A thesis submitted to the Department of Environmental Sciences and Policy of Central European University in part fulfilment of the Degree of Master of Science

# The Finnish approach, within the EU framework, to lead the transition into a Circular Economy

October, 2020

Budapest

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#### ABSTRACT OF THESIS submitted by: Carolina RODRÍGUEZ

for the degree of Master of Science and entitled: The Finnish approach, within the EU framework, to lead the transition into a Circular Economy.

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Over the last decade, the concept of the circular economy (CE) has gained significant momentum as a tool to support sustainable development and tackle the current global megatrends in a manner that allows decoupling economic activities from the consumption of finite resources, through a regenerative and restorative system that provides numerous benefits for the environment, society and economies.

In the European Union (EU) the agenda has shifted from resource efficiency towards CE, with the adoption of several CE Action Plans. Finland is one of the progressive Member States that has also embarked on this journey by implementing numerous policy frameworks, such as the road maps to CE developed by the Finnish Innovation Fund (Sitra), the National Waste Plan, and National Action Plan that have helped the country move towards its goal of being global leaders in CE.

The aim of the thesis is to explore the advances of the CE and policies undertaken by the EU and Finland in their commitment to pave the way into this transition, through a qualitative research encompassing an in-depth literature review, policy document analysis and interviews with experts in the field.

This novel research provides an overview of the current CE policy landscape adopted by the European Commission (EC) and Finland. It discusses how they have mutually reinforced each other and analyses their current state, providing numerous lessons learnt in the process of implementation of the plans and allowing countries envisioning a transition into a CE to leapfrog towards it.

**Keywords:** Circular Economy, Resource efficiency, Policy Frameworks, European Union, Finland, European Commission, Road map, Policy, Regulation, Sustainable Development

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# List of Abbreviations

BREFs	Best Available Techniques Reference documents
C2C	Cradle-to-Cradle
CE	Circular Economy
DG	Directorate General
EC	European Commission
EMF	Ellen MacArthur Foundation
EU	European Union
GDP	Gross domestic product
GPP	Green Public Procurement
H2020	Horizon 2020
ICT	Information and Communications Technologies
LCA	Life Cycle Assessment
LE	Linear Economy
MaaS	Mobility as a Service
MFA	Material Flow Analysis
MoU	Memorandum of Understanding
R&D	Research and Development
SDGs	Sustainable Development Goals
Sitra	Finnish Innovation Fund
SMEs	Small and Medium-sized Enterprises
UN	United Nations
WCEF	World Circular Economy Forum
WEEE	Waste Electrical and Electronic Equipment

### **1. Introduction**

There is a widespread notion of industry and environment being at odds with each other and certainly, the current linear economic paradigm which encompasses conventional resource extraction methods, manufacturing, and disposal, has had a devastating effect on the natural world (McDonough and Braungart 2002). Furthermore, coupling the many flaws of that system with the consumption patterns of an ever-growing population whose demand for goods and services continues to increase, have resulted in an unprecedented set of high impact and interdependent issues, such as environmental pollution, climate crisis, resource scarcity, and decline in biodiversity, among many others that are pushing the planetary boundaries.

Human-made global megatrends are challenging the foundations of society and to tackle them in a sustainable manner, the transformation of political agendas and the reinvention of business models are urgently required. The circular economy (CE) presents an alternative, regenerative and restorative system to decouple economic activities from the consumption of finite resources, by replacing the 'end-of-life' concept with effective design principles that aim to eliminate waste while materials are reduced, reused, recycled, and recovered throughout the entire biological or technological life cycle (Kirchherr *et al.* 2017). Hence, this approach offers benefits for the environment, while improving the economy and well-being of society, as well as increasing their resilience to future disruptions.

Despite being a relatively new model, in recent years the CE has gained traction, becoming a priority for policymakers, enterprises and organizations around the world. Consequently, numerous countries have embarked on major CE agendas, including Finland, which stands out among the European Union (EU) members states with the highest possible target: to become a CE global leader, through high-level policy actions and the implementation of scalable solutions and concrete, agile pilots (Sitra 2016). Several policy frameworks have been adopted in line with this goal, such as the 'Finnish road map to a CE 2016-2025' and its recent update 'Finland's road map to a CE 2.0', the government 'Action Plan for a CE 2017' still under implementation today, as well as the 'National Waste Plan to 2023'.

Additionally, over the last years, the policy landscape of the European Commission (EC) has shifted its focus from resource efficiency towards the CE, recognizing its potential to reconcile economic growth with the environment, as well as a means to achieve climate neutrality. Hence, the EC has gradually increased its level of ambition and broadened the scope for action from the 'CE Action Plan' launched in 2015, through the different adopted packages of legislative and non-legislative initiatives, to the new 'CE Action Plan 2020' that was recently put forward as one of the main blocks of the European Green Deal (EMF 2020).

The foundations for the CE transition have been laid in the EU with the implementation of the different frameworks, yet it is crucial to regularly evaluate these measures to ensure their movement in the right direction. Furthermore, beyond a wide range of coherent policy actions, cooperation among stakeholders and the participation of the society, across all sectors and industries, is required to incorporate different perspectives into the process and hence, successfully achieve systemic change.

Understanding the fundamental need of a shift towards a CE, this novel qualitative research seeks to grasp the scale of the transition currently taking place at different locations around the world, with a focus on the EU and the pioneering role of Finland, while analysing their respective landscape of policies and assessing the state of their implementation. The study of this field provides numerous insights on the initiatives that can foster the transition, as well as the elements that drive it and drag it, and valuable lessons for countries envisioning a systemic change. Thus, to achieve a holistic interpretation of the situation a multi-methods research approach was selected, including an in-depth literature review and policy document analysis as well as insightful semi-structured interviews with experts in the field.

#### **1.1 Research aims and objectives**

This thesis project aims to explore the advances of the CE and the various policies undertaken by the EU and Finland in their commitment to pave the way into this transition, based on the following objectives:

- Critically analyse the different initiatives by the Finnish Government to successfully transition into CE under the current landscape of policies undertaken by the EC.
- Explore the relevant Finnish and EU policy documents to find synergies and possible points of improvement for countries envisioning a shift towards CE.
- Examine the implications of the National waste plan adopted by Finland to create conditions and opportunities that strengthen the CE.

#### **1.2 Research questions**

The following interrogations intend to help the researcher achieve a holistic understanding of the situation in order to provide coherent contributions that help accelerate a systemic change in the direction of a CE.

- How has Finland encouraged and supported the CE policy-making process at the EU level?
- How have the CE Action Plans by the EU influenced Finland's motivations to go from adapter to leader in the global CE landscape?
- What is the state of the transition towards the CE in Finland?
- Which additional measures related to CE have been adopted by Finland with regards to waste management?
- What can other countries learn from Finland's CE strategies and practices?

#### **1.3 Outline of the thesis**

The thesis is structured in five chapters as follows:

Chapter 1 briefly presents the conflict between economic growth and the limitations of planetary resources. The notion of the CE is introduced as an alternative to this problematic and the need to move towards a more sustainable economy. The aims, objectives and research questions centre around the response of the EU and Finland to tackle the issues and the CE policies adopted by them.

Chapter 2 seeks to sufficiently explain the importance of the CE as a solution to the unsustainable dynamics of the linear model and the measures taken by the EU and Finland to deal with the current challenges. It starts with the exploration of the numerous problems caused by humanity as a consequence of the industrial revolution and modern lifestyles. The forces that led to the emergence of the concept are then presented, followed by its potential to support the accomplishment of the Sustainable Development Goals (SDGs) as well as a description of the three guiding principles in which the CE is based. The second part of this literature review focuses on the global transition to a CE, providing a synopsis of the initiatives taking place in different parts of the world, as well as the situation among EU Member States. The third and last part of the chapter offers an updated overview and deeper understanding of the CE policy landscape in the targeted region, with a thorough examination of the CE policy instruments currently under implementation in the EU and Finland.

Chapter 3 explains the reasons that led the author to conduct a multi-method qualitative research and reviews the chosen methods. It starts by informing the reader on the process to generate appropriate and sufficient literature given the novelty of the subject and briefly describes the conceptual framework used for the analysis of the selected policy documents. The second part of this chapter outlines how the semi-structured individual in-depth interviews with

experts were conducted for data collection and the approach for its analysis. Finally, the limitations of the research are summarized.

Chapter 4 includes a comprehensive analysis of the findings from all data collected through the in-depth review of literature and policy documents, as well as the interviews with CE experts, in an attempt to find answers to the posed research questions. It is structured in three parts. First, the investigation of the influence of the EU in the policies adopted by Finland, and vice versa. Followed by a discussion of the state of the transition in Finland, highlighting the lessons learnt and areas that need further strengthening, as well as recommendations to accelerate systemic change in countries envisioning a circular future. Lastly, the contributions and state of the implementation of the National Waste Plan in the country are briefly assessed.

Chapter 5 summarizes the main findings and reflects on them to draw conclusions on the achievements of the transition towards a CE in Finland.

### 2. Literature review

#### 2.1 The circular economy as a tool to support sustainable development

#### 2.1.1 The human-induced Earth imbalance

The Anthropocene, despite being only a small segment of the Earth's timeline, has been characterized by the pervasiveness and severity of human activity which has managed to compete and even exceed the great forces of nature, causing a cascade of effects that have altered the functioning of the planet. The global scale transformation from an agrarian society into an industrialized one and the enormous expansion in fossil fuel utilization indisputably marked a new era, one that was governed by abundance, where the looser constraints in energy supply powered the global economy and the speedy growth of human population. Nevertheless, this upswing also commenced an era of intensified and ever-mounting human influence upon the Earth System (Steffen *et al.* 2007).

The disproportionate use of natural resources became the norm as mass production was adopted in the first half of the  $20^{\text{th}}$  century. As a result, the manner humanity consumed goods was absolutely transformed ever since, and regardless of the well-known fact that Earth's resources are limited, the demand for new products and services has not ceased to increase up to the present day. This is not only a consequence of the growing world population but also its higher purchasing power. In this regard, Kharas (2017) estimated that the expanding global middle class is expected to reach 5,3 billion people by 2030, out of the 8.5 billion people population estimated by the UN (2019). In *figure 1* the sharp acceleration rate at which the emerging global middle class is rising can be observed<sup>1</sup>. The new estimates show an increase

<sup>&</sup>lt;sup>1</sup> The projections by Kharas (2017) include relevant data improvements and updates in the methodology for calculating the evolution of the global middle class, which have important implications in the overall estimates of trends and levels compared to his previous publication (Kharas 2010), hence the new and old data estimates seen in *Figure 1*.

of over 2 billion people between 2015 and 2030, with the largest expansion happening in the Asia Pacific region. The report continues to explain that in the developed countries, two groups can be differentiated, North America and Europe, where although numbers remain large, the middle class is stagnating, with some households falling below the middle-class threshold, while others are moving away from it, towards the wealthier end of the spectrum.



*Figure 1 – Size of the global middle class (Billion people) in the years 2000, 2015, and 2030. (Source: Kharas 2017)* 

Taking into consideration the consumption patterns and lifestyles of the most affluent consumers, Hamel and Kharas (2018) highlight that the upper class in the United States will continue to have a dominant role on the consumerism world stage over the next decade, with an annual spending power of US\$ 10 trillion. Moreover, the Oxfam (2020) recently found out that the richest 10% of the global population, comprising about 630 million people, were responsible for about 52% of global emissions between 1990-2015, exhausting the global carbon budget.

Humankind is using massive amounts of natural resources at a much faster rate than the planet can regenerate, as such the calculations of Earth overshoot day, which are consistent with Ehrlich and Holdren's IPAT approach, provide concrete annual figures to illustrate how humanity's ecological footprint exceeds the planet's biocapacity, resulting in the overall imbalance between human demand and the planetary regenerative budget, with dates moving up the calendar every year. For instance, in 1990 Earth overshoot day fell on October 23<sup>rd</sup>, and last year (2019) it was already on July 29<sup>th</sup>; however this year the novel Coronavirus pandemic has caused a decrease in the appetite for resources shifting the date to August 22<sup>nd</sup>. Moreover, the WWF (2019) estimated that if everyone in the world lived and consumed like the average European resident today, nature's budget for the entire year would have been completely used up by May 10<sup>th</sup>, hence 2.8 Earths would be needed to sustain the demand for natural resources required by that lifestyle.

Ultimately, as explained by the Global Footprint Network (2019a) the precise date each year is less significant than the sheer magnitude of the ecological footprint and the enormous environmental impacts these activities have on the planet. As a result, for the human race to stay within the planetary boundaries and be able to continue developing, safely, in harmony with the environment and without compromising the needs of future generations, a deep transformation is essential.

Additionally, massive amounts of waste are continuously being generated due to the current production and consumption systems, in 2018 Kaza *et al.* from the World bank group reported that 2.01 billion tons of solid municipal waste had been produced worldwide, and the projections (*Figure 2*) for 2050 show an increase of 70%.



