Review of International Experiences

Project: Assessment of the status of the Circular Economy for the development of a roadmap for Brazil, Chile, Mexico and Uruguay

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ACRONYMS

CE Circular economy

EFSI European Fund for Strategic Investments

EMF Ellen MacArthur Foundation

EPR Extended Producer Responsibility

EU European Union

GDP Gross Domestic Product

GHG Green House Gas

GWP Global Warming Potential

IPCC Intergovernmental Panel on Climate Change

LCA Life Cycle Assessment

LATAM Latin America

NDC Nationally Determined Contribution

NGO Non-Governmental Organizations

PaaS Product as a Service

RMI EU Raw Materials Initiative

R&D+I Research, Development and Innovation

SDGs Sustainable Development Goals

SMEs Small and Medium Enterprises

TGAP General Tax of Polluting Activities

UN United Nations

UNFCCC United Nations Framework Convention on Climate Change

VAT Value Added Tax

WEEE Waste Electrical & Electronic Equipment

WWF World Wide Fund for Nature



1. INTRODUCTION

This report presents the results of **Phase 4 (D4.1, D4.2 and D.4.3)** of this Project: "Assessment of the current status of the circular economy for developing a roadmap for Brazil, Chile, Mexico and Uruguay" RFP/UNIDO/7000003530.

The transition to the circular economy will require a systemic, deep and transformative process, engaging a broad range of stakeholders. It's a broad agenda across administrative borders demanding a coherent and harmonized framework of regulations and incentives. It's considered a means to achieve, among other, the complex challenges of the climate change commitments (nationally determined contributions – NDCs) and the sustainable development goals (SDGs) (UN Agenda 2030).

It is increasingly recognized that a circular economy strategy (roadmap) has the potential to foster economic growth in a just, sustainable, and socially fair manner. So, understanding of the different approaches of initiatives under development in different country contexts is key to support decision-makers and stakeholders in the process of designing, planning, development, and implementing circular economy initiatives in the Project countries, namely Brazil, Chile, Mexico and Uruguay.

1.1. METHODOLOGY

The following steps were taken in order to generate the desired outcome of visualizing the common elements and diverting issues to extract relevant findings and learnings to provide key recommendations to the project countries for the design, development, and implementation of their respective circular economy roadmaps; and identify common elements as a means to justify further south-south cooperation to stimulate knowledge exchanges and/or partnerships for planning and developing circular economy pilot projects in the four countries.

- (1) Extract outcomes of **Deliverable 2 (CTCN Project)** which cover the circular economy readiness of the 4 project countries and identifies key intervention areas or prioritized sectors of the economy;
- (2) In line with **Activity 4.1. (ToR)** perform, based on the level of depth and availability of publicly accessible information, a review of a select number of national circular economy roadmaps (from an initial list of 14 nations and the EU), to enable a proper analysis and benchmarking;
- (3) Assess per selected roadmap the projects and pilot projects deemed successful and relevant to the countries in this project, cross-checking these with the prioritized sectors or intervention areas in each of the project countries;
- **(4)** In line with **Activity 4.2. (ToR)**, perform a diagnosis of the conditions and opportunities that enabled these successful case studies;
- (5) Furthermore, also the main challenges and barriers that had to be addressed or overcome by the projects and pilot projects are described;
- (6) This is complemented with a description of the main results and benefits generated by the implementation of the project and/or pilot project and in what manner the project/pilot can contribute to the nationally determined contribution (NDC) and sustainable development goals (SDGs) agreed by selected country;



- (7) Also, the lessons learned, and examples of policy and financial instruments used to enable these projects/pilots to become successful are described;
- (8) Finally, in line with **Activity 4.3 (ToR)**, a comparative analysis is performed in order to visualize the common elements to extract relevant findings and learnings to provide key recommendations to the project countries; and
- (9) Also, based on this same comparative analysis, common issues and intervention areas of sectorial priorities can be identified as a means to justify further south-south cooperation among the project countries.

This report summarizes the main or principle policy actions and activities described in the respective roadmaps for the purposes of depicting the type of focus and priorities set by each country depending on their context and needs, and as a means for a comparative analysis. These do not represent all actions and measures, thus for more details regarding all the measures contemplated for each country please download or review the original roadmaps (see the bibliography for links to the country roadmaps).

Key elements from the international experiences of conceptualizing and implementing a circular economy roadmap can be applied in the context across the four project countries, taking account of the differences between the study countries and those roadmaps predominantly from the European region.

Based on the objectives of the scope in this technical assistance, insights were extracted from the analysis, to be useful across the different contexts of the four countries targeted in this study (Brazil, Chile, Mexico and Uruguay) rather than grounded in specific scenarios or cases.

The projects and initiatives presented in the comparative matrix table (Table 10) that are related to the four countries of this study, have been compiled exclusively from the previous reports developed by specialists in circular economy from each of the four mentioned countries.

Although the countries have many important initiatives on topics of much importance associated with economic and social development and climate mitigation and adaptation, the table only presents the selected projects and initiatives that have its focus directly related to the Circular Economy.

1.2. REPORT STRUCTURE

Chapter 2 summarizes the main outcomes of Phase 2 of this CTCN project, which includes (1) the identification of the key players to be engaged with for the development of the circular economy roadmap in each participating country, describing their experience, capacity and commitment; and (2) evaluation of the degree of adoption of circular economy in each project country, including confirmation of any existing roadmaps/initiatives. This is used as a starting point to enable the cross-check and selection of relevant successful circular economy cases / initiatives (pilots/projects) obtained from other country / international experiences.

The sections in **Chapter 3** present an overview of different circular economy initiatives in general, sectoral or specific levels, by analyzing the national circular economy roadmaps of countries that have been considered among the frontrunners in planning and implementing a circular economy model. A comprehensive desk review resulted in



selecting five international strategic plans (roadmaps) which were publicly available, and also included information about their process/progress of implementation of the circular economy. The five strategic plans assessed include the circular economy roadmaps of – (1) Finland, (2) the Netherlands, (3) France, (4) Denmark and (5) Spain.

In **Chapter 4** the European Union's experience with circular economy development and implementation is analyzed. The wide-scale activities by the EU and its international agenda on circular economy are very relevant to the future economic relations between the EU and Latin America.

Identified examples of actions being undertaken to directly support the transition to a circular economy are presented in table formats per country and which serve as means to provide inspiration and benchmarks for the four participating countries.

The gathered information is structured in such a manner to enable a broad understanding of the visions, objectives, goals and targets, process of development, stakeholders enrolled, pilot projects selected and other relevant information. A set of tables with these common elements from the roadmaps supports a comparative analysis. The main objective in this Chapter is to provide insights about the different approaches for implementing circular economy plans (roadmaps) and projects.

Additional initiatives in other countries namely Aruba, Canada, Colombia, Japan, New Zealand and Wales are briefly mentioned in **Annex 1**, to provide some additional diversity across the world from a small Caribbean island nation to North and South America, Europe and Asia-Pacific.

The sections in **Chapter 5** analyze the lessons learned from the circular economy initiatives deemed successful and relevant, as presented in **Chapter 3**. These are mainly selected by their relation to seven main sectors or intervention areas of relevance for the four related countries in this project, found by assessing the work in Output 2: (1) Agriculture, Farming (dairy, bovine), and Fishing and Forestry; (2) Bio Economy and Biomass technologies; (3) Consumer Goods and Services; (4) Digitalization & Industry 4.0; (5) Industrial manufacturing; (6) Bio- and renewable energy; (7) Urban infrastructure & construction.

The identification of these lessons learned related to the seven main sectors or intervention areas of relevance for the countries, allows a deeper understanding of critical issues of main interest for a successful implementation of the circular economy.

In order to understand what allows the successful implementation of the circular model, an assessment of the prevailing conditions and opportunities that were in place or surged when deploying the circular economy initiatives was performed. Next to the assessment of the specific conditions of implementation, barriers and challenges are identified in order to learn how it has been addressed and what type of measures were implemented.

Additionally, the implicit or explicit intersections of each of these circular economy initiatives (pilots/projects) with the country's compliance with their respective agreements to the SDGs and the NDCs are assessed in order to indicate the alignment of the circular economy plans (roadmaps) and projects to be developed and implemented in the four project countries as means of response to these global agendas.



These critical issues were analyzed either from a regional, national or project level/perspective, as points of concern recommended to be taken into account or to be addressed. This analysis extracts relevant learnings to the four participating countries in the design, development and implementation of circular economy plans and projects.

Chapter 6 includes a comparative matrix showcasing the main sectors and areas of interest identified in the international circular economy initiatives assessed and the relationship with the sectors and areas of interest reported by Brazil, Chile, Mexico and Uruguay identified in **Chapter 2**. The results of the comparative analysis also help to understand potential areas for technical cooperation opportunities and South-South exchanges of best practices, and to identify the potential opportunities and actors that could participate in knowledge exchanges and/or partnerships for planning and developing circular economy pilots/projects in or among the four countries.

The main conclusions and recommendations are provided in **Chapter 7** and should serve as key suggestions to the project countries in enabling them to make informed decisions for the design, planning, development, and implementation of their respective national/sectorial circular economy roadmaps.



2. MAIN OUTCOMES OF PROJECT COUNTRIES' CURRENT CIRCULAR ECONOMY DEVELOPMENT STATUS

The objective of this Project is to explore how a circular economy approach may contribute to reinforce the implementation of climate actions included in the first NDC, as well as providing for sustainable development and complying with national strategies and policies in each respective project country. In summary and as a starting point, the context found in each of the project countries (with focus on identifying potential key actors/stakeholders and inventory of existing circular economy initiatives/project in each country), reported as **Output 2 of this Project** are briefly described:

Brazil:

- Brazil's aim is to create a general roadmap with common objectives and a shared vision for the implementation of the circular economy in the country. This strategic document is going to present general goals for implementing the circular economy nationally. In addition, it is intended to be a simple and flexible tool for managing stakeholder expectations in the support of communication for the next steps.
- In order to support the process of developing a general roadmap for a circular economy implementation in Brazil, a framework was conceived to include the broad diversity of players engaged in circular economy initiatives in the country. A survey was launched as part of the first-level stakeholder's analysis that led to around 140 different respondents, including companies from the private sector (33 %), Government (20 %), civil society (18 %) and academia (13 %) from which about 55% were women. Thereafter a total of 19 actors were selected for interviews, based on their ongoing engagement with circular economy activities/initiatives to gather more detailed insights regarding these, and assess their experience, capacity and commitment to bringing about CE in Brazil. Due to time restrictions, only 9 of the invitees could manage to participate in the interview, 33 % of them were female.
- The assessment also took the country's great regional differences into account. On this basis, seven strategic action areas were presented: (1) Bioeconomy; (2) Urban infrastructure, productive inclusion and regional development; (3) Circular manufacturing, Industry 4.0 technologies and supply chains; (4) Life cycle assessment and Inventory; (5) Research, development and innovation; (6) Low-carbon agriculture, and (7) Bioenergy. All of these strategic action areas are considered potentially important to contribute to the implementation of the circular economy in Brazil and impact on the NDCs for climate change adaptation and mitigation as well as to the SDGs of 2030 Agenda.
- A total of 69 circular economy initiatives/projects were identified, within the (1) public sector 9 initiatives; (2) in the private sector 25 initiatives; (3) in the civil society 14 initiatives; (4) in the academic sector 13 initiatives; (5) 5 start-up initiative in CE; and (6) 3 non-profit initiatives¹. Among the identified initiatives a further assessment was performed, based on the responses to the survey and the interviews, resulting in the identification of 7 key actors that are next to the

¹ For a description of all the circular economy initiatives/project please view **D2.4 of the Project for Brazil**.



multiple actors and stakeholders in the stakeholders map (Report D2.4 Brazil), highly recommended to be involved in the further development of the national circular economy roadmap of Brazil. Among these key actors are (1) the Ministry of Science, Technology and Innovation (MCTI) as lead public sector entity, (2) the Ministry of Regional Development (MDR), (3) the National Confederation of Industry (CNI), (4) Brazilian Institute of Information in Science and Technology (IBICT), (5) Financier of Studies and Projects (FINEP), (6) the Ministry of Agriculture, Livestock and Supply (MAPA), and (7) the Ministry of Mines and Energy (MME).

Chile:

- At the commencement of the Project, Chile had already started a vigorous process towards the circular economy which included an initial stakeholders mapping for Circular Economy. Based on this fact the workplan was adapted to complement this initial stakeholder's identification exercise with sub-regional workshops to help identify additional stakeholders in each sub-region of the country. Four workshops were organized in the principal sub-regions in the country (Antofagasta, Valparaiso, BioBio, and Los Lagos). This led to the identification of a total of 64 institutional stakeholders, namely (1) 15 institutional stakeholders in Antofagasta, (2) 13 in Valparaiso, (3) 16 in BioBio, (4) 20 in Los Lagos. Also, 11 relevant national-level actors/stakeholders identified were recommended to MMA to include in the national road mapping process complementing the existing 17 key stakeholders' group.
- A detailed analysis was made to identify the priority intervention areas for each sub-region to inform MMA in their national circular economy road mapping process. The results included (1) for Antofagasta: (i) Mining, (ii) Energy, (iii) Waste Management; (2) for Valparaiso: (i) Food & Agriculture, and (ii) Waste Management; (3) in BioBio: (i) Tourism, (ii) Manufacturing, and (iii) Education; (4) in Los Lagos: (i) Fishery & Aquaculture, (ii) Plastics, and (iii) Waste Management.
- In 2018 CORFO launched the Call "Prototypes for Innovation Circular Economy" which led to the identification of 35 initiatives/projects focused on circular innovation. This was later complemented in 2019 with a second call launched by CORFO entitled "Sumate a la Economia Circular" (Join the Circular Economy) which resulted in the identification of 26 circular economy related initiatives/projects. In addition, a complete listing of relevant national strategic programs per economic sector/sub-sectors are presented which help inform the circular economy road mapping process. For a description of all these circular economy initiatives/projects and the strategic sectorial programs please view D2.4 of the Project for Chile.
- In January 2020 the "Plastics Pact" Roadmap was launched. Also, the document
 "Circular Economy Study in the Chilean Agri-food Sector" was carried out, as well
 as some efforts for the construction sector. In addition, the circular economy was
 made an effective part of the transversal commitments in the Nationally
 Determined Contribution (NDC). Currently, the country is in the process of building
 its circular economy roadmap led by the Ministry of Environment (MMA).
- The Roadmap has, to our understanding, specific short-, medium- and long-term goals and objectives that are structured in 4 main pillars: (1) Obtaining raw materials; (2) Production; (3) Consumption and Services; and (4) Waste



management, inspired by the French Circular Economy Roadmap. The work has five main objectives: (1) Connect the key actors for the development of the circular economy in the country; (2) Imagining "Chile Circular" the country's vision for a circular future in 2040; (3) Agree on the main important changes that must take place to achieve this vision; (4) Design the strategy and action plan that will lead the process towards "Chile Circular"; and (5) Spread the circular economy in the country. The final roadmap is planned to be presented in November 2020.

Mexico:

- In Mexico, the aim is to create a circular economy roadmap for the country under a sustainable development framework and a vision of regional integration. Intended to contribute to the goals of the strategy on climate change mitigation and also, with industrial competitiveness and jobs creation, as well as improve quality of life in vulnerable populations. As a starting point to develop a circular economy roadmap and the implementation strategy for Mexico, this technical assistance delivered the proposal of a framework of multilevel indicators [macro / meso / micro] that allows connecting all national goals and agendas, such as the Paris agreement NDCs, the 2030 agenda SDGs, and the efforts from circular innovation & research, industrial competitiveness, cities & communities resilience and social impact.
- The stakeholder analysis, facilitated through an initial workshop and follow up outreach and interviews to verify their experience, capacities and commitments, resulted in the initial identification of 18 key actors/stakeholders, including the public sector institutional leadership by the National Institute for Ecology and Climate Change (INECC) which is an organism of the Federal Public Administration, with autonomy of management, sectorized in the Secretariat of Environment and Natural Resources (SEMARNAT) that provides research technical and scientific issues in ecology and climate change, to support the decision making. This critical group is composed of (1) 3 public sector actors, (2) 7 private sector actors (mainly largest industrial associations), (3) 2 civil society actors, (4) 2 academic actors, (5) 2 entrepreneurs/start-ups, and (6) 2 circular economy experts.
- Based on the assessment, the following key intervention areas were identified for Mexico; (1) Regulatory framework (need to create a Circular Economy Law); (2) Legislative Framework (the composition of complementary laws to create an enabling framework); (3) Multi-sectorial engagements; and (4) Education and Research.
- In addition, eight actions/activities are identified that should give rise to complementary lanes on the planned roadmap, these are: (1) Strengthening of a regulatory framework for the transition and adoption of circular economy; (2) Public policies development based on sustainable production/consumption and circular innovation; (3) Industry 4.0 adoption; (4) Imports dependence reduction, exports increase and new markets development through the opportunities of international trade agreements; (5) Industrial symbiosis implementation in industrial parks & value-chains; (6) Sustainable & renewable energy installation; (7) Community based circular economy deployment; and (8) Re-shaping of



business networks where SME's, startups and entrepreneurs provide innovative solutions to the principal industries challenged by sustainability.

