

Well Defined Is Half Solved? The Regulatory Barriers for Circular Economy Business

Topi Turunen, Leila Suvantola** and Seita Romppanen****

Abstract

This article identifies and examines regulatory barriers that hinder the development of the circular economy transition and argues that such barriers must be defined before they can be solved. The article's argument is based on a two-round Delphi study focusing on the regulatory barriers to the circular economy, which demonstrated that many of what had been assumed to be regulatory barriers were not, in fact, caused by substantive regulation as such. Instead, challenges in relation to the interpretation of certain legal provisions and the lack of uniform practices as to their application were regarded as barriers. The study also examined the nature of these issues and the prospects of resolving them, which facilitated insight into the broad spectrum of regulatory instruments that can either remove the existing barriers or function as drivers for the circular economy transition. The EU is implementing a range of actions to facilitate the transition to a circular economy, in relation to which several regulatory frameworks and policy responses are directly relevant. However, the regulatory approaches to the circular economy are sometimes understood too narrowly, as being limited, for ex-

ample, to traditional command-and-control instruments or comprising only particular substantive laws (e.g. on waste legislation). This narrow approach is insufficient in scope. Clear understanding of as well as clarity and coherence among the regulatory approaches to the circular economy are essential in order to achieve full implementation of its aims. Identification and examination of regulatory barriers represent one but practical step forward in enhancing this understanding, clarity and coherence.

Keywords: circular economy, EU, regulation, barriers, drivers

Acknowledgements: We would like to thank the stakeholders who participated in the CICAT2025 workshops and the anonymous experts who participated in the Delphi study and helped us to compile this data that reflects the practical nature of the regulatory barriers to circular economy.

Funding: This work was supported by the Strategic Research Council at the Academy of Finland as part of project CICAT2025, Circular Economy Catalysts: From Innovation to Business Ecosystems (Grant number: 320194/320206).

1. Introduction

1.1 Achieving the circular economy

The world's natural resources are used in excess and inefficiently in the current linear economy model.¹ Raw materials are collected, trans-

* University of Eastern Finland Law School, Finland. Finnish Environment Institute SYKE, Finland. Corresponding author. Itä-Suomen yliopisto, Yhteiskuntatieteiden ja kauppatieteiden tiedekunta, Oikeustieteiden laitos, Joensuu kampus, PL 111, 80101 JOENSUU, topi.turunen@uef.fi.

** Ministry of the Environment, Finland. leila.suvantola@ym.fi.

*** University of Eastern Finland Law School, Finland. Finnish Environment Institute SYKE, Finland. seita.romppanen@uef.fi.

¹ Global Resources Outlook 2019: Natural Resources for the Future We Want. Resources panel UNEP 2019.

formed into products, used and then discarded as waste. This increases global problems such as resource scarcity and excessive pollution loads. The drive towards sustainability prompted the European Union (EU) to adopt the idea of the circular economy (CE).² The EU's Seventh Environmental Action Programme was thus titled 'Living well, within the limits of our planet'.³ The main aim of the Programme was to transform the EU into a CE by 2050. More recently, the European Green Deal 2019 aims to further implement the CE objectives.⁴ Alongside the Green Deal, the EU has published a new CE Action Plan⁵ that focuses on circular and sustainable products and expands circularity from the waste phase to the production process with a strong connection with the new Industrial Strategy for Europe.⁶ The European switch to CE is expected to make a 'decisive contribution' to the EU's aim of achieving climate neutrality by 2050.⁷ The EU's CE transition is part of the global endeavour to achieve a sustainability transition.

² See e.g. Winans, Kiara – Kendall, Alissa – Deng, Huijing: The history and current applications of the circular economy concept. *Renewable and Sustainable Energy Reviews* 68:1, pp. 825–833.

³ Decision 1386/2013 of the European Parliament and the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet', 28 December 2013 (OJ L 354/171).

⁴ COM (2019) 640 final. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions – The European Green Deal, pp. 7–9.

⁵ COM (2020) 98 final. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and Committee of the Regions – A new Circular Economy Action Plan.

⁶ COM (2020) 102 final. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and Committee of the Regions – A New Industrial Strategy for Europe.

⁷ A new Circular Economy Action Plan, p. 2.

The EU introduced the legal definition of the CE in 2020. Regulation (EU) 2020/852⁸ on sustainable investment defines the CE as 'an economic system whereby the value of products, materials and other resources in the economy is maintained for as long as possible, enhancing their efficient use in production and consumption, thereby reducing the environmental impact of their use, minimizing waste and the release of hazardous substances at all stages of their life-cycle, including through the application of the waste hierarchy' (Article 2(9)). The CE represents a new way of understanding the material life-cycle, from planning and production through to use and end of use, by ensuring that nothing is wasted and that the use of natural resources is sustainable. In effect the CE Action Plan introduces a set of legislative and non-legislative measures targeting areas in which EU level action is necessary in order to establish a robust and coherent product policy framework. This framework extends to the entire life-cycle of products.⁹ The economic impacts of a fully implemented CE strategy would be remarkable, ranging from profound impacts on day-to-day operations to impacts on the value creation logic of businesses. Arguably, the shift from a linear to a CE model could be the biggest European economic transformation since the establishment of the internal market¹⁰ – a paradigmatic economic shift.

⁸ Regulation (EU) 2020/852 of the European Parliament and of the Council of the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088, 22 June 2020 (OJ L 198/13).

⁹ 'A product policy framework' aims to 'make sustainable products, services and business models the norm and transform consumption patterns so that no waste is produced in the first place'. A new Circular Economy Action Plan, p. 3.

¹⁰ Ellen MacArthur Foundation: *Growth Within: A Circular Economy Vision for a Competitive Europe* (2015), p. 29, <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoun>

Realization of the CE objectives will ultimately depend on how well the public sector, businesses and individual EU citizens adopt this new approach. The Member States play a crucial role in this context. The overall strategic objectives and frameworks set by the EU are to be implemented by the Member States while considering national and regional specifics such as geographical characteristics and industrial structures. Several regulatory frameworks and policy responses are directly relevant to the development of the CE. The CE covers several substantive regulatory sectors that are currently accustomed to the dominant linear economy model. Full achievement of the CE aims calls for a clear understanding of and coherence as between the regulatory approaches to the CE and the instruments used in this context. An overly narrow understanding of the regulatory approaches and instruments available impedes an effective response to the relevant challenges and does not address the full scope of the CE. For example, restricting regulatory instruments to traditional command-and-control instruments or to particular substantive laws, in particular waste legislation, precludes a comprehensive vision of all applicable regulatory frameworks, including those governing product design and safety and environmental and climate impacts. The existing regulatory framework for the CE provides both barriers to the development of the CE and drivers for the smooth transition to the CE.¹¹ Identification and examination of these regulatory barriers represents a pragmatic step

dation_Growth-Within_July15.pdf (visited on 25 June 2019).

¹¹ Ranta, V. – Aarikka-Stenroos, L. – Ritala, P. – Mäkinen, S. J.: Exploring institutional drivers and barriers of the circular economy: A cross-regional comparison of China, the US, and Europe. *Resources Conservation and Recycling*, 135 (2018), pp. 71–72; See also, on barriers and drivers, Jesus, A – Mendonça, S., Lost in Transition? Drivers and Barriers in the Eco-innovation Road to

forward in terms of understanding them in order to improve the clarity and coherence of regulatory approaches to the CE.