Figure 2 – Projected global waste generation (Billion tonnes) in 2016, 2030, and 2050. (Source: Kaza et al., World Bank group 2018)

#### 2.1.2 From linear to circular

As summarized by Blomsma and Brennan (2017) the waste and resource management topics are part of an increasingly rich and complex debate that has been ongoing for several decades now, during which the propitious circumstances were given for the concept of the circular economy (CE) to emerge. This time frame was divided into three stages by the authors<sup>2</sup>: the preamble (1960-1985), the excitement (1985-2013), and the validity challenge period (2013-present).

- Preamble period (1960-1985): It was initially marked by the reiteration of the importance of responsibly managing natural resources, an idea put forward by thinkers such as Thomas Malthus, John Stuart Mill, and Hans Carl von Carlowitz. which later on led to key developments in the academic fields of chemistry, biology, ecology, physics, management, and business sciences, as well as the interplay between them and the creation of new disciplines such as environmental economics and eco-design. During this stage publications such as Rachel Carson's (1962) Silent spring, the Tragedy of the commons by Hardin (1968), the 'Spaceship Earth' metaphor by Ward (1966) and Boulding (1966), and the Limits to Growth report from the Club of Rome by Meadows *et al.* (1972), drew attention to the toxicity and scarcity issues and made a direct plea to governments and industries to reduce the global society ecological footprint per unit of consumption, and to start doing so in time to avoid global overshoot (Randers 2012).
- Excitement period (1985-2013): Waste started being perceived as a positive force, a resource, and a source of value (O'Brien 2008). Moreover, with the Brundtland report publication (WCED 1987) the sustainable development discussion was

<sup>&</sup>lt;sup>2</sup> The periodization defined by Blomsma and Brennan (2017) does not indicate the abrupt start or end of specific activities and considering that no single events could be identified to cause the transition between them, as well as the fact that exact timings vary for different regions, periods were rather characterized by particular developments.

fuelled, seeing it as an opportunity to address global challenges. Subsequently, the possibility of generating synergies and trade-offs from waste and resources gained traction as strategies with environmental, social, and economic benefits. The intensification of the debate generated a multitude of waste and resource management frameworks around the world, but also as a result of the knowledge gap that surfaced, umbrella concepts such as zero waste, resource efficiency, extended producer responsibility, sustainable consumption and production, industrial ecology, and green economy emerged or were reiterated, to which the academia coalesced and responded with direct practical initiatives to implement alternative waste and resource strategies (Blomsma and Brennan 2017). On the other hand, policymakers started using circularity as a legislative tool, resource life extension through loops and cycles was popularized and businesses started developing their own strategies with the support of consultancy services and organizations that promote such waste and resource management frameworks.

• Validity challenge period (2013-Present): CE started being articulated as an umbrella concept that primarily identifies the capacity to extend the productive life of resources in order to create value and reduce value destruction, thus offering a new narrative to the waste and resource management debate. Furthermore, the term started being highly promoted by the Ellen MacArthur Foundation (EMF) in collaboration with the World Economic Forum (WEF 2014), and as a consequence earlier policies have been replaced or reinvented to give space to new, emerging CE policies that are already being implemented across the globe.

Despite the fact that many have been the scientific thinkers and experts rethinking economic systems and reflecting about the role of human actions, values, and social processes in shaping industrial systems, current economies are still predominantly based on a highly inefficient

model, known as the linear economy (LE), which has caused numerous global environmental issues and although it irrefutably has generated wealth for many, this operating system remains unsustainable for all species and the environment.

Generally, social scientists tend to describe moments of economic change as 'paradigm shifts' and more than a decade after the financial crash, with the global economy and many countries facing multiple crises, the OECD (2019) acknowledged the time is ripe for another such paradigm shift based on the principles of environmental sustainability, rising well-being, falling inequality and system resilience.

Indeed, there is a fundamental need for a new model for the society, which truly allows it to thrive and develop intelligently in balance with nature, staying within the safe and just operating space, respectfully using resources, maximizing the flow of materials and components, and keeping the value bound to them high for as long as possible, as waste is minimized and even eliminated. This is the underlying notion of the CE, conceived by several contributors who helped to develop it, among which the American professor John Lyle and his student William McDonough, the German chemist Michael Braungart, and the architect and economist Walter Stahel can be identified (Winans *et al.* 2017).

#### 2.1.3 The circular economy and the Sustainable Development Goals

The CE is a restorative and regenerative model by intention and design (WEF 2014) that proposes a different approach to the take-make-waste extractive industrial system, which as Qinghua *et al.* (2010) explained aims to capitalize on waste through the recycling of material flows within a closed-loop while balancing economic growth and development with environmental and natural resource use.

On the other hand, the 2030 Agenda for Sustainable Development by the United Nations (UN) (2015) also sees CE as an integral part of it, which can strongly, directly, and indirectly contribute to several Sustainable Development Goals (SDGs), such as SDG 2 – Zero hunger,

via sustainable food production, SDG 6 – Clean water and sanitation, through small scale water purification and nutrients recovery, SDG 7 – Affordable and clean energy, for instance through energy recovery and redistribution in industrial symbiosis systems, SDG 8 – Decent work and economic growth, thanks to the major potential of the CE to generate jobs, SDG 15 – Life on land, due to the adoption of agricultural and agroforestry practices that help restore terrestrial ecosystems, among many other possibilities (Triodos 2017; Einarsson 2019).

Due to the interlinkages that exist between all SDGs and the complexity of the overall system of goals, they shall be understood as a network in which the progress of one goal impacts and is impacted by the others, thus working in conjunction with other goals enables their progress along different dimensions. In this respect, an important enabler is SDG 12 – Responsible consumption and production, which is at the heart of the CE vision where economic growth is decoupled from the wasteful use and overconsumption of resources, aiming to reduce them and supporting their recirculation; hence when operating under this economic system, society can thrive and as a result so does the environment (Einarsson 2019).

CE practices have the potential to reduce greenhouse gas (GHG) emissions contributing to SDG 13 – Climate action; for instance, as presented on the Circularity Gap report by Circle Economy (2019) the implementation of CE measures across the four key value chains of the steel, plastics, aluminium and cement industries in Europe could reduce GHG emissions by 56%, and between 2015 and 2100, their global cumulative emissions could be reduced by 36%, without taking into consideration the deployment of existing low-carbon technologies that could cut a further 20%.

Additionally, a study conducted by Schroeder *et al.* (2018) revealed that making progress on the targets of SDG 4 – Quality education, SDG 9 – Industry, innovation, and infrastructure, SDG 10 – Reduced inequalities, SDG 16 – Peace, justice, and strong institutions and SDG 17 – Partnerships for the goals, would positively influence the uptake of CE practices

around the world. For instance, given the close interconnection between the CE and digitalization, target 9.c on information and communications technologies (ICT) and internet access would support the transition to a CE in developing countries (Webster 2016); on the other hand target 12.c, phasing out inefficient subsidies for fossil fuels, has been identified as an underlying barrier to the CE (EASAC 2015).

Ultimately, Schroeder *et al.* (2018) concluded that CE practices not only have the potential to create synergies between SDGs and targets but can also address trade-offs, for instance, between SDG 8 and SDG 9; directly contributing to accomplishing 21 of the targets and an additional 28 targets indirectly. Thus, CE can be applied as a useful, powerful, and credible tool to support sustainable development and achieve a sizeable number of SDG targets.

#### 2.1.4 The principles of the circular economy

Recognizing the need for this relatively new economic model to work effectively at all scales, from small and medium-sized enterprises (SMEs) to large multinationals; as well as local, state, and national governments; organizations, and individuals, the CE is based on several key principles which are at the core and when carefully applied, they can offer short-term cost benefits, as well as clear strategic opportunities for value creation in the long run. These guiding principles have been compiled as following by the EMF (2013a) which actively works to promote the transition from LE to CE, in conjunction with experts in the CE, cradle-to-cradle (C2C) design, biomimicry, industrial ecology, among others, bringing together several schools of thought:

1) Design out waste and pollution: Instead of fundamentally accepting the existence of waste, products and services must be reconsidered, thought, and designed to last, as well as optimized for disassembly from the beginning. This way, pollution is prevented, and the use of toxic chemicals is eliminated, keeping materials within the loops for their reutilization while feeding the technological or biological materials cycle.

- 2) Keep products and materials in use: The aim is that products, their components, and materials remain in their highest value form to be used, rather than used up, for as long as possible, hence the materials, labour, and energy utilized for production are preserved. Furthermore, it is necessary to have systems in place that allow products to spend more time within a cycle, be reused or redistributed, refurbished or remanufactured, and their materials recovered at the end of their lifecycle to be recycled.
- **3) Regenerate natural systems:** One of the most attractive aspects of a CE is its capacity not only to sustain but also to regenerate the environment and provide extra value while taking a lesson from nature, where waste simply does not exist. Learning from the diversity and interconnectivity in natural systems, as well as, getting inspired by their complexity can help individuals become more creative designers from the beginning. Additionally, it also improves systems thinking, by optimizing entire systems rather than their separate components. Lastly, as it could have been expected the CE also relies on and encourages the use of renewable energy resources, instead of fossil fuels.

Based on these guiding principles today's fundamental problems can be addressed from a different, regenerative perspective that integrates systems while aiming at effectiveness, generating disruptive solutions to deal with and eliminate waste. In this regard, Prof. Dr Braungart *et al.* (2007) explain the concept of eco-effectiveness, as the tight and supportive relationship between ecological systems and future economic growth in which products and their material flows are transformed to generate C2C 'metabolisms' that can be upcycled, hence recoupling ecological and economic systems.

#### 2.2 The global transformation towards a circular economy

The adoption of a more restorative approach could bring an estimate of over US\$ 1 trillion per annum in material cost savings by 2025 (EMF 2014), thus with governments and enterprises around the world realizing the major economic opportunities, as well as the importance of tackling the current challenges in a sustainable manner and assuming their global responsibility, the concept of CE is gaining momentum and influencing policies and business models, as well as technological, organizational and social innovations around the world's largest economies and setting the ground for other, least developed countries, to also follow the lead.

Initiatives such as eco-industrial parks, that started as an example of industrial symbiosis in the 1960s in Kalundborg, Denmark, are now widespread around the world, and due to its many proven benefits, this idea has evolved to cover broader geographic areas, generating millions in synergy revenues every year (Jacobsen 2006).

For instance, in South Africa, eco-industrial networks have been developed through the 'Integrated Waste exchange program' based on a top-down approach, with the support of government agencies, to reduce and manage waste more efficiently. This initiative has been followed by efforts to integrate dematerialization and decarbonization strategies along with the use of life cycle assessment (LCA) and material flow analysis (MFA) (Brent *et al.* 2008).

Although the creation of these networks is usually supported by policy to encourage material and information interchanges (Gibbs and Deutz 2007), their evolution is not exclusively related to governmental interventions and may also result from bilateral agreements among industries. Such is the case of China, where their development usually follows a bottom-up approach and is supported by the community, as it results economical for them to exchange waste or by-products, while waste is reduced and resources are saved, in particular metal scraps, plastics, paper, wood scraps, sludge and ashes (Jinping *et al.* 2014).

Moreover, the Chinese Government has recognized CE as a viable economic reform model and a mechanism for the profitable development of new technologies and products, upgrading equipment and improving industry management (Zengwei *et al.* 2008), and despite certain criticism by experts that consider the need of moving from rhetoric to implementation with more concrete, targeted actions, in 2009, the CE promotion law was approved by the National People's Congress, followed by various action plans that provide detailed measures for specific sectors (McDowall *et al.* 2017). Most recently, in 2018 a 'Memorandum of Understanding (MoU) on CE cooperation' was signed between the European Union (EU) and China with the goal to accelerate bilateral collaboration to better respond to common challenges and support a global transition to a resource-efficient and circular economic model in line with the SDGs (EC 2019a); this historic agreement could also potentially create the building blocks for product standards and policies that would accelerate the adoption of CE practices at a global scale (EMF 2018).

Today, many are the countries embracing CE and enacting policies that promote it at different levels. For instance, Singapore is concentrating its efforts on closing the waste loop aiming to become a zero-waste nation and achieve a 70% recycling rate by 2030, as specified in its Sustainable Singapore Blueprint (Ministry of the Environment and Water Resources and Ministry of National Development 2015). In the meantime, other governments are implementing specific changes at a local level, such as the city of São Paulo, in Brazil, which aims to modify its food system to get more value from it and reduce waste, through healthier, local and regenerative food production (EMF 2019a).

