into an instrument in its formulation.

Chapter 4 introduces a new framework for reflexive law, identifying three key drivers – autonomy, accountability, and adjustability – along with eleven corresponding techniques. These techniques, placed on a spectrum, vary in their potential to drive reflexivity by regulated companies. Autonomy techniques enable self-organization and learning, accountability techniques help align companies with societal values, and adjustability techniques affect companies' anticipation for change to drive reflexivity.

The chapter goes on to explain which of the eleven techniques (and corresponding drivers) are embedded in six types of regulatory instruments commonly used in legislation. Notably, five instruments (self-regulation, disclosure, market, procedure, and performance-based) all have at least one technique embedded in their nature, while technology-based instruments do not. But regardless of their nature, REL techniques can be designed into any instrument in

[2] S. Spierling et al., 'Bio-Based Plastics - A Review of Environmental, Social and Economic Impact Assessments' (2018) 185 *Journal of Cleaner Production*, pp. 476-91; F. Gu et al., 'Dynamic Linkages between International Oil Price, Plastic Stock Index and Recycle Plastic Markets in China' (2020) 68 *International Review of Economics and Finance*, pp. 167-79.

their formulation (including technology-based instruments). The ideas and examples presented in Chapter 4 confirm the assumption that any regulatory instrument can, in theory, build potential for regulatee reflexivity.

Lastly, Chapter 4 discusses how a contextual assessment is necessary for enhancing REL's effectiveness in stimulating reflexivity. Achieving an appropriate balance is the target. Understanding what is appropriate requires a contextual assessment to gauge what the right balance is between the reflexive drivers, including whether higher-, medium- or lower-level REL techniques align best with the specific context.

7.1.3. Sub-question 3: How is the potential for REL to drive regulatee reflexivity in the EU's Single-use Plastics Directive (SUPD) affected by the national transposition process for EU directives?

The potential for REL to drive regulatee reflexivity was, for the most part, the same or stronger in French and German transpositions of the SUPD. More experimentation in the Member States' REL approaches occurred where the choice of instrument was left to Member States and where the SUPD used higher-level REL techniques. However, the potential for REL was weaker in Member States' transpositions where the SUPD used REL techniques that do not directly influence the actions of private companies.

Chapter 5 examines the implementation of REL in the EU's multi-level governance framework. Through a case study of the Single-Use Plastics Directive (SUPD) and transpositions by France and Germany, the study affirms that REL evolves through the transposition process. Specifically, the potential for REL to drive regulatee reflexivity in the EU's SUPD was mostly strengthened by transposition, meaning REL techniques were not coded in the Directive but were present in Member State transpositions. This is due to the fact that the majority of REL techniques affect the actions of companies but it is not always necessary or possible to have the level of detail relating to the REL techniques at the directive level. However, the transposition process raises concerns about the effectiveness of REL techniques that do not directly regulate private companies' actions, such as awareness raising and threat of regulation. These run the risk of being omitted from Member State regulation or, if transposed, may be unnoticed by private companies which lessens REL's potential to drive regulatee reflexivity.

Other factors which affected the transposition of REL include the choice of instrument by Member States and the use of higher-level REL techniques. This spurred creative applications by France and Germany, bolstering the REL approach for regulatee reflexivity. Such creativity and experimentation included divergences between France and Germany on the balance between the reflexive drivers. The divergence between the two nations included Germany's focus on increasing accountability on companies actions while France was more focused on giving actors autonomy.

7.1.4. Sub-question 4: To what extent does the potential for REL in the EU's SUPD drive reflexivity by regulated companies in France and Germany?

The EU's SUPD drove regulatee reflexivity at the double-loop level through appropriately balancing techniques for autonomy, accountability and adjustability within and across SUPD instruments. However, reflexive drivers beyond the SUPD also drove double-loop reflexivity and a combination of SUPD and external drivers was fundamental in the one instance where triple-loop reflexivity occurred.

Chapter 6 adopts a empirical legal approach to address the final sub research question, examining on-the-ground responses of regulated companies to REL within SUPD instruments. Four types of responses – triple-loop reflexive, double-loop reflexive, single-loop adaptive, and negative – were identified. Instruments led to multiple responses, including, at times, multiple responses within same company. Double-loop reflexive responses were linked to a balance between the REL techniques. This balance was achieved in single SUPD instruments, such as caps & lids, and combinations of instruments, such as collection and recycled content instruments. Moreover, a new REL technique, 'visions of future technologies or systems' was identified as a key driver within the SUPD to expand the framework presented in Chapter 4.

Despite the evidence of reflexive drivers in the SUPD, findings show how other contextual factors influence regulatee responses, either enhancing or blocking the effects of REL techniques. Other drivers of reflexivity beyond the SUPD include related laws, such as upcoming plastics regulation in the EU, and non-legal forces, such as market competition and consumer pressure. The one instance of triple-loop reflexivity traced back to a combination of these drivers rather than solely arising from the SUPD.

In summary, Chapter 6 highlights how REL does affect reflexivity but it is not the only driver. Reflexive responses were at their strongest when contextual factors and related legislation align, emphasizing the interconnected influences between REL and context on regulatee reflexivity.

7.2. Answering the main research question

In this section I synthesise findings from the preceding chapters to answer the main research question: *How does REL facilitate a circular economy for single-use plastics in the EU by driving regulatee reflexivity?* The answer is discussed below, first with regards to the theory building and empirical legal approach undertaken in this thesis, and second, with regards to the effects of the reflexive drivers on SUP circularity.

The theory building and empirical legal approach undertaken in this thesis reveals how REL drives reflexivity for SUP circularity in the EU by (a) building *potential* for reflexivity through embedded and designed-in REL techniques in different regulatory instruments within the EU's SUPD; (b) enhancing the potential for reflexivity through the transposition

process; and (c) building an appropriate balance of reflexive drivers according to context to stimulate reflexivity at the double- and triple-loop level.

With regards to the effects of the reflexive drivers on SUP circularity, autonomy, accountability and adjustability drove reflexivity for SUP circularity in three distinct ways: 1) involving regulated SUP companies in the act of regulation; 2) enhancing connectivity among certain actors across plastics lifecycles; and 3) shaping companies' understanding of the future. As already mentioned, the effects of the drivers came from both single SUPD instruments, across instruments (notably recycled content and collection), and through an amalgamation of forces beyond the SUPD. I elaborate on these effects on SUP circularity below.

First, autonomy techniques involved regulated SUP companies in the act of regulation by giving companies certain decision-making freedoms on specific parts of the regulation. This allowed companies' technical knowledge, resources and power, with regards to advancing circularity, to be utilised by the regulator. Results show how the autonomy techniques regulated either the process for implementing instruments (recycled content and collection) or the scope (caps & lids). These two examples led to reflexive responses. Companies were given space to self-organise to fulfil compliance obligations that targeted a certain aspect of circularity for specific SUP products.

Second, accountability techniques for REL in the SUPD drove reflexivity for SUP circularity by connecting certain actors across plastics lifecycles. In the case of the reuse instrument, these actors were consumers and producers of reusable takeaway containers, while SUPD instruments, recycled content and collection, built connectivity between public and private actors at different ends of the plastics life cycle (production and waste). In the latter example, actors undertook reflexive learning together to work out how to comply and enhance the recycling of SUP beverage bottles. This included sharing knowledge about regulatory hurdles, such as health and safety regulation. In Chapter 3 the complex and fragmented nature of plastics' regulation was evident and is considered a key barrier to enhancing circularity across lifecycles.[3] Therefore, bringing actors across lifecycles together, also with the goal of stimulating reflexivity is a valuable tool to drive SUP circularity.