This article focuses on the regulatory barriers to CE businesses. A Delphi study¹² is applied as an empirical research method by which the main regulatory barriers for the adoption of the CE and the regulatory options for addressing them are identified. The Delphi method involves collecting anonymous data from a panel of experts using various data collection and analysis techniques. In other words, the Delphi method is applied as a practical tool through which to identify barriers that hinder the development of CE businesses. The study provides information based on ‘law in action’ instead of ‘law in books’¹³ by examining the dynamic relation between the regulatory instruments and their practical execution. It is rooted in the idea that to achieve the CE objectives, regulatory barriers to the CE must be removed. However, their removal requires that they are first identified. There are many ways to remove barriers, such as amending an existing regulatory framework or providing guidance on its interpretation. This article identifies the most significant regulatory barriers for the CE in the Finnish context. Finland serves as a good case study because it is taking a leading role in the CE transition and is currently implementing an ambitious CE road map¹⁴.

the Circular Economy. *Ecological Economics* 145 (2018), pp. 75–89, p. 75.

¹² The Delphi method is a structured communication technique or method, originally developed as a systematic, interactive forecasting method which relies on a panel of experts. See e.g. *Harold A. Linstone, Murray Turoff (1975), The Delphi Method: Techniques and Applications, Reading, Mass.: Addison-Wesley.*

¹³ Halpérin, J-L., Law in Books and Law in Action: The Problem of Legal Change. *Me. L. Rev.* 64 (2011), pp. 45–76, p. 47.

¹⁴ Sitra: Critical Move – Finland’s Road map to Circular Economy 2.0 (<https://www.sitra.fi/en/projects/critical-move-finnish-road-map-circular-economy-2-0/#challenge>, accessed 24.9.2020).

1.2 Regulating circularity

There are several definitions of regulation. First, it can refer to a specific set of commands involving the adoption of rules binding on society at large. Many command-and-control instruments (i.e. those that exert influence by imposing standards supported by sanctions) fall within the scope of this narrow definition, which primarily refers to regulation through legal rules.¹⁵ Second, the concept of regulation can also be understood more inclusively to cover all state actions that are designed to influence business or social behaviour.¹⁶ This broader concept of regulation extends to all forms of social control, 'whether intentional or not, and whether imposed by the state or other social institutions'¹⁷ and includes both traditional and less traditional regulatory rules. This broad understanding of regulation is applied in this article.

Policy goals such as CE are often complex and cannot comprehensively be regulated through a single policy or regulatory instrument.¹⁸ Arguably 'while the CE philosophy is easy to understand, it is very complex to put into practice'.¹⁹ The development of the CE depends

upon approaches that transcend and integrate different policy sector targets in the context of the CE transition. For example, in order to promote CE business activities, the whole life-cycle of the product and the various substantive regulatory frameworks applicable at each stage of that life-cycle has to be taken into account.²⁰ A complementary mix of policy instruments that are tailored to meet different CE objectives is necessary. The CE transition is a complicated and multifaceted policy objective that does not necessarily take one definite path.²¹ The CE fundamentally requires a holistic approach to regulation, an approach that can address 'the diversity of the challenges at hand' and entails rules that are 'clever and fitting'.²²

Regulation can function as the gatekeeper of sustainability, while it can also be perceived as the facilitator that establishes and upholds the architecture enabling the CE. At the same time, fostering the CE touches upon and creates a great variety of questions and challenges relevant to regulation.²³ However, regulation is only one of the tools in the CE toolbox and the full development of the CE requires a multi- and interdisciplinary approach. The CE transition calls for systemic change, involving parallel actions throughout the value chain instead of purely

in the European Union: Impacts on transition towards a more circular economy. *Journal of Cleaner Production* (in press, 2020).

²⁰ See Hughes, Richard: The EU Circular Economy package – life cycle thinking to life cycle law? *Procedia CIRP* 61 (2017), pp. 10–16.

²¹ See COM (2020) 98 final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A new Circular Economy Action Plan.

²² Maitre-Ekern, Eléonore: The Choice of Regulatory Instruments for a Circular Economy in Mathis, Klaus, and Huber, Bruce R. (eds.): *Environmental Law and Economics*, pp. 305–334, p. 305–332.

²³ See, e.g., Backes, Chris: *Law for a Circular Economy* (Eleven International Publishing, 2017), p. 15.

¹⁵ Morgan, Bronwen – Yeung, Karen: *An Introduction to Law and Regulation: Text and Materials*. Cambridge University Press 2007, pp. 80–81; Baldwin, Robert – Cave, Martin – Lodge, Martin: *Understanding Regulation: Theory, Strategy, and Practice* (Oxford University Press, 2012), pp. 3 and 106.

¹⁶ Baldwin, Robert – Cave, Martin – Lodge, Martin: *Understanding Regulation: Theory, Strategy, and Practice* (Oxford University Press, 2012), pp. 3 and 106.

¹⁷ Morgan, Bronwen – Yeung, Karen: *An Introduction to Law and Regulation: Text and Materials*. Cambridge University Press 2007, p. 3.

¹⁸ See e.g. COM (2020) 98 final. Annex to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A new Circular Economy Action Plan: The Commission lists 7 different new sustainable product policy frameworks to accommodate the new CE Action Plan.

¹⁹ María del Mar Alonso-Almeida, M. et al., *Institutional entrepreneurship enablers to promote circular economy*

sector or product focused approaches.²⁴ The CE thus requires actions in the regulatory field and institutional and cultural changes, technological innovation and knowledge development as well as the active participation of all stakeholders.²⁵ Hence '[l]egal research in this area must be integrated into interdisciplinary teams and projects'.²⁶

Regulation is typically perceived as restricting or hindering behaviour. However, the influence of regulation can also be enabling and facilitative.²⁷ The arguments set out in this article relating to the barriers (and drivers) of the CE focus particularly on the regulatory choices we make in order to achieve the CE. What regulatory strategies are deployed? What regulatory instruments should be developed and implemented? Moreover, the question of how suitable, effective and appropriate these instruments are is essential to the debate concerning the barriers to and drivers of the CE.

There are a number of different regulatory strategies available to promote the development of CE business. The regulatory authority can, for example, choose to regulate the subject of regulation (e.g. CE businesses) through direct regulation (i.e. legal rules). Alternatively, it can rely on the CE businesses to self-regulate, or adopt a combination of the two, in the form of co-regulation. The regulatory authority can also delegate the authority to regulate to a third party. The

choice of regulatory strategy is important.²⁸ Although the toolkit is extensive and comes with alternatives, '[c]hoosing among the alternatives is inherently difficult because they operate in a different manner and pursue different objectives'.²⁹ The strategy chosen has to be able to demonstrate that it is *effective* and legitimate in terms of achieving its objectives. Effectiveness refers to the capacity of a given regulatory framework to solve the problem at hand and its ability to contribute to the set regulatory objective.³⁰ Hence, effectiveness can be perceived as the ability to bring about solutions (effectively).³¹ Legitimacy is, in principle, about how we accept and justify the authority that produces these solutions.³² In fact, public policy derives much of its legitimacy from its problem-solving capacity, and hence the two concepts are intertwined.

²⁸ Baldwin, Robert – Cave, Martin – Lodge, Martin: *Understanding Regulation: Theory, Strategy, and Practice* (Oxford University Press, 2012), pp. 105, 135 and 146.

²⁹ Maitre-Ekern, Eléonore: *The Choice of Regulatory Instruments for a Circular Economy* in Mathis, Klaus, and Huber, Bruce R. (eds.): *Environmental Law and Economics*, pp. 305–334, p. 306.

³⁰ Lenschow, Andrea: 'Studying EU environmental policy', in Jordan, Andrew – Adelle, Camilla (eds.), *Environmental Policy in the EU. Actors, Institutions and Processes* (Earthscan from Routledge 2013), pp. 49–72, p. 56.