For a description of all these key intervention areas please view D2.4 of the Project for Mexico.

Uruguay:

- The objective of this Project in Uruguay was to explore how a circular economy approach may contribute to reinforce the implementation of climate actions included in the first NDC, as well as providing for sustainable development and complying with national strategies and policies.
- Given that during the commencement of the Project, Uruguay was already in the finalizing stage of presenting its National Circular Economy Plan of Action (launched in December of 2019.) and that in the course of 2019 Uruguay launched an array of initiatives to further circular economy efforts in the country, the mandate for this Project was adapted to analyze the food system's productive structure in the country, in particular focusing on two key value chains in this system: (1) the dairy value chain and (2) the bovine meat value chain. Both are part of global value chains and play a leading role in creating large export flows with added value, as well as for employment creation.
- The national strategy/action plan has the objective of (1) systematic generation of information for the design of public policies and stimulate the investigation and innovation, (2) identify early actions and implement these, (3) promote the awareness of circular business models, and (4) incentivize practices and processes among various social actors. The plan aims to facilitate the introduction of innovative technologies to diminish the environmental footprint in key production systems that may provide further opportunities to reduce GHG emissions towards complying with the Paris Agreement and facilitating the adoption of sustainable pathways in Uruguay. Further, the Plan of Action identifies other areas to ensure the convergence of national long-term strategies, progressing towards circular economy and promoting bioeconomy and pursuing sustainable objectives and climate change goals.
- Among the prioritized intervention areas are (1) Meat, (2) Diary, (3) Forestry, (4) Food Waste & Packaging, (5) Servitization², and (6) Valuing materials. And coupled to these, based on group consultations, a series of early-actions were identified, including (1) public procurement of food and their packaging with a sustainability perspective, (2) the transition of the industry to a circular economy, (3) the design of a Technology Center in Bio-economy, (4) deployment of electric vehicles upon the demand of the public sector, (5) circularity of nutrients, (6) strengthening the circular economy capacities, and (7) valuing materials.
- 38 national institutional actors were identified in the preparation of the national action plan, composed of (1) 13 public sector actors, (2) 5 private sector actors, (3) 2 NGOs, (4) 4 civil society organizations, (5) 7 sectorial associations, and (6) 7 academic actors. As a complement to this process, through this project

² Servitization is a transformation journey - it involves firms (often manufacturing firms) developing the capabilities they need to provide services and solutions that supplement their traditional product offerings (Baines et al., 2017).



additional stakeholder identification and engagement (interviews) took place in the diary and bovine meat sub-sectors resulting in the identification of a total of 36 relevant institutional actors with understanding of their experience, capacities and commitment to Circular Economy, 18 in each respective sub-sector.

- Next to the 30 circular economy relevant initiatives/projects identified as part of the ongoing national activities in Uruguay a further analysis was performed relating to the value-chains of the diary and bovine meat sub-sectors resulting in the identification of critical actions/activities in each step of the respective valuechains.
- In the dairy sub-sector key identified actions relate to (1) food management, (2) management of the animal remains, in particular their storage and use, (3) the use of energy, (4) the care and health of the cattle, (5) the production of milk, (6) the management of fertilizers, and (7) the handling and transport from the diary processing industry for the processing of wholesale and retail commercial milk to the final consumer.
- In the bovine meat sub-sector key identified actions relate to (1) the meat processing, (2) the feedstock, (3) the products and sub-products, (4) the remains and effluents, and (5) the destination of the produce based on the demand.

For a description of all the identified circular economy initiatives/projects and the strategic actions within the two sub-sectors please view D2.4 of the Project for Uruguay.

By reviewing the roadmap reports from the selected countries (international cases), the next section includes an overview of the most important aspects relevant to this report, going through their methodologies, scope, vision, general objectives, main areas of action and some general information about the context of the country. In addition, a short description and current implementation status of several examples of initiatives being implemented within each of the roadmaps are presented.



3. REVIEW OF SUCCESSFUL AND RELEVANT INTERNATIONAL CASES OF CIRCULAR ECONOMY IMPLEMENTATION

The selection of the circular economy successful cases is performed to match them to the best extent possible with the most important sectors, aspects, and criteria identified in the contexts of Brazil, Chile, Mexico and Uruguay.

3.1. FINLAND: LEADING THE CYCLE TO A CIRCULAR ECONOMY 2016-2025

In 2016, under the leadership of Sitra Innovation Fund, Finland was the first country in the world to produce a national roadmap to a circular economy (SITRA, 2016). This provides a true "blue sky" exercise as no prior roadmaps were available. Following this, the roadmap was also updated in 2019 based on operational experience³.

Sitra is an organization who studies, researches and brings together partners from different sectors. Its operation is funded from returns from an endowment originally granted by the Finnish parliament (SITRA, no date, a).

Finland's circular economy roadmap gathers a synthesis of the views that central actors in society had on the needs for change and the required measures. Almost 50 different parties from the public, private and third sectors, including NGOs, were invited to draw up the roadmap.

The roadmap aims to create a shared mindset in Finnish society to promote the circular economy and the most effective means to do it, shifting the focus of business competitiveness towards circular economy and low-emission solutions. It states that: "The world needs pioneering solutions to ensure that economic growth and increased well-being are no longer based on a wasteful use of natural resources" (SITRA, no date, b).

The starting premise for the Finnish roadmap is that a circular economy strives to maximize the circulation of products, components and materials and the value bound to them as much as possible in the economy where services, recycling of materials and intelligence-based digital solutions are the foundations for this new economy.

In this process, four key sectors were engaged: (1) the central government as responsible for the articulation and cooperation across ministries, (2) the municipalities with focus on developing the discussion on public procurement, education, teaching, smarter land use, (3) the private sector to find ways of cooperation among companies and with the public sector and evaluate new circular business models and strategies, and (4) the general public, especially on contributions for awareness raising and behavioral change towards more sustainable consumption choices.

Furthermore, in June 2017, the first World Circular Economy Forum was hosted by Finland (SITRA, no date, b), taking a global leadership role by organizing it and enable Finland to build its international leadership role on Circular Economy.

Finnish Circular Economy Roadmap (2016):

The original Finnish roadmap included policy actions and pilot projects related to five strategic sectors:

 $^{^3}$ This confirms that a Roadmap needs to be considered as a living document that needs periodic revisions and updates as the transition toward circular economy evolves.



- (1) **Sustainable Food System**, referring to all of the parties and resources associated with food production and consumption as well as the resource loop.
- (2) **Forest-based Loops**, regarding an economic sector developed within the existing natural resources, considered one of the country's best areas in the circular economy.
- (3) Technical Loops, referring to the sustainable use of non-renewable natural resources, lengthening the product life cycle via maintenance measures, and determining how the waste can be returned to the loop - produced during material processing and product manufacturing and/or in products end of use.
- (4) **Common Actions** relating to creating an operating environment that enables and encourages a circular economy and thus accelerates systemic change towards a circular economy society.
- (5) **Transport & Logistics** referring to transporting people, things, raw materials, side streams and all kinds of materials as required for the circular economy.

For each of the five strategic sectors of the circular economy roadmap, a structure of related policy actions, pilot project categories and examples of initiatives are shown below. This provides a better understanding of the approach designed for practical implementation of the circular economy in Finland's specific context.

(1) Sustainable Food System

Policy Actions:

- Creating a market for organic recycled nutrients.
- Minimizing food waste by eliminating obstacles and creating incentives.
- Supporting biogas systems and other renewable energy solutions in agriculture.

Pilot-Projects categories and examples of related initiatives:

Waste food

• Expand the "shared table" project to reduce food waste.

Nutrient recycling

- o Domestic fish and fish industry for a more competitive circular economy.
- Biogas system and utilization of food and fertilizer nutrients.
- More efficient collection and use of municipal biowaste.

Diet

- Public procurement to encourage use of sustainable food.
- National resource calculator for consumers.
- Open data competition for food and nutrients.
- Communal food production, ownership models & shared consumption.



(2) Forest-based Loops

Policy Actions:

- Maximization of the overall value of Finnish forest-based products and services rather than the just the 'amount of wood'.
- Public procurement to encourage the market of wood-based products and those made from other renewable raw materials when life cycle analysis demonstrates that they are more sustainable overall.
- Support for investments demonstrating bioproducts and bio-services on a commercial basis.
- Incentives to develop Finnish wood construction and the design of wooden furniture and promoting the interior design sector.

Pilot-Projects categories and examples of related initiatives:

Industrial symbiosis

- A showcase network that makes use of byproducts from side streams.
- Industrial-scale bio- and circular economy business environment.

New Innovations

- Building a 'packaging innovation valley' in Finland.
- Development of a market ecosystem for lignin from cellulose, across the value chain internationally.
- Support for innovative bioproducts and technologies exports.

Ecosystems services

• Forest ecosystem services to the 'OPENNESS EU' research project (OpenNESS, no date).

Digitalization

o Create a biomass atlas.

Nutrient recycling

 Switching to the use of recycled nutrients in wastewater treatment plants at forest industry plants.

(3) Technical Loops

Policy actions:

- Promote the use of secondary raw materials, in public procurement and public infrastructure construction.
- Plan and describe in the environmental impact assessment and environmental permit processes the use of outputs from side streams produced.
- Include eco-design requirements in product design and construction and in the material development phase.



Pilot-Projects categories and examples of related initiatives:

Industrial and construction material flows

- o Create regional markets for secondary materials.
- o Material efficiency agreements.
- o Use of secondary material in earthworks.

Construction and property use

- Technical departments in towns and cities can be circular economy enablers.
- Maximizing the use of the existing building stock and joint use of facilities.

Increasing knowledge

 Create a training for vocational teachers in cleantech and circular economy.

B2B, consumer interface

o Pilot a circular economy framework for a shopping center.

(4) Common Actions

Policy Actions:

- Funding, promotion of exports and co-operation between private and public sectors to accelerate circular economy.
- Using public procurements to focus on purchasing solutions and products that support the circular economy.
- An education and research policy that enables a circular economy.
- Eliminating regulation barriers and creating incentives.
- Changing the focus of taxation.
- Improve guidelines to build collaboration among the public administration areas.
- Promote digital and service-centered circular economy incentives.
- Create indicators for circular economy.

Pilot-Projects categories and examples of related initiatives:

Increasing knowledge, Market creation and export

- o A circular economy networking platform.
- o Circular economy consumer trials.

Regional Trial

o Set up Zero-waste areas.



(5) Transport & Logistics

Policy Actions:

- Develop incentives and policy instruments to accelerate a radical change towards a more service-based transport system.
- Develop tax and other steering to support the end of fossil fuel use in private cars and promote the implementation of biofuels produced in a sustainable manner.

Pilot Projects categories and examples of related initiatives:

Energy

- Make Central Finland a model province in the use of biogas.
- Use of high-blend biofuels in buses in the City of Helsinki (BioSata)
 (Bioenergy International, 2017).
- o Eliminate the use of imported fossil fuels, switching to domestically produced renewable energy for transport use.

Regional Trial

 Cities and towns lead the way in adopting more sustainable transport systems.

Alternative forms of transport

Self-driving robot buses on the streets of Finland as part of service-based transport and logistics (SOHJOA project, cited in Helsinkismart, no date).

<u>Updated Finnish Circular Economy Roadmap (2019):</u>

More recently, in 2019, an updated version of the Finnish circular economy roadmap was published (SITRA, 2019a). Through six events with stakeholders and interviews with 25 specialists from different sectors in the country, this roadmap update report presents around 350 ideas and comments collected from the stakeholders.

In the updated roadmap (2019), four cross-sectoral strategies are defined:

- (1) Circular economy solutions are focused on competitiveness and an economic growth strategy.
- (2) Move to a low carbon energy which requires energy to be sustainably produced, renewable and low carbon.
- (3) Natural resources are to be considered scarce and measures should include returning materials to the cycle again and again, the material efficiency of products and the adoption of circular economy business models.
- (4) Adopt a new kind of approach to ownership, in terms of culture, taxation and income distribution.

Successful circular economy initiatives in Finland mentioned in the roadmap, that stand out as relevant examples for Brazil, Chile, Mexico and Uruguay are summarized in the **Table 1** below.



TABLE 1: SUCCESSFUL AND RELEVANT CIRCULAR ECONOMY INITIATIVES IN FINLAND

Sustainable food system

The "Regional Sustainable Food System" (SITRA, no date,c), a cooperation between public institutions, local food producers and processors organized to create and implement a regional sustainable food system model based on circular economy principles and innovative practices. It aims to develop local food culture, also focusing on the cultivated land and its condition. The project is managed by the Ministry of Agriculture and Forestry implemented by local producers, the Central Union of Agricultural Producers and Forest Owners, public administration, joint municipal authorities and others. At the time the roadmap was published, the project was finalizing the funding base and project content and communicating with the actors in regions about the project.

Nutrient recycling

Biogas system and utilization of food and fertilizer nutrients, the LARA high-quality fertilizer project (Laatulannoite, no date) is a system for recycled food products to help food producers shift from using artificial fertilizers towards nutrients cycling. It's a quality label for fertilizer products from biogas and composting plants or other similar processing plants. Launched in 2018, this project is built upon a partnership between the Finnish Association for Biological Waste Treatment, Finnish Water Utilities Association and Finnish Biogas Association.

Forest-based loops

The **international demonstration platform for new bioproducts** (Eionet, 2019), a consortium of companies of various sizes from many sectors, are cooperating to jointly look for international funding for producing **new forest-based bio-products** (for example, from the EU's Horizon program, European Fund for Strategic Investments (EFSI) and/or regional development and cohesion funds). The aim is to demonstrate new methods for the development of bio-products to replace fossil materials and accelerate the development of solutions by extensive industrial-scale projects, such as: the application of new service-based business models; optimizing industrial symbiosis; industrial 4.0 applications in the forest industry; development of bio-based chemistry and biotechnology innovation and entrepreneurship; application of circular economy principles into forestry.

Pilots:

Industrial symbiosis:

(1) A regional cluster for bio- and circular economy business environment, **ECO3** showcase industrial-scale network of companies that makes use of side streams. (Eco3, 2019)

Innovation

- (1) Building a **Packaging Valley** in Finland (Packaging Valley, no date), which would be a unique packaging sector ecosystem; **Lignin Club Ecosystem** (Lignin Club Ecosystem, no date);
- (2) Cellulose from Finland/DWoC design-driven value chains in the world of cellulose (**DWOC**) 2013-2018 (multidisciplinary research collaboration project aimed at finding new innovative applications for cellulose-based materials); export support for innovative bioproducts and technologies (DWOC, 2018).

Ecosystem services: Integrating ecosystem services into forest policy and management in Finland- **OPENNESS EU project** (OpenNESS, no date).

Digitisation: A **biomass atlas** – a browser-based online service that promotes the sustainable use of biomass (Biomassa-Atlas, no date, a).

Nutrient recycling: Switching to the use of recycled nutrients in wastewater treatment plants at forest industry plants (Biomassa-Atlas, no date, b).

Technical Loops



Circular economy demonstration plant for electrical and electronic equipment (Nontox, no date), to enhance products design for sustainability, modularity, reuse, energy and material efficiency; application of robotics and automation, including identification of materials containing harmful chemicals, for collection and sorting; new business models for product refurbishing, reuse, disassemble and component utilization; and the management of materials by means of new 4.0 processing systems and technologies.

Industrial Symbiosis

The Arctic industries ecosystem and Kemi-Tornio region circular economy innovation platform, an industrial symbiosis initiative in the technology park of Digipolis (Digipolis, no date), in the City of Kemi, where local companies share infrastructure for water, energy and materials circulation to promote better utilization of industrial and community side streams. A model for processes and tools needed to promote industrial symbiosis co-operation network in a company-oriented manner was created. This includes an open network involving experts from industry, educational institutes, sector research institutes and the authorities co-operating across industrial and sectoral boundaries. The next phase aims to expand activities into regions and achieve deeper co-operation and new local and global partnerships.