Third, adjustability techniques drove reflexivity for SUP circularity by shaping companies' understanding of the future. Examples include how SUPD instruments set future-orientated visions, such as new technologies (caps & lids attached to beverage containers) or new systems of provision (reuse and recycling systems). These visions were magnified by the threat of upcoming regulation of SUP circularity beyond the SUPD. For example, France's more stringent upcoming measures built anticipation in regulated companies for future adjustability, as did the threat of the EU's upcoming packaging regulations. Companies' vision and understanding of the future was also shaped by non-legal forces, such as consumer

[3] J. Kirchherr et al., 'Barriers to the Circular Economy: Evidence From the European Union (EU)' (2018) 150 *Ecological Economics,* pp. 264-72, at 268-9.

pressure and market competition. These forces magnified the effects of reflexive drivers in the SUPD, making companies anticipate future changes and undertake more long-term planning. Together, the amalgamation of reflexive drivers in the SUPD and in external forces led to the one observed instance of triple-loop reflexivity. In conclusion, Chapter 3 shows how plastics circularity is a fast-moving field with various new technologies and practices continuously appearing on the horizon. As sustainability improvements evolve and change so too do definitions of circularity. This means that the (re)setting of circularity trajectories is an important tool for driving reflexivity for SUP circularity by making companies anticipate new futures and reorientate their businesses accordingly.

7.3. Addressing the thesis objective

The introduction of this thesis highlighted that an investigation into REL is important for facilitating sustainability transformations for its ability to understand how legislation is not just scaling out and up, but also scaling deep. Transformations are defined as a fundamental change to an existing system which changes the core structures, and often the scale, that define the system.[4] This scaling concerns scaling-out change across social systems; scaling-up change to governing institutions' norms and processes; and scaling-deep change to the underlying values and paradigms that perpetuate unsustainable production and consumption systems.[5] The introduction also explained how legislation are tools to scale out transformations by steering large numbers of actors towards certain innovations, such as new technologies, institutional or economic procedures or lifestyles, and tools to scale up transformations in cases where they regulate governing institutions themselves. Against this background, this thesis set out to investigate the potential of REL as a pathway to also scale deep by stimulating reflexivity and driving actors to rethink their relationships, values, or assumptions and change their 'hearts and minds'.[6] Such scaling deep by economic actors working within unsustainable production and consumption systems, is fundamental to transforming the overarching paradigms that govern these production and consumption systems.

This section addresses the thesis research objective: *to understand the role of REL in scaling transformative change to address complex sustainability challenges.* I synthesise empirical findings on *how* REL drives reflexivity to discuss REL's role in scaling transformative change for sustainability. This focuses on three overarching elements within REL's capacity which affect the scaling out, up, and deep of transformative change for sustainability. In light of this, I give the following response to the thesis objective:

[4] B. Walker et al., 'Resilience, Adaptability and Transformability in Social–Ecological Systems' (2004) 9(2) *Ecology and Society,* pp.1-9, at 7; C. Folke et al., 'Resilience thinking: Integrating resilience, adaptability and transformability' (2010) 15(4) *Ecology and Society,* article 20.
[5] F. Westley et al., 'Five Configurations for Scaling Up Social Innovation: Case Examples of Nonprofit Organizations From Canada' (2014) 50(3) *The Journal of Applied Behavioral Science*, pp. 234-60, at 234; M. L. Moore, D. Riddell & D. Vocisano, 'Scaling Out, Scaling Up, Scaling Deep: Strategies of Non-Profits in Advancing Systemic Social Innovation' (2015) *The Journal of Corporate Citizenship*, pp. 67-84, at 75.
[6] Moore, Riddel & Vocisano, n. 5 above, p. 74.

The role of REL in scaling transformative change to address complex sustainability challenges is to build transformative future visions for sustainability, an appropriate balance between the reflexive drivers and between rigidity and flexibility, and a cohesive REL approach in both formal and informal legal approaches.

This response is explained in the following sections focusing on three elements within REL's capacity which shape transformative change to address complex sustainability challenges. These are (1) to set transformative future visions, (2) to balance the reflexive drivers, (3) to build rigidity and flexibility, and (4) to build coherence.

7.3.1. To set transformative future visions

Instead of relying solely on bottom-up innovations to drive broader change, REL can initiate top-down transformations by setting a transformative future vision and enforcing its realization. In this regard, the role of REL is to broaden the problem frame,[7] and guide regulated actors towards more transformative innovations. This relates to the role of the law in setting formal legal rules and establishing new benchmarks that regulated actors adhere to. While bottom-up innovations still have potential to scale up and drive sustainability transformations,[8] the law can require a top-down scaling out to guide the development of innovations by actors in production and consumption, or scaling up when regulating actors in governing institutions.

Although reflexivity remains desirable for incorporating regulatee knowledge into the approach, the level of the vision significantly influences the ultimate responses, whether reflexive or not. To enhance the capacity of REL to guide sustainability transformations, the vision must be transformative. Based on empirical findings, Chapter 6 introduced a novel REL technique for adjustability – future visions. This suggests that visions setting future goals rather than merely preventing certain actions enhanced reflexive responses. Expanding on this idea, while future visions stimulate reflexivity, transformative future visions are indispensable for scaling sustainability transformations.

Empirical findings underscore how the benchmark vision outlined in the law significantly shaped regulatee responses. While companies exhibited complex and diverse reactions to instruments in the SUPD, ranging from reflexive responses to more incremental adaptations, ultimately, the findings highlight that the benchmark vision set by the law largely determines the limits of regulatee responses. This aligns with existing literature on ossification, acknowledging that while companies may demonstrate beyond-compliance practices and reflexivity, ossification – where companies adhere strictly to compliance requirements – still

[7] Moore, Riddel & Vocisano, ibid, p. 77.
[8] F. W. Geels, 'The Dynamics of Transitions in Socio-Technical Systems: A Multi-Level Analysis of the Transition Pathway from Horse-Drawn Carriages to Automobiles (1860-1930)' (2005) 17(4) *Technology Analysis and Strategic Management,* pp. 445-476, at 449–52.

occurs.[9] The importance of top-down law lies in its ability to establish rigid trajectories for the future. As long as the vision is desirable in terms of sustainability, ossification is not a problem. Defining 'transformative future visions in the law' is not black and white. Rather than relating to ambiguity[10] mirroring broader policy visions, the definition primarily hinges on the extent of departure from dominant production and consumption practices. For example, the collection instrument in the SUPD outlined a vision for refining recycling processes within the existing system, while the reuse instrument set a vision to establish new production and consumption patterns, even if limited to takeaway containers. The latter, being further from the status quo, necessitated deeper learning by regulated companies, prompting reflections on the long-term sustainability of their existing business models. This suggests that visions that are further from dominant systems of production and consumption require deeper learning, thereby scaling transformative change more deeply.

7.3.2. To balance the reflexive drivers

As discussed, the stimulation of reflexivity through REL is a pathway to transformative change for resolving complex sustainably challenges because it changes the hearts and minds of regulated actors. This rethink of practices, processes, and underlying values is crucial for moving beyond dominant paradigms within unsustainable production and consumption systems. Therefore, REL's has a fundamental role in scaling sustainability transformation where more reflexive responses can be stimulated. Findings suggest that REL has capacity to do this by building an appropriate balance between (a) the reflexive drivers and (b) rigidity and flexibility in the legislation to drive more reflexive responses. These two points are elaborated on below.