³¹ Effectiveness has multiple meanings. It is not a normative concept. However, evidence on the effectiveness of legal and policy instruments is of particular importance for a perspective that is interested in researching 'to what extent the theoretical assumptions, on which much of environmental governance is based, in fact work in practice'. Often this type of interest focuses, for example, on the effectiveness of particular regulatory instruments. See Faure, Michael: 'Effectiveness of Environmental Law: What does the Evidence Tell us?', *36:2 William & Mary Environmental Law and Policy Review* (2012), pp. 293–336, pp. 294–295.

³² Legitimacy can be described through its sociological (socially accepted use of authority) and normative (justification; is the use of authority well founded) dimensions. Bodansky, Daniel: 'Legitimacy', in Bodansky, Daniel – Brunnée, Jutta and Hey, Ellen (eds.): *The Oxford Handbook of International Environmental Law* (Oxford University Press, 2007), pp. 704–723, p. 709.

²⁴ See e.g. Maitre-Ekern, Eléonore: *The Choice of Regulatory Instruments for a Circular Economy* in Mathis, Klaus, and Huber, Bruce R. (eds.): *Environmental Law and Economics*, pp. 305–334, p. 311.

²⁵ Backes, Chris: *Law for a Circular Economy* (Eleven International Publishing, 2017), p. 16.

²⁶ Backes, p. 16.

²⁷ Baldwin, Robert – Cave, Martin – Lodge, Martin: *Understanding Regulation: Theory, Strategy, and Practice* (Oxford University Press, 2012), p. 3.

Under the different regulatory strategies, different kinds of regulatory instruments may be deployed. Regulatory instruments seek to steer social behaviour. Different types of regulatory instruments can be classified in a number of ways and there is no consensus on the categorization.³³ This article does not seek to give a fixed meaning of the concept. Rather it explains our broad understanding of the concept in the CE context. The article approaches regulatory instruments in a broad sense instead of focusing solely on traditional forms of regulation such as command-and-control instruments. All 'regulatory instruments' are policy instruments that are based on coercive legislative instruments even though their expected impact may also be financial or even informational.³⁴ For example, although tax is sometimes regarded as a financial instrument, it is based on coercive legal provisions and supported by criminal sanctions.³⁵ Furthermore, the provision of information may be required by legislation and failure to do so typically results in the imposition of a sanction. Thus, even though the targeted outcome is informational guidance, the instrument is not merely informational in scope.³⁶ As a systemic and

multifaceted policy umbrella, the development of CE will require a mix of regulatory instruments and extensive regulatory actions in more than one legislative framework. Our arguments on the barriers and drivers of CE development should be viewed as a perspective that is closely related to the questions of how we regulate and what instruments we deploy for that purpose.

1.3 Barriers and drivers

The research began with a review of international and national literature, focusing on identifying barriers that impede CE businesses. The legal literature on CE barriers is extensive and growing.³⁷ The concepts of barrier and driver are often left undefined and often seem to include different categorisations and scopes. The definitions are left open in this article in order to discuss the issue in broad terms rather than narrowing it down to specific definitions with the data received from the Delphi study. Generally speaking, in this study barriers means challenges that hinder achievement of the CE or have negative implications for the attainment of its objectives. These may relate, for example, to legal provisions, policy spaces created by the legal provisions and common practices in different fields of business. While this article focuses on CE barriers, it is also useful to understand the relevance of a CE driver, as a counterpart to a CE barrier. CE drivers are actions that promote or encourage actors to take steps towards achievement of CE objectives.

The literature review served a basis for identifying existing regulatory barriers. It revealed that only a limited number of barriers are identified as regulatory barriers. However, the literature study revealed several attitudinal and price barriers that can be addressed by means of

³³ Morgan, Bronwen – Yeung, Karen: *An Introduction to Law and Regulation: Text and Materials*. Cambridge University Press 2007, pp. 79–80.

³⁴ Krott, Max: *Forest Policy Analysis*. Springer 2005, p. 219: Our definition follows the logic of Krott's which states that '(r)egulatory instruments comprise all those regulatory political interventions which formally influence social and economic action through binding regulations'.

³⁵ Vedung, E.: *Policy Instruments: Typologies and Theories*. In Bemenmans-Videc, M.-L. – Rist, R.C. – Vedung, E. (eds.): *Carrots, Sticks and Sermons: Policy Instruments and Their Evaluation*. Transaction Publishers 1998, p. 32: The addressees of economic instruments have to possibility to decide whether to take the measures involved or not.

³⁶ Vedung, E.: *Policy Instruments: Typologies and Theories*. In Bemenmans-Videc, M.-L. – Rist, R.C. – Vedung, E. (eds.): *Carrots, Sticks and Sermons: Policy Instruments and Their Evaluation*. Transaction Publishers 1998, p. 33.

³⁷ Kirrherr et al. 2018 s. 264 with references.

legislative instruments³⁸ and are of indirect relevance to regulation. Furthermore, administrative decisions were repeatedly referred to as regulatory barriers by interest group participants in a workshop on the CE in the construction sector organized by the CICAT2025 research project in August 2019. It transpired in the discussion that the challenges referred to related to the methods by which command-and-control regulations were applied rather than the content of these regulations as such.

The theoretical approach to CE barriers has been criticized as being insufficient to capture the multifaceted nature of CE. A need for 'more empirical content' has been expressed³⁹ and this is addressed in this article by means of an empirical study. We argue that enabling the transfer to the CE calls for identification and correction of the specific barriers to doing so. The Delphi study was based on a literature review on the regulatory barriers for the CE and sought to test the general arguments made in the literature and to show the barriers' significance in practical terms.

2. Materials and methods: Delphi study

The Delphi method is a qualitative research method that aims to tap the expert knowledge on the topic at hand and entails the collection and distillation of anonymous data from experts using a series of data collection and analysis techniques. In other words, it turns to experts for their knowledge and understanding. The method is well suited for collecting information about a problem or phenomenon that is vague,

partly unknown and challenging to approach.⁴⁰ The participants' anonymity enables avoidance of monopolization or domination of discussion, group thinking and marginalization of divergent opinions. Conducted on the internet, it allowed for flexibility over time and space.⁴¹ In our study the Delphi method provided a method by which to identify and examine the practical regulatory barriers to the achievement of the CE and to distinguish between barriers drawn from the perspectives of 'law in books' and 'law in action'. The Delphi study was conducted in order to reach beyond the theory of barriers and acquire better understanding of the views of the relevant CE stakeholders.⁴²

The barriers identified in literature and the workshops were tested in a Delphi study directed to national CE experts.⁴³ The purpose of the Delphi study was threefold: to find out whether the experts in the CE businesses identified the same or different regulatory barriers to the transition to the CE as noted in the national and international research literature; to evaluate the significance of each barrier in the national context to ensure that further examination would focus on the most relevant ones; and to identify

³⁸ Technopolis: Regulatory barriers for the Circular Economy Lessons from ten case studies. Technopolis 2016, p. 57.

³⁹ See e.g. *de Jesus, Ana – Mendonça, Sandro*: Lost in Translation? Drivers and Barriers in the Eco-innovation Road to the Circular Economy. *Ecological Economics* 145 (2018), p. 85.

⁴⁰ *Skulmoski, Gregory J. – Hartman, Francis T. – Krahn, Jennifer*: The Delphi Method for Graduate Research. *JITE-Research* Volume 6 (1) 2007, pp. 1–6.