Another example is that of South Australia that has taken the first steps towards a CE with its own 'Waste Strategy 2015-2020' which focuses on the recycling of landfill waste and material and resource efficiency, as well as the creation of a state government organization, Green Industries S.A., that is in charge of monitoring its implementation. As a result of these

measures, waste management in the state has improved, with 75-80% landfill waste currently being recycled and a reduction in GHG emissions below the 1990 level, despite the 60% growth in the economy in the same period (Lifecycles *et al.* 2017). However, in the mining regions of the country, for instance, Gladstone, or the industrial area of Kwinana, there exist a large number of possible synergies between the multiple actors for energy, material and water flows exchange, that could facilitate innovative and new industry opportunities, but the lack of policy instruments in place have impeded the mobilization of these collaborations (Mattiusi *et al.* 2014).

On the other hand, some CE related initiatives that aim to increase consumers' responsibility for material use and waste were identified in regions of Japan and Korea by Prendeville *et al.* (2014). Due to its geographical location and geological limitations, Japan has become an expert dealing with the resource scarcity challenge, and as a result the country, which has not yet developed its CE vision, counts with a solid system for waste management and recycling, as well as numerous policies and laws under implementation, including 'The Law for the Promotion of Efficient Utilization of Resources', recycling acts for the construction, home appliances and food sectors, and 'The 4th Fundamental Plan for a Sound Material-Cycle society' based on the 3Rs (reduce, reuse, recycle) and which aims to further increase resource productivity, while decreasing the final disposal amount (GR 2016; Office of Sound Material-Cycle Society 2018).

Meanwhile, Winans *et al.* (2017) pinpointed that in North America and Europe the application of the CE concept by corporations is done with the objective of enhancing reduce-reuse-recycle programs and to conduct product-level life cycle studies. Nonetheless, the CE scenario in the United States varies from state to state, for instance in the city of Boulder, Colorado the 'Green building and Green Points' programme was established in 2007 to reduce the impact of the construction sector on the natural environment by promoting sustainable

practices through the efficient use of resources and recycling of construction materials, with specific targets that require at least 50% construction waste to be recycled and 65% demolition waste to be diverted from landfills (City of Boulder 2013). The success of this long-term local measure could result in its scale-up at the national level, as it is commonly done in the United States (Sitra 2016).

Moreover, it is estimated that Californians throw away approximately 6 pounds of trash every day, that adds up to 2200 pounds (roughly 1 tonne) per year and doubles the 2020 goal of 2.7 pounds per person per day (Truelove *et al.* 2018), hence the state senate has recently passed an ambitious legislation to cut packaging and plastic waste by 75% by 2030; and the proposed 'California Circular Economy and Plastic Pollution reduction act' that would attack the trash crisis from design to disposal is currently under discussions (BFFP 2019; Becker 2019).

The 2018 report on 'The State of the CE in America' (Circular CoLab 2018) concludes that many CE solutions already exist and are under implementation in the States, however, they might not necessarily be classified or recognized under the CE concept which is still recent. Nevertheless, government entities, as well as organizations and social enterprises, are taking action to promote the CE principles, keeping the focus on closing the loop for goods and materials and demanding radical alternatives that no longer address the need of the current linear economic and production model, and instead shift towards CE.

Alternatively, Canada introduced its CE 'Roadmap to Smart Prosperity' in 2016 with a holistic and broad focus under the conception that smart welfare equates a thriving economy and a healthy environment, hence improving Canadian's quality of life. The roadmap provides a vision for a low-carbon future and identifies points of improvement such as the need to decrease the quantity of materials it uses per unit of gross domestic product (GDP) at a faster rate (Sustainable Prosperity 2016).

In Europe there is a growing consensus around the importance of the CE and the idea of gradually transitioning towards it is fiercely supported by the EU, which considers it one of the brightest focus areas for the future. Furthermore, in comparison to other competing markets, the EU is well known for its stricter environmental regulations, and seeing the current global challenges and the capacity of the CE as a means to deal with them sustainably while boosting global competitiveness and accelerating society's move towards a more resource-efficient system, the response by the European Commission (EC) has been to prioritize the topic and adopt new measures that solely focus on enabling the transition to a CE (Sitra 2016).

Nevertheless, the EC has been working to transform the EU's economy into a sustainable one over the past decades. Long before the CE notion was introduced, the main focus was on waste management and the rational utilization of natural resources, in this regard the EC adopted the 7th and last flagship initiative of the 'Europe 2020 strategy' (EC 2010) for smart, sustainable and inclusive growth, knowns as the 'Roadmap to a Resource-Efficient Europe' (EC 2011). Launched in 2011, the European Commissioner for Environment, Janez Potočnik, during his speech explained the objective of the strategy is to "support the shift to a resource-efficient, low carbon economy that makes better use of natural resources in order to achieve sustainable growth", moreover, he emphasized the need for promoting green economic growth based on quality not quantity (Potočnik 2011). The roadmap to a Resource-Efficient Europe, which also takes into account the 'EU Sustainable development strategy' (EC 2001) is among the key initiatives of the '7th Environment Action Programme' (EC 2014a) and focuses on the transformation of the European economy into a sustainable one by 2050, including 2020 milestones, while also outlines the structural and technological changes needed to increase resource productivity and decouple economic growth from resource use and its associated environmental impacts (Amanatidis 2019).

Besides of these measures, the EU has also laid down general waste management and prevention framework directives, more specific hazardous and waste oil directives, as well as regulations for waste shipment, strategies on prevention and recycling of waste, and production and waste stream specific laws, all of which have built up the CE action plans by the EU and have contributed to set clear impulses for Member States to embed resource efficiency and CE objectives in various national programmes, strategies and instruments. In fact, some national policies precede EU policies. (Amanatidis 2019; Domenech and Bahn-Walkowiak 2019).

The map in *figure 3* by the WBCSD (2018) gives an overview of the level of engagement in CE among the EU Member States, based on the existing and upcoming national policies at the time of the study.



Figure 3 – Level of engagement in CE in the EU Member States. (Source: WBCSD 2018, own modifications).

For instance, countries like Denmark and Sweden do not count with CE visions per se but rather focus on 'resource wisdom' and 'smart industry' visions respectively, while Luxembourg has its CE roadmap since 2014, with goals primarily at the top level. The Netherlands, on the other hand, has made great progress ever since it launched its 'Netherlands Circular Hotspot' campaign in 2016 and has now become a CE innovation hub with clear goals to reduce by 50% the use of primary raw materials by 2030 and become a waste-free economy by 2050 (Government of the Netherlands 2016; Sitra 2016).

Finland, despite being a small state, is also among the frontrunners and was the first nation to have launched a comprehensive CE road map in 2016, entitled 'Leading the cycle – Finnish road map to a CE 2016-2025", which comprised a holistic CE thinking that applies to the entire society, linking system-level change visions with tangible actions. It is also the first of its kind in terms of its scope and practical nature, besides the extent of stakeholder participation, with 1000 participants brought together in the process. Additionally, Finland also counts with a bio-economy strategy adopted by the Government in 2014 that supports the CE vision (Sitra 2016; Iles 2018; Bio-based News 2014).

The EU and EC have also implemented 'Framework programmes for research and technological development' that reinforce technological research such as FP6 and FP7, and innovation such as Horizon 2020 (H2020), to ensure Europe's global competitiveness and foster a just and sustainable societal transition in the achievement of the EU climate neutrality goals by 2050, as stated in the Green Deal (Science Europe 2019).

Achieving systemic change requires a range of practical actions and the commitment from governments, enterprises, and citizens. Analysing global trends and challenges to identify the areas that need the most immediate action is key to successfully transition into a CE and in this process, the role of states as facilitators and supporters is vital to create growth platforms that favour their market and allow companies to combine efforts and search for comprehensive solutions and possibilities for industrial symbiosis.

#### 2.3 Circular economy policy instruments and approaches

Competition for scarce resources is driving research and experimentation in new technologies and business models. Nonetheless, the systemic and disruptive changes required to transition to a more circular economic system will not occur without substantial changes in the existing regulatory structures. Despite the genuine interest some companies and individuals have developed for the CE, without proper governmental intervention the transformation of the system does not seem feasible, hence the formulation, implementation and enforcement of specific CE related policies are necessary to achieve the desired outcome of having cyclical closed-loop systems in place (Wilts and O'Brien 2008).

Efficient waste management has been the primary focus of numerous existing regulatory measures, from sorting, recycling, treatment, disposal, landfill diversion, charges, and taxes, as well as extended producer responsibility; and whilst targeting the end-of-life phase is an essential part of the CE, a shift towards the upstream phases, such as product design and service development, is also needed to have consistent, coherent and credible CE policy mixes (Berg *et al.* 2018).

Beyond these environmental policies, concentrating on the following categories and reassessing them is also beneficial to enable the CE: regulatory frameworks, economic instruments, green public procurement (GPP), research and innovation as well as education, communication and information policies (WHO 2018; Preston 2012). Moreover, the EMF (2015) identified other subcategories that would require further intervention, such as fiscal frameworks, technical and financial business support schemes coupled with the need to create industry collaboration platforms at different levels.

Additionally, the role of policymakers is of fundamental importance to accelerate the transition, set a clear direction and create enabling conditions for the CE to thrive, as well as in detecting opportunities, addressing market and regulatory failures, and collaborating with

businesses to overcome unintended barriers of existing regulations (EMF 2015). Even though there exist several policy approaches, their choice is usually highly linked to the precise issues being addressed, the objectives, strategies, and specific actions, as well as their scale and scope but also the different parts involved. These may include but are not limited to, policy instruments, policy frameworks or top-down approaches, and government programs or bottomup approaches (Winans *et al.* 2017).

Based on an analysis of the global material footprint in 2015, from 92.8 billion tonnes of materials, the volume of extracted resources was 84.4 billion tonnes, while only 8.4 billion tonnes correspond to cycled resources. This fraction known as the circularity gap serves to estimate the percentage of the global economy that is circular, currently, this figure is only 9% (Circle Economy 2019). Having identified the enormity of the challenge, the next mandatory step is to align effective CE government policies and purpose with business strategies and best practices that can be disseminated. Therefore, governments are required to formulate concrete and ambitious policies that foster and help move forward the shift to a CE, which support novel technologies, markets and business models, promote the use of renewables and responsible use of all resources and to the extent possible, enhance product lifetime, whilst withdrawing policies that endorse linear economic systems (Berg *et al.* 2018).

For instance, regulating the use of water and boosting water reuse is a common practice in countries like Israel, Australia, Singapore, among many others. However, the EU has identified two barriers preventing the spreading of this practice on Member States, namely lack of awareness on benefits among stakeholders and the general public, and the absence of a supportive and coherent framework for water reutilization. As a result of these findings, the EU recently adopted a regulation on the minimum requirements for water reuse, that encourage circular approaches for agricultural irrigation and the promotion of water-efficient technologies for industrial purposes. A solution for the latter could be the implementation of zero-liquid discharge technologies, that not only purify water, but which may also recover heat that can also be reused in industrial processes (EC 2020a).

Furthermore, although the implementation of tools such as LCAs for products is not mandatory today, their demand continues to increase as companies realize the importance and advantages the application of this methodology can have, helping them identify environmental hot-spots during their production, optimize their processes, as well as, improve their design to reduce waste and create a competitive advantage amidst competitors. Consequently, in the EU this concept is being transformed into legal requirements through the CE Action Plans, which aim to integrate this assessment in public procurement (Hughes 2017).

#### 2.3.1 Circular economy policy landscape at the European Union

Within the European context, as indicated by Hughes (2017), the EU has implemented laws on waste disposal and reduction for over 30 years, as well as regulations addressing the environmental performance of products put on the market and substance restrictions, such as eco-design requirements or the directive on the reduction of hazardous substances, for over 20 years, besides of strategies for sustainable growth and resource efficiency initiatives in the last decade, nonetheless they had not formed a cohesive whole until recently.

#### 2.3.1.1 Circular economy Action Plans

In July 2014, the EC's continuous efforts and commitment to stimulate the transition were explicitly conveyed in a communication solely dedicated to the CE published as 'Towards a Circular Economy: A zero waste programme for Europe' and a legislative proposal to review recycling and other waste-related targets in the EU (EC 2014b). However, regardless of the numerous opportunities for economic growth highlighted by the Barroso commission, quickly after the first attempt was presented, the strategy including the pending legislative proposal on waste was withdrawn from the executive's work programme in December 2014, as part of the political discontinuity exercise carried out for the first Work Programme of the Juncker

Commission. At that time, the First Vice-President of the commission, Frans Timmermans cited the need to ensure that "the CE is approached in a circular way and not just half a way" and pledged to develop a better designed, more circular proposal covering the full economic cycle, instead of simply targeting waste reduction (Crisp 2014; EU Fusions 2014; EC 2015a).

As a consequence, a year later, in December 2015, 'Closing the loop - An EU action plan for the Circular Economy' a new, concrete and ambitious programme of actions and measures covering the whole cycle: from production and consumption to waste management and the market for secondary raw materials as well as a revised legislative proposal on waste, known as the 'Circular Economy Action Plan', was introduced by the EC (EC 2015b).