First, the empirical chapters of this thesis, summarised in Section 7.1, demonstrate that reflexive responses to the law are enhanced when REL approaches strike an appropriate balance of the REL techniques – autonomy, accountability and adjustability – according to context. Achieving this balance is the responsibility of REL. Firstly, this comprises equilibrium across each within a single regulatory instrument and/or multiple instruments in one law so each driver is represented. Findings showed how techniques for autonomy often need to be balanced with techniques for accountability to ensure market actors incorporate wider societal views in the autonomous development of innovations. Moreover, Chapter 6 shows how adjustability techniques in the SUPD case study, though the least present driver in the whole law, seemed to have a strong influence on driving reflexive responses. This justifies that legislation should have a balance between all three drivers.

The balance of reflexive drivers also involves selecting REL techniques with the appropriate strength according to the context. Chapter 6 findings indicate that, in certain scenarios, the

[9] C. Parker & V. L. Nielsen, *Explaining Compliance: Business Responses to Regulation* (Edward Elgar Publishing 2011); M. A. Livermore, 'Reviving Environmental Protection: Preference-Directed Regulation and Regulatory Ossification' (2007) 25(3) Virginia Environmental Law Journal, pp. 311-86.
[10] L. B. Edelman, 'Legal Ambiguity and Symbolic Structures: Organizational Mediation of Civil Rights Law' (1992) 97(6) *American Journal of Sociology,* pp. 1531-76.

impact of a particular technique was impeded or blocked due to contextual elements. For instance, higher-levels techniques for autonomy, accountability and adjustability in the SUPD instrument extended producer responsibility (EPR), were hindered by existing legislation. In addition, the effects of public disclosure (medium-level accountability) in the SUPD instrument for labelling did not stimulate reflexivity because regulated companies were not public-facing. Therefore, it is the role of REL to assess the context of the regulated issue to gauge whether lower-, medium- or higher-level techniques are most likely to be effective in driving reflexivity.

7.3.3. To build rigidity and flexibility

Up to now, REL literature argued that the rigidity or flexibility of a regulatory instrument was an endogenous and defining feature in categorising law as REL or non-REL. Specifically, command-and-control technology- and performance-based regulatory instruments were considered too rigid to be categorised as REL. Alternatively, procedure-, self-regulation-, disclosure- and market-based instruments were considered more flexible as they did not prescribe specific technologies or performances.[11] However, the novel REL framework introduced in this thesis challenges this perspective showing how so-called rigid instruments can embody different REL techniques to drive regulatee reflexivity. Findings also reveal that instruments previously considered flexible, such as disclosure- and market-based approaches, may not induce reflexivity without proper application of REL techniques.

However, far from rendering rigidity and flexibility concepts useless, I synthesise findings from preceding chapters to explore three new ways to view rigidity and flexibility in REL with respect to driving reflexivity to scale sustainability transformations. These concern rigidity and flexibility with regards to (1) setting stable benchmarks, (2) technical elements within regulatory instruments, and (3) balancing scope and process.

Setting stable benchmarks – One can consider rigidity as being linked to legislation itself. Whether requiring certain information to be disclosed, procedures to be implemented or technologies to be adopted, legislative requirements set rigid benchmarks to guide and steer societal actors. Section 7.1.3 explained how the setting of transformative benchmarks through REL plays a fundamental role in stimulating more transformative responses, whether reflexive or not.

Technical elements within regulatory instruments – Rigidity and flexibility can be understood from a more technical perspective by looking at the REL techniques as either rigid or flexible. Table 7.1 below is one example of this. It places the twelve REL techniques from the framework developed in this thesis on a spectrum, categorising them as rigid or flexible based on whether definitions of what they are more clear-cut and rigid or ambiguous and flexible. Below, I elaborate on preliminary assumptions about this categorisation, highlighting the benefits and risks of rigid or flexible techniques to drive reflexivity to facilitate complex

[11] E. W. Orts, 'Reflexive Environmental Law' (1995) 89(4) *Northwestern University Law Review*, pp. 1227-340.

sustainability transformations. Rather than empirical conclusions, these assumptions serve only to exemplify new theoretical possibilities to understand the role of rigidity and flexibility in scaling transformative change through REL.

Table 7.1: Preliminary exercise categorising REL techniques as rigid or flexible processes

	Rigid ⟷ **Flexible**		
Autonomy	Explicit options		Participation in (re)formulation Autonomous choice
Accountability	Third-party verification Public disclosure Awareness raising Self-monitoring and reporting		Third-party participation in (re)formulation
Adjustability		Scheduled adjustments	External adjustments Vision of future Threat of regulation

REL techniques categorised as rigid are clear-cut and widely recognised. In essence, awareness of what they are is rigid which makes them easier to use in practice by legislators. Public disclosure, for instance, is a familiar process with consistent steps, albeit some variations. However, these rigid techniques are prone to uniform application and can become routine for regulated companies. According to Boström et al, 'fixed frames prevent reflexive learning'.[12] This means that the routinised and fixed nature of these techniques run the risk of triggering knee-jerk reflexivity rather than reflexivity arising from conscious awareness, deliberation and choice.[13]

Conversely, flexible techniques are more ambiguous and lack a prescribed way for formulation and implementation in law and practice. For example, with the autonomy technique 'participation in (re)formulation', regulators may involve companies in creating new processes (as seen in the SUPD's collection & sorting instrument) or technical standards (as with the SUPD's caps & lids instrument). This flexibility allows for diverse outcomes, creating room for reflexivity, but it also introduces uncertainty and the potential for market capture.

In light of this, it is the role of the regulator to consider the context of the sustainability issue in deciding how the rigid/flexible elements of the REL techniques may affect responses to law. This is important to avoid knee-jerk responses in the case of rigid techniques or market capture with more flexible approaches. Both hinder transformative change for sustainability.

[12] Boström et al., 'A Reflexive Look at Reflexivity in Environmental Sociology' (2017) 3(1) *Environmental Sociology,* pp. 6-16, at 6.
[13] According to Lynch knee-jerk reflexivity refers to habitual, thoughtless or instantaneous responses which conflicts with conceptualisations of reflexivity that emphasise conscious awareness, deliberation and choice. See M. Lynch, 'Against Reflexivity as an Academic Virtue and Source of Privileged Knowledge' (2000) 17(3) *Theory, Culture & Society*, pp. 26-54, at 27.

Balancing scope and process – Lastly, findings from this thesis indicate that another important feature of REL that affects reflexivity concerns the degree of autonomy allotted to regulated actors with regards to scope or process. In defining scope versus process in a regulatory instrument, I distinguish between three levels in a regulatory instrument: aims, objectives and processes. In the case of the SUPD's collection instrument you have (a) the aim which is to reduce SUPs in marine environments through setting up a new recycling collection system; (b) objectives, which lay down the scope of requirements (dates, targets, etc.) to achieve the aim, such as 20% SUP collection by 2024; and (c) the process (how-to) for achieving the objectives, such as requirements for actors in SUP production and waste management to come together to devise the collection system. Some regulatory instruments do not specify these processes (c) but leave them open and flexible. Other instruments, such as the collection instrument in the SUPD, do specify the process.

Findings in this thesis indicate that regulatee autonomy with regards to the scope or process can vary in flexibility, ranging from vague with room for interpretation and more autonomy, to clear-cut and rigid and less autonomy. Different degrees of flexibility or rigidity relating regulatee autonomy in the scope or process can be linked to the response exhibited. To exemplify this, Figure 7.1 below is a preliminary idea of what this balance between the rigidity or flexibility of scope and process in an instrument might look like. I connect the two examples to findings on certain SUPD instruments from this thesis. Again, these examples do not serve as empirical conclusions but aims to exemplify new theoretical possibilities to understand the role of rigidity and flexibility in facilitating transformative change through REL.