⁴¹ Hannes K., Heyvaert M., Slegers K., Vandenbrande S. and Van Nuland M. (2016) Exploring the Potential for a Consolidated Standard for Reporting Guidelines for Qualitative Research: An Argument Delphi Approach. *International Journal of Qualitative Methods*, p. 1–16; Hasson, F., Keeney, S., & McKenna, H. (2000) Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing* (32), p. 1008–1015.

⁴² See *Skulmoski, Gregory J. – Hartman, Francis T. – Krahn, Jennifer*: The Delphi Method for Graduate Research. *JITE-Research* Volume 6 (1) 2007, pp. 6–7: The Delphi study has also been used to identify and rank computer forensics legal issues.

⁴³ Peter Cane, Peter – Herbert M. Kritzer, Herbert M.: Introduction in Peter Cane, Peter – Herbert M. Kritzer (eds.): *The Oxford Handbook of Empirical Legal Research* (Oxford University Press, 2010), pp. 1–10, p. 4.

tools to remove the barriers or to transform them into drivers.

The participants in the Delphi study were selected from a list of 'the most interesting companies in the CE' in Finland identified by the Finnish Innovation Fund (SITRA).⁴⁴ They represented all five CE business models (circular supply, product service system, sharing, product life extension and resource recovery) identified by the OECD.⁴⁵ This was done to ensure that the CE was addressed in all its forms, not only in the traditional context of material recovery. In addition, representatives of research institutes and administrative bodies relevant to the CE were also included. Rather than utilizing many experts, a small number of relevant experts with practical experience were identified.⁴⁶

A Delphi study typically consists of repetitive rounds based on previous results of the study. This study comprised the submission of two rounds of questionnaires to the panelists in autumn 2019. The participants received feedback between the rounds as is typical in a Delphi study.⁴⁷ During the first round the panelists were asked basic questions on which legal provisions either promote or do not promote the

CE. Furthermore, they were asked to either confirm or to deny the relevance or significance of each of the regulatory barriers identified in the literature review. The second round focused on viable solutions for removal of the barriers. The alternative methods of removal of each barrier presented to the experts to choose from were defined in very general terms. In addition, further questions were presented on the confirmed barriers with a view to elaborating on the nature of the barrier. Some of the assessed solutions would require significant changes in the national legislation, but some were simple and did not require any legislative actions. The decision to test unconventional or elaborate alternatives was based on the assumption that the urgency of the paradigmatic shift to the CE requires openness to new regulatory approaches. The results point to *where and how* to regulate and in *what direction* rather than specific regulatory content. The following subsections present the results of the Delphi study and offer a practical starting point for removal of the regulatory barriers to the CE.

3. Results: Regulatory barriers identified in the Delphi study

3.1 Regulatory barriers

3.1.1 Introduction to regulatory barriers

During the first round, the panelists were asked about the practical significance of the barriers identified in the literature review. They were able to either confirm or deny the existence of each barrier. Most of the pre-identified barriers were directly connected with various provisions of substantive regulation or their practical implementation. This article does not discuss all the barriers that were identified in the literature review but focuses on those that were confirmed in the Delphi study. The article emphasizes the barriers that were widely agreed upon and those that were contested. The experts were also able to freely comment on the barriers and on each

⁴⁴ Finnish Innovation Fund Kiertotalouden kiinnostavimmat (The most interesting companies in the circular economy in Finland) <https://www.sitra.fi/hankkeet/kiertotalouden-kiinnostavimmat/> (visited 27.6.2020): Sitra uses the list of present inspiring examples of the CE from Finland and give all Finnish companies the opportunity to be among the first in the world to transition to a CE. The companies on the list have been evaluated from the perspective of their 1. interestingness, effectiveness, business and scalability/repeatability.

⁴⁵ OECD: Business Models for the Circular Economy – Opportunities and Challenges for Policy, 2019 read.oecd-ilibrary.org/environment/business-models-for-the-circular-economy_g2g9dd62-en#page1.

⁴⁶ Powell, C. (2003) The Delphi technique: myths and realities. *Journal of Advanced Nursing* p. 376–382.

⁴⁷ Tapio P. (2002) Disaggregative policy Delphi Using cluster analysis as a tool for systematic scenario formation. *Technological Forecasting & Social Change* (70), p. 83–101.

other's views during the study. In the following subsections the identified barriers are divided into command-and-control, financial and attitude-related or informational barriers.

These classifications were formulated to facilitate analysis of the results. Command-and-control barriers refer to barriers caused by environmental policy that relies on legislation (i.e. traditional forms of regulation such as permissions, prohibitions, standard setting and enforcement).⁴⁸ Financial barriers, on the other hand, refer to barriers that are not (at least directly) imposed as a result of coercive regulatory provisions but hinder the achievement of the CE by making the transition a less profitable option where a linear economy business model is utilized.⁴⁹ Attitude-related and informational barriers refer to barriers that are caused by general attitudes or by incorrect or deficient information on how to move towards CE objectives.

3.1.2 *Command-and-control barriers*

The literature review indicates that the lack of clarity in the legal concepts of waste and end-of-waste (EoW) is widely recognized as a substantial problem for material cycles of the CE.⁵⁰ This

view was strongly supported by the experts in the Delphi study. EoW regulation refers to regulation concerning when certain waste ceases to be waste and obtains the status of a secondary raw material. The question of ceasing to be waste is crucial in the CE because EU legislation provides that all substances and objects which the holder discards, intends or is required to discard are regulated as waste. 'Waste' is utilized to a more restricted extent than 'non-waste'. Materials classified as waste must cease to be so before they can be efficiently used in new products. Hence, EoW regulation plays a crucial part in the implementation of CE.⁵¹ Even though this barrier was regarded as having moderate significance, the importance of EoW regulation and decision-making as well as the unclear definitions were repeatedly mentioned in the comments made by the participants on permitting practices and administrative barriers.

Interestingly, the barrier presented by EoW regulation mainly concerned delays in and incoherence of administrative decision-making. Slow and unpredictable administrative processes reduce the attractiveness of CE business models to business actors and investors. This does not fit the traditional definition of command-and-control barriers. Lengthy administrative decision-making processes and lack of predictability as to outcomes may be categorized as administrative barriers even though the decision-making is based on command-and-control legislation. The barriers may be related to insufficient clarity of the regulations, inappropriate interpretative models, a lack of guidance for decision-making,

⁴⁸ Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997.

⁴⁹ See *Vedung, E.*: Policy Instruments: Typologies and Theories. In Bemenlans-Videc, M.-L. – Rist, R.C. – Vedung, E. (eds.): *Carrots, Sticks and Sermons: Policy Instruments and Their Evaluation*. Transaction Publishers 1998, p. 32.

⁵⁰ *Turunen, Topi*: The Concepts of Waste and Non-waste in the Circular Economy. Publications of the University of Eastern Finland. Dissertations in Social Sciences and Business Studies, no 181, pp. 207–208; *Westblom, Caroline*: Towards a Circular Economy in Sweden – Barriers for new business models and the need for policy intervention. IIIIEE Theses 2015:18, p. 50; *Technopolis*: Regulatory barriers for the Circular Economy Lessons from ten case studies. Technopolis 2016, p. 47; den Hollander, Marcel C. – Bakker, Conny A. – Hultink, Erik Jan: *Product Design in a Circular Economy – Development of a Typol-*

ogy of Key Concepts and Terms. *Journal of Industrial Ecology* Vol. 21(3) 2017, p. 519.

⁵¹ COM (2018) 32 final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation, p. 5.

insufficient administrative resources or a lack of deadlines for administrative processes. Related to this, most of the experts identified environmental permitting processes as a barrier for the CE and the recovery of waste-based materials. Most of the stakeholders regarded it as a significant barrier. The comments revealed an assumption that there is a lack of expertise in EoW decision-making which leads to delay.