The CE Action Plan is a document adopted by the EC that affirms the vision of the CE in the EU and which sets out a policy framework that builds on and integrates existing policies and legal instruments. In this context, the 2015 CE Action Plan encompasses two parts, an introduction section describing the proposals, including amendments to legislation related to waste and landfills which were already due for revision, and various new initiatives; as well as an Annex giving the proposed timescale for agreeing when those proposals should be actioned (McDowall 2017; Hughes 2017).

The creation process of the CE Action plan started at the top, by a core project team cochaired by the First Vice-President of the EC, Frans Timmermans and Vice-President for jobs, growth, investment and competitiveness, Jyrki Katainen, as well as Elżbieta Bieńkowska, Commissioner for industry and entrepreneurship and Karmenu Vella, Commissioner for environment. Their joint efforts were key to successfully bring together a more holistic CE Action Plan, keeping the environmental challenges as a priority, and the endowment this represents to the growth of the EU economy. Several other commissioners were also involved in the identification of effective policy instruments to cover a wide range of areas that would in turn fuel a fast integration of the principles within the value chains of production and consumption at the EU level (Heinz 2018). Furthermore, as part of the process, the commission organized a CE conference in Brussels in June 2015 which counted with the presence of 700 stakeholders, who wished to contribute to shaping European economic policy-making and that resulted in intensive and collaborative consultations between the parts (EC 2015a).

The 54 actions encompassed in the 2015 CE action plan contained incentives and reformed regulations over the entire loop as following (EC 2015a, 2015b):

- Production: 9 actions such as extensive commitments on eco-design, and regulations on material efficiency, promoting durability and repairability by the EU standardisation organization, inclusion of CE in the Best Available Techniques reference documents (BREFs), substitution of hazardous substances, and others.
- Consumption: 7 actions comprising updated guidance on commercial practices to avoid false green claims, enhancement of ecolabel effectiveness, independent testing programme, actions to support GPP, among others.
- Waste management: 6 actions containing four revised legislative proposals on waste with clear and ambitious targets to reduce landfill to a maximum 10% of municipal waste and recycling 70% packaging and 60% municipal waste by 2030, promote and stimulate industrial symbiosis, to name a few<sup>3</sup>. Besides of measures to improve cooperation among Member States for better implementation of waste legislation and shipment regulations, voluntary certification, etc. (Amanatidis 2019).
- Market for secondary raw materials: 7 actions involving the development of quality standards, a revised fertilizer regulation, setting minimum requirements for reused water, safe and cost-effective water reuse promotion and innovation (Part of H2020), further develop an information system for raw materials in EU, etc.

<sup>&</sup>lt;sup>3</sup> The waste legislation proposals included amendments for the waste framework directive, the landfill directive, the packaging and packaging waste directive; and the directives on end-of-life vehicles, batteries and accumulators and waste batteries and accumulators, and waste electrical and electronic equipment (WEEE).
- Sectorial action:
  - Plastics: 2 actions, namely the creation of plastics strategy and specific actions for marine litter reduction in connection with SDG 14 – life below water.
  - Food waste: 4 actions encompassing the development of methodology, indicators, and measures to reduce it by half by 2030, clarifying the legislation on waste, food and feed and exploring options for more effective use.
  - Critical raw materials: 4 actions such as the elaboration of a report to identify them, improving information exchange between manufacturers and recyclers of electronic products, specifying recycling standards for WEEE.
  - Construction and demolition: 3 actions including assessment guidelines for demolition, voluntary recycling protocol, indicators to assess lifecycle environmental performance of buildings, and incentives for their use.
  - Biomass and bio-based materials: 3 actions, to develop best practice guidance on biomass use and innovations support (Part of the H2020 programme), ensuring bioenergy synergies and assessment of the bio-economy strategy.
- Innovation and investments: 8 actions comprising the H2020 research program to support industrial innovation, revising regulatory framework, addressing regulatory obstacles for innovators, targeting communication and funding activities/projects, engagement with stakeholders and support approaches, among others.
- Monitoring: 1 action aiming to develop a monitoring framework for CE.

The binding directives on waste management and recycling proposed by the EC to the co-legislators (the Council and the Parliament) were one of the most crucial advances in CE in the last decade at the EU level, following interinstitutional negotiations between them, the four directives were adopted in May 2018. Additionally, the EC presented the '2018 CE package' summarizing a set of actions adopted as a consequence of the 2015 CE Action Plan, reflecting

the political will and the direction of the EU, and which included the 'EU strategy for plastics in the CE', a communication on options to address the interface between chemical, product and waste legislation; a monitoring framework on progress towards a CE, and a report on critical raw materials, as well as several proposals to reduce the impact of certain plastic products on the environment, among other initiatives (EC 2018a; Amanatidis 2019; Berg *et al.* 2018).

All the 54 measures established by the EC in 2015 with the goal of closing the loop were adopted and are still being implemented today in parallel with new actions that have also entered into force ever since. Furthermore, a couple of years after its adoption, in March 2019, approaching the end of the Juncker presidency, the EC launched a comprehensive report outlining the main achievements under the Action Plan and future challenges (EC 2019b).

Most recently, in December 2019, the new von der Leyen commission presented a green development programme and roadmap, which aims for a climate-neutral Europe by 2050, known as the 'European Green Deal'. This action was followed by the adoption of a 'New Circular Economy Action Plan' in March 2020, as one of the main building blocks that support the latest growth strategy of the EU. This newest agenda reinforces some of the acts first introduced in the previous Action Plan in more ambitious terms and enlists all the new key actions to be implemented until 2024. The 2020 CE action plan, seeks to accelerate the systemic transition towards a regenerative growth model, protecting the environment and empowering consumers while also strengthening Europe's competitiveness (EC 2020b; Circwaste 2020a).

This communication to the parliament and the council comprises 35 new interrelated measures (legislative initiatives, strategies, and other instruments and policies) along the entire life cycle of products, with legislative proposals such as the product policy framework that aims to mainstream sustainable products in the EU, influencing their design to ensure durability, repairability and recyclability; and establishing the 'right to repair' as well as ensuring that companies substantiate their environmental claims. Moreover, a minimum mandatory GPP

criteria and targets to drive the transition have been set. The latest plan also includes new detailed guidelines for electronics and ICTs, batteries and vehicles, packaging, plastics, textiles, construction and buildings, and food, water and nutrients (EC 2020c, 2020d; Circwaste 2020b).

## 2.3.2 Circular economy policies in Finland

CE policies are attracting the attention of policymakers within, and outside the EU. The political impetus brought by the implementation of the EU CE Action Plans not only generated internal discussions across the EC departments and agencies but also had broader effects between Member States and stakeholders of different sectors, increasing cooperation among them (WBCSD 2018).

While EU countries are working on their adaptation to the CE, their efforts, focus, and maturity levels differ across the continent. Among these, Finland stands out with its ambitious policies, such as the 'Finnish Road Map to a Circular Economy 2016-2025', the 'National Waste Plan to 2023', the 'Action Plan for a CE' and 'Finland's road map to the CE 2.0' all with clear national and international goals to promote the CE and position the country as a global leader by 2025. Additionally, municipalities, regions and businesses have also set their own targets. CE initiatives in the country are supported by various regulations, financial incentives, research and development (R&D) funding, and GPP policies (Circwaste 2020c; WBCSD 2018). *Figure 4* shows the different CE related policy documents adopted by the EU (yellow dots) and the Finnish Government (white dots) in chronological order.



Figure 4 – CE policy documents adopted by the EU and Finland. Note that the 'First CE Action Plan' is crossed out as it was withdrawn soon after its publication, unlike the other policy documents which are currently under implementation. (Source: Own elaboration)

Based on estimates, the full adoption of a CE in Finland would create over 75000 new jobs and provide the national economy with 2 to 3 billion euros in added value potential by 2030; besides reducing dependency on resource use (Wijkman and Skånberg 2017). Thus, the cabinet of Prime Minister Juha Sipilä (2015-2019) included the CE as one of its key projects in its Government Programme, pointing out that "Our goal is to make Finland a forerunner in the bioeconomy, circular economy and cleantech by 2025. Sustainable solutions speed up export and employment. With better regulation, we can increase investments that will help boost economic growth." (Sitra 2014; EC 2016; Prime Minister's Office 2015). Therefore, navigating the current Finnish policy landscape, a number of CE initiatives can be found among several ministries such as the Ministry of Economic Affairs and Employment, Ministry of the Environment and Ministry of Agriculture and Forestry, and also beyond the administration, with the participation of the Chemical Industry Federation of Finland, the Federation of Finnish Industries, along with others (Sitra 2016).

On a global scale, Finland is a relatively small nation that counts with 5,53 million inhabitants (OSF 2020a), nonetheless, it has been a trendsetter in many fields. Having emerged from an economic downturn in 2016 that lasted nearly a decade, this agile country now seeks to improve its competitiveness and ensure the well-being of its people while detaching from the consumption of natural resources, by becoming the testing ground for the CE (*BBC* 2019). A study by the Finnish Innovation Fund (Sitra) (2016) estimated that 87% of Finns regard this 'critical move' as very important or fairly important, in spite of the major changes in behaviour this represents for the society given that the Global Footprint Network (2019b) calculated that to meet the consumption of the average Finn 3.8 Earths would be needed.

During the establishment of the CE notion in Finland, the public, independent and future-oriented organization, Sitra has played a fundamental role. Sitra was founded by the Finnish Parliament in 1967 to build "the successful Finland of tomorrow" guaranteeing a fair and sustainable future while improving the well-being of the whole Finnish society; it is funded by returns on endowment capital and capital investments. Also known as the Finnish Innovation Fund, it oversees the promotion and acceleration of the CE in the country. In this regard, one of its focus areas concentrates on the scale-up of fair and inclusive CE solutions that address the global sustainability crisis, which can be exported to the world (Sitra 2016).

## 2.3.2.1 Finnish road map to a circular economy 2016 – 2025

A comparative study by Deloitte (2015) revealed that large Finnish enterprises and international CE pioneer companies had a similar approach with traditional process and product development innovations dominating the innovation field while making the most of networks. Except for a notable difference, leading international companies had taken actions to reform their earnings model. Analysing the international landscape further, it was found that beyond corporate-level innovation activities, the focus of CE trials was on the regional and local level. Hence, understanding the need for a single holistic approach that combines systemic change, via targets and action plans across interlinked focus areas, with practical actions, including best practices and pilots that have the potential of being easily replicated to provide added value on a national and international scale, Finland assumed the challenge to tap its potential (Sitra 2016).

Sitra led the process to develop the world's first road map to a CE, setting out the starting position for the country, as well as defining its strategy, goals and main priorities of the focus areas, all under the guiding principles to ensure accomplishing the global leader role by 2025. Since its publication in 2016, 'The Finnish road map to a CE 2016-2025' has spurred the movement towards a systemic change, where high-level policy actions and their regular evaluation together with scalable solutions and concrete pilots that can be readily launched, promote the transition and serve as an example for other countries to adopt this economic model, while increasing the well-being of their citizens without the overconsumption of fossil fuels and natural resources (Sitra 2016, 2019).

In this regard, the role of the state is to facilitate a progressive growth platform that favours the domestic market and companies, while also strengthening international cooperation to take advantage of the vast opportunities presented by the global market in the long term. To do so, as seen in *figure 5* Finland decided to concentrate on its strengths, divided over four focus areas of expertise and a fifth entity, including the synergies between them, across their entire life cycle, namely:

- Sustainable food system: The focus of food growth lies on the wise utilization of resources coupled with recycled nutrients to provide consumers with choices that have lower emission, consume less raw materials, and avoid food waste generation.
- Forest-based loops: Natural resources in Finland are characterized by scarcity and efficiency, as a result, Finns learnt to utilise their side streams, taking biobased materials in combination with digital technology to a new level that established the country as a leader in bioeconomy because of its innovations in forestry and forest industry, and the added value of their products and services.
- Technical loops: Solutions are created based on the sustainable use of materials and products, meaning minimising the use of virgin raw materials, optimising the length of their loop, and maximising their reuse at different phases of the life cycle.
- Transport and logistics: A fossil-free, seamless, smart transportation system that moves people, items, raw materials, side streams, and others is a basic element of the CE. Finland also aims to implement Mobility as a Service (MaaS), sharing economy transport solutions and clean, optimised transport networks.
- Common actions: Essential initiatives to achieve systemic change intersect all sectors of the society, such as citizens and consumers, companies, legislators, research institutes and universities, and demand active cooperation between them, as well as extensive communication to effectively implement joint actions.



*Figure 5 – Proposed Finnish CE road map. (Source: Sitra 2016 with own modifications).* 

Within the different focus areas, three levels of actions have been implemented: policy measures, large key projects, and smaller pilots. Furthermore, in its effort to mainstream the CE, ensure domestic market functionality and create comprehensive CE solutions aimed at businesses and export growth, Finland's upper-level targets are summarised over three fields: economy, environment and society, whose balanced combination is expected to ensure sustainable growth while strengthening the country's competitiveness and creating new jobs.