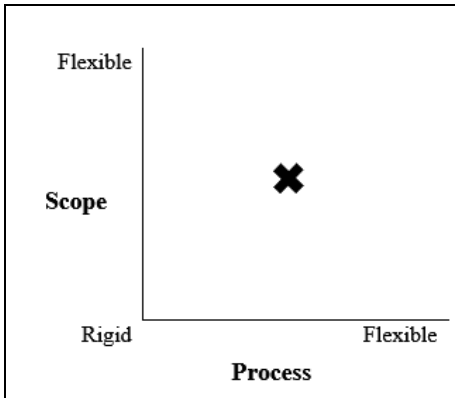

Image 1: Instrument with more balance between rigidity and flexibility regarding scope and process. Alike to SUPD instruments: collection and caps & lids.

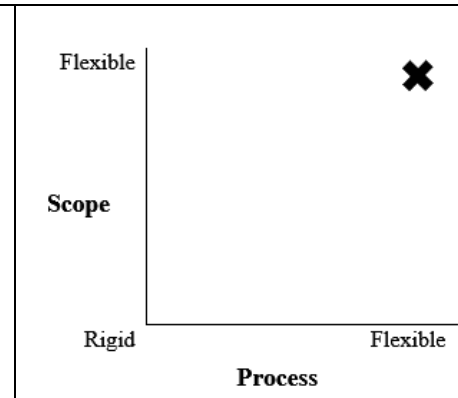

Image 2: Instrument with high flexibility in scope and process. Alike to SUPD instrument: bans.

Figure 7.1: Examples of REL approaches with differing degrees of flexibility and rigidity with regards to process and scope

Image 1 in Figure 7.1 illustrates a regulatory instrument with a balanced mix of flexibility and rigidity in scope and process. This aligns with two SUPD instruments, namely the

collection and caps & lids instruments. Both instruments set clear objectives for regulated companies, allowing flexibility in the process to achieve those objectives through REL techniques for autonomy.

Conversely, Image 2 in Figure 7.1 shows a regulatory instrument with higher degrees of flexibility in both scope and process akin to the SUPD instrument banning certain SUPs. The objective, which is to prohibit specific SUP products, delineates what is not permitted, providing flexibility and autonomy in determining the scope. The ambiguous definitions of 'single-use' versus 'multi-use' SUPs introduced more flexibility (and confusion) in the scope. Additionally, the process for achieving the objective is also left open to regulated companies. Results from these SUPD examples reveal that the collection and caps & lids instruments prompted more reflexive responses than the bans did, emphasizing the significance of understanding the balance between scope and process in stimulating reflexivity.

Theoretically, this demonstrates how considerations of rigidity and flexibility in both scope and process are crucial for understanding how the law propels regulatee reflexivity toward transformative change.

7.3.4. To build coherence

The empirical chapters in this thesis demonstrate how fragmentation is a key barrier to achieving circularity for plastics. This fragmentation relates to disconnect between economic actors and complex legislative frameworks across plastics life cycles. REL has a role in enhancing coherence among actors and within and across formal and informal law, to address this fragmentation through reflexivity, thus enhancing the potential for transformative change. Findings demonstrating these two aspects of coherence are discussed below.

To stimulate reflexivity for transformative change, REL is tasked with building coherence among the right societal actors through REL techniques, maximizing the effect of the drivers. In other words, 'building of networks and partnerships' to scale sustainability transformations.[14]

Considerations for societal coherence through REL techniques are particularity relevant for autonomy and accountability techniques which connect regulated actors with each other and with wider society to resolve value disparities between autonomous social subsystems and drive reflexivity. [15] In the case of the SUPD, higher-level autonomy brough producers together, while higher-level accountability brought producers together with public actors in

[14] Moore, Riddell & Vocisano, n. 5 above, p. 77.

[15] This refers back to Habermas' theories on communication and democratic legitimacy which argues that the connecting social actors helps resolve value disparities between autonomous social subsystems. See J. Habermas, *Theorie Des Kommunikativen Handelns* (Suhrkamp 1981); J. Habermas, 'Historical Materialism and the Development of Normative Structure', *Communication and the Evolution of Society* (Beacon 1979); Orts, n. 9 above, pp. 1254 & 1258; and L. Farmer & G. Teubner, 'Ecological Self-Organization', in Teubner, Farmer & Murphy (eds), in G. Teubner, L. Farmer & D. Murphy (eds), *Environmental Law and Ecological Responsibility* (John Wiley & Sons, 1994), pp. 3-13, at 4.

waste management. Findings confirm that these approaches to REL played an important role in opening the 'black box' of one social actor by building coherence through information sharing and network building. In writing about reflexive law, Teubner stated how 'Self-referential systems – social systems like law, politics, and regulated subsystems – are 'black boxes' in the sense of mutual inaccessibility. Each knows the input and the output of the other, but the internal processes that convert inputs to outputs remain obscure.'[16] By bringing particular actors together, the REL techniques enable information sharing and learning which may not have been achieved without REL. Other techniques which connect societal actors, such as awareness raising, public disclosure and verification of information, also requires considering who is incorporated into the scope.

Whichever actors are incorporated into the scope creates a particular type of network, knowledge exchange and, ultimately, shapes the responses exhibited. Deciding who the 'right' actors are depends on the nature of the problem. Legislators can select actors with specific knowledge to address information asymmetries; actors who will build accountability in decision-making; or multiple actors across sectors, communities or institutions to connect fragmented knowledge.[17]

As well as building coherence amongst societal actors to enhance learning and scale societal transformations, findings show that regulatee responses were also affected by coherence across multiple laws and policy fields. Specifically, other formal laws, such as the Waste Framework Directive (WFD)[18] and informal legal processes, such as the formulation of upcoming packing regulations, hindered and/or enhanced the reflexive response of companies regulated by the SUPD. This relates to fragmentation in the law which is a well-known issue in driving coherence in regulatory responses.[19]

To achieve reflexive responses, connections between laws, or lack of them, should be considered to maximise the positive effects of REL in driving reflexivity. This can lead to building mutually supporting drivers across law and policy fields. Moreover, the role of REL is to avoid mixed messages through fragmented policy fields that hinder the driving of reflexivity and scaling sustainability transformation.

Moreover, by building social cohesion through legislation, REL can help to identify and address fragmentation in the law. For instance, SUPD instrument for beverage bottle recycled content led to learning on related laws for water quality standards. Companies were tasked with building cohesion between the two.

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[16] G. Teubner, 'Autopoiesis in Law and Society: A Rejoinder to Blankenburg' (1984) 18(2) *Law & Society Review,* pp. 291-312, at 300.
[17] A. Gupta, T. Pistorius & M. J. Vijge, 'Managing Fragmentation in Global Environmental Governance: The REDD+ Partnership as Bridge Organization' (2016) 16(3) *International Environmental Agreements: Politics, Law and Economics,* pp. 355-374.
[18] Directive 2008/98/EC on waste and repealing certain Directives [2008] OJ L 312.
[19] E. Fisher, B. Lange & E. Scotford, *Environmental Law: Text, Cases and Materials* (2nd edn, OUP 2019) chs 2 and 12.

7.4. Implications for future research, policy and practice

This thesis has developed and applied theoretical ideas around REL to explore the socio-legal effects of the EU's SUPD on regulatee reflexivity. In this section, I discuss the implications for future research in expanding knowledge about REL and for SUP policy and practice in applying REL.

7.4.1. Future research

Future research to develop the conclusions and syntheses presented in this thesis are crucial to continue exploring and expanding the remit of REL. This section presents suggestions for this with regards to empirical, theoretical and methodological research agendas.