Moreover, there are coercive legal provisions that are considered barriers to the achievement of the CE. The product and chemicals safety provisions impact the quality requirements of the materials used in the production processes. The legislation also applies to waste-based materials when they are used as substitutes for virgin raw materials in new products. Hence, these provisions lay down requirements significantly impacting the material potential of waste-based materials. In literature *Westblom* stated that both 'SMEs and large companies... cannot ensure a viable market for secondary materials today since 'old products' contain a lot of chemicals which are banned in new products'.⁵² This risk has also been identified by the European Commission⁵³ and in other literature⁵⁴. In the Delphi study most of the stakeholders at least partly

⁵² *Westblom, Caroline*: Towards a Circular Economy in Sweden – Barriers for new business models and the need for policy intervention. IIIIEE Theses 2015:18, p. 55.

⁵³ COM (2018) 32 final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation, p. 4.

⁵⁴ See *Antikainen, Riina* et al.: Renewal of forest based manufacturing towards a sustainable circular bioeconomy. Report of the Finnish Environment Institute (SYKE) 13/2017, s. 67; *Berg, Annukka – Antikainen, Riina – Hartikainen, Ernesto – Kauppi, Sari – Kautto, Petrus – Lazarevic, David – Piesik, Sandra – Saikku, Laura*: Circular Economy for Sustainable Development. Reports of the Finnish Environment Institute 16/2018, p. 13–14; *Technopolis*: Regulatory barriers for the Circular Economy Lessons from ten case studies. Technopolis 2016, p. 47.

agreed that product safety legislation (especially chemicals legislation) is a barrier to the CE and to the reintroduction of waste-based materials into production processes.

3.1.3 Financial barriers

Financial barriers to the CE were the most commonly identified barrier type in the literature review. These can roughly be divided into lack of financial support and subsidies⁵⁵, lack of financial incentives to move towards CE,⁵⁶ the price advantage of virgin raw materials compared to waste-based materials⁵⁷ and unfavourable tax

⁵⁵ R2π Consortium: Stakeholder Views Report – Enablers and Barriers to a Circular Economy. 2018, p. 21, 24–5; *Kirchherr, Julian – Piscicelli, Laura – Bour, Ruben – Kostense-Smit, Erica – Muller, Jennifer – Huibrechtse-Truijens, Anne – Hekkert, Marko*: Analysis – Barriers to the Circular Economy: Evidence From the European Union (EU). *Ecological Economics* 150 (2018), p. 269; *Ilić, Marina – Nolić, Magdalena*: Drivers for development of circular economy – A case study of Serbia. *Habitat International* 56(2016); *Rizos, V., et al.*: The circular economy: barriers and opportunities for SMEs. 2015. Available at: <https://www.ceps.eu/system/files/WD412GreenEconetSMEsCircularEconomy.pdf>; *Tura, Nina – Hanski, Jyri – Ahola, Tuomas – Stähle, Matias – Piiparinen, Sini – Valkokari, Pasi*: Unlocking circular business: A framework of barriers and drivers. *Journal of Cleaner Production* 212 (2019), p. 91.

⁵⁶ *Kirchherr, Julian – Piscicelli, Laura – Bour, Ruben – Kostense-Smit, Erica – Muller, Jennifer – Huibrechtse-Truijens, Anne – Hekkert, Marko*: Analysis – Barriers to the Circular Economy: Evidence From the European Union (EU). *Ecological Economics* 150 (2018), pp. 268–269; *Ritzén, Sofia – Ölundh Sandström, Gunilla*: Barriers to the Circular Economy – integration of perspectives and domains. *Procedia CIRP* 64 (2017), p. 10; *Rizos, V., et al.*: The circular economy: barriers and opportunities for SMEs. 2015. Available at: <https://www.ceps.eu/system/files/WD-412GreenEconetSMEsCircularEconomy.pdf>.

⁵⁷ *Kirchherr, Julian – Piscicelli, Laura – Bour, Ruben – Kostense-Smit, Erica – Muller, Jennifer – Huibrechtse-Truijens, Anne – Hekkert, Marko*: Analysis – Barriers to the Circular Economy: Evidence From the European Union (EU). *Ecological Economics* 150 (2018), p. 269; *Preston, F.*: A global redesign? Shaping the circular economy. 2012. Available at: <http://www.ecoconnect.org.uk/download/ShapingtheCircularEconomy.pdf>, p. 10; *Pomponi, Francesco – Moncaster, Alice*: Circular economy for built en-

treatment⁵⁸. The most important financial barrier identified in the Delphi study was the price advantage of virgin raw materials. In many cases, after all things had been considered, using waste-based material proved more expensive than using virgin raw materials. This included various costs linked to administrative processes and delays connected with using waste-based materials that are not experienced when using virgin raw materials. Despite this, some panelists expressed the view that prices will adjust to changing circumstances and should not be interfered via regulatory instruments. Another financial barrier that was identified was the unfavourable treatment of companies providing products as services (lighting as service instead of buying lamps etc.) under current tax legislation as compared with companies selling products. The panelists recognized, however, that taxation and other financial instruments could be utilized to encourage a shift to the CE.

vironment: A research framework. *Journal of Cleaner Production* 143 (2017), p. 716.

⁵⁸ Kas, Judith – Bet, Bram – Truijens, Daphne (eds.) *Barriers and Best Practices for the Circular Economy*. SMO Promovendi – Circular Minds 2017/2018, p. 28; R2π Consortium: *Stakeholder Views Report – Enablers and Barriers to a Circular Economy*. 2018, pp. 22, 24; Kirchherr, Julian – Piscicelli, Laura – Bour, Ruben – Kostense-Smit, Erica – Muller, Jennifer – Huibrechtse-Truijens, Anne – Hekkert, Marko: *Analysis – Barriers to the Circular Economy: Evidence From the European Union (EU)*. *Ecological Economics* 150 (2018), p. 269, 271; Tura, Nina – Hanski, Jyri – Ahola, Tuomas – Stähle, Matias – Piiparinen, Sini – Valkokari, Pasi: *Unlocking circular business: A framework of barriers and drivers*. *Journal of Cleaner Production* 212 (2019), p. 91; Kumar, V. – Sezersan, I. – Garza-Reyes, J. – Ernesto, G. – AL-Shboul, M. A.: *Circular economy in the manufacturing sector: benefits, opportunities and barriers*. *Management Decision*, 57(4)2019, p. 9; Jesus, Ana – Mendonça, Sandro: *Lost in Transition? Drivers and Barriers in the Eco-innovation Road to the Circular Economy*. *Ecological Economics* 145 (2018), p. 82.

3.1.4 Attitude-related or informational barriers

CE business can emerge as a response to increasing demand, providing customers with more sustainable choices. Conversely, in the absence of emerging demand CE businesses are likely to fail. However, there is a slow increase in the cultural acceptance of circular business models such as ‘servitization’ where ownership of a product is replaced with the provision of a service.⁵⁹ This inertia is considered as an important barrier to the CE and to result from consumers’ inadequate awareness of and information about the alternatives. We label this barrier *culture of ownership*. The participating experts also identified this as being a barrier in Finland.

In addition, public procurement has a significant potential impact on CE demand because of its volume. Furthermore, through public procurement, the public sector can be at the forefront of the CE transition and set an example for other actors. Two thirds of the experts involved in the Delphi study regarded public procurement procedures as being inadequate in ensuring the best choice from a CE perspective. The topic was regarded by most experts as at least significant for circularity.