The Finnish road map synthesizes the views of the society's key operators, as such, it was developed in broad cooperation with stakeholders, including 48 members of the public, private and third sectors in a cross-sectional working group, 63 expert interviews and 1000 participants from which 250 ideas for actions were collected and summarized in 64 actions (Sitra 2016).

## 2.3.2.2 The Finnish Action Plan for a Circular Economy

Presented by the Finnish Government, Ministry of the Environment and Sitra, the 'Action plan for a CE' (2017) is a strategy that builds upon the Finnish road map to a CE 2016-2025 and the key projects of the Government Programme, comprising measures to promote the realization of the CE during the Sipilä Cabinet term (2015-2019), under the following priorities:

- Developing platforms for experimenting and testing CE best practices to generate internationally competitive solutions.
- Create legislative incentives, enhance new operating models, and increase sustainable and innovative GPP.
- Support innovation of new products and services.

The newest version of this framework, the 'Strategic programme to promote a CE' is expected to be published this year (2020) with the aim to reinforce the role of Finland as a CE trailblazer in the pursuit of the carbon neutrality target by 2035, including new objectives and indicators, additional measures needed, and further allocation of resources for promotion and achieving systemic change (Ympäristöministeriö 2020a, 2020b; WBCSD 2018).

## 2.3.2.3 National waste plan to 2023

Adopted in 2018, the 'National Waste Plan to 2023' was proposed by the Ministry of Environment and the Government of Finland, replacing the previous plan from 2008. The document which consists of both, waste management and reduction of quantity and harmfulness of waste, under the EU Waste Framework Directive (2008), takes into account the waste hierarchy and key principles of self-sufficiency and proximity, laying down detailed targets to 2023 together with the measures to be undertaken to achieve them (Laaksonen *et al.* 2018). Moreover, it goes beyond the six-year waste plan horizon and presents the longer-term target state to 2030, with the following seven objectives:

• High standard waste management is part of the CE.

- The efficient production and consumption of materials save natural resources and help mitigate climate change.
- Decrease in waste volumes, while reuse and recycling rates rise to a new level.
- The recycling market works well in Finland and is a source of employment.
- Low concentration valuable materials are also recovered from recycled materials.
- Production processes use less hazardous substances, material cycles are innocuous
- High-quality R&D and high level of expertise in the waste sector.

Given the challenges to promote recycling and reduce the volume and harmfulness of certain types of waste, the Waste Plan encompasses detailed targets and measures to handle these streams, divided into four key areas which are: construction and demolition waste, biodegradable waste, municipal waste (including packaging waste) and WEEE. For instance, the FAO (2018) estimates that around 400 million kg food waste is produced in Finland each year, this represents 15% of all edible food, thus in line with the EC goal of halving food waste by 2030, Finland has committed to minimising its food waste as stated in the plan and the road map to a CE by Sitra (2016) through the elimination of logistic obstacles, creation of incentives, and the development a control system that allows monitoring such waste.

Furthermore, considering the recycling targets to 2023 (60% biowaste and 55% municipal waste), the National Waste Plan outlines two scenarios with different waste volume developments and the required facility capacity and locations, encouraging centralisation to allow synergies between actors. The plan also comprises quantitative and qualitative indicators for monitoring its implementation and assessing the effectiveness of the measures, as well as administrative and financial policy instruments, and an array of voluntary alternatives for businesses. The preparation of this framework was an interactive process in cooperation with experts on waste and stakeholders of the steering group which included representatives from the Ministries of Environment, Agriculture and Forestry, Social Affairs and Health, Economic

Affairs and Employment, as well as government and research institutions and nongovernmental organizations which convened for 16 meetings (Laaksonen *et al.* 2018, WBCSD 2018). As a result, the execution of this strategic plan is expected to steer the country towards a CE in respect of waste management, although complementary measures are also required.

#### 2.3.2.4 Finland's road map to the Circular Economy 2.0

Monitoring progress towards a CE is a laborious task, nevertheless, it is the baseline to define new priorities, thus Finland has proposed several key indicators, such as monitoring the size of environmental business activities, exports and employment; the number of CE related patents; resource productivity; raw materials consumption; volumes and reuse rates of industrial, construction and municipal waste; the share of renewable or low-carbon energy production of the final energy use; the carbon footprint of the average Finn; and the share of CE businesses, yet as the CE shall not be seen as a separate sector but rather as a phenomenon that spans the whole society, assessing this share represents a challenge of its own (Dean 2019a).

Over 16 million euros in funding have been provided by Sitra to promote the implementation of the road map to a CE in Finland, focusing on cross-sectoral actions that directly impact the society. In this process, multiple trails of development have been established with more than 70 projects for generating systemic change (Sitra 2019). However, to keep up with its agenda and be at the forefront of the CE transformation, Finland needs to speed up its pace. Hence, after evaluating global megatrends and their local impacts, as well as the progress made since the implementation of the first road map in 2016, Sitra has identified new focus areas to work on. As a result, an updated version of the document was published in March 2019, 'the road map 2.0' (Järvinen *et al.* 2019) builds on the initial framework and proposes the following four strategic goals, that cover all sectors of the society:

• Renew the foundations of competitiveness and vitality through CE solutions that create added value and focus on an economic growth strategy.

- Shift to sustainably produced, renewable and low-carbon energy, promote its efficient use and set more ambitious goals in both, national and the EU's climate and energy policies.
- Regard natural resources as scarcities, limiting their use and adopting CE practices for their consumption to meet the Paris Agreement climate targets.
- The appraisal of everyday decisions as catalysts for change is the next step required by the CE. For instance, the adoption of a new approach to ownership, among many other sustainable daily choices could help achieve the aim of the government of cutting the carbon footprint in half by 2030, from the 2010 level.

The foundations of this updated version were similarly drawn up in collaboration with stakeholders from the public, private and third sectors, in total 25 specialists and decision-makers were interviewed, 6 workshops were held where 110 professionals and experts attended, and 350 ideas and comments were collected via an online platform. The CE steering group from Sitra also participated in the formulation of the goals.

Furthermore, the new road map includes a number of suggestions or visions aimed at the key players (central government, towns and cities, businesses, and citizens) that have yet to be embraced; and enlists 29 new vital actions with concrete steps which the participating organizations committed to during the co-creation of this framework (Dean 2019b).

Since 2016, Finland has been actively moving forward on the paths towards a CE, with excellent political initiatives under implementation in many of the key sectors, however, more ambition and action across boundaries of administrative sectors are required. As explained by Sitra (2019) there is a pressing need for economic steering methods. While it is also necessary to examine CE legislations and steering as a single entity, which in turn promotes cooperation between sectors and operators.

# 3. Methodology

The main aim of the thesis is to explore and critically analyse the current CE policy frameworks undertaken by the EC and the CE related policies, as well as the action plans implemented in Finland, in order to find synergies and points of improvements for countries envisioning a shift towards a CE. Thus, to achieve a thorough understanding of the situation a qualitative research approach was adopted. The research design integrates multiple methods that enhance its quality, avoiding too great of a reliance on one single approach (Knights and McCabe 1997). Furthermore, as explained by Roller (2015), multi-method research frees the researcher into total immersion with the subject matter and enables the study of relatively complex entities or phenomena in a way that is holistic and retains meaning, resulting on a more elaborated and balanced interpretation of the research questions (Bryman and Bell 2011).

# **3.1 In-depth literature review**

In order to have a better overview of the current transformation from linear to circular economic models taking place around the globe, and grasp a deeper understanding of the CE policy landscape in the EU and Finland, an in-depth literature review was carried out. The initial stage of the research comprised an online search based on the key terms summarized in *table 1*.

Key terms	Circular Economy	Circular Economy Policies	
Associated keywords	Resource efficiency Life cycle thinking Waste management and recycling Circular business models Sustainable development goals Circular design Closed-loop systems Regenerative system	CE Policy frameworks CE Policies in the EU CE Policies in Finland CE Action Plans CE Road maps CE Legislations CE Regulations CE Package CE Strategies	

Table 1 – Keywords used to obtain relevant literature (Source: Own elaboration).

The relevant academic literature was gathered with the help of web search engines such as Google Scholar and the available databases of the Central European University library. Other important sources of literature include the learning hub and reports of the Ellen MacArthur Foundation, and the publications of Sitra, available on their website. Moreover, updated core information was collected from the website of the Environment Directorate General (DG) of the EC. As a result, numerous scientific papers from recognized journals as well as grey literature were obtained, from which other important sources were identified using the snowball method.

Tranfield *et al.* (2003) suggest that a systemic literature review process provides a more reliable foundation on which to design a research, as it is based on a more comprehensive perception of the subject. In this regard, the evaluation of the pertinent literature enabled the conceptualization of the overall research context and provided the basis for understanding the emergence of the CE concept and the influence the different schools of thought had in it. The evolution of the notion over the last decades, amidst the increase in demand for resources of an ever-growing population and the need for sustainable solutions, has in turn steered policy debates and generated numerous initiatives around the world. A snapshot of these is provided with a focus on the actions taking place in the last couple of years in the EU, and Finland, which stands out among all Member States due to its ambitious plans to lead the transition to a CE.

## 3.1.1 Policy document analysis

As a research tool, policy document analysis is an established and appealing qualitative method for investigating the nature of a policy document in order to look at what lies behind it, within it and beyond it (Cardno 2018). *Table 2* summarizes the policy documents examined:

EU level policy documents	Finnish policy documents	
CE Action Plan 2015	Leading the cycle: Finnish road map to a CE 2016-2025	
CE Package 2018	Action Plan for a CE 2017	
New CE Action Plan 2020	From Recycling to a CE: Finland's National Waste Plan to 2023	
	The Critical Move: Finland's road map to a CE 2.0 2019	

Table 2 – List of policy documents analysed (Source: Own elaboration).

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Taylor *et al.* (1997) proposed a conceptual framework for policy analysis that consists of three parts: context, text and consequences. The initial stage allows the researcher to comprehend the forces and values that brought the policy into being, for that it is necessary to explore its antecedents and recognise the issues that gave rise to the need of the policy in the first place. The content of the document is then subjected to scrutiny through a questioning process which as explained by Bell and Stevenson (2006) enables to find out the reason why it is structured or framed in a particular way. Finally, comprehensive policy evaluation is required to determine the effectiveness of its implementation and whether the stated purposes have been achieved. Furthermore, Alexander (2013) emphasizes the importance of looking for signs of likely challenges to implementing the policy which could be related for instance to people, processes, or structure.

The in-depth literature review helped pinpoint the different policy documents that build on each other and which led to the development of strategies solely focused on the CE. These policy initiatives (*Table 2*), including both regulations and frameworks, were analysed, offering clear background insights and an overview of the current CE policy landscape in the EU and Finland. As a result, overlaps, differences, and points of mutual reinforcement were identified enabling to draw a more complete picture of the situation, for the fulfilment of the research questions.

# **3.2 Interviews with experts**

Subsequently, semi-structured individual in-depth interviews were conducted with professionals, experts and representatives of the field to gather qualitative data and further comprehend the transformational phenomenon taking place in Finland and the respective implications of the EU framework, in order achieve the aims and objectives of the research.

#### **3.2.1 Data collection**

The first step taken was to seek out those who could offer the best insights with regards to the CE policy frameworks in the EU and Finland. The key actors taking part in the development of the different frameworks were identified from the list of members in the annexe sections of the documents. Furthermore, CE specialists, advisors and policy experts were also found at the EC, Sitra and Finnish ministries directories. After that, the process to organize the interviews started with a request for a short interview sent via email and LinkedIn. All interviews were scheduled online in accordance with the availability of the interviewees. Given the current COVID-19 pandemic, all interviews were conducted online, via video conferencing platforms and usually lasted between 30 - 45 min. Interviewees were asked for their consent to record the conversation and use the material throughout this research, to what all participants agreed in advanced.

The interviews were organized for three target groups: CE Policy experts from the EC, Sitra specialists enabling the leap into CE in Finland, as well as authorities and advisors from the Finnish Ministry of Economic Affairs and Employment, and the Ministry of Environment that could provide their take on the CE initiatives, such as the Finnish CE action plans and the National Waste Plan. However, it is important to notice that given the professional background and expertise, as well as the existing opportunities for cooperation in the field, most of the interviewees were part of the working group or were indirectly involved in the development of one or both Finnish road maps to a CE; facilitating the interview process. Hence, given the overlaps among these target groups, several questions remained the same for all of them although three sets of semi-structured questionnaires were prepared.

A total of fourteen potential interviewees were contacted via email, most of them replied and among these, a couple suggested other experts who were a better fit for the research and shared their contacts, while others were not available. The interviewees received a one-pager summarizing the aim and objectives of the research. Only two of the final eight interviewees requested the questions in advanced to prepare for the interview. *Table 3* summarizes the interviewees who kindly accepted to participate and who understanding the nature and purpose of the research, not only agreed to share their experiences and provide insights on the progress of the transition to a CE in their respective fields but also gave their consent to be named in this thesis and have the conversations recorded (except for Interviewee #1 who prefer not to be named).