Transport & Logistics

Promoting and prioritizing 'mobility as a service' in the Helsinki Capital Region (SmartClean, no date,a), the goal of the 'Smart & Clean' project is to create a low carbon and smart transport and mobility concept for Finland. It aims to create new ways for cooperation between cities, companies and the state to accelerate the climate mitigation targets in cities and promote the circular and the sharing economy. Smart & Clean have initiated seven concrete change projects (ecosystems) during 2016–2019. These projects involved Helsinki region cities, more than 150 companies, and universities & research institutions in accelerating the transition to smart urban energy, emission-free mobility, the circular economy, urban resource wisdom and a sustainable built environment.

National Educational system

The inclusion of circular economy matters at all levels of the educational in Finnish national educational system was a successful initiative. Learning materials and courses were developed and tested. Over 70,000 children and young people across Finland studied the circular economy in 2018-2019. For example, 75% of 12-years-olds and 40% of 15-years-olds have learned about circular economy (SITRA, no date, d).

Building Materials

The Ministry of the Environment of Finland is providing a national database to enhance the circulation of building materials to facilitate further use in construction after their initial use (SITRA, 2019b).

Textiles

A joint collaboration between almost all municipal waste management plants to the implementation of a centralized processing plant for the recovery of end-of-life textiles. This initiative is supported and funded by the Ministry of Economic Affairs and Employment and the Regional Council of Southwest Finland (SITRA, 2017).



3.2. THE NETHERLANDS: A CIRCULAR ECONOMY BY 2050

The Netherlands is arguably the country that has demonstrated the highest national leadership to plan, update and implement elements of the circular economy. It took a sectoral approach focused on materials and products.

The circular economy roadmap for the Netherlands was published in September 2016 by the Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs, also on behalf of the Ministry of Foreign Affairs and the Ministry of the Interior and Kingdom Relations, and input was provided by the Social and Economic Council.

It was implemented as a response to a motion presented in the parliament requesting the Cabinet to come up with an overarching program for the circular economy. It set a target date of 2050 for the development of a circular economy in the Netherlands.

The roadmap document "Circular Economy in the Netherlands by 2050" describes a governmental program for all departments (Government of the Netherlands, 2016). The aim is to streamline and coordinate current policy paths, integrating previous waste management and resources management governmental policies like "The Strategic Vision for the use of Biomass on the Road for 2030" (Ministry of Economic Affairs, 2016), and others.

For instance, in the case of the "The Strategic Vision for the use of Biomass on the Road for 2030" the aim is to contribute in many areas such as food, energy, climate, mobility and a bio-based and circular economy by using all biomass produced in a sustainable manner, in order to develop an innovative and competitive economy in the Netherlands.

The main focus of the Dutch roadmap is on material and product flows. The second chapter of the roadmap is titled: "Raw material use: the great challenge of the 21st century". The interim objective is to achieve a 50% reduction in the use of primary raw materials (minerals, fossil and metals) by 2030.

In this process, four group of actors were identified as key: (1) the government to foster new legislation and regulations and create market incentives; (2) Banks and investors to create ways for financing the transition; (3) Businesses to support knowledge creation and innovation in new business models and strategies; and (4) Consumers (citizens and companies) making the choices in the purchasing and discard of products.

Five instruments are to be used as needed as circular economy enablers for the prioritized sectors: (1) Fostering legislation and regulations; (2) Intelligent market incentives; (3) Financing; (4) Knowledge and innovation; and (5) International cooperation.

The desired outcome is a circular economy in the Netherlands by 2050 where raw materials will be used and reused efficiently without any harmful emissions into the environment. Products and materials will be designed in such a way that they can be reused with a minimum loss of value and without harmful emissions entering the environment. When new raw materials are needed, they will be obtained in a sustainable manner, preventing further damage to social and physical living environments and public health.

According to the roadmap, making the transition to a circular economy is also key for meeting climate change mitigation and adaptation, contributing to the climate policy and contribute to the realization of the Sustainable Development Goals (SDGs).



The Dutch roadmap has set many areas of action under five (5) prioritized sectors: (1) Biomass & Food; (2) Plastics; (3) Manufacturing industry; (4) Construction Sector; and (5) Consumer goods, presented below. This provides a better understanding of the approach designed for practical implementation of the circular economy in the country's specific context.

(1) Biomass & food

Dutch policy aims to reduce the dependence on imported raw-materials and pursue an ecological sustainable food system for raw-materials, energy, water and nutrients. "The Strategic Vision for the use of Biomass on the Road for 2030" study indicates biomass use for food and feed, as well as a base material for textile, paper & carton, building materials, chemicals, plastics, transport fuels and, lastly, for energy production. Thus, improving its use potentially contributes to the sustainability targets of several major economic sectors with considerable large exports for the country (Ministry of Economic Affairs, 2016).

Action areas:

- Sustainable biomass and food production;
- Optimize utilization of biomass and food;
- Close the loop of industrial resources;
- Replacement of fossil energy sources by biomass and bioeconomy;
- Bio-based chemical production based on biomass and green chemistry;

(2) Plastics

The country's vision by 2050 is to use 100% renewable plastics (recycled and bio-based) and eliminate the dependence on fossil sources for the production of plastics wherever this is technically feasible, without any harmful impact on the environment. To achieve this ambition, the design of products should enable plastic materials to retain their value for longer periods, combating plastic litter effectively and reducing CO_2 emissions drastically.

Action areas:

- Changing design
- Discouraging use of non-recyclable products
- Usage of renewable (recycled and bio-based) materials
- Uses of biodegradable plastics
- International closure of the plastics value chain

(3) Manufacturing Industry

By 2020, have at least 50% of the businesses taking steps towards circularity opportunities by increasing awareness of the business risks in metals raw materials, due to extraction and processing, environmental and climate issues as well as other sustainability problems across the globe. Enroll sectors such as electronics, machinery and systems industry, automotive industry, electric transport, aerospace, and sustainable energy technologies, that use increasingly more raw materials due to a growing demand for products and services.



Action areas:

- Development of business models with circular potential and substantial export prospects, specially focused on products requiring energy-intensive production;
- The Netherlands will take the lead in EU regarding risk management for the supply
 of several metals by initiating the establishment of a European Partnership for
 responsible minerals;
- Meeting material needs by reuse, placing an active focus on the rapid reuse of residues to cover part of the Dutch need for new raw materials;
- Take actions to boost the EU Raw Materials Initiative (RMI);
- Develop and implement a pilot project involving e-waste urban mining;
- Develop and implement a pilot project involving sustainable urban mining in collaboration with the maritime sector;
- Strategic track businesses and knowledge institutes, in the aim of building a longterm strategy for raw materials supply security; and
- Implement 'green' agreements with sectors and value chains that are vulnerable in terms of supply security.

(4) Construction Sector

In the Netherlands the resource intensity in the construction sector is high, accounting for 50% of the raw materials used, 40% of total energy consumption, and 30% of total water consumption. In addition, a large proportion of waste in the Netherlands (approximately 40%) involves construction and demolition waste, while the sector is responsible for approximately 35% of CO₂ emissions.

Action areas:

- Implement sectoral agreements for example for the concrete sector;
- Support more innovative and circular construction projects;
- Pilot projects targeting CO2 reduction;
- Pilot projects for reuse of materials;
- Implementation of an innovation agenda in the construction sector;
- Use the Central Government Real Estate Agency (RVB) to use life cycle costs approach and convert circular ambitions into practice;
- Support sustainable circular economy construction by road and rail networks;
- Reduction of material consumption by natural capital solutions.

(5) Consumer Goods

Consumer goods rank first in the environmental impact top ten of average annual consumption per capita. Many discarded products are already separated and recycled, but half of the mass still goes to waste because it is incinerated or end up in a landfill. Residual waste from citizens and companies accounts for 80% of the total volume of incinerated or landfill waste.



Action areas:

- Wider deployment and expansion of behavioral knowledge;
- Promoting sharing, reuse, and repair among residents;
- Optimizing consumer goods product value chains;
- More effective collection and return systems;
- Improved sorting and processing systems;
- High-grade use of recyclables; and
- Disposable Products Waste Fund.

Successful circular economy examples that can demonstrate the potential of business models and products already in place in the Netherlands, that stand out as relevant examples for Brazil, Chile, Mexico and Uruguay are summarized in the **Table 2** below.

TABLE 2: EXAMPLES OF SUCCESSFUL AND RELEVANT CIRCULAR ECONOMY INITIATIVES IN THE NETHERLANDS

Consumer goods

Repair Cafés: Free meeting places where things can be repaired together in a social setting, to encourage the average consumer to repair things or have them repaired and exert pressure on manufacturers to improve the repairability of their products, to keep existing products in use for longer periods. In a Repair Café there are tools, materials and also expert volunteers to help make repairs needed on clothes, furniture, electrical appliances, bicycles, crockery, appliances and toys.

ReBlend: A social enterprise that brings innovation to end of use collection and reprocessing for clothing that is discarded, filling a gap in reverse logistics for textile production. It examines the production of recycled textile, connecting supply and demand. With the mission to raise awareness about the ecological impacts of the textile industry and to inspire the use of looped & renewable raw materials. In collaboration with fashion designers, manufacturers and brands, ReBlend (2013) developed a yarn made of 100% recovered textile and processes this into clothing and upholstery fabrics.

Manufacturing industry

Philips: "Circular Lighting" introduced light as a service business model replacing owning of "property" by renting the "service" of products, involving supply and maintenance of products for a monthly fee model – as a leased service. This is an example of one of the new circular business models – namely, products as a service. Without an investment threshold and at lower costs, it ensures long-term efficiency in the maintenance of the lighting system – which incorporates the latest technology and saving energy while making responsible use of resources. Philips Lighting and the UN have set a joint ambition to reduce the lighting share in global power consumption (still ~15% in 2014) to a maximum of 8 percent by 2030.

Plastics

Corbion: A supplier and producer of PLA, a biodegradable plastic made from biomass. Polylactic acid (PLA) is a raw material that is used in many products for medical industry and food packaging and also in cars, textiles and electronics. As PLA is made from biomass, it is a renewable raw material. It is compostable and can thus be used for consumables that are difficult to recover by recycling.



Plastic Whale: An organization that retrieves plastic from rivers and canals and uses it to build fish boats and skateboards out of plastic bottle caps. The aim is also to create employment opportunities by a mobile "board bakeries" in places where there is waste. The goal is to tackle plastic waste at the global level by encouraging local activity.

Financing

Rabobank regards itself as one of the facilitators of the circular transition. As a bank, they wish to finance triple bottom line circular business models, taking account social, environmental and economic factors.

Construction Sector

Delta Development Group: Park 20 | 20 is a Cradle-to-Cradle Business Park, developed by Delta and its partners VolkerWessels and the Reggeborgh Groep. The buildings have an integral approach to all the flows (energy, water, biodiversity and materials) using sustainable C2C materials. Circular processes ensure that our resources intact.

Fashion & Textiles

C&A: The first major retailer to offer certified jeans and T-shirts at Gold level Cradle to Cradle Certified™, made of 100% organic cotton, including stitching, with 100% non-toxic dyes and produced in a socially and environmentally responsible way, the world's first in Europe, Brazil and Mexico.

Circular Economy in Dairy Sector

A discussion paper prepared jointly by Friesland Campina and Circle Economy for the Word Dairy Summit held in Rotterdam, the Netherlands in October 2016, "The Circular Dairy Economy" explores the business case for a farmer led, 'net-positive' circular economy and presents some insights into the potential of circular economy in dairy farming from a Dutch perspective (Circle Economy, 2016).

Regarding the diary sector, three main important areas are highlighted by the report: (1) soil nutrient restoration, (2) waste management, and (3) biodiversity monitoring, as being important to create positive impacts. Related to these three areas, some circular economy practices that are already in place in the Netherlands can illustrate opportunities, in particular for Uruguay with an economy highly dependent on the agricultural sector.

The report "The Circular Dairy Economy" also presents some case studies (see Table 3) that illustrate the three approaches with innovative initiatives in order to make a transition towards circular economy in the diary sector in the Netherlands.



TABLE 3: EXAMPLES OF SUCCESSFUL AND RELEVANT CIRCULAR ECONOMY INITIATIVES IN THE DIARY SECTOR IN THE NETHERLANDS

Soil nutrient restoration

Animal feed and fertilizers are managed to minimize environmental impacts, while maintaining and enhancing soil quality. Examples in the Netherlands include **KringloopWijzer** (no date), **an online tool for farmers to monitor the nutrient cycle of animal feed, soil and fertilizer and better manage the use of minerals**.

Waste management

Wastes from dairy farming are minimized, reused and recycled. Dairy farms in the Netherlands are working with bioenergy companies to install waste digesters that process manure into biogas for the national grid (Host Bio-Energy Installations, no date; Waste Management World, 2015). Also, waste and by-products from the food industry are used as feed for dairy cows in the country.

Biodiversity monitoring

Financing strategies to maintain or enhance biodiversity direct and indirect biodiversity risks and opportunities. FrieslandCampina, WWF and Rabobank are collaborating to develop a monitor for dairy farm biodiversity (FrieslandCampina, 2017). The initiative's aim is to make sure all dairy farmers complying with these metrics are eligible for green financing and government benefits (Biodiversiteitsmonitor, no date).

Optimized grazing

This approach seeks to maximize the productivity of the land by combining biological and technological approaches to achieve circularity, using technology levers to recover greenhouse gas emissions and nutrients from manure and productivity optimization. Case study - Enhanced fertilization pilot with 250 farmers: **Vruchtbare Kringloop Achterhoek (VKA)** (no date) is a collaborative initiative. The aim was **to improve soil fertility and the quality of ground and surface water by reducing the leakage of phosphorus and nitrogen**. This was done through more timely feeding and tailormade diets, and by inducing higher yields of feed crops to reduce the surplus of minerals in the soil. As a consequence, milk production and the number of cows increased on average by 10%. Milk production increased on average by 6% to 19.000 kg of milk per hectare, while the cost of disposing of excess manure decreased due to the increased on-farm use.

Extensive grazing

This approach builds on biological processes and organic farming methods to close the 'soil-plant-animal-nutrient' biological cycle locally. It prioritizes biological processes to close manure cycle on the farm and promotes integration of biodiversity within farm operations. The pathway is the closest to achieving full circularity and being restorative.

Case study - Organically produced milk sold at a premium and local feed production: On the island of Schiermonnikoog a cooperative of seven farmers based on extensive cow farming for minimal dependence on external inputs. Compound feed combined with higher biodiversity is expected to ensure a greater stability in feed production. Farmers have agreed to reduce their combined herd from 640 to 330 cows. Also, milk production per cow will decrease from 8.365 to 7.270 kg. Milk needs to be sold at a long-term price premium of at least 10 cents above the price of normal milk by virtue of an organic or local food label. Close cooperation between farmers and stakeholders in the value chain is needed.

Intensive high-tech farming



This approach leverages high technological solutions with advantages for productivity and circular performance. Technology levers are pivotal to this pathway to allow scaling and cost reductions. Best practices include biodigesters with methane capture, limiting greenhouse gas emissions and allowing for efficient nutrient recovery.

Case study - landless farms can close cycles with technology: A high-tech, stable-based production farm, the Floating Farm stablished in Rotterdam (Rotterdam Partners, no date) since 2017 is an innovation lab to research and develop optimal process of food production, energy and water handling and waste-treatment. It also educates consumers on the innovative processes of milk handling, animal welfare, and high-tech robotics. The technologies and methods employed include urine capture and manure collection robots via separate streams for more efficient biogas production; milking robots; indoor farming of high-nutrient grass with LED technology; wastewater capture, recycling and reuse; and solar panels and renewable energy generation. Practices for animal welfare is prioritized and young stock are raised to promote biodiversity through grazing.

3.3. FRENCH ROADMAP '50 MEASURES FOR A 100% CIRCULAR ECONOMY'

Starting on 24 October 2017, meetings to develop the French roadmap with stakeholders were led by the Ministry for an Ecological and Solidary Transition (Ministère de la Transition Écologique, no date) and Ministry for the Economy and Finance (Ministère de l'Économie, des Finances et de la Relance, no date).