3.1.5 Conclusions on barriers

Based on the first round of the Delphi study, administrative practices related to the command-and-control instruments are actually more significant than the legal provisions themselves and should perhaps be understood separately from traditional command-and-control barriers. These administrative barriers relate to practical arrangements as to enforcement of the provisions – i.e. lengthy administrative processes and their unpredictable outcomes – and mostly relat-

⁵⁹ Jesus, Ana – Mendonça, Sandro: *Lost in Transition? Drivers and Barriers in the Eco-innovation Road to the Circular Economy*. *Ecological Economics* 145 (2018) p. 75–89, s. 82/83.

ed to interpretation of the concepts of waste and EoW. Moreover, there were barriers that, from the policy instrument point of view, appeared to have potential to be addressed by regulation in a broad sense – i.e. via legislation providing leverage to the CE. For example, the price advantage of virgin materials, lack of cultural acceptance of CE business models and inadequate public procurements practices are not command-and-control barriers, but could be addressed through such regulatory measures.

The identified barriers relate to the production, use and end-of-life phases of the material cycle and focused on the recovery of waste-based materials in the end-of-life phase. However, the first (material acquisition for production) and last (end-of-life/EoW) phases of the life cycle are intertwined in the CE where waste-based materials are efficiently harnessed back into production processes. The culture of ownership and unfavourable tax treatment of servitization were the only identified barriers that are related to other stages of the material's life-cycle, that is to the sale and use of products. The scarcity of barriers identified in the life-cycle stages between the acquisition of raw materials and EoW is likely to relate to the fact that the CE is currently in its nascent stages. One of the reasons why the barriers to and potential for CE business were identified at these particular points of the life cycle is that the market for CE products and services is still developing and not all of the intermediate barriers within the value chain have been identified. This correlates with the outcome of the Delphi study on the most significant stages of the material's life-cycle for the CE. The recovery of secondary material was identified as representing the biggest CE business potential currently – and also in the future. However, the experts involved in the Delphi study expected design and servitization to attract more CE business poten-

tial during the next decade. The barriers relating to these stages are yet to be identified.

The literature review suggested that intellectual property rights (IPRs) and accounting legislation could hinder the achievement of the CE.⁶⁰ However, the majority of experts involved in the Delphi study failed to recognize either IPRs or the accounting regulation as barriers to the CE. Thus, these issues were excluded from further elaboration in the second round of the Delphi study.

3.2 Regulatory alternatives identified in the Delphi study

3.2.1 Introduction to the alternatives

In the second round of the Delphi study the aim was to clarify the nature of the barriers and to identify preferred *alternatives* to address them. It is fairly easy to identify regulatory barriers to the CE, but more challenging to determine which of the many alternative ways to address each of them is objectively the best. We proposed a wide range of alternative regulatory instruments to address the identified barriers, from which the panelists selected the preferred, most effective and efficient ones. The aim was to identify the preferred type of intervention: could the barrier be removed by increasing the amount of available information or by introducing financial incentives such as investment aid? Or should it be addressed by means of coercive legal provisions? As it was impossible to list all possible interventions, we had to narrow down the alternatives by reference to the type of barrier. However, the panelists had always the opportunity to choose 'other alternatives' and describe them. As the majority of the experts did not utilize this

⁶⁰ Kas, Judith – Bet, Bram – Truijens, Daphne (eds:) Barriers and Best Practices for the Circular Economy. SMO Promovendi – Circular Minds 2017/2018, p. 28.

option, our assumption is that overall the alternatives we offered were considered adequate.

The proposed solutions to barriers included a wide selection of different regulatory alternatives ('regulatory' in the broad sense of the word) ranging from mere informational instruments to strict coercive command-and-control provisions. The following subsections elaborate on the results of the second round of the Delphi study and provide examples of the regulatory instruments available and suited to address each of the identified CE regulatory barriers. Our original intention was to examine the barriers and the potential solutions in each of the material life-cycle phase: material extraction, design, manufacturing, packaging and transportation, use and end of life.⁶¹ However, as our study revealed the intertwined nature of raw material generation and end of life phases, and as the literature review revealed scant analysis of the barriers relating to the stages between these two phases, we have divided the life-cycle into just two sections in order to present the results within a logical structure. The first subsection discusses the circulation of secondary materials derived from waste back to production processes. The second subsection elaborates on generation of supply and demand for CE products and materials.

⁶¹ Schmidt, Jannick H. et al.: 'Life cycle assessment of the waste hierarchy: A Danish case study on waste paper', *Waste Management* 27 (11) 2007, pp. 1525–1526: Alternatively, the life-cycle can be divided into five parts: (1) extraction of the raw materials; (2) producing the product; (3) packaging and distribution of the product; (4) use and maintenance of the product; and (5) disposal or recovery of the product. For example, the life-cycle of paper products begins with the extraction of the raw material through forestry, followed by the production of pulp and paper, packaging and distribution, its use and the possible alternatives for processing after use, taking into account transportation and other necessary factors.

3.2.2 From grave to cradle

In the first round of Delphi study, the challenge of directing 'waste' back to production processes was discussed extensively. It has also been addressed multiple times by the Court of Justice of the European Union.⁶² In the second round, solutions for this barrier were examined alongside the evaluation of the rationality of the waste legislation. We presented additional questions regarding the *administrative barriers* in EoW decision-making. The choices preferred by the panelists to address the problem were (1) more specific regulation on when 'waste' ceases to be waste, (2) increased resources for regulators to improve the quality and pace of administrative decision-making and (3) training for authorities on the interpretation of the EoW regulation to improve the quality and predictability of administrative decision-making relating to EoW.

The study showed that most of the experts regarded the broad interpretation of 'waste' in EU waste legislation as at least a somewhat significant barrier to achievement of the CE. A couple of the panelists disagreed with this, opining instead that the regulatory shift as to the commodification of waste presented the most challenging issue. A couple of experts in fact suggested dumping the concept of 'waste' altogether and replacing it with 'materials' (referring to both waste-based and virgin materials).

The case-by-case application of EoW criteria received heavy criticism in the Delphi study. The panelists proposed two regulatory solutions to address the challenges identified in the administrative process: (1) an EoW procedure to be developed into a product approval mecha-

⁶² See C-358/11, *Lapin luonnonsuojelupiiri*, [2013] ECLI:EU:C:2013:142; C-399/17 *European Commission v Czech Republic* ECLI:EU:C:2019:200; C-60/18 *Tallinna Vesi v. Keskkonnaamet* ECLI:EU:C:2019:264; C-212/18 *Prato Nevoso Termo Energy* ECLI:EU:C:2019:898; COM (2018) 32 final, p. 5.

nism (comparable to REACH registration and authorization mechanisms) where a waste material ceases to be waste once it is demonstrated that it fulfils the EoW requirements, and (2) an open access database on all EoW decisions to provide information on good practices and how to fulfil the EoW criteria. The EoW product approval mechanism was supported by all experts answering the question. It was expected it to have at least average impact in promoting the CE. There was wide agreement among the panelists that the approval procedure could reduce the degree of overlap in decision-making and regarded EoW as product approval process as sufficient.⁶³ Most of the experts also expected that replacing environmental permitting with a notification system could function as a driver for the introduction of emerging techniques and innovations on a wider scale. The experts also agreed on the benefits of an open access EoW database, which was expected to ensure better knowledge-sharing and greater uniformity in decision-making. However, a couple of experts questioned the logic of the database. One stated that there may be changes in the EoW definition in the future that would cause the data from previous cases to become outdated.