Empirically, future research can investigate the breadth of REL's effects on regulatee reflexivity to develop understanding of REL as a tool to scale out reflexivity for sustainability transformations. I suggest this is undertaken in two respects. First, the framework for REL presented in Chapter 4 and applied in Chapters 5 and 6, comprises a continuum of REL techniques which indicates that certain techniques drive regulatee reflexivity more than others. These assumptions are based on a review of REL literature and findings show that the REL techniques are important drivers of reflexivity. However, future research should undertake large-scale quantitative or qualitative research to assess these assumptions on the relative strength of REL techniques. While acknowledging that context affects the responses to the REL techniques, generalisations on which techniques tend to stimulate reflexive responses more than others are still useful in understanding the underlying potential of legislation to stimulate reflexivity.

Second, additional empirical studies are necessary to understand how different contextual elements affect the manifestation of reflexivity through the reflexive drivers and REL techniques. The final section in Chapter 4 draws theoretical links between certain contextual elements and the REL techniques. This is based on a study of 11 contextual factors from Saurwein.[20] Dedicated studies that investigate the effect of context on how REL drives reflexivity are crucial for understanding and applying REL in practice. This includes empirical studies to develop theoretical understanding about the 'appropriate balance' between the three reflexive drivers according to context.

Both of these empirical remits for REL – testing assumptions about the strength of REL techniques and exploring how context affects (reflexive) responses – would also benefit from applications to other governing instruments. This thesis has focused on REL in EU legislative frameworks. Other exciting areas might be private regulatory initiatives or international legal frameworks. Specifically for plastics, important private initiatives and international law include the Ellen MacArthur Foundation' Plastics Commitment and current developments of the UN's Global Plastic Treaty. Application of the REL framework to these cases would shed

[20] F. Saurwein, 'Regulatory Choice for Alternative Modes of Regulation: How Context Matters' (2011) 33(3) *Law and Policy*, pp. 334-66.

new light on the REL techniques in a governing mechanism and their in-context effects on driving reflexivity in practice.

With respect to theory, understanding on how the informal law- and policy-making arena affects (reflexive) responses by regulated actors requires development. This thesis has focused on the effects of reflexive drivers in formal law, namely the SUPD. Findings show how other laws and non-legal forces external to the SUPD affected the observed regulatee responses. This included upcoming regulations related to SUP circularity. Therefore, understanding of the informal processes relating to the formulation and implementation of legislation holds great promise to expand understanding of precisely how REL drives regulatee reflexivity.

Also from a theoretical perspective, thorough research to conceptualise how rigidity and flexibility in legislation connects to the reflexive drivers and stimulates regulatee is a logical next step. Section 7.3.3 explains how flexibility and rigidity both play a role in stimulating reflexive learning among regulated actors and indicates three possible ways to understand this further. Exploration and analysis of these preliminary ideas helps follow in the footsteps of this thesis to move past previously limiting definitions in REL that excluded certain regulatory instruments. This is necessary to expand the remit of REL theory and unleash its potential as a tool for understanding the scaling of sustainability transformations.

Lastly, knowledge of REL can expanded through new methodological approaches. Findings on the in-practice effects of REL in this thesis rest on interviews with regulated companies. Though appropriate for the reasons outlined in Section 2.2.3, future research could apply participatory observation as a method to zoom in on the practices of one or two regulated actors. This may help to break down barriers to analyse the (reflexive) learning processes as they happen and from within.[21] Moreover, this creates opportunities to understand the longer-term effects of formal and informal processes in legislative frameworks on regulatee reflexivity. For instance, in the case of the upcoming global plastics treaty,[22] one might look temporally at (a) the negotiations to produce the final treaty, (b) the ratification process and implementation into national law, and (c) the after effects once national legislation is established. A comparison of these could be useful to understand whether certain parts of the law-making process stimulate regulatee reflexivity more than another and why.

7.4.2. Policy and practice

This section presents implications from findings in this thesis relevant to actors who formulate laws for plastics circularity, and practitioners who respond to these laws.

[21] A. Bryman, *Social Research Methods* (4th ed, Oxford University Press 2012), pp. 493–4.
[22] UNEP, 'Historic Day in the Campaign to Beat Plastic Pollution: Nations Commit to Develop a Legally Binding Agreement' (*UN Environment*, 3 February 2022) <http://www.unep.org/news-and-stories/press-release/historic-day-campaign-beat-plastic-pollution-nations-commit-develop> accessed 8 December 2023.

Law and policy makers working on sustainability challenges, including those drafting upcoming packaging regulation in the EU and the new Plastics Treaty, can utilise the framework of autonomy, accountability, and adjustability in this thesis, to include REL in future regulations. Findings show how combinations of the REL techniques enhance reflexive responses to benefit circularity and go beyond the aims of the regulation. Section 7.2 explains how these techniques are fundamental pathways that involve regulated SUP companies in the act of regulation; enhance connectivity among certain actors across plastics lifecycles; and shape companies' understanding of the future. Combined, these help address limitations with legal system knowledge and stimulate reflexive responses to enhance circularity.

As shown in Chapter 4-6 and in Section 7.3, certain REL techniques are more effective in driving reflexivity in certain contexts, for instance, a particular actor may be more susceptible to accountability techniques than another. It is therefore the role of the regulatory practitioners to use the REL framework of techniques also in combination with knowledge about potential contextual barriers/enablers to REL from Saurwein.[23] Such factors include economic benefits for the industry, reputational sensitivity of the industry, capacities of the industry or government actors to address the regulatory issue and the severity of the regulatory issue. Considering the links between these contextual issues and the REL techniques can help policy makers determine (1) how to give autonomy to regulated actors and regarding which elements of scope or process; (2) how to build accountability, either in decision-making or through information disclosure; and, (3) how to build adjustability through scheduled adjustments or more flexible approaches. To demonstrate this, three examples from this thesis where REL techniques and reflexive drivers were magnified by contextual issues are reiterated below, including reflexive drivers in forces external to the SUPD. These are where regulatee and third-party participation boosted connectivity across life cycles, public disclosure and market competition boosted reflexivity by public-facing companies, and scheduled adjustments on product design to boost market competition.

Regulatee and third-party participation to boost connectivity across life cycles – The collection and recycled content SUPD instruments contained higher-level techniques for autonomy and accountability. These brought together actors in production and waste to make decisions about achieving the objectives set out in the regulations. This shows how REL techniques can be used to share knowledge and connect actors across life cycles and build new systems for circularity.

Public disclosure and market competition to boost reflexivity by public-facing companies – Findings show that well-known brands were more affected by accountability from the market and consumers than companies whose were not public-facing. This suggests that accountability techniques – information disclosure and public awareness raising – would be suitable in governing well-known companies towards circularity. As these well-known

[23] Saurwein, n. 20 above.

companies tend to be large multi-nationals who contribute a significant amount to SUP pollution this holds potential to maximise the effects of regulation to reduce SUPs.

Scheduled adjustments on product design to boost market competition – The instrument for recycled content was boosted by market competition through application of lower-level adjustability – scheduled adjustments. The adjustable targets for incorporating recycled plastics in new products led to industry actors wanting to out compete each other to have the highest percentage of recycled content.

Lastly, any practitioners in policy and industry spheres should cultivate reflexive learning processes within their institutions to focus on longer-term planning for more sustainable futures; environmentally, socially and economically. Findings in this thesis show how reflexive responses related to longer-term decision making. For instance, one organisation set up a new partnerships with a university to develop more sustainable products while another organisation updated its decision-making procedures to improve the review process for sustainability projects. This rethinking of elements of an organisation that shape the organisation in the longer-term helps make the organisation itself more sustainable by strengthening its long-term viability.