#	Interviewee	Organization and position	Interview date
1.	Interviewee #1	EC, Policy Officer, Circular Economy, DG Environment.	28.08.2020
2.	Dr Janez Potočnik	EC, Commissioner for Environment 2009–2014. Sitra, Senior Advisor.	18.09.2020
3.	Timo Mäkelä	EC, Director of DG Environment 1996–2015. Sitra, Senior Advisor.	07.08.2020
4.	Tim Forslund	Sitra, Circular Economy Specialist.	10.08.2020
5.	Laura Järvinen	Sitra, Specialist, Road map Process Coordinator.	18.09.2020
6.	Dr Mika Aalto	Ministry of Economic Affairs and Employment, Head of Division 2013-2018.	20.08.2020
7.	Anna-Maija Pajukallio	Ministry of Environment, Senior Ministerial Adviser, Material Economy.	22.09.2020
8.	Sirje Stén	Ministry of Environment, Ministerial Adviser, Material Economy.	30.09.2020

*Table 3 – List of conducted interviews (Source: Own elaboration).* 

The purpose of these interviews was to genuinely understand and determine if and how the CE Action Plans by the EU influenced Finland's motivations to go from adapter to leader, as well as the possible contribution and role of Finland in the adoption of CE policies at the EU level. Moreover, the questions were designed to recognize the driving force of this country to willingly take part in the transition, examine their innovative ideas and how they have implemented and enforced them to become the world leaders in CE by 2025. In this regard, given the current situation of the COVID-19 pandemic and the fact that all the frameworks considered in this research are currently under implementation with goals in the near future, although it is still early to evaluate the impacts of the coronavirus pandemic on the direction CE is taking, interviewees briefly discussed their take on this and whether it would affect the goals. Finally, the overall state of the transition was discussed and learning points were considered from both road maps perspectives, as well as the current waste management policies.

After the interviews, several experts shared links of relevant studies with the researcher, thus follow-up sessions took place over LinkedIn and via email with a couple of participants to clarify doubts that emerged during the analysis.

## 3.2.2 Data analysis

As explained by Bryman and Bell (2011) content analysis offers a distinctive approach to the analysis of texts by quantifying content in terms of predetermined categories, in a systematic and replicable manner. Hence, this was the selected method to assess the responses collected during the expert interviews.

Having open-ended questions offered a degree of flexibility for the interviewees to fully express their experience, knowledge, and framing of the issues. A consequence of this choice was that on some occasions long responses were given, which later on ended up being a challenge for the researcher to extract the relevant material, as Wilson (1996) had predicted. Moreover, it also resulted in the deviation from the original question a couple of times.

During the interviews, written notes were made. Once, the interviewing process was concluded certain parts were transcribed to provide a basis for the analysis. The following step was the fragmentation and classification of the text into topics, as described by Creswell and Creswell (2018), data was then reduced and arranged in separate categories which allowed the researcher to develop a structure for the results and discussion presented in the following chapter.

# **3.3 Limitations**

Despite the small sample of interviews carried out, the numerous contributions by the interviewed experts result invaluable, not only because of their direct involvement in the EU and Finnish policy-making processes but also because of their readiness to collaborate and assist the researcher, providing key pieces of information as well as relevant material to continue carrying on the research.

As it was expected, not all the experts invited for an interview could participate. However, it was particularly difficult to contact experts from Circwaste, a Finnish project that promotes efficient use of material flows, waste prevention as well as new waste and resource management concepts which is coordinated by the Circular Economy Service Centre established by the Finnish Environment Institute. Including this initiative to a greater extent was part of the original research plan, however given their unresponsiveness, this project was only discussed very briefly during the interview with the expert of the Ministry of Environment, who kindly offered to reach them.

Technical issues also occurred with the video platform during two interviews, which not only shortened the time of the meeting, but in one of the cases resulted in the absence of one policy expert from the EC, who given the difficulties and busy scheduled had to leave.

Group discussions, another research method originally planned for this thesis research, were intended to take place at the platform provided by the EMF during the online course "From linear to circular" in which the researcher participated between April and July 2020. Nevertheless, despite a large number of experts present, CE policies and the role of policymakers were only broadly discussed during one of the courses, without a specific focus on the EU, nor Finland. Moreover, no participants from Finland were part of the group, thus the researcher could not use this resource for the intended purpose other than learning valuable insights that were presented in the literature review.

# 4. Results and discussions

The information collected during the interviews, policy document analysis and in-depth literature review is examined and discussed throughout this chapter with the purpose of answering the research questions posed at the beginning of this study.

Dividing the interviewees into three target groups enabled the structuring and analysis of the data in a systematic manner, similarly to the outline of this chapter:

- The conversations with members of the EC focused on understanding the possible influence of Finland in the promotion and adoption of CE policies at the EU level. The lessons learnt from the implementation of the CE action plans were discussed, as well as the inevitable question on whether the current COVID-19 pandemic would affect the actions and goals.
- 2. The interviews with members of Sitra and the Ministry of Economic Affairs and Employment centred on the current state of the transition and learning points of the implementation of the different frameworks. Finland's motivations to go from adapter to leader and the possible influence of the CE policies by the EC were also discussed. Furthermore, considering the role of the state as a facilitator and supporter of the transition, the attitude of the Finnish governments towards the CE and whether continuity is ensured between the changing cabinets was also touched upon.
- 3. The discussions with members of the Ministry of the Environment who participated in the development of the road maps and other frameworks also concentrated on the state of the transition from their perspective, as well as the driving force for Finland. The implementation of the National Waste Plan and other initiatives that have impulsed the transition to a CE were addressed.

# 4.1 Reciprocal effects of the CE policies adopted by the EU and Finland

## 4.1.1 The road from resource efficiency to the circular economy

Moving away from the conception of waste being a problem, towards the idea of waste as a solution, in line with the logic of the CE, was a determining factor to initiate the transformation in the environmental area of policy-making at the EU level.

The emergence of resource efficiency policies, during the Barroso Commission, started as an alternative to connect economic interests with preservation and conservation of the environment. The development process lasted three years and counted with the participation of major political, business and civil society leaders as well as researchers in the round table, which gave rise to the 'Roadmap to Resource-Efficient Europe' adopted in 2011. As a result, linking waste policies with resource efficiency objectives to promote circularity started becoming an important item on the EC agenda, as well as that of Member States. In this regard, Dr Potočnik (Pers. comm.) points out the importance of cooperating with progressive countries, that are already ahead on such policies, in order to align on the same intended direction.

A good example of this is Finland, which at the beginning of the last decade, in 2011, conducted a study to assess the potential of sustainably using biological natural resources for the production of food, energy, goods and services in the country, also known as bioeconomy (Luoma *et. al* 2011). Two years later, the EC under the lead of DG Research and Innovation, published its 'Bioeconomy Strategy' and consequently Finland, initiated the process to develop its own, which came to light in 2014 after two years of development. As such, Dr Aalto (Pers. comm.) highlights the significant role of these bioeconomy initiatives to also prepare the ground and foster the CE.

## 4.1.2 The CE Action Plan of the European Commission, and Finland's supportive role

The EC took the lead on the CE policies at the EU level, with the first proposal launched in July 2014, at the end of the Barroso commission, in the communication entitled 'Towards a circular economy: A zero waste programme for Europe'. However, quickly after its launch, the principle of political discontinuity was applied, at the start of the Juncker Commission, with the aim of introducing a more comprehensive proposal. The revised CE Action Plan presented in 2015 followed a top-down approach and counted with the cooperation of two EC Vice-Presidents, namely, Frans Timmermans and Jyrki Katainen, the EC Commissioner for Environment, Maritime Affairs and Fisheries, Karmenu Vella and Elżbieta Bieńkowska, European Commissioner for Internal Market, Industry, Entrepreneurship and SMEs.

As explained by Mäkelä (Pers. comm.) Finland played some role in shaping what was being done in the EU. Interviewee #1, supported by Dr Aalto (Pers. comm.) added that the Finnish Jyrki Katainen was a prominent figure in the creation process of the CE Action Plan and during his time at the EC he constantly kept the topic up in the discussion, thus his leadership in the CE has been regarded as very important for the commission. Nonetheless, it is also worth to recognize his continuous involvement in the subject, currently working as President of the Finnish Innovation Fund, he aims to reach a wider audience and transform the market economy to match the principles of the CE and sustainability. Additionally, before serving the EC, Katainen was Prime Minister of Finland (2011-2014) and during his mandate, one of the three priorities of his government programme was to enhance sustainable economic growth, employment, and competitiveness (Prime Minister's Office 2011). Therefore, it is plausible to ponder the idea that EC Vice-President, Katainen had a supportive role in the development of the CE policies, while representing the general interests of the EU as a whole rather than his home state; as pledged by commissioners at the European Court of Justice and stated in the EU treaties that rule the functioning of the EC, the latter was significantly emphasized by interviewee #1 (Pers, comm.).

#### **4.1.3** The Finnish response to the Circular Economy Action Plan

Interestingly, at that time Sitra was already deeply involved and evaluating the opportunities of a CE for Finland (Sitra 2014) thus the country started to play a central role in the field as well, and just as the other Member States, it backed the intentions of the EC to adopt the plan. In this regard, Emmanuelle Maire from DG Environment at the EC (EMF 2019b) explains that having a political agenda that counts with the support of the members of the EU parliament and all Member States, has been a successful and critical step for the EU to have a governance in place that enables systemic change.

The EU took a holistic system-level approach which requires the transformation and planification of the economy following the CE principles (Sitra 2016). The political impetus brought by the CE Action Plan generated a number of responses from the Member States, including Finland. As explained by Dr Aalto (Pers. comm.) "The commission's initiative set the stage for this discussion to start in Finland, but from the early stages the enthusiasm was high in Finland and it appeared quite clearly that it wanted to be in the cutting edge of CE". As a result, Sitra, operating under the Finnish Parliament, answered the call for action by developing a unique CE road map and was the first country to publish it in 2016, demonstrating its high-level of engagement towards the CE as the foundation of the new economy.

Thanks to the adopted measures and the cooperation between ministries and stakeholder under the guidance of Sitra, the CE in Finland is progressing, making it one of the leading countries, in this regard Dr Potočnik (Pers. comm.) highlights the role of the Finnish Innovation Fund as one of the organizations that is worth cooperating with to advance the CE, given their experience and efforts to popularize it not only in Finland but also at an international level. One example of this is the creation of the World CE Forum (WCEF), a global initiative taking place every year since 2017, to gather thousands of CE experts, policymakers and business leaders from all over the world to discuss and present circular solutions.

#### 4.1.4 Finland's Presidency of the Council and the New Circular Economy Action Plan

Another remarkable milestone in the study of the reciprocal effects of the adopted CE policies is Finland's Presidency of the Council of the EU in the second half of 2019. One of the priorities of this term was to work towards the integration of the CE as a central part of the next Commission's work programme as well as encourage Member States to reach a consensus on topics related to it (Kuisma 2019). Moreover, as stated in 'Finland's Presidency Programme' (Finnish Government 2019a) during the mandate "We will support effective implementation of the Commission's updated bioeconomy strategy" as it is one of Finland's area of expertise, and with regards to the CE, continuity of the work is ensured, nonetheless "it is necessary to provide guidance on the next steps, such as extending the measures into new sectors".

The 2019 report on the implementation of the CE Action Plan (EC 2019b) provided a positive overview on the state of the 54 actions adopted in 2015, including the revision of the waste legislative framework, plastic strategy and measures against single-use plastics, also informing that over 10 billion euros had been invested to support the accomplishment of the actions and sketched the challenges that remained open. Based on these efforts and advances, the Finnish presidency aimed at injecting further momentum for the development of the New CE Action Plan (EC 2020c), seeking to step up and speed up the work on the expansion of markets for secondary raw materials and deal with the current issues on chemical, fertilizers, critical raw materials, among others.

The EC has its own right of initiative, meaning it is responsible for planning, preparing, and proposing new European legislations, and as explained so far, the CE has been part of its agenda over the last decade. However, the priorities of the different presidencies of the Council of the EU, have a direct and indirect influence on the programmes of the commission (Potočnik Pers. comm.). Thus, Finland's figure, to a certain extent may have had a positive effect in the development of the new CE Action Plan published earlier this year (2020).

#### 4.1.5 The effects of the current COVID-19 pandemic on the actions and goals

With regards to the COVID-19 pandemic, at the EU level, plans have not been affected. Interviewee #1 (Pers. comm.) adds that the political willingness and implementation of the targets of the EU Green Deal remain unchanged, just as the CE ambitious actions which are a priority and will not be modified.

The situation is similar in Finland, where the pandemic has not altered the approach nor willingness concerning CE. This is precisely relevant now that the current Marin Cabinet has pledged to make Finland carbon-neutral by 2035 and the achievement of this goal definitely has its reflections in the CE as well.