We also tested the option of less stringent product safety and chemicals provisions for waste-based materials in order to remove the barriers presented by product safety and chemicals legislation. This has also been floated by the European Commission.⁶⁴ It did not, howev-

er, meet with approval from the experts. While product safety and chemicals legislation were identified as barriers to the use of waste-based materials, the panelists found it more important to maintain high standards for all materials. Lower standards for waste-based materials could lead to lower acceptance of waste-based materials and have an adverse impact on their reputation. Two experts regarded the different regulatory frameworks for wastes and non-waste materials as a bigger barrier to the CE.

Another approach suggested to overcome the challenge proposed was to introduce more stringent restrictions on disposal of recoverable materials with the objective of promoting the emergence of recovery markets and material recovery. The panelists unanimously agreed with the idea and the vast majority considered the approach as significant. A couple of the experts pointed out the challenges relating to the ownership of recoverable materials, the allocation of the waste management duties and the economic feasibility of using waste-based materials. These topics would need to be addressed if this policy instrument were to be applied.

One expert noted that a disposal restriction or landfill ban would not increase waste recovery if the virgin raw materials remained cheaper than waste-based materials and their processing (including administrative) costs. The price advantage of virgin raw materials had been one of the financial barriers identified in the literature review, and in the first Delphi round the panelists were almost unanimous in confirming that the high cost of waste-based materials compared

⁶³ The suitability of environmental permit in EoW decision-making was also criticized nationally in *Kauppi, Jussi – Turunen, Topi: Materiaalin jätestatuksesta päättäminen tapauskohtaisesti: menettelyyn liittyvien sääntelyvaihtoehtojen tarkastelua*. Muistio, SYKE 30.1.2019 (only available in Finnish).

⁶⁴ COM (2018) 32 final. p. 4; SWD (2018) 20 final. Commission Staff Working Document Accompanying the document Communication from the Commission to European Parliament, the Council, the European Eco-

nomic and Social Committee and the Committee of the Regions on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation, pp. 10–12. E.g. In the restrictions of the REACH Regulation a higher cadmium content is allowed for recycled plastics (0,1%) than for new plastics (0,01%).

to virgin raw materials constitutes a disincentive to the circulation of waste-based materials. This barrier further illustrates the intertwined nature of the first and last stages of the material life-cycle. We suggested to the panelists that this barrier could be addressed via a virgin material tax. The panelists were, however, very sceptical about this approach's ability to correct the imbalance. They expressed faith in the market's ability to correct itself once a sufficient circular material supply emerges.

We also tested the idea of promoting the secondary use of materials by compulsory digital tagging of products with information on materials including hazardous substances. From the point of view of chemicals legislation (REACH registration and the 'no data, no market' rule), knowing the chemical content of the materials plays a key role in using and marketing the material. The panelists were divided. Some of them saw the benefits in this kind of tracking system while others rejected the idea. Those in support considered that information on the content of end-of-life materials could significantly promote more efficient material cycles. Those against expected this only to increase the burden on businesses without promoting the recovery of waste-based materials.

3.2.3 *Supply and demand for CE products*

The barriers to the transition to the CE identified in the life-cycle stages between material acquisition and EoW related to the supply and demand for CE materials and services as well as the price advantage held by products derived from virgin raw materials. The main barriers were the culture of ownership and shortcomings in the public procurement procedure. The targeted decision-maker here is the buyer and user, whether private or public. Regulatory instruments could provide leverage even though the regulated party could be someone else. Increasing the life

span of products, creating demand for the supply of products as a service and supporting the sharing and borrowing of products instead of buying and owning them would all contribute to the achievement of the CE.

We asked the experts which aspects they thought should be covered in product design requirements in order to promote the CE. The preferred options were durability, repairability and a prescribed time for the availability of spare parts. In the era of 3D printing the last mentioned would appear to be cheap and easy to organize as the client could purchase the necessary data for printing and the spare part could be printed around the globe – given adequate machinery – at no or minimal transport cost. We also asked for innovative ideas for CE product design. The experts proposed modularization, deposit systems and redesign of the extended producer responsibility scheme that would favour durable products that are easy to recover as materials. They also emphasized the importance of incorporating the costs of the product's life-cycle impacts into the price of the product so that the price would also cover its disposal. Moreover, they emphasized the importance of designing the supply of products as a service.

We also floated the idea of promoting the CE by reducing the VAT on products that consist of waste-based materials in order to combat the price advantage of products derived from virgin raw materials. Such a tax reduction might depend, for example, on the share of waste-based material in the product and ultimately products consisting only of recovered materials would be tax-free. The panelists were split on this proposal with a slight majority in favour. They took the view that such a system would be dogged by problems and unexpected repercussions, for example in the context of international trade. It was proposed to give tax exemptions to CE businesses instead. On the other hand, the provision

of tax exemption to households using products as services was strongly supported as a way to promote the adaptation of servitization. However, this was viewed as being of only moderate significance in promoting CE.

Due to the significant volume of public procurements this topic was also covered in the study. Circular public procurements give the public sector the chance to lead the private sector and consumers by example.⁶⁵ Moreover, it is possible to impose legal obligations directly on the public sector through traditional command-and-control instruments. In the Delphi study the experts were asked to select the best instruments to promote the CE, product as service solutions and sharing economy in public procurement. The majority thought that the biggest potential lies with strategic choices made by the contracting authority (e.g. municipal procurement strategies). The second most favoured alternative was to amend the legal framework for procurement criteria to promote CE-friendly procurement. The third most popular alternative was providing better information for public procurement decision-making. The experts thought that the existing legislation would allow more CE products or services to be chosen but that the lack of knowledge and tools hamper proper comparison. Most experts preferred the procurement of products as a service rather than the product itself.

4. Discussion: Understanding the Broad Spectrum of Regulatory Instruments

4.1 Identifying the barriers (and regulatory alternatives and drivers)

The CE requires significant modifications in all stages of the material life-cycle and this will not happen automatically. This article has sought to

identify the most relevant regulatory barriers to the achievement of the CE. Some of these barriers are directly connected to command-and-control regulation (e.g. waste legislation, chemicals legislation) but there are also barriers based on practical aspects of the sectors under discussion or indirectly created by the applicable regulatory instruments. New legislation to facilitate the development of the CE may be required. However, at the same time, the Delphi study showed that many barriers caused by command-and-control provisions could also be removed through other instruments:

- The problems caused by the process of case-by-case EoW decision-making and delays could be addressed through implementation of new command-and-control provisions on the new decision-making process. However, many of the problems connected with decision-making and interpretation of the provisions could be addressed more easily through informational steering.
- The existing legislation lays down a framework for circular public procurement but the practices in procurement processes could be improved more efficiently through informational guidance than through new legislation: the development of administrative practices could play a key part.
- Culture of ownership as a barrier for product as a service and sharing business models was considered difficult to address through command-and-control instruments.

Barriers where the solution was directly connected to command-and-control instruments were also identified:

- A disposal restriction or a landfill ban would have a direct impact by reducing the disposal of waste. However, despite the effectiveness of such an instrument, the experts doubted its

⁶⁵ See e.g. *Harnessing Procurement to Deliver Circular Economy Benefits*. REBus 2017, p. 5.

ability to lead to the most efficient material recovery.

- Product and chemicals regulation were identified as barriers. However, the experts took the view that such regulation played a role in ensuring safe material circulation.
- Regulating taxation (e.g. VAT) of waste-based materials could directly decrease the price gap between waste-based and virgin raw materials. Nonetheless, the experts preferred to allow the market to deal internally with the barrier rather than to interfere with regulation.
- Regarding product design, it was identified that there is potential in including circular aspects (durability, recyclability) in the design requirements through command-and-control regulation. The particular relevance of innovations and technological development (especially 3D printing) was also identified.