A result of five months of work involving all stakeholders as well as the public via an online consultation, the roadmap for the circular economy presents a set of coherent, balanced and structuring measures to guide stakeholders. It also strives to enable the achievement of the SDG targets of UN 2030 Agenda, in particular the objective of "establishing sustainable consumption and production patterns" (Ministère de la Transition Écologique, 2019).

During two months of work, four workshops were dedicated to topics related to (1) territories, (2) plastics, (3) sustainable consumption/production and (4) economic instruments.

Working groups were launched for industrial sectors (e.g. plastics) to establish commitments. Also, specific working groups were launched to continue the exchanges between different actors (I.e. communities, businesses, NGOs, etc.), to identify the most relevant tools for meeting the objectives of the roadmap and the practical ways of implementing them.

An online platform was open to take public input having over 1,800 contributions and 16,000 votes. In 2018 the output was presented to stakeholders and working groups, and launched to continue dialogue with communities, businesses and NGOs. With more than 3,000 contributions and nearly 30,000 votes, this second consultation confirmed citizens' strong interest in the circular economy.

Following up on the French Circular Economy roadmap, the government has enacted new legislation_(Ministère de la Transition Écologique, 2020). The anti-waste law for a circular economy was put into effect on February 10, 2020. The relevant decrees (Decree n° 2020-731) dated June 15, 2020 were enacted which relate to the exemption from value added tax where goods are donated to recognized public benefit organizations (humanitarian, educational, social or charitable).



In July 2020, Ordinance n° 2020-920 relating to the prevention and management of waste was enacted. This sets new goals for the quantity of household and similar waste to be reused or recycled, as follows: 55% by 2025, 60% in 2030 and 65% in 2035 (measured by mass).

The Circular Economy roadmap for France called '50 measures for a 100% circular economy (Ministère de la Transition Écologique, 2018) focused mainly on actor's mobilization rather than taking a materials-based approach. The roadmap states the French challenge is to mobilize actors in regions: citizens, communities, businesses, associations, government agencies, researchers and other development actors for real action and upscaling.

The French roadmap does not focus on specific business sectors but instead on the mobilization of everyone to make the change from a linear to circular approaches. It takes the approach of looking generally at production, consumption and waste management as well as ways to mobilize everyone in this change process. Key intentions expressed in the roadmap include the creation of actions that can result in changing habits, provide more good practice information, engaging and inspiring the general public.

The roadmap presents fifty (50) measures with examples of success stories divided in into sub-roadmaps representing four areas of action, identified as key for a circular economy implementation in France: (1) "Better production", (2) "Better consumption", (3) "Managing our waste" and (4) "Mobilizing all actors". For each of the 50 measures presented in the document, one or more groups of actors designated "target audience" (Consumers/citizens, Companies, State/local authorities) are noted.

Many of the mentioned measures are actually 'calls for action' rather than specific projects. As an example, for "Better production", the first measure is: "Use more secondary raw materials in products" and for "Better consumption", the first measure is: "Strengthen the range of services offered by actors involved in reuse, repair and the economy of functionality (product-service systems)".

The Roadmap also sets some general and concrete targets:

- A 30% reduction in the consumption of natural resources in relation to French GDP between 2010 and 2030.
- A 50% reduction in the amount of non-hazardous waste landfilled by 2025, compared to 2010.
- A 100% of plastics recycled by 2025.
- Avoid the emission of 8 million tons of CO2/year from plastic recycling.
- Create up to 300,000 additional jobs, including in new professions.

The definition for each of the four area of action in the French roadmap, together with key objectives and some examples, are presented below. This provides a better understanding of the approach designed for practical implementation of the circular economy in the country's specific context.

(1) Better Production roadmap

In order to assure that products that are put into the market (1) make use of more recycled materials, (2) are produced with resources from sustainable supplies and, (3)



more generally, are created using eco-design approaches, the following key objectives are set:

- Promote upgrading and differentiation of products through better environmental performance.
- Produce better with less non-renewable resources.
- Incorporate more recycled raw materials, in particular for plastics.
- Create jobs and meet training needs for new occupations or new skills in the circular economy.

Under the roadmap for Better Production, seven measures were proposed, with focus on improving investments and supporting better management of resources. Instruments to increase recycling are mentioned like the implementation of EPR schemes by industry as well as incentives to incorporate more recycled raw material into products and implementing voluntary environmental labelling. Enabling conditions like more governmental incentives, engaging SMEs and the development of professional skills are also mentioned as important measures to reach the objectives.

(2) Better Consumption roadmap

In order to assure that all actors – consumers, businesses and public authorities – have access to information to inform their consumption choices, so they can take into account the environmental impacts at all stages of the product life cycle on their purchases.

Key objectives are:

- Give consumers the means for more responsible consumption.
- Increase the lifespan of products.
- Create sustainable jobs in the repair sector, particularly from the social and solidarity economy.
- Combat food waste.

Under the roadmap for Better Consumption, nine measures were proposed, with focus on the implementation of criteria to encourage producers that put eco-designed products on the market and to improve the information to enable more responsible choices in purchases for consumers, as well as fight advertising that encourages premature scrapping of products.

Also, the measures propose to incentivize manufacturers and distributors that are implementing reuse and repair activities and oblige more information on spare parts and repairability of products, especially for electrical and electronic appliances and furniture. The intensification of actions to stop food waste and textile waste for unsold materials that are thrown away and destroyed are also an important measure to reach the objectives in this area.

The roadmap aims to achieve long-term, sensible consumption habits mostly through:

- Improved consumer information.
- Extended product lifecycle.
- Environmental reward-penalty system promoting eco-conceived products.



- In-depth assessment of the existing web of environmental/green labels.
- A reinforced fight against food waste.

(3) Better Waste Management roadmap

In order to assure that the expectations from the public consultation are achieved, by having a national harmonized and unambiguous sorting system to simplify the waste sorting processes and by new deposit schemes that could help to develop the sorting habits and improve collection.

Key objectives are:

- Collect 100% of potentially recyclable waste.
- Make the sorting of waste easier for French citizens.
- Incentivize the recovery of all biowaste (amounts to 22 million tons).
- Accelerate the introduction of pricing incentives for waste management systems.
- Ensure that companies and government agencies which are large waste producers meet recovery obligations for metal, paper, wood, plastic and glass.
- Set sorting and recycling targets for building demolition and construction phase.

Under the roadmap for Better Waste Management, twenty-four measures were proposed, with a broad range of action to improve waste management. The focus goes from simplifying and harmonizing the sorting of waste for citizens, improving and setting new targets for extended producer responsibility (EPR) schemes.

Many actions have focus on improving regulatory and economic structure, like adapting the waste regulatory framework, improvement in regulatory labels and adapt the tax system to make waste recovery cheaper than disposal together with studying the implementation of specific financial systems and pricing incentives for waste collection as well as the development of new industrial sectors related to the circular economy.

The measures also put focus on specific materials like defining a biowaste economic framework to remove the barriers and facilitate recycling and recovery, and combat pollution and waste-related nuisances from plastic particles. Also, it is proposed the development of new EPR schemes for packaging – for more public engagement in food & beverage marketplaces - and for construction waste, including the review of the current regulatory procedure for "pre-demolition waste assessment".

Among the waste management measures, the following are particularly important:

- Adapting taxation to render reuse and recycling more advantageous than disposal (through reduced VAT rates and redeployed General Tax of Polluting Activities (TGAP) in accordance with waste treatment priorities).
- Incentivizing waste collection tariffs and fees.
- Improving bio-waste recycling and empowering the agricultural sector in the overall circular economy scheme.
- Expanding the extended producer liability principle to new product categories.
- Easing the end-of-waste criteria and enforcement.



(4) Mobilize All Actors roadmap

In order to assure the transition to the circular economy, it is key to mobilize actors in all regions. The awareness raising and involvement of all public actors, is seen as an opportunity for social innovation as well as to create jobs for the most vulnerable individuals.

Mobilizing regions around meaningful projects and drive innovation in favor of circular economy, is key for change in regional level and depends on the dialogue between the many local actors. Public procurement which represents nearly 15% of GDP can pull the circular economy for businesses. A network of coordinated actors in the industry can also foster synergies to scale the implementation of industrial symbiosis to optimal management of resources in each region.

Key objectives are:

- Inform, educate and train all actors about the circular economy;
- Rely on the key driver of public procurement;
- Mobilize local authorities and businesses in the regions;
- Establish governance for sustainability;
- Support the transition to a circular economy with appropriate financing.

Under the roadmap for Mobilize all Actors, ten measures were proposed, with focus on citizen, business and local government engagement. Increasing the communication efforts, raising awareness and teaching circular economy into mainstream education are measures that aims to inform the public more effectively and improve the mobilization of citizens on the circular economy, responsible consumption, waste prevention and materials management.

On the other hand, by supporting circular economy projects from companies through dedicated funding, especially for innovation, and by strengthening the synergies between companies, are measures to foster the creation of industrial and territorial ecology and industrial symbiosis. For this, it is also desirable to mobilize the scientific and technical community and strengthen the national governance and steering by establishing a national circular economy council.

Along with these measures, more engagement from national government with local authorities, regional councils and regional public administration is desired to develop regional strategies for transitioning to the circular economy and also to develop new innovative tools and methods to encourage public authorities to take account of operating and end-of-life costs in public procurements.

Also, France's should act to promote the circular economy at the European supporting the necessary changes in European laws and at the international level mobilizing other countries. To achieve this aim it is important to set up measures to create synergies between adjacent regions and neighboring countries taking into account resources that can be mobilized at the targeted territorial level and adapt national policies and EPR schemes to the specifics of overseas territories.

The following specific roadmap targets are of most relevance to achieve the objectives:



- 1. Targeting citizens and businesses in an unprecedented communication and information effort.
- 2. Supporting the move towards the circular economy via dedicated financings at local, national, and EU levels.
- 3. Securing the continued participation of the scientific community.
- 4. Contemplating heavily public procurement (15% of France's GDP) as a lever to deploy the circular economy program.

Successful circular economy examples that can demonstrate the potential of business models and products already in place in the Netherlands, that stand out as relevant examples for Brazil, Chile, Mexico and Uruguay are summarized in **Table 4**.

TABLE 4: EXAMPLES OF SUCCESSFUL AND RELEVANT CIRCULAR ECONOMY INITIATIVES IN FRANCE

Better Production

The MachaonGroup (at Chalons-en-Champagne, Marne) is one of the only recyclers in EU that is **specialized in recycling plastic bags and films** (Machaon, no date).

Results: The industrial plant was commissioned in 2017 and the main start-up challenges have already been met. In 2019, it has tripled its recycling capacity to **recycle nearly 50% of the soft plastics (LDPE)** of the French population.

Arjowiggins Graphic is a French company that produces high-tech recycled papers and specialist papers (Arjowiggins Graphic, 2016).

Results: The collection of recycling of paper to produce **60% of fibrous raw materials takes place locally** around the manufacturing sites and **generates about 250 jobs** based on solidary economy.

Better Consumption

The **SEB Group** provides a **10-year repair guarantee to repair malfunctioning parts** on their products. Household appliances are designed with easily removable parts and mostly customized and available for 12-15 years after manufacture (Groupe SEB, no date).

Results: 8% of consumers confirm product choice for its "10-year repair guarantee" (even if it's not a first choice). Over 39% of out-of-warranty products were repaired in 2012-2017. This represents **extending service life of 300,000 products/year**, from toasters to vacuum cleaners.

Établissements André Cros (at Isère, Grenole): specialized in **sale, leasing and maintenance of equipment** (compressors, pumps, generators, etc.) for industry, construction and public sectors (ETS Andre Cros, no date).

Results: The company has been working for 20 years to move **from equipment sale-maintenance model to the pay-for-use model**. A change from selling products to offering products as a service, was collaboratively developed within the company and also involving the cooperation of customers and suppliers.

Better Waste Management



The **Region of Grand Besançon Conurbation**, comprising 69 municipalities and 192,000 residents implemented in 2012 a **pioneer incentive charging scheme "by weight and collection" for waste management**.

Results: Achieved a **34% decrease in waste between 2008 and 2017 (from 227 kg to 150 kg per resident)** and a decrease in the average bill (ex. VAT) from €74.7 in 2012 to €71 in 2017 (bill/year per capita).

SMICVAL Company (at Saint-Denis de Pile, Gironde) since the 2000s, **separate and collects biowaste**, identifying ways to the diversion of organic matter (SMICVAL, no date).

Results: More than 50,000 inhabitants benefit from this type of collection, planning to get to 100,000 inhabitants in the short term. The **collected biowaste is transformed into a certified compost** that is usable in organic farming, reducing landfills without increasing costs.

Bouygues Immobilier (Bouyues Immobilier, no date). An upstream assessment allowing the classification of all the materials, methodical on-site sorting and development of recovery and reuse channels.

Results: Applied to the restructuring project for the former Sanofi headquarters and laboratories in Bagneux, **achieved 97% recovery of structural and finishing materials**.

Mobilize All Actors

Platform for Industry and Innovation at Caban Tonkin PIICTO – Marseille, Fos-sur-Mer, (Bouches-du-Rhône) (PIICTO, no date). An association of 38 members in industry, including the port authority, local authorities, public bodies, consular services, business clusters, etc. working for create a platform for pooling services and equipment and build more competitiveness through the exchanges of materials.

Results: Implemented channels for recovery of materials and more than a dozen new channels being studied. Also, hosted several demonstrators and pre-industrial pilot projects with €60 million investments in innovative projects for energy storage, renewables, CO2 capture and storage and the recovery of industrial by-products.

French Association of Private Enterprises (AFEP) (AFEP, 2019). Mobilizing large enterprises from business sectors around the circular economy.

Result: In 2015, a booklet on good practices was published presenting synergies with the climate. In 2017, 33 companies publicly adopted 100 commitments in relation to all levers of the circular economy that undergo annual monitoring.

3.4. DENMARK'S STRATEGY FOR CIRCULAR ECONOMY

In 2018, the Danish Ministry of Environment and Food and the Danish Ministry of Industry, Business and Financial Affairs launched a Strategy for Circular Economy, based on specific recommendations by government's Advisory Board for Circular Economy (Advisory Board for Circular Economy, 2017). The Strategy for Circular Economy is being implemented in the period 2018-2022_(Ministry of Environment and Food, 2018a). The aim is to enroll the business community, local authorities, regions, organizations, knowledge institutions, and citizens.

On June 2017, 27 recommendations, along with a vision, objectives, and points of orientation for the Danish business community, were presented. The Advisory Board for Circular Economy formed by the government along with the Confederation of Danish



Industry, the Danish Chamber of Commerce, the Danish Construction Association, and the Danish Agriculture & Food Council, is committed to this agenda.

The Danish government supported an offensive approach to create harmonized framework conditions among EU Member States. The circular economy is considered a very wide regional agenda that cross borders. Therefore, the roadmap in Denmark looks for a common approach with harmonized conditions to make possible to eliminate barriers and exploit the new opportunities.

A transition to a more circular economy is also considered important by the government to contribute to the attainment the Danish 17 UN SDGs plan of action. The focus of the document is on consumption of natural resources. The report states: "circular economy is about making growth sustainable".

The **Danish Circular Economy Strategy** contributes to the government program for an ambitious and sustainable green transition. It aims to create the right framework conditions to enable the business community to be frontrunners and all players in society – public along with private ones – support the environmental and economic potentials to be gained from the transition to a more circular economy.

Objectives committed by the business community's own ones are:

- from 2014 to 2030, increase resource productivity by 40 percent
- from 2014 to 2030, increase recycling from 58 percent to 80 percent.

The Danish Circular Economy Strategy contains six focus areas:

- (1) Enterprises as driving force for circular transition;
- (2) Data and digitalization in a circular economy;
- (3) Circular economy through design;
- (4) New consumption patterns through circular economy;
- (5) A proper functioning market for waste and recycled raw materials; and
- (6) Circular economy in buildings and biomass.

The definition for each of the six focus areas and the respective strategic initiatives proposed in the Danish Circular Economy Strategy are presented below. This provides a better understanding of the approach designed for practical implementation of the circular economy in the country's specific context.

(1) Enterprises as a driving force for circular transition

Costs of raw materials and processed materials make up almost a half of production costs in Danish industries. With the optimal use of existing technologies, it is expected that Danish industry could reduce material costs and corresponding savings in labor costs. On the other hand, a survey of 610 Danish small and medium-sized enterprises (SMEs) show that 51 percent find that they do not have sufficient knowledge about circular economy for using it in their enterprise, even though 88 percent of enterprises have a positive attitude to circular economy. In order to increase access to new markets and enhance competitiveness, enterprises will benefit from focusing on the development of circular solutions and services.