International institutions have voiced the need for ecologically sustainable recovery measures as the most efficient way to move forward. As such, it is important to acknowledge the sustainable recovery working group appointed by the Ministry of Environment, preparing criteria for a supplementary budget that not only promotes economic recovery but also responds to environmental challenges such as climate crisis and biodiversity loss (Sitra 2020).

Finland is trying to transform the situation into a positive one, speeding up the transition and making its recovery one of the most explicitly circular, as expressed by Forslund (Pers. comm.) and although many regard this time as a window for opportunities, Dr Aalto (Pers. comm.) is more sceptical considering the pandemic makes it more difficult for companies to do their business and as a consequence, it will slow down many development projects.

It results difficult to foresee how CE will move amidst this situation, but it will surely be assessed by other authors, yet it was important to discuss this topic briefly during this research to evaluate how the current happenings impact the transition. Nonetheless, taking into consideration how previous crises have led to innovative solutions, and with technological advances and the political willingness, CE has the potential to build a more resilient, new economy, based on cooperation. Moreover, according to Walter Stahel "The CE has not been affected by the COVID-19 pandemic... The big impact of the pandemic is on flows" (Forslund 2020). Additionally, businesses that have CE principles embedded in their system, are more resilient than others to adapt to the changing measures and agendas worldwide.

## 4.1.6 Learning points on the implementation of the EU Circular Economy Action Plans

One of the most important lessons learnt from the adoption of the CE Action Plans is the significance of having a rather comprehensive approach, where instead of contemplating only one aspect, the entire life-cycle of a product is assessed. For instance, in order to increase recycling rates, it is necessary to start up-stream by modifying their design, at the same time this encompasses a decrease in the use of chemicals and toxic substances to ensure secondary raw materials can be reused. However, consumer behaviour should also be in line with sustainable principles to ensure a productive waste management system.

Another point to take into account is the need to increase international cooperation, given the interconnectedness of the global markets. In this regard, collaboration between the powerhouses is a fundamental step to accomplish a CE, as such the MoU signed by Europe and China to share best practices and find mechanisms that advance the CE, could bring product standards between the two markets and in turn generate a global shift towards circularity. Having comparable standards in sectors such as food, mobility, construction, among others is not only advantageous but in the best interest for both parties, given the amount of European business producing in China, as well as tapping the potential of the CE to reduce the enormous consumption of raw materials in the country and decrease the amount of WEEE.

The CE Action Plans of the EU are a joint agenda and as such the implementation of these frameworks require the engagement and empowerment of stakeholders (businesses, citizens, NGOs) "CE cannot be achieved without the collective/common engagement of different actors that bring their expertise to the table" (Interviewee #1 Pers. comm.). The EC is focusing on this point to make sure everyone is on board.

Moreover, the CE agenda also required the involvement and engagement of many front services within the EC, including environment, industry, health, consumers, among others, which worked together from the development of the concept to the implementation. Interestingly, the momentum created by the adoption of the measures also had side effects in the commission, generating internal discussions across EC services in different sectors and consequently strengthening cooperation within the departments.

The CE is characterized by interconnectedness, within a system and with each other, thus the EC has taken a similar approach to it, considering all aspects as equally important. GPP is identified as one of the key pillars that will help lead to a breakthrough in CE. As such, it was announced, "To tap into this potential, the Commission will propose minimum mandatory GPP criteria and targets in sectoral legislation and phase in compulsory reporting to monitor the uptake of GPP without creating unjustified administrative burden for public buyers." (EC 2020b).

# 4.2 The state of the transition to a circular economy in Finland

#### 4.2.1 The implementation of the Finnish road maps to a circular economy

The CE offers the opportunity for sustainable economic growth that Finland had been seeking in order to generate employment, increase exports and support their economy, thus policy-wise it has been prioritized and given the wide understanding among Finnish business leaders, new circular business models are being adopted. According to Mäkelä (Pers. comm.) CE is one of the new economic directions together with the digital economy.

The implementation of the first Finnish Road map started 4 years ago, in 2016, thus the initial steps have been taken across many sectors and progress is already visible. Sitra and Statistics Finland are working on the development of new indicators that allow monitoring and assessing progress in the area. The EU is also developing its monitoring framework for better

accountability over four sectors: production and consumption, waste management, secondary raw materials, and competitiveness and innovation (Dean 2019a).

Regarding the actions announced in the first road map, it appears that some have been implemented, others have not, while some more have been merged in the second, updated version of the road map. The reasons behind the actions that stayed in the planning stage are numerous, it is possible that they did not receive enough funding, or those in charge did not commit further to it, that is why in the second road map the vast majority of actions are directly linked to stakeholders that willingly commit to them. In this regard, it is important to point out that Sitra only proposes policy actions, but these are not binding, and despite having selected the focus areas with the biggest impact in Finland, in the first road map several actions remained intact as explained by Järvinen (Pers. comm.).

The fact that actions are spread across sectors and implementation occurs at different levels makes it difficult to assess the state of the transition. Additionally, given the voluntary nature of the commitments, there is no need for reporting from the stakeholder side, nor a responsible institution for follow up. As such, Sitra did not carry a specific evaluation assessing progress on each action encompassed on the 'Finnish Road map to a CE 2016-2025'.

On the other hand, the 2.0 version of the road map was rather the opposite of the previous one, a two-pager presenting the new strategic goals and vision for key players, as well as few examples of actions, with slightly more information available on their website but without any detailed report published. This simplistic view was a rather disappointing approach to such a critical strategic plan, even more considering the high relevance of the pioneering goal set by Finland.

Certain advances in several areas are quite remarkable, for instance, the decrease in landfilling over the last decade; the inclusion of CE education at all levels, from elementary school to specific programs in higher education, the improvements in the mobility sector including a car-sharing scheme and integrated transport services. Nonetheless, more work is still needed in the administrative sector as well as more steering methods that set the direction (Forslund Pers. comm.).

## 4.2.2 Learning points on the implementation of the road maps

Some of the most important learning points found from the implementation of the road maps are the following:

- Engagement: CE is a teamwork which requires to have everybody on board. The process of developing the road maps started with the shared mindset of the path forward and counted with the participation of experts from all sectors and backgrounds. This integrative method allowed the exploration of different perspectives based on the experiences of the actors. The resulting multi-faceted road maps followed a bottom-up approach in which the ideas that emerged through a collaborative process were structured and prioritized accordingly.
- Business participation: Strong engagement is needed from the business sector as they are the ones implementing the CE and providing services and products. However, it is also important to pitch them the benefits of CE business models, by demonstrating how their revenues can increase creating a competitive advantage, as well as the decrease in costs and the possibility of staying ahead of regulations. Mäkelä (Pers. comm.) added that "this (circular) strategy cannot be built on public funding and supports; it can stimulate it and help move things forward, but business engagement is needed".
- Communication: It is fundamental for constantly informing society on the advances, achievements, findings, new business opportunities, circular jobs and environmental effects of the measures taken. Another aspect is to strengthen and invest in dialogues among stakeholders and create reports that contain future plans.

- Digitalization: It plays an important role by keeping CE agile and making it visible to the general public, current projects include transport and food sector.
- Education: A central area for developing know-how that is experiencing a nascent momentum is the creation of CE courses and trainings. Sitra, together with the Finnish Ministry of Education have played a pivotal role in advancing learning and introducing the concept in the education system from elementary school. A study by Forslund *et al.* (2018), demonstrate that Finland is also pioneering in this sector, where lots of investment is being made, and counts with a total of 26 learning offerings at higher education, making it the country with the highest number of courses in the world (Forslund Pers. comm).

#### **4.2.3 Recommendations for countries envisioning systemic change**

- Define a common view and why CE is important for the specific country, identify stakeholders and how to engage them in the task. Start with small actions in groups and make connections to sustainable development visible. Mäkela (Pers. comm.) underlines that the creation of a national roadmap secures political support, and it should be done with a holistic approach.
- Road map development: Given the high interest in the Finnish road maps, Sitra has elaborated a concept book which allows any country to create a national CE road map (Järvinen and Sinervo 2020). This hands-on guide focuses on learnings from the development process perspective. Furthermore, Järvinen (Pers. comm.). highlights that besides the road map, countries need responsible figures for leading the process, and overlooking its implementation. Another suggestion is to connect the road map with existing programmes in the country.
- Content-specific: Understanding the local reality and geography, identifying possibilities and synergies, as well as assessing strengths and challenges is a

fundamental step to consider how CE practices can be adopted anywhere. Moreover, it is critical to recognize that one size does not fit all, and as such many factors can influence the process.

- Ownership of actions helps connect stakeholders with the target and keep them accountable for its progress. From Finland's experience, this is a crucial step.
- Cross-sectoral cooperation: Breaking down the silo mentality is essential in CE to find business opportunities, partners, secondary raw materials, possibilities for industrial symbiosis, among many other possibilities.
- Communication is key to inspire others and inform the state of the implementation in each country, keeping in mind that this is not a competition but rather a global collaboration.
- World Circular Economy Forum organized by Sitra and partners keeps CE in the global agenda and gives visibility to it, moreover it presents an opportunity to gather stakeholders and discuss new ideas for implementation of the road maps as well as enables the formation of alliances.
- Innovative approaches to governance such as institutions like Sitra are needed, in the words of Dr Potočnik (Pers. comm.) "If we can learn something from Finland is actually Sitra, how to create an institution which is not directly bound by bureaucratic principles of the government, which has the freedom to decide the things which are inventive and following the right development streams, but on the other hand which is so closely linked to the government that it has a direct link to the government and also to the rest of Europe".
- Learn from the mistakes others have made, combine solutions, cooperate.

#### 4.2.4 The Finnish Governments and their role in the transition

Despite the changes in the Finnish cabinets of the last years, in the exercise of their duties, continuity has been ensured and CE has remained a priority, as reaffirmed in the latest publication of Prime Minister Sanna Marin's government programme, in which the CE term is continuously brought up across focus areas given its potential to support a socially, economically and ecologically sustainable society (Finnish Government 2019b).

Seeing the role of the state as a facilitator and supporter of the transition, all interviewees consulted about the attitude of the governments towards CE, and whether there has been continuity between changing governments solidly agreed and indeed, the fact that the CE can successfully cross political boundaries is well perceived in Finland, which has gone from a conservative government (2015-2019) that prioritized the CE because of its business orientation, thus employment generation and contribution to GDP, among other advantages; to the present centre-left government which also supports the CE agenda with its own emphasis on a new, sustainable growth (Mäkelä Pers. comm.). Additionally, Forslund (Pers. comm.) argues that there is a general consensus in the society with over 87% Finns regarding it as very important or fairly important that Finland's transition to a CE takes place (Sitra, 2016).

Furthermore, as part of the government agenda, the new strategic programme for advancing the CE is currently being developed in conjunction with several ministries and is expected to be launched by the end of the year, setting new goals and ways of measuring progress. Noticing the carbon neutrality goal recently adopted by Finland, Järvinen (Pers. comm.) confirms the 2025 goal has been changed to 2035, yet the intention remains the same for the country, being a trailblazer in CE.

On the other hand, new actors are joining the call, such as the Finnish Federation of Chemical Industries which seeks to cut its emissions and become carbon-neutral by 2045, focusing over two areas, namely, the efficient use and production of clean energy and the utilization of biobased or circular raw materials. Demonstrating the high level of ambition and commitment in different industries across the territory as underlined by Dr Aalto (Pers. comm.).

# 4.3 The contributions of waste management strategies and practices to a CE

## 4.3.1 The Finnish strategic plan and EU Waste Directives

The National Waste Plan adopted by Finland in May 2018 was developed under the EU Waste Framework Directive (2008/98/EC) and at the time of its publication, six amendments were being negotiated between the Parliament, Council and Commission. Significant efforts were made by the Ministry of Environment to take these reforms into account. This legislative package, proposed in the 2015 CE Action Plan, entered into force on July 2018 under the Directive (EU) 2018/851 and a period of two years was granted to Member States to transpose these changes into their legal systems. In this respect, Interviewee #1 (Pers. comm.) highlights that each Member State needs to feel they are driving their own CE transition because they are the ones implementing it, hence the EU gives freedom for national-level development. Additionally, Member States have a role in deciding whether to increase the ambitions of what has been proposed by the EU, given that it can also help better shape the CE to their specific local characteristics.

The Waste Directives are binding and as such the EC must ensure their effective implementation. Nevertheless, the enforcement of EU legislation is based on cooperation with Member States<sup>4</sup>, that is why the EC actively supports them in implementing EU law through guidance and dialogue (EC 2020e).

Another role of the EC is to issue early warnings to Member States if needed, as it recently happened to Finland who together with 13 other countries, received a report from the

<sup>&</sup>lt;sup>4</sup> These shared competences are laid down in Article 4 of the Treaty on the Functioning of the European Union (EU 2012).

commission which assessed their data between 2013 and 2015 and found them at risk of failure to meet the 2020 reuse/recycling intermediate targets on municipal waste, consequently the EC worked with the authorities to support Finland in meeting the targets agreed by the co-legislators in the Waste Framework Directive from 2018 (EC 2018b).