To do this, the framework in Chapter 6 can be used as a decision-making tool. This consists of two elements. The first is Pickering's three stages of learning and response: (1) *recognition* of impacts through awareness, monitoring, and anticipation; (2) *rethinking* to learn from past experiences, critique core values and practices, and envision possible futures'; and (3) *response*, comprising changes to practices and processes or core aims (e.g., business strategies), values and discourses. The second part of the reflexive framework concerns whether the object of learning focuses on the single-loop level and leads to incremental and adaptive responses or on the deeper, double- and triple-loop levels which indicate deeper reflexivity on underlying goals, values, assumptions and relationships. Adaptive, incremental responses are not enough the transform the plastics economy. Practitioners in policy and industry in the plastics field must undertake reflexive learning processes and responses if true transformations towards a circular economy for plastics are to be achieved. This is not only beneficial for the sustainability of society, but also the long-term sustainability of organisations themselves.

Scientific summary

How does EU legislation drive reflexive learning in regulated actors to facilitate circular transformations in the plastics economy? In a nutshell, this is the socio-legal focus of this thesis. Against the backdrop of increasing awareness of the damaging effects of single-use plastics (SUPs), the European Union (EU) has set itself on a path to transform the plastics economy through increasing upstream regulation targeting plastics producers. But the role of legislation for scaling sustainability transformation, such as SUP circularity is little understood. Legislation are considered tools for scaling out transformations for governing large number of actors, and scaling up transformations where they regulate governing institutions. This thesis develops thinking on reflexive environmental law (REL) theory to understand how legislation are tools for scaling deep sustainability transformations by driving reflexive responses in regulated companies. Such responses are crucial to aid the regulator by changing the hearts and minds of plastics' economy actors so they develop new innovations necessary for transforming the economy. As a result, the broader thesis objective is **to contribute to furthering the understanding of the role of REL in scaling transformative change to address complex sustainability challenges**.

This thesis adopts a case study approach to develop REL theory and answer the main research question: **how does REL facilitate a circular economy for single-use plastics in the EU by driving regulatee reflexivity?** This development of REL theory is necessary to expand REL beyond certain regulatory instruments, such as disclosure- and procedure-based, enabling understanding of how any regulatory instrument, including traditional command-and-control regulations commonly found in legislation, drive regulatee reflexivity.

The new framework for REL is developed through an exploratory case study of the Single-use Plastics Directive (SUPD) and cases of transpositions and regulatee responses in France and Germany. The SUPD case study was considered appropriate to explore not only the variation in regulatory instruments, but also a mix of responses from the diverse companies regulated by the SUPD to develop new theoretical perspectives. EU directives must be transposed into national legislation, therefore, the cases – France and Germany – enable exploration into manifestation and evolution of REL in multi-level legislative frameworks and REL's effect on regulatee (reflexive) learning processes.

Chapter 3 delves into the physical and regulatory aspects of plastics through a narrative literature review. The findings reveal the intricate nature of the challenges associated with plastics, demonstrating how their physical and regulatory aspects undergo fluctuations throughout the production, usage, waste management, and pollution stages within the plastics life cycle. This variation includes technological, environmental, economic and political aspects which build a complex array of interconnected challenges across plastics' life cycles. The chapter also highlights new movements in terms of circularity for plastics and increasing transnational approaches. The success of these approaches requires regulatory frameworks tailored to consider geopolitical factors arising from the transboundary nature of the plastics economy and a country's role as a producer, consumer, and/or recipient of plastic pollution.

Chapter 4 introduces a novel framework for REL based on the overarching drivers of regulatee reflexivity – autonomy, accountability and adjustability – with autonomy fostering self-organization, accountability aligning regulatee decision-making with societal values, and adjustability influencing regulatees' anticipation for change. Beneath these drivers are 11 REL techniques with either a lower-, medium- or higher-degree of potential to drive regulatee reflexivity. The chapter explores how these techniques are embedded in six common instruments used in legislation while emphasizing that technology-based instruments are the only one that has REL techniques embedded in their nature. Nonetheless, the conclusions discuss how, theoretically, REL techniques can be incorporated into any instrument to foster regulatee reflexivity. The chapter concludes emphasising that although the REL techniques have varying strengths, their effects depend on the context. Therefore, regulators must strive to establish an appropriate balance between autonomy, accountability, and adjustability guided by contextual considerations.

Chapter 5 investigates how the new framework for REL presented in Chapter 4 manifests and evolves within the European Union's multi-level governance framework. Through a comparison of REL in the SUPD with transpositions by France and Germany, the study reveals that the potential for REL to drive regulatee reflexivity was generally equal to or stronger in the French and German transpositions of the SUPD. Notably, Member States exhibited more experimentation in their REL approaches when given the freedom to choose instruments and where the SUPD incorporated higher-level REL techniques. However, the effectiveness of REL was weaker in Member States' transpositions when the SUPD employed techniques that did not directly impact the actions of private companies. This raises concerns about the transposition process potentially omitting or overlooking REL techniques, particularly techniques for 'awareness raising' and 'threat of regulation', diminishing REL's ability to drive regulatee reflexivity. Additionally, the choice of instrument and the use of higher-level REL techniques influenced the transposition of REL, leading to creative applications by France and Germany and highlighting divergences in their emphasis on accountability and autonomy.

Chapter 6 uses semi-structure interview methods to explore regulatee responses to the SUPD in France and Germany. Findings reveal how different regulatory instruments in the SUPD led to a diverse mix of regulatee responses, including negative responses, single-loop adaptive responses, and double- and triple-loop reflexive responses. Double-loop reflexive responses are associated with a balanced application of REL techniques observed in certain SUPD instruments and combinations of instruments. Despite the evidence of reflexive drivers in the SUPD, contextual factors and related legislation, including upcoming plastics regulation in the EU, as well as non-legal forces like market competition and consumer pressure, also influence regulatee responses. The one instance of triple-loop reflexivity is attributed to a combination of these drivers rather than solely originating from the SUPD. The study introduces a new REL technique, 'visions of future technologies or systems' to update the REL framework presented in Chapter 4. In summary, Chapter 6 underscores that

while REL plays a significant role in driving reflexivity, it operates in tandem with various contextual factors, showcasing the interconnected influences shaping regulatee reflexivity.

In answering the main research question, conclusions explain how REL drives regulatee reflexivity, first, through an appropriate balance between the reflexive drivers according to context. These drivers are important for stimulating reflexivity to address plastics circularity by involving regulated actors in the regulatory process, enhancing connectivity across plastics lifecycles, and shaping companies' future perspectives.

In addressing the thesis objective, conclusions underscore REL's pivotal role in catalysing sustainability transformations for its ability to understand how legislation is not just scaling out and up, but also scaling deep. First, whether stimulating reflexivity or not, REL has a role in setting transformative visions as benchmarks for broad social change. This is crucial to scale-out transformations by ensuring that regulated companies are being pushed towards transformative futures. Beyond this, REL's role is to drive reflexivity and scale-deep sustainability transformations. Reflexivity is enhanced not only, through an appropriate balance between the reflexive drivers in one legislative act, but mutually supporting drivers across different formal and informal legal spheres. Furthermore, REL's involvement in driving reflexivity is tied to the interplay of rigidity and flexibility within legislation, marking a vital area for future theoretical development. Lastly, the thesis underscores REL's essential function in fostering coherence among regulated actors and across legal domains, a cornerstone in promoting regulatee reflexivity by addressing fragmentation within production and consumption systems and the legislative frameworks governing them.