Three strategic initiatives are proposed to this area of action:



1. Promoting circular business development in SMEs

For incorporating circular economy for SMEs, the lack of knowledge and resources is considered an important challenge. Concretely, it was established to start a program to offer 50 percent co-financing for the procurement of consultancy from private experts to development, implementation and upscale of circular business models and co-financing machinery and equipment.

2. Setting up a single point of entry to the authorities for enterprises with circular business models

Current regulations also often do not take into account enterprises working across existing value chains. Circular economy enterprises with innovative business models meet new, and often more regulatory barriers. So, to provide a faster clarification whether a new technology, business model, or production method can be applied under current regulation, a one point of entry to authorities will be created for enterprises with circular business models.

3. Expanding the access to financing of circular business models

The government will create more options for finding financing for the creation, development, and maturing of circular business models by making is possible for the Danish green investment fund to provide guarantees to give to new green enterprises. Currently, capital green investments for enterprises is available from public and private investment funds, such as the Danish green investment fund (Danmarks Gronne Investeringsfond, no date), the Danish growth fund (Vaekstfonden, no date), and 'innovayt' market maturing program (Innovyat, date). In addition, innovation fund Denmark grants subsidies for the development of knowledge and technology.

(2) Data and digitalization in a circular economy

The digitalization and the use of big data, part of Industry 4.0 technologies, is expected to contribute to support the transition to a more circular economy through smarter consumption and improve the use environmental data to qualify decisions from public and private organizations. Massive amounts of data are constantly generated about different material flows that could create transparency for materials tracing in products and buildings. Data may also drive innovation for developing new solutions and services to the optimization of material flows, to reduce transport costs, waste collection, and also for sharing assets platforms between enterprises, contributing to productivity and savings. This is translated in many new technologies like: 3D print, Internet of Things (IoT), blockchain, robots and digital sharing economy platforms, and by the use of sensors to increase traceability and sorting of materials.

One strategic Initiative is proposed to this area of action:

Supporting digital circular options by commercial use of data and challenges

Is often difficult for enterprises to get access to relevant data to get the potential of digital technologies, especially for SMEs. To support the development of circular business, the government aims to release studies of using public and private data to promote circular business models and make it available. From this, two to three pilot projects are intended to be launched in association with experts and key public and/or private data owners. Also, government's existing platform with special focus generate innovative solutions on



green business will be expanded, as well as the statistics to improve Denmark's resource productivity.

(3) Circular Economy through design

Choices in the design phase of materials and chemicals are decisive for the lifetime of the product. Almost 80 % of the environmental burden of a product is decided in the design phase (European Commission 2020a).

Two strategic Initiatives are proposed to this area of action:

Incorporating circular economy into product policy.

The Danish government aims to enhance efforts to EU requirements for environmental qualities accounting, for both energy efficiency and circular economy for all product groups and phasing out of the use of substances of concern for human health or the environment that cause problems in materials reuse or recycling. Also, the government works to promote the circular economy agenda in eco-labels, like the 'Nordic Swan' (Nordic Ecolabel, no date) and the "EU Flower" (European Commission, 2020b).

• Boosting Danish participation in European work on circular standards.

The government will support the Danish Standards association involvement in the work of developing circular standards at EU level, in order to increase its influence in the EU development of standards for circular economy and protect Danish enterprises' interests.

(4) New consumption patterns through circular economy

Denmark aims to be among the frontrunners in green and circular public procurement. By extending and developing the partnership for green public procurement and by promoting the change in consumption patterns of enterprises, citizens, and the public sector. To make more attractive for designers and producers to think in circular terms and support the market for circular solutions and procurement of products and services by enterprises and public institutions.

Two strategic Initiatives are proposed to this area of action:

• Promoting circular procurement

A task force on green procurement is designated to study how to better include the environmental and economic consequences in green and circular products and services. Also, the on-line portal for responsible procurement should increase the focus on circular procurement to boost competency, transparency and knowledge-sharing among enterprises and public players (Udbudsportalen, no date).

Increasing focus on total cost of ownership in public procurement

The government aims to create new tools and improve existing ones, integrating total costs of ownership and life cycle assessments in the decision-making for public procurement and construction. Also, new guidelines in this area, to be developed to country's digital strategy for buildings, may contribute to ensure a better decision-making basis for public procurers and developers in relation to long-term economic conditions and environmental impacts.



(5) A proper functioning market for waste and recycled raw materials

Danish public authorities want to give the right incentives to ensure that the waste management sector has a proper functioning market for high-quality recycling raw materials in order to create a catalyzing effect on circular economy. To reach this goal, harmonized conditions to create a common playing field for enterprises across the country to have access to valuable wastes, opportunities for economies of scale, and competition for the best solutions.

Four strategic Initiatives are proposed to this area of action:

• Promoting more harmonized collection of household waste.

The government in cooperation with local authorities, industry associations, and the business community, commits to prepare common guidelines on sorting criteria and collection schemes for household waste, taking into consideration the differences between urban and rural communities, blocks of flats and single-family homes, and others, as well as the specific ambition level for recycling.

• Creating a level playing field on the market for waste and recycled raw materials.

By investigating how to gather in one same unit the administration and supervision tasks for waste and recycled raw materials, the government aims to have a more harmonized administration and proper enforcement of rules - both in national and international levels - to create equal terms of competition for enterprises.

Liberalizing Waste Electrical & Electronic Equipment (WEEE) management.

Governmental regulation for WEEE to facilitate the control of household waste collection and management services, through certified enterprises aiming to get the most of value from preserving products potential for reuse and WEEE materials for recycling.

Establishing a fund for the handling of regulatory barriers to circular economy

By establishing a fund for regulatory measures promoting circular economy, to be used for a focused follow-up to analyses on waste and bioeconomy. Also, to allow prioritizing circular economy implementation in connection with public utilities strategies, and others.

(6) Circular economy in buildings and biomass

In Denmark, some of the largest economic and environmental potentials for circular economy relies on building and construction sector and the food industry. A market can be strengthened if materials from buildings demolished and disassembled are recycled. Also, through biorefining can convert biomass from residues of agriculture, forestry, fishery, and food production into a diversity of inputs to the production of pharmaceuticals, food, feed, materials, and energy.

Three strategic Initiatives are proposed to this area of action:

Developing a voluntary sustainability class.

Creating a voluntary sustainability class in the building regulation may help improve resource efficiency in the building sector as well as the reuse and recycling of construction materials. Also, its intended to include construction materials embedded energy, impacting in reduction of total energy consumption. The development of this sustainability class also has the aim to accelerate the phasing out of substances of



concern in buildings, also increasing the extent and value of reuse and recycling of construction materials.

Propagating selective demolition.

Danish government together with the business actors are looking for ways to standardized demolition plans and capacitation to improve construction waste traceability, to reduce the loss and promote the reuse of construction materials in new buildings. This initiative aims to simplify for developers to comply with existing rules, improve communication with authorities, and expand the practice of "selective demolition" (Khrishna, R., 2009)4.

• Getting more value out of Biomass Strategy for Circular Economy.

In cooperation with the business actors, a governmental framework is the basis for the development of a long-term Bioeconomy strategy (Danish Agriculture and Food Council, 2019). The aim is to foster the creation of new market-driven value chains in the use of biomass and make Denmark among the international frontrunners, preventing food waste in the entire value chain and bring down the environmental burden from the entire food industry. To enhance the cooperation across the value chain and disseminate knowledge for public and private players a think-tank will be also established, inspired by the UN SDG on food waste, co-financed with private funds for four-year and self-financed in the longer term (Microbiome Support, no date).

Successful and relevant circular economy examples that can demonstrate the potential of circular business models and products already in place or under development in Denmark, that may be of interest for Brazil, Chile, Mexico and Uruguay are summarized in **Table 5** below.

TABLE 5: EXAMPLES OF SUCCESSFUL AND RELEVANT CIRCULAR ECONOMY INITIATIVES IN DENMARK

Enterprises as a driving force for circular transition

Promoting circular economy through higher education, research, development, and demonstration: Educational and research institutions are important to support the transition to a more circular economy. The **Ministry of Higher Education and Science** is discussing recommendations from the **advisory Board for Circular Economy** with the management of higher educational institutions. Also, the circular economy has a predominant place in the government's strategic investments in research "**RESEARCH2025**" (Ministry of Higher Education and Science, 2019). The finance act of 2018 allocated almost DKK 1 billion for research funds that may be used among others, within circular economy, in related areas like: green growth, bioresources, eco-innovation, green development and demonstration, energy technology development and demonstration and market maturing. **Since 2017, the Aarhus university established a research center for circular bioeconomy**.

Data and digitalization in a circular economy

Government Strategy for Denmark's digital growth: in January 2018, the government presented a **strategy for Denmark's digital growth** (Ministry of Industry, Business and Financial Affairs, 2018)

⁴ Involves the removal of selective parts of building in a process where the demolition activities are sequenced in such a way that it makes way for the separation of building materials and then sorting them out. Article Source: http://EzineArticles.com/2640905.



with the aim of creating the conditions for Danish enterprises including SMEs, take the opportunities on digitalization and **Ind. 4.0 technologies**.

Circular economy through design

Political agreement on **Joint Chemical Effort 2018-21**: In a joint effort between all the Danish parties, governmental investments were allocated **to enhance efforts against harmful substances in products**, **which can turn into a barrier to circular economy like PVC**. These investments will support enterprises' innovation with regard to substitution of undesired chemicals in production and products and to avoidance of substances with adverse effects on human health and the environment. To this aim, part of the initiatives is to expand the eco-label scheme and to support circular economy in plastics, specifically by following the **EU Plastics Strategy** (European Commission, 2018a).

New consumption patterns through circular economy

Government promotes circular economy through teaching: circular economy is already part of the Danish student's curriculum since childhood until high school. In 2018 Danish Government commit to take efforts to establish more contents and targets on the subject for new curriculum programs and also pursue a dialogue with stakeholders to increase circular economy in adult and vocational training.

A proper functioning market for waste and recycled raw materials

National plastics action plan and expansion of the deposit-return system: in 2018 the government released the **national plastics action plan** that proposes an **expansion of the deposit-return system** to used bottles for juices, expected to **increase recycling of plus 52 million plastic bottles/year** (Ministry of Environment and Food, 2018b).

Circular economy in buildings and biomass

Government measures promoting bioeconomy: in 2017 and 2018 the governmental is **funding a** pilot plant on biorefining of biomass from agricultural crops for the production of biogas, cattle feed, protein concentrate for high-performance feed, and also to the production of sophisticated biofuels. The aim of this pilot project is to qualify, optimize and demonstrate this technology, for the establishment of green biorefining plants around the country (State of Green, no date).

Industrial Symbiosis

Starting in 1972, a **landmark pilot project in Denmark** developed **the world's first industrial symbiosis park with a circular approach**. This predates the current concept of circular economy and has its formative roots in **Industrial Ecology**. The **Kalundborg Symbiosis** is a partnership between eleven public and private companies (KALUNDBORG SUMBIOSIS (no date). By having a local partnership, resources are shared and reused, and residue from one company's process becomes an input resource for another. The cycling of energy, materials and water reduces the impact of industrial process in environmental and the economic terms.

Waste Management for recovery

The regulations for waste management in Denmark used to give higher incentives to the incineration of waste at the expense of recycling (Danish Ministry of Environment, 2013). Now, the government is **proposing changes in order to create competition on equal terms**. Originally citizens could not legally take their products directly to a scrap dealer who might create value



by recycling. Therefore, the government proposed that local authorities' right of assignment and citizens' duty of use of municipal services are abolished. This is meant to **give enterprises a better opportunity to contribute to the new circular transition through take-back schemes or new innovative business models for recycling** (City of Copenhagen The Technical and Environmental Administration City Development, Sustainability, 2018).

3.5. SPAIN'S "ESPAÑA CIRCULAR 2030"

In June 2020 the Spanish Government published España Circular 2030, the new Strategy for Circular Economy in Spain until 2030 (Gobierno de España, 2018). It contains circular economy objectives and a series of strategic orientations for the period 2020-2030.

As with other national roadmaps, España Circular 2030 highlights the significant negative impact on resources and ecosystems, along with high levels of waste and emissions of greenhouse gas emissions. This sets up the need for creating a sustainable circular economy as a new basis to promote a new production and consumption model.

In this new circular model, the value of products, materials and resources are maintained within the economy for as long as possible, with minimal waste and reusing as much as possible the waste that cannot be avoided.

The strategy outlined below is designed to contribute to Spain's efforts to achieve a sustainable, decarbonized economy, which uses resources efficiently and is competitive. This strategy is to be brought about in successive three-year action plans.

The Strategy:

- 1. Sets up a series of objectives for 2020-2030 which will aim for a 30% reduction in the national consumption of resources and a 15% reduction in waste generation (as compared to 2010)
- 2. Contributes to Spain's efforts to transition to a sustainable, decarbonized, resource-efficient and competitive economy
- 3. Takes the form of successive three-year action plans providing for concrete measures to deliver on circular economy.

Key Sectors:

Given its importance both for the Spanish economy and society, certain economic sectors are subject to monitoring and follow up. These sectors are:

- a. Construction
- b. Farming, fishing and forestry
- c. Industry
- d. consumption goods
- e. Tourism
- f. Textile and garments

Challenges:



The help, participation and involvement of the entire society is needed. Not only the government but also all economic sectors (manufacturing, production, distribution and waste management), who have to incorporate research and innovation as key elements to achieve the intended goals.

In addition, social agents, and, even more importantly, consumers and citizens, must play a decisive role; their purchasing choices, as well as their waste separating habits will be fundamental.

Every three years, within the Governing Board, an assessment of the results, effects and impact of the Circular Economy Strategy and any related action plans will be made. This will help inform each subsequent 3-year plan.

Operating Principles:

España 2030 is based on the following operating principles.

- Protection and improvement of the environment
- Preventive action
- Decarbonization of the economy
- "Polluter pays" principle
- Health protection
- Rationalization and efficiency
- Cooperation and coordination between public entities
- Public participation
- Sustainable development
- Solidarity between people and territories
- Integration of environmental conscience in decision making
- Increasingly competitive economy
- Generation of quality employment.

Goals for year 2030:

- Reducing by 30% domestic material consumption in relation to national GDP, taking 2010 as a reference.
- Reducing waste by 15% with regard to 2010 waste levels.
- Reducing food waste throughout the entire food chain: 50% reduction per person in retail and households and 20% in production chains and supplies from 2020, thus advancing towards the Sustainable Development Goal (SDG).
- Promoting reuse and reuse enabling activities until reaching 10% of municipal waste.
- Reducing greenhouse gas emissions to under 10 million tonnes of CO₂eq.
- Improving water use efficiency by 10%.



Monitoring and Assessment Systems:

Spain is adopting the same indicators as the European Commission to assess progress towards a circular economy.

Every three years, within the Governing Board, promote an assessment of the results, effects and impact of the Circular Economy Strategy and any related action plans, although the first assessment shall be conducted once the First Action Plan is concluded.

The monitoring and assessment are to be based on ten indicators grouped in four stages and aspects of circular economy:

- 1. Producers and consumers
- 2. Waste management
- 3. Secondary raw materials
- 4. Competitiveness and innovation

The GHG contribution of the waste sector is also included.

At the time of writing this report, the Spanish roadmap was just 3 months old. The roadmap does not include any success stories, case studies and pilots. Therefore, we have chosen to report several initiatives in specific sectors that begin the transition towards a more circular economy.

TABLE 6: EXAMPLES OF SUCCESSFUL AND RELEVANT CIRCULAR ECONOMY INITIATIVES IN SPAIN

Textiles and Garments

The textile and garment sectors are included in "España Circular 2030" in part because it contributes 2.9% to Spanish GDP and it creates 4.1% of Spanish jobs. This sector includes a large number of SMEs and it is associated with significant negative environmental impacts from the intensive use or consumption of materials arising from the "fast fashion" trend. (Fast fashion is the rapid turnover of new, seasonal garment designs leading to intensive use of materials and resulting in a high level of waste of which only ~1% is recycled.) This is noteworthy because it is the only national roadmap studied which specifically highlights and responds to the well documented "fast fashion" trend worldwide. From 2025 it will be compulsory to implement a plan for separate collection and management of textile waste in Spain.