Based on the total amount of municipal waste produced by each state, the EU set the municipal waste reuse/recycling targets of 50% by 2020, 55% by 2025, 60% by 2030 and 65% by 2035. Finland on the other hand ambitiously set their target at 55% by 2023. However, having rates of recycling (including composting) at 42%, incineration at 55% and landfilling at only 3% in 2016, Finland quickly saw the need to introduce measures such as a landfill tax, extended producer responsibility, increase public awareness, enhance sorting of waste streams and evaluate different scenarios to increase facility capacity, among others (EC 2018c; Laaksonen *et al.* 2018).

The early warning report by the EC suggested the Finnish authorities develop communication and awareness-raising programmes, take stricter measures for separate collection of recyclables and bio-waste, as well as create incentives for municipalities and provide them with technical support, among other recommendations.

#### 4.3.2 The Finnish approach to municipal waste management

An overview of the situation on municipal waste management between 2002 and 2018 is presented in *Figure 6* which shows an increase in the total municipal waste quantity that reached 3,041,082 tonnes in 2018, according to Statistics Finland (OSF 2020b), a rise in recycling over the last years to 42% is observed, as well as the outstanding decrease in landfilling over the last decade that stands at only 0.7% and which according to Pajukallio (Pers. comm.), from the Finnish Ministry of Environment, is one of their biggest achievements. Additionally, it can be seen that energy recovery (waste-to-energy) is still the most significant treatment mode with a share of 57%.



Figure 6 – Municipal waste by treatment method from 2002 to 2018. (Source: Statistics Finland 2020)
As part of the National Waste Plan (2016) and in response to the warning issued by the
EC (2018), several measures were adopted to reach the targets, these are briefly discussed.

For instance, to increase the recycling of packaging waste, Finland issued a Packaging Decree and introduced a system of packaging producer responsibility in 2016. Although the implementation of this program did not help reduce the amount of packaging waste, Stén (Pers. comm.) explains that recycling rates have raised anyway, as the volume of waste diverted to recycling increased.

Sharing responsibility with consumers is another means which has resulted efficient. The Finnish approach, in line with the EC suggestions, demanded the participation of the society which was asked to stop disposing plastics with mixed household waste since last year (2019). The measure was accompanied by strong public campaigns that encouraged residents to collect plastic separately in dumpsters specifically distributed for this purpose. The call has been heard and as a result, Finns have started separating plastics so efficiently that the maximum capacity of the only plastics recycling facility in the country has been reached, with figures expected to reach 30000 tonnes in 2020, exceeding by 10000 tonnes the ability of the plant in Riihimäki to process such waste. In the following, two years a quarter of all plastic waste collected in the country will be shipped to Sweden or Germany for sorting, giving some time to Finland to increase their own plastic recycling capacity, however the need for private sector investment has also arisen (Yle 2020).

Considering that 1/3 of municipal waste in Finland is biowaste, raising its recycling rate also raises the recycling rate of municipal waste. Hence, the Ministry of Environment has proposed to halve food waste by 2030 through improvements in control systems and monitoring food waste. Other measures include the establishment of an online marketplace for waste and side streams which reduces food waste and promotes the use of by-products through a voluntary material efficiency commitment in the food sector (Laaksonen *et al.* 2018).

One of the targets of the National Waste Plan is to achieve a relative decoupling of the growth in municipal waste volume from the increase in GDP. A rather "difficult" journey as stated by Stén (Pers. comm.) in which little steps have been taken so far, such as the introduction of economic instruments that boost repair and maintenance services, increase product lifespans and support product sharing, thus enhancing the CE. However, more work is still needed in this area.

Currently, the Ministry of Environment is on the process of updating their National Waste Plan in accordance with the EU Waste Directives, to develop new strategies that allow them to meet the targets in the coming years. Fortunately, the sector has not been affected by the pandemic but as specified by Stén (Pers. comm.) this opportunity could be taken as the time to change the system.

## 4.3.3 Learning Points on the implementation of the National Waste Plan

The development of the Waste Plan was done in a similar manner as other Finnish frameworks, through an interactive process that counted with the participation of many stakeholders and left numerous lessons, among which it is important to highlight the improvements to assess the impacts of the measures compared to the previous waste plan. This time a combination of various quantitative and qualitative indicators were used, these have allowed monitoring and progress examination in terms of waste generation prevention and material efficiency at both, national and EU levels.

The ambitious policies adopted by Finland and the high level of response from the society have been key to accomplish the targets thus far, yet investments in new technologies as well as increasing capacity is currently needed, particularly for biowaste treatment and plastic packaging recycling facilities.

The high-quality education system in Finland is an example for other countries. Considering that better consumption habits are adopted by individuals when provided with knowledge and skills at an earlier age, one of the actions under implementation is the inclusion of food waste awareness and the environmental and financial impacts of this in the basic education curriculum as well as in the food service industry.

Another initiative with export potential to the world is the Finnish levy and deposit system for beverage containers, which encompasses two laws effective since 1994, that have successfully stimulated the use of refillable containers. The first regulation imposes a tax at the producer level on soft drinks, and alcoholic beverages, packed in glass, plastic or aluminium containers that are not recyclable or refillable. The fee is determined by the product volume and the responsibilities are shared between the Ministry of Finance (revenue collection and administration costs) and the Ministry of Environment (enforces these regulations). The second one exempts refillable and recyclable containers from the first tax law, as long as they meet the refundable deposit requirements. The company PALPA (Suomen Palautuspakkaus) is in charge of the deposit-based recycling system, managing all incoming (national and international) packaging products. Once approved, they enter a database which is directly linked to reverse vending machines that monitor all items sold. At the producer level, deposit and recycling fees
are calculated monthly, based on their sales. These fees are passed on to consumers who once they return empty containers to collection points receive their deposits back (De Groene Zaak 2020).

Return rates in Finland are at 100% for refillable glass bottles, 91% for recyclable glass, 95% for cans and 92% for plastic bottles (2013). Although this system is already existing in other countries, Stén (Pers. comm.) considers this scheme as one of the strategies that should be implemented globally, as it is the best functioning part of Finnish recycling infrastructure.

GPP criteria and policies that support reuse and recycling of products and materials have also been introduced in Finland, which counts with a GPP National Strategy, currently covering 16 areas and which sets clear targets for central, regional and national level, and aim to achieve 100% GPP at the central level. This initiative goes in line with the efforts of the EU to encourage Member States to apply GPP practices for at least 50% of public tenders, as an environmental protection strategy. In this regard, the European Parliament noted Finland has already partially implemented its GPP National Action Plan (EC 2019c).

Furthermore, Finland set up a national competence centre for sustainable and innovative public procurement that coordinates the above-mentioned activities and which is also in charge of piloting green deals, such as the one recently signed by stakeholders of the construction sector and the Ministry of the Environment, Senate Properties and the cities of Helsinki, Espoo, Turku and Vantaa with the aim of having fossil-free construction sites from 2025 as one of the initial steps towards the carbon neutrality goal set for 2035. The accomplishment of this action stated in the National Waste Plan supports the target on reducing the volume of construction and demolition waste. Pajukallio (Pers. comm.) also considers this voluntary agreement a positive example for other countries in the advancement towards CE.

Finally, the EC early warning report also included a suggestion for Finland to support municipalities with the aim to improve efficiency in terms of cost reduction and enhanced performance (EC 2018b). Circwaste, is a project supported by the EU LIFE IP programme that targets these issues and seeks for innovative solutions for waste prevention and the efficient utilization of material flows from municipal and industrial waste, industrial by-products, construction waste and soils as well as surplus food. This initiative, which started in 2016 and is expected to run until 2023, is coordinated by the Circular Economy Service Centre established by the Finnish Environment Institute Finnish Environment Institute (SYKE) and comprises a total of 19 subprojects that contribute to the implementation of the National Waste Plan through scientific research, the execution of demonstrations and launch of pilot projects (Circwaste 2017, TUAS 2020).

In its implementation, over the last 4 years, the Circwaste project has effectively impulsed the transition towards a CE at a regional level over the following five geographical areas: Southwest Finland, Satakunta, Central Finland, North Karelia region and South Karelia region as explained by Pajukallio (Pers. comm.).

## 4.4 Other relevant actions and the importance of stakeholder participation

Frameworks and regulations are needed for business adaptation, however different approaches can also be helpful to capture the attention of leaders in the industry, by showing them the advantages of a circular business model, such as the increase in their revenues and reduction in costs due to fewer resources and energy consumption, or the competitive advantage over their competitors and improved reputation. Incentives at the consumer level, can also be advantageous and result in additional motivations for choosing circular products over others. Higher investment in R&D and the availability of funds to support start-ups are other enabling conditions that can support CE.

Governments and industries play a fundamental role to transform the system, however the whole society has to roll up their sleeves and work together, supplementary actions by organizations, such as the EMF, C2C, Sitra, Tevi, Tondo, Novu, E4CB, among many others; are required to stimulate individuals, create awareness, educate them and get everyone involved to participate. The work done by these organizations to support companies willing to re-evaluate, review and redefine their business models or simply inform them of the advantages and motivate them to change, plays an essential role to accelerate the transition, creating a space for companies to network, cooperate, innovate and partner.

## 5. Conclusions

The CE agenda at the EU level was somehow influenced by the advances of progressive Member States, such as Finland. A prominent figure during the development of the first CE Action Plan was the EC Vice-President at that time, Jyrki Katainen, moreover during the Presidency of the Council, Finland also had some intent, but overall it stemmed from wider considerations, Finland alone was not decisive.

On the other hand, Finland has responded the call by the EC with the implementation of the road maps, as well as other CE related policy frameworks that have had high levels of response from the stakeholders. As such, it is understood that the EC policies and Finland's approach to the CE have supported and mutually reinforced each other.

Despite the changing cabinets, CE has remained a priority in the Finnish government programmes since it emerged, ensuring continuity on the aim of transitioning towards a circular future. However, a slight change in plans has taken place, given the new carbon neutrality target set by the current Marin Cabinet in its government programme, which intends to make Finland the world's first fossil-free welfare society by 2035. Consequently, delaying by 10 years the 2025 goal of becoming world leaders in CE.

Finland has been moving in the path towards a CE since 2016. In this period, numerous initiatives have arisen with clear advances in the education, waste management, mobility and construction sectors, among others.

Besides the exemplary response from the Finnish society, one of the most valuable assets is Sitra, the Finnish Innovation Fund, which presents an innovative approach to governance that should be replicated in every country envisioning a circular future. Furthermore, it has prepared a concept book summarizing all the learnings and know-how from the road map development process sharing with the world the lessons learnt and allowing countries to leapfrog towards a CE.

Although, it results difficult to assess the state of the implemented actions in the country given that they are not binding, a new updated and simplified version of the road map has been adopted in 2019, directly linking the majority of actions to stakeholder in order to ensure ownership and thus progress measurements.

Transitioning towards a CE not only demands numerous changes in both value and supply chains, and the evolution of consumer habits but also new perspectives at the strategies for downstream waste disposal, beyond the existing policies.

In Finland, there is a need for investments in new, innovative, technically and economically viable facilities that enable municipal waste treatment and high-standard recycling practices for plastics and bio-waste treatment as well as the recovery of secondary raw materials which can be injected back in the loops. At the same time, heterogeneous waste streams often pollute and thus decrease the quality of materials, developing and expanding existing separate collection networks are a conditio sine qua non to ensure effective recycling. Additionally, in the efforts to avoid moving down the waste hierarchy it is also necessary to find alternatives to recover valuable materials and dispose waste fractions for which cost-effective recycling technologies have not yet been discovered.

When evaluating the current global landscape, it results evident that there is an unprecedented set of challenges for which the CE can offer an advantageous solution, as it does not only contribute to economic growth but also helps create new jobs while business opportunities are generated and a space for innovation is opened. Furthermore, the CE addresses longer-term challenges such as pollution, biodiversity loss, climate change, ozone layer depletion, among others and increase the resilience of the economy and society to future disruptions. Nevertheless, it is important to consider that introducing a completely different perspective on the way things have been done represents an enormous challenge. Generally, people tend to resist to changes, even at an individual level, hence presenting a new economic system which aims to transform the whole society requires close, local, national and international cooperation between all the stakeholders as well as a deep level of engagement, which is present in the Finnish society but not widespread in the world.

Finally, it is important to understand that achieving the ultimate goal of transforming the economy from linear to circular is not a straight forward journey but a long, arduous and energy-intensive process, yet it is definitely a thrilling transition period, full of possibilities and real, proven social, economic and environmental benefits for all with great potentials that are waiting to be tapped.

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## **Personal communications**

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- Mäkelä, Timo. Senior Advisor, Sitra. Former Director of Directorate General Environment, European Commission. Online interview, 07 August 2020.
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