Samenvatting

Hoe stimuleert EU-wetgeving reflexief leren bij gereguleerde actoren om circulaire transformaties in de plasticeconomie te ondersteunen? Dit is de focus van dit sociologisch-rechtswetenschappelijk promotieonderzoek in een notendop. Er is steeds meer bewustzijn van de schadelijke effecten van plastics voor eenmalig gebruik (single-use plastics; SUP's). Tegen deze achtergrond is de Europese Unie (EU) op weg om de plasticeconomie te transformeren met meer regelgeving gericht op plasticproducenten hoger in de leveringsketen. Er is echter weinig bekend over de rol van wetgeving voor het opschalen van de duurzaamheidstransformatie, zoals circulair gebruik van SUP's. Wetgeving kan gezien worden als instrument voor het uitbouwen van transformaties waarbij een groot aantal actoren betrokken zijn en voor het opschalen van transformaties bij overheidsinstellingen. In dit promotieonderzoek wordt de theorie van reflexief milieurecht (reflexive environmental law, REL) ontwikkeld om te begrijpen hoe wetgeving gezien kan worden als instrument voor het opschalen van vergaande duurzaamheidstransformaties die reflexieve reacties bij bedrijven stimuleert. Zulke reacties zijn cruciaal voor de regelgever om een diepgaande mentaliteitsverandering te bewerkstelligen bij de actoren in de plasticeconomie, zodat zij nieuwe innovaties ontwikkelen die nodig zijn om de economie te transformeren. De bredere doelstelling van dit promotieonderzoek is dan ook om **een bijdrage te leveren aan het begrip van de rol van REL bij het opschalen van transformatieve verandering voor het aanpakken van complexe uitdagingen op het gebied van duurzaamheid**.

In dit promotieonderzoek wordt een casestudy-benadering gebruikt om de REL-theorie te ontwikkelen en de belangrijkste onderzoeksvraag te beantwoorden: **hoe faciliteert REL een circulaire economie voor plastics voor eenmalig gebruik in de EU door de reflexiviteit van gereguleerde actoren te stimuleren?** Deze ontwikkeling van de REL-theorie is nodig om te komen tot REL die verder gaat dan bepaalde regelgevingsinstrumenten, zoals regelgeving op basis van openbaarmaking en procedures. Hierdoor kan inzicht worden verkregen in hoe elk regelgevingsinstrument, waaronder de traditionele command-and-control-regelgeving die gewoonlijk in de wetgeving wordt aangetroffen, de reflexiviteit van gereguleerde actoren stimuleert.

Het nieuwe kader voor REL wordt ontwikkeld aan de hand van een verkennende casestudy naar de richtlijn over plastics voor eenmalig gebruik (Single-use Plastics Directive; SUPD), omzetting van die richtlijn in de nationale wetgeving van Frankrijk en Duitsland, en reacties van gereguleerde actoren uit die landen. De SUPD-casestudy werd beschouwd als een geschikt middel om de variatie in regelgevingsinstrumenten te onderzoeken, evenals om de mix van reacties van de verschillende bedrijven die onder de SUPD vallen te onderzoeken, om zo nieuwe theoretische perspectieven te ontwikkelen. EU-richtlijnen moeten worden omgezet in nationale wetgeving. Zodoende kan er aan de hand van specifieke casussen – Frankrijk en Duitsland – onderzoek worden gedaan naar de manifestatie en evolutie van REL in meerlaagse wetgevingskaders en het effect van REL op (reflexieve) leerprocessen van gereguleerde actoren.

Hoofdstuk 3 gaat in op de fysieke en regelgevingsaspecten van plastic door middel van een verhalende literatuurstudie. Uit de bevindingen blijkt hoe ingewikkeld de uitdagingen in verband met plastic zijn en wordt duidelijk hoe de fysieke en regelgevingsaspecten fluctueren tijdens de stadia van productie, gebruik, afvalbeheer en verontreiniging binnen de levenscyclus van plastic. Deze variatie omvat aspecten op het gebied van technologie, milieu, economie en politiek, die een complexe reeks onderling verbonden uitdagingen vormen gedurende de levenscyclus van plastic. Het hoofdstuk belicht ook nieuwe bewegingen op het gebied van circulariteit voor plastic en toenemende grensoverschrijdende benaderingen. Deze benaderingen kunnen alleen slagen met regelgevingskaders die zijn afgestemd op geopolitieke factoren die voortvloeien uit de grensoverschrijdende aard van de plasticeconomie en de rol van een land als producent, consument en/of ontvanger van plasticverontreiniging.

Hoofdstuk 4 introduceert een nieuw kader voor REL op basis van de overkoepelende drijfveren van de reflexiviteit van gereguleerde actoren – autonomie, verantwoordelijkheid en aanpasbaarheid. Daarbij bevordert autonomie zelforganisatie, stemt verantwoordelijkheid de besluitvorming van gereguleerde actoren af op maatschappelijke waarden, en beïnvloedt aanpasbaarheid de anticipatie van gereguleerde actoren op verandering. Onder deze drijfveren zijn er elf REL-technieken met weinig, gemiddeld of veel potentie om de reflexiviteit van gereguleerde actoren te stimuleren. In dit hoofdstuk wordt onderzocht hoe deze technieken zijn ingebed in zes veelgebruikte wetgevingsinstrumenten, waarbij wordt benadrukt dat REL-technieken alleen inherent onderdeel uitmaken van technologische instrumenten. Desalniettemin wordt in de conclusies besproken hoe REL-technieken, theoretisch gezien, kunnen worden opgenomen in alle instrumenten om de reflexiviteit van gereguleerde actoren te bevorderen. Tot slot wordt benadrukt dat het effect van de REL-technieken afhangt van de context, al zijn ze niet allemaal even krachtig. Regelgevers moeten daarom streven naar een passend evenwicht tussen autonomie, verantwoordelijkheid en aanpasbaarheid op basis van de specifieke context.

In hoofdstuk 5 wordt onderzocht hoe het nieuwe kader voor REL dat in hoofdstuk 4 is gepresenteerd, zich manifesteert en evolueert binnen het beheerskader op meerdere niveaus in de Europese Unie. Door REL in de SUPD te vergelijken met omzettingen in nationale wetgeving door Frankrijk en Duitsland, laat het onderzoek zien dat er in de Duitse en Franse omzetting van de SUPD over het algemeen een even groot of groter potentieel was voor REL om de reflexiviteit van gereguleerde actoren te stimuleren. De lidstaten experimenteerden met name meer met de nationale REL-benadering wanneer ze de vrijheid kregen om instrumenten te kiezen en wanneer REL-technieken op een hoger niveau werden geïntegreerd in de SUPD. De effectiviteit van REL was echter zwakker in de omzetting door de lidstaten wanneer er in de SUPD technieken werden toegepast zonder rechtstreekse invloed op de acties van bedrijven. Dit roept vragen op over het omzettingsproces, waarbij REL-technieken mogelijk worden weggelaten of over het hoofd worden gezien, met name technieken voor ‘bewustmaking’ en ‘dreiging van regulering’, wat leidt tot afname van het vermogen van REL om de reflexiviteit van gereguleerde actoren te stimuleren. Bovendien beïnvloedden de

keuze van het instrument en het gebruik van REL-technieken op hoger niveau de omzetting van REL, wat leidde tot creatieve toepassingen in Frankrijk en Duitsland. Daarbij kwamen verschillen tussen de twee landen naar voren wat betreft de nadruk op verantwoordelijkheid en autonomie.