Tourism

Spain is reliant on **tourism** income to offset the country's trade deficit. Water resources are especially scarce near beach areas, and high waste levels exist in tourist areas. The challenges of managing this issue with a lower level of waste separation available at origin, as well as the continuous growth of inland tourism associated with nature, requires attention be placed on this sector for sustainability as well as circularity reasons.

EU Ecolabel

Fostering use of the **EU Ecolabel** as an important tool for Green Public Procurement. The Ecolabel is a voluntary instrument identifying products that have a reduced environmental impact throughout their lifecycle.

Energy Efficiency



The **Ministry of Energy, Tourism and Digital Agenda** has entered into an agreement with the Spanish Official Credit Institute to **fund actions focused on promoting energy efficiency in tourist accommodation**.

Waste Regulations

The European Union is currently revising the current **Framework Directive on Waste** and, once enacted, the Spanish regulations on waste management will need to be amended accordingly. For instance, new definitions are under discussion (i.e., municipal waste) with new objectives for reuse and recycling.

Moving Towards a New Plastics Economy

The business ambition for creating a new plastics economy is reported by eleven businesses. The report analyses the scope of the plastic industry for the Spanish economy, the planet and society, as well as policies at European and Spanish levels to move towards a new plastic economy. The report highlights as key challenges the trade-offs for companies and shows the best practices from different sectors (Ruiz, E., R. Canales and T. Fernandez, 2020).

Aragón Circular

Aragón Circular is a regional economic strategy that aims to boost the circular economy in the entire region of Aragon. Its objective is to **create a political**, **economic**, **and social framework** that will allow Aragon to move towards an innovative circular economy. The strategy is expected **to generate high-quality employment and provide the backbone for the territory** (Aragon Circular, no date).

3.6. SUMMARY OF FINDINGS

As a means to gather a comparative summary, **Table 7** provides an overview of the goals, objectives and prioritized sectors or focus areas per assessed country.

TABLE 7: COMPARATIVE MATRIX OF GOALS, OBJECTIVES AND PRIORITIZED INTERVENTION AREAS OF ASSESSED COUNTRIES

Country	National Goal or Main Challenge	Roadmap Objectives	Priority Business Sectors or Focus Areas
Finland	To effect systemic change in becomin g a leading country in the circular economy.	 Economy: The circular economy will be a new cornerstone for the Finnish economy Environment: Finland as a model country for the challenge of scarcity Society: From adapter to pioneer 	 (1) Sustainable Food System; (2) Forest-based Loops; (3) Technical Loops; (4) Common Actions; and (5) Transport & Logistics.





Country	National Goal or Main Challenge	Roadmap Objectives	Priority Business Sectors or Focus Areas
The Netherlands	To develop a circular economy in the country by 2050.	 Utilize raw materials in existing supply chains in a high-quality manner. For new raw materials, fossil-based, critical and nonsustainably produced raw materials are replaced by sustainably produced, renewable, and generally available raw materials New production methods, and new products are designed and organized differently. New ways of consumption are promoted. 	(1) Biomass & Food;(2) Plastics;(3) Manufacturing industry;(4) Construction Sector; and(5) Consumer goods
France	To move away from the throwaway society.	 A 30% reduction in the consumption of natural resources in relation to French GDP between 2010 and 2030. A 50% reduction in the amount of non-hazardous waste landfilled by 2025, compared to 2010. A 100% of plastics recycled by 2025. Avoid the emission of 8 million tons of CO2/year from plastic recycling. Create up to 300,000 additional jobs, including in new professions. 	(1) Better production;(2) Better consumption;(3) Managing our waste; and(4) Mobilizing all actors.
Denmark	To make growth sustainable	 Strengthen enterprises as a driving force for circular transition Support circular economy through data and digitalization Promote circular economy through design Change consumption patterns through circular economy Create a proper functioning market for waste and recycled raw materials Get more value out of buildings and biomass 	(1) Enterprises (SMEs); (2) Data and digitalization; (3) Design; (4) New consumption patterns; (5) Market for waste and recycled raw materials; and (6) Construction and biomass.



Country	National Goal or Main Challenge	Roadmap Objectives	Priority Business Sectors or Focus Areas
Spain	To promote a new production and consumption model	 Reduce by 30% domestic material consumption in relation to national GDP, taking 2010 as a reference Reducing waste by 15% with regard to 2010 waste levels. Reducing food waste throughout the entire food chain: 50% reduction per person in retail and households and 20% in production chains and supplies from 2020, thus advancing towards the Sustainable Development Goal (SDG). Promoting reuse and reuse enabling activities until reaching 10% of municipal waste. Reducing greenhouse gas emissions to under 10 million tons of CO2eq. Improving water use efficiency by 10%. 	(1) Construction; (2) Farming, fishing and forestry; (3) Industry; (4) Consumption goods; (5) Tourism; and (6) Textile and garments.

The application and implementation of circular economy principles begin to differ between countries based on their national sector prioritization.

Typically, a country will define a national goal or main challenge. Then specific sectors or key focus areas of the economy are selected to represent the main priorities of the economy.

Specific actions and pilot programs are then formulated with ways to monitor and measure the systemic changes achieved within these prioritized sectors and focus areas. Actions are assessed and applied in relation to the principles based on each country's unique national needs.



4. EU'S CIRCULAR ECONOMY ACTION PLAN

Particular attention is placed in the European Union's experience with the development and implementation of circular economy at the regional level. Lessons can be learned in order to stimulate regional cooperation on circular economy in Latin America.

4.1. EUROPEAN GREEN DEAL

Europe's new agenda for sustainable growth, the European Green Deal is the EU's strategy for a climate-neutral, resource-efficient and competitive economy (Aragon Circular, no date). The main objectives of this agenda are (1) to eliminate net emissions of GHGs by 2050, (2) to generate economic growth decoupled from resource use, and (3) to guarantee that no person and no place is left behind.

Starting in 2020, the European Green Deal Action Plan puts efforts to boost the efficient use of resources by moving to a clean, circular economy, restore biodiversity and cut pollution (European Commission, 2019a).

The European Commission's (EUC) new action plan for circular economy released in 2020 is one of the main blocks of the European Green Deal. The "Circular Economy Action Plan For a cleaner and more competitive Europe" is a future-oriented agenda for achieving a cleaner and more competitive Europe (European Commission, 2020c).

In co-creation with economic actors, consumers, citizens and civil society organizations, this action plan proposes initiatives for the entire life cycle of products aiming to ensure that resources are kept in the EU economy for as long as possible with maximum utility. To this aim, the plan presents a set of interrelated initiatives to establish a strong and coherent product policy framework for more sustainable products, services and business models, by promoting circular economy in product design, processes and new consumption patterns.

The new Circular Economy Action introduces legislative and non-legislative measures targeting key areas of action at the EU level, like:

- Make sustainable products the norm in the EU;
- Empower consumers and public buyers;
- Focus on the sectors that use most resources and where the potential for circularity is high such as: electronics and ICT; batteries and vehicles; packaging; plastics; textiles; construction and buildings and food, water and nutrients;
- Ensure less waste;
- Make circularity work for people, regions and cities,
- Lead global efforts on circular economy.

Priority will be given to address product groups identified in the context of the value chains featuring the Circular Economy Action Plan. The Commission aims to facilitate industrial symbiosis, supporting the sustainable and circular bio-based sector and promote the use of digital technologies for tracking, tracing and mapping of resources and promoting the uptake of green technologies.



The Commission (EUC) will also propose that companies substantiate their environmental claims using product and organization environmental footprint methods and test the integration of these methods in the EU Ecolabel, to also include more systematically durability, recyclability and recycled content in the criteria.

As part of the governance of the sectorial actions, the European Commission (EUC) will cooperate closely with stakeholders in 7 European key value chains:

- (1) Electronics and ICT;
- (2) Batteries and vehicles;
- (3) Packaging;
- (4) Plastics;
- (5) Textiles;
- (6) Construction and buildings; and
- (7) Food, water and nutrients.

More specifically:

- (1) **Electronics and ICT** The Commission (EUC) will present a 'Circular Electronics Initiative' mobilizing existing and new instruments for energy efficiency and durability, reparability, upgradability, maintenance, reuse and recycling, in line with a sustainable products policy framework and take back schemes to return or sell back waste electrical and electronic equipment WEEE.
- (2) **Batteries and vehicles** Commission (EUC) will propose a regulatory framework for batteries to enhance the sustainability for electro-mobility, creating rules on transparency for batteries manufacturing, ethical sourcing of raw materials and security of supply. It will foster regulations for the recycled content and to improve the collection and recycling rate as well as the phase out non-rechargeable batteries. Also, it will promote product-as-service business models and product design linked with end-of-life treatment to facilitate reuse, repurposing and recycling.
- (3) **Packaging** the Commission (EUC) will review the Directive 94/62/EC27 to ensure that all packaging on the EU market is reusable or recyclable in an economically viable way by 2030, to reinforce the mandatory essential requirements for packaging to: reduce (over)packaging and packaging waste, to improve design for re-use and recyclability of packaging and to reduce the complexity of packaging materials. Part of the initiative is to harmonize separate collection systems and rules for the safe recycling into food contact materials.
- (4) **Plastics** the Commission (EUC) will propose mandatory requirements for recycled content and waste reduction for plastics in most relevant products such as packaging, construction materials and vehicles and ensure the implementation of a new directive on single use plastic products. It looks also to address the microplastics environmental issues by developing restrictions, labelling, standardization, certification and regulatory measures and harmonizing data assessment methods. Also, emerging sustainability challenges in the use of biodegradable or compostable plastics and in sourcing, labelling and use of bio-based plastics may be addressed in a specific policy framework.



- (5) **Textiles** the Commission (EUC) will propose a comprehensive EU Strategy for Textiles, based on input from industry and other stakeholders by developing eco-design measures, ensuring the uptake of secondary raw materials and tackling the presence of hazardous chemicals. Also, by providing incentives and support to product-as-service models, circular materials and production processes to increase sorting, re-use and recycling of products. Also, improving regulatory measures such as extended producer responsibility will support to achieve higher levels of separate collection of textile waste.
- (6) **Construction and buildings** Commission (EUC) will launch a new comprehensive Strategy for a Sustainable Built Environment to ensure greater coherence across the relevant policy areas such as climate, energy and resource efficiency, management of construction and demolition waste, accessibility, digitalization and skills. This may consider the introduction of recycled content requirements for certain construction products, improvements in the durability and adaptability of built assets and the development of digital logbooks for buildings, integrate life cycle assessment in public procurement and the EU sustainable finance framework, and the revision of material recovery targets set in EU legislation for construction and demolition waste.
- (7) **Food, water and nutrients** The Commission (EUC) aims at a Bioeconomy Strategy and Action Plan to ensure the sustainability of renewable bio-based materials. It will also propose a target on food waste reduction to address comprehensively the food value chain, as a key action under the forthcoming EU Farm-to-Fork Strategy. Also, a legislative initiative on reuse to substitute single-use packaging, tableware and cutlery by reusable products in food services. The Commission will also consider reviewing directives on wastewater treatment and sewage sludge develop an Integrated Nutrient Management Plan, to stimulate the markets for recovered nutrients. A Water Reuse Regulation aims to also bring improvements in water reuse in agriculture and facilitate water reuse and efficiency in industrial processes.

The EU Circular Economy Action Plan looks for steering the impacts of the circular economy to different sectors, countries and markets resulting from changing trade and investment patterns, volumes, and interdependencies, in the aim of getting positive social and environmental consequences. It commits to foster transformative change by leading the way to a circular economy at the global level, through influence, expertise and financial resources (European Commission, 2020d).

4.2. EU'S INTERNATIONAL CIRCULAR ECONOMY LEADERSHIP

Under the right enabling conditions and investments, it is expected that the circular economy implementation in developing countries could provide new opportunities beyond waste management and recycling, for more economic diversification, value creation and skills development, helping to leapfrog to more sustainable technologies in production and consumption patterns (Chatam House, 2019).

The EU Commission staff working document 'Leading the way to a global circular economy: state of play and outlook' presents actions related to the international dimension of circular economy that may be of more interest to the implementation of the circular economy in Latin America region especially regarding the countries of Brazil, Chile, Mexico and Uruguay (European Commission, 2020c).



EU multinational companies operate with global supply chains, many of them starting with suppliers in developing countries. The EU Circular Economy Action Plan will setup standards related to recyclable waste, trade in minerals and other material resources that apply across global value chains, especially for raw materials exports and global value chains. By working with developing countries EU aims to secure access to more sustainable raw materials, to reduce global environmental impacts, especially concerning the supply risk and resource dependency.

The Action Plan calls for promoting the global circular economy transition systematically including in the EU's multilateral policy dialogues, as well as in international and in multilateral environmental agreements. In 2018, to facilitate the EU's engagement in relevant environmental activities, EU has launched a three-year partnership Instrument support contract for 'Environmental Diplomacy in G7/G20' (European Commission, 2017a).

In the Scope of the action plan, the EU Commission will propose a Global Circular Economy Alliance to identify knowledge and governance gaps in advancing global circular economy and take forward partnership initiatives, including with major economies. The Alliance may also be of use in supporting the circular economy transition through multilateral forums such as the G7/G20. For developing countries, this can be especially important regarding policies and practices for a more just transition towards circular economy, such as promoting green and decent work.

EU Commission also intends to initiate discussions on an International Agreement on the Management of Natural Resources (Council of European Commission, 2019). This effort will foster the creation of international rules on waste prevention and management, extended producer responsibility, product design or consumer information, and other approaches. Part of this agreement includes the establishment of specific national circular economy action plans, in alignment with the global aims of SDG Decent Work and Economic Growth target 8.4: 'Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programs on sustainable consumption and production, with developed countries taking the lead'.

In this direction, there are efforts to an international agreement covering the whole plastics life cycle (design, production, logistics, consumption, and waste stages) in line with the European Plastics Strategy to contribute to tackling the global efforts on preventing plastic pollution, including all types of microplastics. Since 2018, the Commission has adopted a comprehensive European Strategy for Plastics in Circular Economy (COM (2018) 28), followed in 2019 by the Directive (EU) 2019/904 of the European Parliament to address intentionally added and unintentionally released microplastics (European Commission, no date).

In **Table 8** below some relevant multilateral initiatives are presented that are aligned with the scope of the EU Circular Economy Action Plan and which are important to take into account as these all contribute to influencing the international agenda regarding circular economy understanding, are enablers to move toward a global governance around the topic, and enable the EU to position itself as a leading region to exert international influence that will impact the project countries' trade, commercial, economic, and other geo-political interests.



TABLE 8: MULTILATERAL INITIATIVES ALIGNED WITH THE EU CIRCULAR ECONOMY ACTION PLAN

The 10 Year Framework of Programs on Sustainable Consumption and Production Patterns (10YFP) (One Planet, no date)

Also known as the **One Planet Network**, is a global framework of action to enhance international cooperation to accelerate the shift towards sustainable consumption and production (SCP) in both developed and developing countries. It is composed of six programs on (1) Sustainable Public Procurement (SPP), (2) the Sustainable Tourism Program (STP), (3) the Consumer Information for Sustainable Consumption and Production (CI-SCP) program, (4) the Sustainable Buildings and Construction program (SBC), (5) Sustainable Food Systems and (6) the Sustainable Lifestyle and Education (SLE). **The EU financially supports the 10YFP Secretariat**.

The Partnership for Action on Green Economy (PAGE) (Partnership for Action on Green Economy (no date).

It is a mechanism to **coordinate UN action on the green economy** and to help countries achieve and monitor the emerging Sustainable Development Goals, especially SDG 8 'Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all'. **The EU is one of the main PAGE financial supporters**.

The Platform for Accelerating the Circular Economy (PACE) (Platform for Accelerating the Circular Economy (no date)

A public-private collaboration to create systems change at speed and scale to help partners to: (i) develop blended financing models for circular economy projects, in particular in developing and emerging economies; (ii) create and adjust enabling policy frameworks to address specific barriers to advancing the circular economy; and (iii) bring the private and public sector into public-private collaborations to scale up the impact of circular economy initiatives. The World Economic Forum (WEF) hosts and facilitates the Platform, and the EU Commission is represented in the PACE Steering Committee.