It is obvious that – while command-and-control regulation will retain its position – other regulatory instruments are increasingly important for the CE transition. Complicated regulatory schemes have led to increased significance of informational steering and regulation through non-binding guidance documents. Therefore, in order to achieve CE objectives, a wide-ranging regulatory toolkit is indispensable in assembling a framework comprising the necessary regulatory instruments.

4.2 What kind of regulation is needed?

In order to facilitate the CE transition, its objectives must be clearly determined and the barriers to them identified (Baldwin and Black 2008). While other regulatory barriers to the CE exist, the experts consulted in relation to this study considered those discussed above as being the most important. Moreover, the same rules are likely to apply to the barriers to the CE not dis-

cussed here. Identification of the regulatory barriers and possible means to address them are the first steps towards a CE regulatory system. The barriers cannot always be addressed through traditional command-and-control instruments. The paradigm shift to the CE is not simple and includes significant amendments in multiple sectors of substantive legislation, entailing a wide variety of provisions and instruments that address myriad different CE objectives. As the literature review and the Delphi study show, the regulatory instruments for the CE remain undeveloped and are scattered across various substantive regulatory frameworks.

Currently, there is no specific CE legislation in place in the EU. Hence, streamlining of the substantive regulatory frameworks is essential. The potential to regulate CE is often understood too narrowly: the focus is either limited to traditional command-and-control regulatory instruments⁶⁶ or to certain substantive pieces of legislation (most typically focusing on waste management) that do not address the whole scope of the CE.⁶⁷ A broader regulatory approach should be adopted. The experts involved in the Delphi study concluded that the most important areas of CE business presently are processing raw materials and the circulation of surplus raw materials within the production processes. That said, by 2030 the greatest business potential is expected to emerge in product design and products as services. It is essential to identify as early

⁶⁶ C.f. Ranta, V., Aarikka-Stenroos, L., Ritala, P., & Mäkinen, S. J.: Exploring institutional drivers and barriers of the circular economy: A cross-regional comparison of China, the US, and Europe. *Resources, Conservation and Recycling* (2017); Rogge, Karoline S. – Reichardt, Kristin: Policy mixes for sustainability transition: An extended concept and framework for analysis. *Research Policy* 45(8)2016, p. 1625.

⁶⁷ Milios, Leonidas: Advancing to a Circular Economy: three essential ingredients for a comprehensive policy mix. *Sustainable Science* 13(2018), pp. 868–872.

as possible the barriers relating to these life-cycle stages or the transition to the CE may stall due to lack of either supply or – more importantly – demand. However, new barriers may emerge in tandem with the development of CE business models once the most pressing initial barriers have been addressed. The lack of policy instruments to complement this transition is recognized as one of the barriers to the CE. This demonstrates the inadequacy of taking a narrow view of the scope of substantive regulation of the CE. Although waste management plays a crucial part in the CE, it is merely one stage of the life-cycle and the whole life-cycle should be regulated in a comprehensive way.⁶⁸

The choice and design of legislative instruments is an essential element in facilitating the shift towards the CE. A dynamic regulatory framework to address the ‘diversity of the challenges at hand’ has been proposed as a way forward in the development of regulatory approaches in this regard.⁶⁹ Furthermore, special attention should be paid to the ‘interactions between the different instruments so that they can reinforce rather than undermine one another’.⁷⁰

Clear understanding of clarity as well as coherence among the regulatory approaches

to the CE and the instruments utilized in this context are essential in order to achieve the CE targets. Being a complex regulatory subject, the CE is dogged by a multitude of problems, which stem from various regulatory choices, industrial practices and attitudes. Command-and-control instruments are often not the most favoured option by which to address the barriers that exist, since less coercive methods that entail lower administrative costs may also work. It is therefore crucial to identify and examine the regulatory barriers in order to enhance understanding of the development of the CE and its clarity and coherence. For example, our Delphi study showed that lack of legal certainty (e.g. as to interpreting the concept of waste and public procurement practices) represents one of the main barriers faced by CE businesses. In these situations, the experts preferred to seek more information in order to obtain a better understanding of the possible interpretations rather than recommend revision of the regulatory framework. While it is important that the regulatory instruments do not restrict practices to non-circular approaches and that they allow for the creation of novel solutions for the CE, it is also important to build foundations for the mainstreaming of the CE and investment in it.

Regulation of the CE will entail an array of obligations, incentives, disincentives, informational guidance and administrative and industrial practices. Consumer behaviour is also an essential part of the CE. However, for the most part this cannot be directly regulated but steered indirectly through obligations imposed on the manufacturer (e.g. product ecodesign and the generation of information) or on the seller of the product (e.g. labelling, deposits) or providing information to influence the consumer’s decision-making. The CE transition requires a wide and comprehensive spectrum of all available in-

⁶⁸ See COM (2020) 98 final (and its Annex). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A new Circular Economy Action Plan For a cleaner and more competitive Europe. The new CE strategy of the union presents multiple initiatives along the entire life-cycle of products, targeting for example their design, promoting circular economy processes, fostering sustainable consumption, and aiming to ensure that the resources used are kept in the EU economy for as long as possible.

⁶⁹ Maitre-Ekern, Eléonore: The Choice of Regulatory Instruments for a Circular Economy in Mathis, Klaus, and Huber, Bruce R. (eds.): *Environmental Law and Economics*, pp. 305–334.

⁷⁰ Maitre-Ekern, Eléonore: The Choice of Regulatory Instruments for a Circular Economy in Mathis, Klaus, and Huber, Bruce R. (eds.): *Environmental Law and Economics*, pp. 305–334.

struments as there is no one-size-fits-all solution that will remove the existing barriers.

5. Conclusions

This article has described the results of the literature review and the two-round Delphi study on the barriers to the CE and the potential for regulatory instruments to address them. The preliminary hypothesis was that not all the barriers are adequately covered in the existing literature. The Delphi study tested the assumptions derived from the literature review and workshops held in the context of the CICAT2025 project. The study revealed that some of the barriers identified in the literature were not considered significant or were even non-existent, at least in Finland. However, for the most part similar barriers were identified in the Delphi study.

The study provided an overall view of the practical barriers to the CE identified by CE business stakeholders. Use of the Delphi method provided a medium through which to examine practical regulatory barriers to CE and to distinguish between barriers from the perspectives of 'law in books' and 'law in action'. Information was collected on the relevance and significance of the regulatory barriers for the CE. The study revealed that only a limited number of barriers are identified as regulatory barriers. Instead, the study identified a number of attitudinal and

price barriers that can be addressed by means of legislative instruments. The Delphi study also clarified the nature of the barriers and the preferred options for addressing them. The study did not recommend specific regulatory strategies by which to remove the regulatory barriers but gave insight into the nature of the barriers and the possible regulatory logic of removing them. The identified solutions represented a wide range of regulatory options ranging from purely informational instruments to strict coercive command-and-control provisions.

The CE transition requires significant amendments to substantive legislation in numerous sectors, adding up to a wide array of provisions and instruments that complement the CE objectives and address multiple problems. Since the EU does not have in place legislation dealing specifically with the CE, streamlining of the CE-related substantive regulatory frameworks is essential. It is also essential to broaden the understanding of the regulation of the CE from the narrow scope of traditional command-and-control regulatory instruments and certain substantive pieces of legislation (most typically focusing on waste management) to a wider range of regulatory instruments and a broad interpretation of the term 'regulation'.