In hoofdstuk 6 worden de reacties van gereguleerde actoren in Frankrijk en Duitsland op de SUPD verkend door middel van semi-gestructureerde interviewmethoden. Gereguleerde actoren blijken heel divers te reageren op verschillende regelgevingsinstrumenten in de SUPD. Er zijn negatieve reacties, adaptieve single-loop reacties en double- en triple-loop reflexieve reacties. Double-loop reflexieve reacties hangen samen met een evenwichtige toepassing van REL-technieken in bepaalde SUPD-instrumenten en combinaties van instrumenten. Ondanks het bewijs van reflexieve drijfveren in de SUPD worden de reacties van gereguleerde actoren ook beïnvloed door contextuele factoren en gerelateerde wetgeving, zoals de aanstaande plasticverordening in de EU, en door factoren buiten de wetgeving, zoals marktconcurrentie en druk van de consument. Het enige geval van triple-loop reflexiviteit wordt toegeschreven aan een combinatie van deze drijfveren in plaats van dat het uitsluitend voortkomt uit de SUPD. Het onderzoek introduceert een nieuwe REL-techniek, ‘visies op toekomstige technologieën of systemen’, als update van het REL-kader dat in hoofdstuk 4 is gepresenteerd. Samenvattend onderstreept hoofdstuk 6 dat REL weliswaar een belangrijke rol speelt bij het stimuleren van reflexiviteit, maar wel in samenwerking met verschillende contextuele factoren, wat de onderling verbonden invloeden toont die de reflexiviteit van gereguleerde actoren vormgeven.

In de conclusie wordt de belangrijkste onderzoeksvraag beantwoord door uitleg over hoe REL de reflexiviteit van gereguleerde actoren stimuleert, allereerst door een passend evenwicht tussen de reflexieve drijfveren volgens de context. Deze drijfveren zijn belangrijk voor het stimuleren van reflexiviteit om de circulariteit van plastic aan te pakken door gereguleerde actoren bij het regelgevingsproces te betrekken, de connectiviteit tussen de levenscycli van plastic te verbeteren en de toekomstperspectieven van bedrijven vorm te geven.

In antwoord op de doelstelling van het promotieonderzoek wordt de essentiële rol van REL onderstreept bij het katalyseren van duurzaamheidstransformaties, omdat hierdoor duidelijk wordt hoe wetgeving niet alleen breder en uitgebreider wordt toegepast, maar ook de diepte ingaat. Ten eerste, los van de vraag of reflexiviteit wel of niet wordt gestimuleerd, speelt REL een rol bij het vaststellen van transformatieve visies als benchmarks voor brede maatschappelijke verandering. Dit is essentieel voor het opschalen van transformaties door ervoor te zorgen dat gereguleerde bedrijven in de richting van een transformatieve toekomst worden geduwd. Daarnaast is de rol van REL het stimuleren van reflexiviteit en duurzaamheidstransformaties die de diepte ingaan. Reflexiviteit wordt niet alleen versterkt door een passend evenwicht tussen de reflexieve drijfveren in één wet, maar ook door elkaar ondersteunende drijfveren in verschillende formele en informele wetgevingsgebieden. Bovendien is de betrokkenheid van REL bij het stimuleren van reflexiviteit gekoppeld aan het samenspel van starheid en flexibiliteit binnen de wetgeving, wat aanduidt dat dit een

belangrijk terrein is voor toekomstige theoretische ontwikkeling. Ten slotte wordt de essentiële rol van REL benadrukt voor het bevorderen van de samenhang tussen gereguleerde actoren en in diverse wetgevingsdomeinen. Dit is fundamenteel voor het bevorderen van de reflexiviteit van gereguleerde actoren door de fragmentatie binnen productie- en consumptiesystemen en de wettelijke kaders die daarop van toepassing zijn aan te pakken.

About the author

Violet Ross is from West Sussex in England, United Kingdom. She started her PhD in 2020 at Wageningen University as part of a collaboration across two research chair groups – Law and Environmental Policy. Her PhD research assessed the impact of regulatory instruments within the EU's Single-use Plastics Directive on the reflexive transformation of the plastics economy towards circularity.

Throughout her PhD project, she functioned as a representative for fellow PhD candidates in the Law group and the Wageningen Centre for Sustainability Governance. In this capacity, she organized various activities and events to advocate for the interests of her peers.

Violet holds a Joint Honors Bachelor's of Arts in Chinese and history from the University of Leeds, along with a Master's of Science in environmental technology from Imperial College London. Her professional background includes diverse experiences, such as environmental data disclosure for a Beijing-based non-governmental organization (NGO) and environmental impact assessment for a London-based planning and development consultancy.

Her research interests encompass various interdisciplinary areas, focusing on the transition towards a circular economy through regulatory measures and organizational management to address complex sustainability challenges.

Publications

V Ross & L de Almeida, 'Refining Reflexive Environmental Law by Nature and Nurture: Autonomy, Accountability, and Adjustability' *Transnational Environmental Law* [forthcoming 2024].

V Ross, 'Book Review of Global Plastic Pollution and its Regulation: History, Trends, Perspectives' by G Nagtzaam et al., *Transnational Environmental Law* [forthcoming 2024].

V Ross, L de Almeida, Judith van Leeuwen & J van Zeben, 'Reflexive EU Environmental Law: Divergence in the French and German Transposition of the Single-use Plastics Directive' [submitted for publication Jan 2024].

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J. van Zeben and **V. Ross,** 'Plastics: From resources to waste and back again', *Handbook of Global Environmental Politics,* P Harris (ed.) 2nd edn (Routledge 2022). DOI: 10.4324/9781003008873-42.

V Ross & J van Zeben, 'Shell Nederland Verkoopmaatschappij BV and Belgian Shell NV' *Oxford Encyclopedia of EU Law* (2020, OUP).

Education certificate

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Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
A1 Managing a research project			
WASS Introduction Course	Wageningen School of Social Sciences (WASS)	2020	1
Writing research proposal	Environmental Policy Group (ENP) and Law group Wageningen	2020	6
Review of case on EU waste law	Oxford Encyclopaedia of EU Law	2020	1
Peer review of book on circularity for plastics	Oxford University Press	2021	1
Peer review of journal article for Cambridge Prisms: Plastics	Cambridge University Press	2023	1
Brain friendly working and writing	WGS	2020	0.3
'Reflexive environmental law for the circular plastics economy: A case study of European Union legislative approaches'	WASS PhD-day	2022	0.5
'Reflexive environmental law for the circular plastics economy'	ECPR Conference, University of Innsbruck	2022	1
'Private-firm reflexivity to build plastics circularity – An empirical investigation into manifestations of reflexive environmental law fostered by EU legislative acts'	3rd Oslo International Environmental Law Conference, University of Oslo	2022	1
'Does the law drive reflexivity in companies to enhance plastics circularity? A case of the EU's Single-use Plastics Directive'	SCORAI Conference, Wageningen University (WUR)	2023	1
A2 Integrating research in the corresponding discipline			
Sociology and political science of environmental transformations	ENP, WUR	2020	1.5
Introduction to Law for the Life Sciences LAW12806	WUR	2021	6
PhD Training Programme (introduction, foundation, comparative law sessions)	IUS Commune Research School	2020-2022	3

Summer School: Lancaster Social Science Intellectual Party for Postgraduate Students	Lancaster University	2021	1
Summer School: Environmental Law Doctoral Researchers' Workshop	University of New South Wales and University of Melbourne	2021	1
B) General research related competences			
B1 Placing research in a broader scientific context			
Ethics in Social Sciences Research	WGS	2020	0.5
Advanced Qualitative Research Design and Data Collection GEO56806	WUR	2021	6
PhD writing retreat	WASS	2022	1
B2 Placing research in a societal context			
Producing and hosting two episodes of new podcast: 'So What?'	Wageningen Centre for Sustainability Governance (WCSG)	2022	1
Production of daily conference report	SCORAI Conference, WUR	2023	1
C) Career related competences/personal development			
C1 Employing transferable skills in different domains/careers			
MSc Supervision Course	ENP	2022	0.5
Assistance supervising and grading law essays for course: ENP 10806	ENP and Law groups	2023	1
Total			**37.3**

*One credit according to ECTS is on average equivalent to 28 hours of study load

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