The Extractive Industries Transparency Initiative (EITI) (The Extractive Industries Transparency Initiative, no date)

A global standard established to promote the open and accountable management of oil, gas and mineral resources, the EITI Standard requires the disclosure of information along the extractive industry value chain from the point of extraction, to how revenues make their way through the government, and how they benefit the public. It seeks to strengthen public and corporate governance, promote understanding of natural resource management, and provide the data to inform reforms for greater transparency and accountability in the extractive sector. In each of the 53 implementing countries, the EITI is supported by a coalition of government, companies, and civil society. The EU Commission is represented as an observer to the EITI Board.

The Green Initiative of the International Labor Organization (International Labour Organization, no date)

It concentrates on three important areas: (i) advance research and understanding of the challenges and opportunities for the world of work arising from a green transition; (ii) forge policy responses in all sectors to ensure decent work and social justice for all; and (iii) build strategic partnerships at national, regional and international levels. The Green Initiative seeks to understand the challenges and opportunities of the coming transition. It provides a platform of knowledge and research to further build the case that decent work approaches and social dialogue are indispensable for truly transformative change.

UNEP's Special Program (United Nations Environment Programme, no date).



Also known as the **Chemicals and Waste Management Program**, it provides support to developing countries and countries with economies in transition to enhance their **sustainable institutional capacity to develop**, **adopt**, **monitor and enforce policy**, **legislation and regulation for effective frameworks** for the implementation of the Basel, Rotterdam and Stockholm Conventions, the Minamata Convention and SAICM (Strategic Approach towards International Chemicals Management).

4.3. EU'S STRATEGIC INSTRUMENTS FOR ENGAGEMENT WITH INTERNATIONAL PARTNERS

For promoting key circular economy policies and approaches internationally, the EU intends to use its extended external relations network and its global 'soft' power. There are tools and approaches for circular economy that offers important opportunities also for the countries in Latin American region (LATAM):

- Policy dialogues, trade, technical and financial assistance and investments as part of its broader efforts to promote climate neutrality and sustainable development;
- Alignment, where appropriate, with EU norms and standards, product policy (including eco-design);
- New business models, resource-efficient production and uptake of clean technologies;
- The sound management of chemicals;
- Ambitious waste prevention and management measures (including through waste prevention and management plans aligned with the waste hierarchy and circular economy objectives; targets for recycling of key waste streams and reducing landfills; extended producer responsibility schemes and deposit return schemes for plastic products and packaging);
- Sustainable consumption and consumer information (including through the product environmental footprint method, to enable companies to optimize their operations, avoid green washing and ensure consumers' informed choices);
- Strategies for action in priority sectors (e.g. plastics, textiles, buildings); and
- Up-skilling and re-skilling in a way that responds to the needs of the circular economy.

Policy Dialogues and Green Deal Diplomacy

Policy dialogues can have beneficial effects in strengthening ties of European green businesses in developing markets, as many European businesses are leading efforts in circular economy and resource and energy efficiency methods and technologies. For example, in 2017 the EU developed the Latin America-EU Mineral Development Network Platform (Mineral Platform, no date). The EU formal and informal policy dialogues with developing countries and regions, are also considered key to advance the transition in the context of free-trade agreements as part of European Green Deal diplomacy efforts.

Implementing the circular economy holds socio-economic and ecological potential benefits for cooperation with developing regions. In Latin America, the EU missions for cooperation on resource efficiency were successful in 2016 to Chile, in 2017 to Colombia,



in 2018 to Peru and in 2019 to Mexico and new circular economy missions to Brazil and Costa Rica are envisaged for 2021 (European Commission, 2020e).

Joint Strategy on Aid for Trade (AfT)

Regarding new EU trade agreements, in 2017 the updated Joint EU Strategy on Aid for Trade (AfT) (European Commission, 2017b) embedded the principles of circular economy and environmental sustainability. The strategy calls for a responsible trade policy in line with the 2030 Agenda for Sustainable Development offering developing countries opportunities in trade, growth and employment while enhancing ecological and societal resilience. In this direction, free trade agreement (FTA) between the EU and its trading partners can be built on synergies with existing formal policy dialogues on the environment and on circular economy-related cooperation activities. In LATAM, active dialogue and cooperation on circular economy is already ongoing with many EU FTA partners including Mexico, Chile, Colombia and others (European Parliamentary Research Service, 2018).

External Financing Instruments

Furthermore, through its external financing instruments in line with SDG 12 of UN 2030 Agenda, the EU helps partner countries manage their resources more sustainably and adopt sustainable consumption and production practices. Some of the key initiatives contributing to circular economy on which future EU action will build are listed in the table below.

TABLE 9: KEY INITIATIVES CONTRIBUTING TO EU CIRCULAR ECONOMY ACTION PLAN

"Reducing plastic waste in the Americas - Ensuring sustainable consumption and production patterns" (European Commission, 2019b)

A €5 million project to activities in the target countries (**Brazil, Chile, Colombia as well as Canada**) to help reduce plastic waste. This project targets to promote the extended producer responsibility, address discarded fishing gears, support sustainable plastic production, green public procurement and others. See: https://ted.europa.eu/udl?uri=TED:NOTICE:170123-2020:TEXT:EN:HTML&src=0

"Low Carbon and Circular Economy Business Action in the Americas" (Low Carbon Business Carbon in Brasil, no date)

Targeting Canada, Brazil, Mexico, Chile, Colombia and Argentina, the project mobilizes European industrial clusters and builds on the low carbon business action pilot phase in Brazil and Mexico (which ran from 2014- 2019 with a budget of €12 million). It aims to provide business support to companies in the region, that use low carbon and circular economy related technologies and services and help limit/reduce greenhouse gas emissions in line with the Paris Agreement. See: http://www.lowcarbonbrazil.com.br/announcement-of-the-launching.php

"Strategic Partnership for the implementation of the Paris Agreement in major economies" (SPIPA) (International Climate Initiative, 2020)

Project aims to strengthen EU bilateral policy and technical dialogues on climate and energy policy with 15 non-European major economies, including **Argentina** and **Brazil**. From 2018-22 the €20 million project aims to promote European investment in support of the Paris Agreement and to increase public awareness. See: https://www.international-climate-initiative.com/en/details/project/strategic-partnerships-for-the-implementation-of-the-paris-agreement-spipa-17 1 364-2993



"Natural Capital Accounting and Valuation of Ecosystem Services" - UN System of Environmental Economic Accounting (SEEA, no date)

Project was launched in 2016 aims to support EU's circular economy and biodiversity protection priorities in **Brazil**, China, India, **Mexico** and South Africa. Under this €7 million project, the EU and the UN Statistics Division (UNSD) work together **to build on existing natural capital assessment systems and develop new tools and approaches** to better quantify the economic benefits that ecosystems and biodiversity provide. See: https://seea.un.org/home/Natural-Capital-Accounting-Project

"International Urban Cooperation" (IUC) (European Commission, 2019c)

Launched in 2015, in a €30 million program to support international **city-to-city pairings between European cities and their international counterparts**. Together, these cities can be frontrunners in proposing integrated sustainable urban development strategies that **chart the path to a circular economy**.

https://iuc.eu/solutions/?s_title_o=circular+economy&s_country=&s_provider_name=&c=filter

World Benchmarking Alliance (WBA)(World Benchmarking Alliance, no date)

By 2023, the multi-stakeholder platform supported by EU will assess the progress of 2,000 companies across seven major areas: social, digital, circular, food and agriculture, urban, financial, decarbonization and energy, having as its core mission **the promotion of dialogue and action around the role of business in achieving the SDGs**. The main objective is the creation of a widely accepted benchmarking framework that can be used for comparing companies' performance and impact towards the achievement of the SDG's including the empowerment of consumers and investors constituencies towards sustainable choices. See: https://www.worldbenchmarkingalliance.org/circular-benchmark/

"SWITCH to Green" initiative (Switch to Green, no date)

Provides a model on which to build for future cooperation on circular economy in promoting enabling policy frameworks and green business with focus on key value chains. The initiative is implemented in partnership with international organizations such as UNEP and UNIDO, government counterparts in partner countries, private sector actors – in particular micro, small and medium size enterprises – and civil society. The main ongoing actions supported by the EU in the context of this initiative include Partnership for Action on Green Economy (PAGE) as well as SWITCH Asia, SWITCH Med, SWITCH Africa, SWITCH to Circular Economy Value Chains. See: https://www.switchtogreen.eu/?p=2141

International Platform on Sustainable Finance (IPSF) (European Commission, 2018b)

The IPSF connects the EU with third countries willing to exchange best practices and coordinate their approaches on sustainable finance. The IPSF scope covers different frameworks and tools of capital markets that are key for investors to identify and seize green investment opportunities, such as in green taxonomies, climate-related disclosures, standards and labels for green financial products. Along with the European Union, other countries are part the IPSF including LATAM countries like Argentina and Chile. See: https://parispeaceforum.org/?s=circular+economy



5. LESSONS LEARNED FROM THE SUCCESSFUL CASE STUDIES

This Chapter includes an analysis of the elements identified as lessons learned in different country contexts as discussed in **Chapter 3**, related to the main sectors or intervention areas of relevance for the four project countries. This analysis provides an overview of the most instructive and relevant learnings to allow for a deeper understanding of issues of relevance for a successful implementation of circular economy plans and projects.

The main issues are analyzed either from a regional, national, or project level perspective and highlighted as key recommendations to be taken into account or to be addressed in circular economy plans and projects.

All comments and references to 'Regional Level' in this section of the report are based on analysis of the European Union.

This analysis includes the identified conditions and opportunities that influenced the process of implementation of these international successful circular economy initiatives. It also considers the main challenges and barriers and the policies and incentives/measures taken for their implementation, which may be relevant to the four project countries. The main results and benefits reported in these initiatives and their intersection with the compliance with the NDC and SDGs endorsed by each country are also identified.

5.1. ANALYSIS OF THE CONDITIONS AND OPPORTUNITIES FOR SUCCESS

5.1.1 REGIONAL LEVEL

Based on the assessment of the European Union's experience, the main **conditions and opportunities** identified as means for successful implementation of the circular economy at the **regional level** are:

- (1) Fostering governmental support;
- (2) Coordinating co-related regulations in different areas;
- (3) Create platforms to support stakeholders; and
- (4) Establishing new and harmonize common waste management targets and requirements.

The above points are mainly derived from the European Union experience (as an economic zone as well as a geographic region leading the circular economy transition). A brief description is provided of why these four pre-conditions are important for enabling a regional effort (in this case relevant for the Americas as a region) toward circular economy.

(1) Foster governmental support

In 2015, the leadership of the European Commission, in particular the Vice-Presidents and Commissioners recognized that a circular economy strategy has the potential to foster economic growth and this was the keystone to push forward and accelerate action towards circular economy planning and support for projects in the region. This indicates that leadership is critical within a pertinent regional organization/institution.



(2) Coordinate co-related regulations in different areas

The European Circular Economy Action Plan of 2015 was one of the first blueprints for implementing circular economy policies across Europe and abroad. Additional policies, such as the recently launched 'European Green Deal' (December 2019) and the 'new Circular Economy Action Plan' of 2020 help to maintain the momentum, broaden and deepen the European circular economy agenda.

The Circular Economy Action Plan from 2015 contained targets and introduced new obligations for landfill, reuse, and recycling, mapped out 54 actions, as well as four legislative proposals to be met by 2030 and 2035, such as separate collection of municipal textiles and biowaste. Before that, many other EU initiatives and legislation already addressed to a certain extent, the sustainability aspects of products, either on a mandatory or voluntary basis. Examples are the 'Roadmap for a Resource-Efficient Europe' from 2011 aiming at decoupling resource consumption from economic growth and the 'European Resource Efficiency Platform' (EREP) from 2012, advocating for a transition towards a circular economy and the EU's Circular Economy Package in 2014, built upon the Resource Efficiency Roadmap.

This observation indicates that there is a need for a continuous evolution and coordination of policy development and related regulatory framework to stimulate and enable actors at the regional level to engage in circular economy practices.

(3) Create platforms to support stakeholders

After the Circular Economy Action Plan (CEAP) was presented in 2015 by the EU Commission, several platforms were created, for instance, in 2017 the European Circular Economy Stakeholder Platform and the Circular Economy Finance Support Platform. Platforms are observed to be essential instruments to enable the extensive engagement with various actors and stakeholders and build a common vision and strategy to enable concerted action.

(4) Establish new and harmonize common waste management targets and requirements

Based on the EU road mapping process, it is observed that waste directives are being adopted at EU level as an incentive towards circular economy implementation. New recycling targets at municipal level for all EU member States indicate a requirement of 55 percent recycling rate by 2025, progressively increasing to 65 percent by 2035. Also, packaging recycling must reach 65 percent by 2025 and 70 percent by 2030. A set of specific new requirements for extended producer responsibility on packaging waste are planned to start in 2025 and for source-separation of organic waste to start in 2023.

In this case it is clear that top-down decisions are made, demanding EU member states to comply with targets and requirements. As the European Union as a union is bounded to clear rules and laws, these decisions become enforceable. In the Americas due to the lack of such a formal legal structure it is very difficult to enforce region-wide targets and objectives toward circular economy. Nevertheless, through the creation of regional voluntary platforms and policy dialogues, common targets, interpretation and action on circular economy deployment can be stimulated.

5.1.2 NATIONAL LEVEL

The main issues of relevance relating to conditions and opportunities for successful implementation of the circular economy at the national level are:



- (1) Acknowledging the circular economy in supporting the achievement of the SDGs and NDCs;
- (2) Seizing opportunities in green technologies, circular business models, and new sectors of the economy;
- (3) Promote more resource productivity;
- (4) Implement new policies to improve market competitiveness for wasted materials recovery; and
- (5) Build common cross-border harmonized frameworks to incentivize business.

The five factors or issues of relevance to the project countries are further described below.

(1) Acknowledging the potential of circular economy in supporting the achievement of the SDGs and NDCs.

Several of the nations assessed acknowledge the circular economy as a new national development strategy that allows for rethinking the production and consumption patterns and effectively respond to the sustainable development goals (SDGs). From a climate change mitigation perspective applying the circular thinking to production processes and value chains is also beneficial as a recent study indicates that in total, an estimated 67% of global greenhouse gas emissions are related to material management (The Circle Economy, 2018).

This statistic includes all global greenhouse gas emissions, with the following categories excepted: passenger transport by cars, trains and planes; heating and cooling of houses; and any energy used for personal care like washing machines or razors. What is included is the impact of all emissions to extract resources, to refine them, to move them around (logistics) by ocean vessels, planes or trucks and to process them at end-of-use. The majority of these emissions stem from the extraction, processing and production stages

For example, in Denmark's circular economy plan, the government as well as society in general explicitly acknowledge that the current standard of living in the country is not sustainable for everyone in the planet. This is due to a very high consumption of natural resources. At the same time, the government is pursuing policies ensuring continuous economic growth. Denmark acknowledges the value and relevance of the circular economy framework as a path towards sustainability and chose to use this as the national development strategy to a more sustainable growth. Now, many public institutions are actively engaged in circular economy as a way to rethink the production and consumption patterns and are working to implement the plan of action to contribute to the attainment of the 17 UN Global Goals, including combating climate change.

(2) Seize economic opportunities in green technologies, circular business models, and new sectors of the economy.

Several assessed nations understand and recognize the circular economy's value in opening up and seize new business and economic opportunities. But among all, based on the reviewed circular economy roadmaps and plans, the nation that most clearly outlines its understanding of the linkage between circular economy and new business opportunities is **Denmark**.



An important observation is that those parts of the business community that are applying circular thinking for product design, new business models, and increased recycling, see circularity as an opportunity for competitive advantage to 'get more value out of less resources' and are considered front-runners in their respective sectors.

Again, based on the circular economy plan of Denmark, it is clear that both the public and private sector leadership understands and sees opportunities to create and/or expand new economic sectors in their economy in sectors like bioeconomy, sustainable construction, and resource-efficient production. Also, the rapidly growing global market for green technologies and services is considered an opportunity to maintain a high level of competitiveness of enterprises.

The **construction sector** alone accounts for around a third of all waste arising in Denmark, with great economic and environmental potential for improvement in this sector. The **food industry** in Denmark has identified market opportunities for bio-refineries using biomass from cropping systems that produce large volumes of waste. In addition, preventing food waste could reduce costs and bring down the environmental burden from the entire value chain.

(3) Promote more resource productivity.

Another important issue found across the analyzed countries is the need for the increase in resource productivity. Even with relatively high resource productivity, as found in countries like **Denmark**, there is still space for improvement. For example, the raw materials and processed materials make up almost **half of production costs** in Danish industries and it is estimated that the industry could reduce material costs by 3.3. billion USD (DKK 21 billion) by applying existing optimization methods and technologies (Ministry of Environment and Food, 2018b).

(4) Implement new policies to improve market competitiveness for wasted materials recovery.

Creating value and a domestic market for secondary materials is among the common objectives identified in the assessed countries. Most are looking into policies and mechanisms to send proper pricing signals and explore technological solutions to close the loop of material flows and enabling the recovery/recycling of a wide variety of materials (waste).

The **Danish Strategy for Circular Economy from 2018**, has close correlation with the Danish 'Utilities Strategy' from 2016 (OECD, 2019) where government is looking to harmonize regulations to promote a better utilization of wasted materials across the whole country. This aims to create a more competitive market and better access to recyclable waste instead of waste incineration. This can also break down the barriers to establishing larger sorting plants to increase the segregation of recyclable waste as well as to make it easier for enterprises to establish take-back schemes and pursue new innovative solutions for recycling.

(5) Build common cross-border harmonized frameworks to incentivize business.

Most of the assessed roadmaps/plans include specific reference to the need for harmonization of frameworks (beyond the national regulatory framework), this in part because all six analyzed countries are EU member states and are therefore subject to the



European Commission's ongoing efforts on promoting the circular economy at the regional level.

Circular economy entails a very broad agenda across administrative borders, so having a common harmonized framework both domestically as well as in par with regional and/or international frameworks is key to ensure the conditions for its proper implementation and also a precondition to incentivize the commitment from the business community. This is particularly important for export dependent economies and sectors.

5.1.3 SECTOR LEVEL

The main issues of relevance relating to **conditions and opportunities** for successful implementation of the circular economy at **the sector level** are:

- (1) Implement platforms for monitoring, improvements and collaboration across a sector;
- (2) Alignment of local business with global programs and guidelines;
- (3) Cooperation across sectors government, governmental agencies and private; and
- (4) Bring together existing business communities focused on more sustainable practices.

These four main factors are further elaborated below.

(1) Implement platforms for monitoring, improvements and collaboration across a sector.

Facilitating cooperation within prioritized sectors, either through platforms or sectorial working groups, is an important enabler for the adoption of circular economy principles and activities within a sector.

A good example is the **Dutch diary sector** which includes one of the world's largest dairy cooperatives willing and able to cooperate with other organizations to monitor and protect the biodiversity of land area with dairy activities. Engagement with such representative groups, associations or cooperatives in a prioritized sector on circular economy deployment can be an effective means to jump-start or accelerate the transition toward circular economy.

Although not directly titled as a circular economy initiative, to measure the dairy Sustainable farming's influence on the environment, the Dairy Chain (Biodiversiteitsmonitor, date) and FrieslandCampina cooperative with no the Worldwide Fund for Nature's Netherlands office (WNF) and Rabobank (FrieslandCampina, 2017). developed the 'Biodiversity Monitor'. This is a new method for mapping the measures taken by the dairy farming sector to protect biodiversity. In the Netherlands, over 75% of all dairy farmers are members of FrieslandCampina, one of the world's largest dairy cooperatives with 17,413 members dairy farmers in the Netherlands, Belgium and Germany. Many dairy farmers are already committed to protecting meadow birds, farmland nature, and reducing the impact on the environment. In 2016, 64% of dairy farmers indicated that they were involved in some way in nature management. According to FrieslandCampina (FrieslandCampina, no date,a), dairy farming covers two-thirds of the Dutch land area and this makes it the largest habitat for flora and fauna.

(2) Alignment of local business with global agendas and guidelines.

An important observed issue is the need for local businesses to align with and enabled their response to global agendas, such as the UN Sustainable Development Goals (SDGs).



Analyzing further the case of the Netherland's 'Biodiversity Monitor', this is aligned with the guidelines of the UN's Food and Agriculture Organization - Livestock Environmental Assessment and Performance Partnership (FAO-LEAP) (FAO, no date). This is a multistakeholder initiative that seeks to improve the environmental sustainability of the livestock sector through harmonized methods, metrics, and data, contributing to the achievement of the 2030 Agenda for Sustainable Development and the Paris Agreement.

It is important to make sure circular economy initiatives are aligned with existing global agendas and multilateral agreements to secure the necessary international funding and technical support to enable the transition to a global circular economy. This in particular is relevant for local businesses operating in a highly globalized and inter-connected supply chains, in particular businesses dependent on access to the European Market.

(3) Cooperation across sectors - government, governmental agencies, and private.

Public-Private-Partnerships (PPPs) may be an effective approach to bring about circular economy understanding, cooperation, development and deployment within sectors of interest. Such cooperation can lead to having next to the technical know-how and the specific real-case sectorial demand by involving companies, also the institutional and financial backup of public agencies and local authorities to facilitate implementation.

A good example in **Finland** is the LARA (Laatulannoite, no date) quality nutrient project which was implemented from 02 July 2018 to 29 February 2020. The project developed a Quality Assurance System (QAS) for recycled nutrient products in biogas and composting and other similar plants. After pre-studies in 2017, the project named "Lara laaturavinne" received financing of about 176,500 USD (€ 150,000). In 2019, the quality system pilot was tested in four different companies resulting in an empirically proven solution for the sector. The main sponsor of the project was the Ministry of the Environment, Sitra (SITRA, 2019c) and nine companies operating in this sector. The project was implemented in cooperation with the national Waterworks Association (FIWA).

(4) Bring together existing business communities focused on more sustainable practices.

The matchmaking of proactive business communities that aspire to more sustainable practices may be an effective approach to incentivize the adoption and implementation of circular economy inspired solutions in sectors of interest. Generally, these business communities are more receptive to groundbreaking approaches such as learning about the circular economy principles and business models.

Another good example from **Finland** is the Urban Food change project (Smartclean, no date,b) which aims to create markets and digital marketplaces for local food producers. Aimed especially in the urban environment, in accordance with sustainability principles, eliminating food waste and promoting nutrient cycles. The project started in Helsinki, involved fourteen companies and five local communities producing complementary urban food services. The solutions focused particularly on utilizing local production and industrial surpluses, as well as streamlining logistics.



5.2. IDENTIFICATION OF THE MAIN CHALLENGES AND BARRIERS

5.2.1 REGIONAL LEVEL

The main issues of relevance relating to **challenges and barriers** for successful implementation of the circular economy in **a regional level** are:

- (1) Lack of a more comprehensive set of standards and regulations;
- (2) International regulations and standards for materials flows are not in place; and
- (3) Misconception of circular economy can slow down a broader adoption.

These three key challenges and/or barriers are further elaborated below. Please note that these same identified challenges and barriers are also applicable at other levels (national and sectorial).

(1) Lack of a more comprehensive set of standards and regulations.

Based on the assessment of the EU's circular economy action plan, a more comprehensive set of requirements is needed to ensure the gradual improvement of the sustainability and circularity of products procured and used on the EU market. The European Commission is in the process of improving the coherence between the chemicals, products, and waste related legislations. Technical barriers to recycling caused by the presence of certain chemicals in products is also identified as a challenge that needs to be addressed.

This evolving process is relevant to the project countries as new EU product standards (which highly probably will include circularity requirements) and other quality requirements will be introduced and potentially become the new quality standards for access to the European market. Within the Americas there is also the challenge of not having harmonized understanding or product quality standards to create a level-playing field for local proactive or front-runner businesses to compete and access regional markets.

(2) International regulations and standards for material flows are not in place.

For the effective closing of material loops or justifying the recovery of used materials there is a need for a regional or international regulatory framework that enforces the wide-scale adoption of protocols or standards for post-use recovery of materials (waste) in a variety of sectors.

An interesting approach proposed by **the Danish Roadmap** and **the Dutch Roadmap** is the development of international standards for materials flows in the building sector, like the 'buildings materials passport' (BAMB, 2020) for a more systematic management and removal of materials and substances of concern. Such an international standard is not in sight for the short term, even though this is key for the recycling of construction materials and a reduction of costs for buildings maintenance and renovation.

(3) Misconception of circular economy can slow down a broader adoption.

In several EU Member States the understanding of a circular economy still remains low, particularly outside of environment ministries in the national capitals. The misconception that the circular economy is purely an environmental related policy creates reservations whether it can secure a place on the political priorities of the EU Commission.



Without a common understanding and level of priority or urgency to circular economy beyond the leading ministries within the national governments, the deployment of activities to achieve EU-level targets and objectives may be hampered and slowed down. This is in particular relevant to key actors involved in the waste management sector, which in most countries are managed and funded via decentralized public authorities.

5.2.2 NATIONAL LEVEL

The main issues of relevance relating to **challenges and barriers** for successful implementation of the circular economy at a **national level** are:

- (1) Established regulations that favors markets where the value of waste materials is lost;
- (2) Lack of access to knowledge and investments for companies and SMEs;
- (3) Procurement of products and services are based on purchase price;
- (4) Unharmonized waste management systems make it difficult for operators to improve their services; and
- (5) Business is afraid of the risks in market competition.

These five identified challenges and barriers to circular economy deployment at the national level are further elaborated below.

(1) Established regulations that favor markets where the value of waste materials is lost.

Regulations need to be subjected to technological and societal evolution and need to be designed to be robust and flexible for changing conditions and needs. A critical challenge or barrier observed in nations that have the ambition to transition toward circular economy but that in the past have prioritized waste-to-energy plants (incineration) is that they are now locked-in to continue to supply municipal solid waste (through long-term waste feedstock agreements) to guarantee the financial viability and operations of such plants and recovery of investments.

An example is **Denmark** which is among those countries that sends the lowest volumes of waste to landfill but is still incinerating a relatively large proportion of waste, as compared to other 28 EU countries. Regulations in the Danish waste management sector has favored waste incineration for many years. Municipalities have made high investments in waste incineration plants and local authorities in most cases assign household waste and commercial waste to those plants. This context has created an incentive to fill up the plants at the expense of diverting more waste for recycling and other alternatives, and a barrier to enterprises taking back and receiving end of life products, preventing from seeking better (circular) solutions.

(2) Lack of access to knowledge and investments for companies and SMEs.

A common challenge identified among the assessed countries is that for many small and medium-sized enterprises (SMEs) it is difficult to realize (more) circular business models. In general, the access to knowledge and resources is seen as a significant challenge for SMEs. Mostly, the lack of access to advisory services is considered a barrier to the development of circular business models.

In 2017 a survey in **Denmark** (Statistics Denmark, 2020) showed that 88 percent of enterprises have a positive attitude to circular economy, but only 49 percent find that



they have sufficient knowledge about circular economy for using it. Current regulations are, in many cases, a barrier to enterprises that want to enroll in circular economy business models. This also leads to an insecure investment climate and sometimes enterprises give up using new innovative circular technologies.

(3) Procurement of products and services are still based on purchase price.

A key identified challenge to the circular economy transitions is that most public and private sector procurers and developers are still making their decisions based on purchase price instead of the total costs of ownership. When the complete use-cycle is taken into account the economic value and performance (mainly cost-savings) changes significantly.

Danish enterprises and public institutions still lack knowledge about how to incorporate relevant circular requirements and associated economic and environmental benefits in procurement of products and services for suppliers and to design tender documents.

(4) Unharmonized waste management systems make it difficult for operators to improve their services.

Among the assessed countries, contradicting regulations are observed leading to unharmonized waste or material management systems within a country. This has in some cases leads to fragmentation and the lack of optimizing opportunities for deployment of integral and cost-effective technological solutions.

For instance, in **Denmark** there is an unharmonized waste management system in which every local authority designs its collection schemes for household waste and sets up different sorting criteria. What is classified as waste in one municipality is not necessarily the same for a neighbor, or even what is classified as recyclable in one municipality can be suitable for incineration in another. This creates a fragmented market where private waste collectors and waste treatment operators have to adopt different solutions to each locality. This negatively impacts the creation of economies of scale for waste management, limiting competition, resulting in sub-optimal solutions in waste collection and unclear communication with citizens.

The present market structure for WEEE collection In Denmark has focused on only one potential loop, namely recycling. Also, up to 50 percent of the collection takes place outside the official systems. This results in a low tolerance for risk for investments required in necessary technology development and innovations in other looping opportunities such as, reusing, refurbishing, reselling and sharing the electro- and electronic products.

In Denmark, construction enterprises have an obligation to source-separate waste to recycling but many of them do not comply with the rules. Fast and relatively unplanned demolitions make it difficult to separate the valuable parts of the waste, materials are often mixed, thus increases the risk that substances of concern are recycled or recovered instead of being managed safely.

(5) Business is afraid of the risks in market competition.

A key observation is that the adoption of circular business models is still considered a barrier to the business community due to potential unfair competition. This is the case as long as the regulatory framework is not adapted to send to right market signals and new standards and requirements are enforced.



In **Denmark**, the business community perceives the circular economy opportunities positively but is mainly afraid of the risks in market competition, and therefore needs the support by the public sector to realize their full potential of engaging and leading the transition to a more circular economy. For instance, practices for more selective demolition is still needed to set demolition planning standards, simplifying compliance for developers, facilitating communication with authorities and improving the traceability of construction waste and training.

5.2.3 SECTOR LEVEL

The main issues of relevance relating to **challenges and barriers** for successful implementation of the circular economy at a **sectoral level** are:

- (1) Improving the recognition and compatibility of environmental performance with business rationale;
- (2) New quality systems are needed for the assessment of more sustainable resources;
- (3) Low adoption of technologies and services to extend products' lifecycle;
- (4) Databases providing information for materials management are not yet available; and
- (5) New schemes for urban bio-waste composting have to invest in means for community engagement.

These five identified challenges and barriers to the circular economy deployment at the sectoral level are further described below.

(1) Improve the recognition and compatibility of environmental performance with business rationale.

A critical challenge identified for the acceptance by certain business communities and sectors is the understanding of circular economy principles and relevance to enable the compatibility between the improvement of the environmental performance vis-à-vis the business performance and rationale.

An example is the dairy farming in **the Netherlands** which has great influence on the biodiversity in surrounding nature reserves, and even in areas abroad, for example through the purchase of feed. The dairy farmers need to demonstrate their environmental performance and be recognized, for example, to get more favorable interest rates for bank loans. However, they can only take those measures when these are financially feasible and fit in with their business operations.

(2) New quality systems are needed for the assessment of more sustainable resources.

In many sectors there is a general lack of proper quality assurance standards or systems that enable the adoption of circular economy compatible products and solutions. This also includes the need for life cycle analysis (LCA) methods to understand and confirm the lifecycle impacts of products, including the use of natural resources.

Prior to the LARA project (2017) and the Quality Fertilizer quality system (2018) (The Finish Biocycle and Biogas Association, 2020), **Finland** did not have a uniform standard for fertilizer products produced from recycled materials, which are increasingly used in agriculture and landscaping. A national quality system for fertilizer products made from recycled nutrients was necessary for end-users of products looking for new, reliable and



cost-effective alternatives. On the other hand, recycled biological nutrients on the market have issues related to safety and broader adoption.

(3) Low adoption of technologies and services to extend product's lifecycle.

The adoption of prefabricated elements and modular components in repair construction is still low. Industry still needs to test to validate concepts and cooperation. The introduction of new solutions in repair construction also demands a new approach to procurement.

The 'Renovation Leap change' (SmartClean, no date, c) project in Finland addresses the challenges of the construction sector with new practices related to repair activities to help to shorten the duration of renovation work, reduce the cost of repair and make the lifecycle of properties smarter and more energy efficient. The project created new qualitative objectives and innovative procurement models for repair construction.

(4) Databases providing information for materials management are not yet available.

Although there are many good ideas and targets set for the transition toward circular economy in the assessed countries' roadmaps and plans, still allot remains to be done in the development of critical tools and databases to factually realize the circular economy transition.

An example is the ambition by the Ministry of Environment of Finland which in collaboration with the Finnish Innovation Fund — Sitra, is exploring ways to establish a **buildings database (SITRA, 2019b)** to facilitate recovery of construction materials after use. To do this, more research and information has to be made available (thus resources assigned) on the composition, total amounts and geographical locations of materials in use and available for recycling. Currently, there is no precise data available on the quantity, quality and composition of the materials used in the built environment. These are significant technical challenges that can be overcome with sufficient allocation of financial resources.

(5) New schemes for urban bio-waste composting have to invest in means for community engagement.

An interesting observed challenge is that not all cases of community-based solutions are practical or implementable. And have therefore to be properly designed to instill a long-term incentive for participants in the solution.

This is for instance the case of **France** where in densely inhabited urban areas, too few people have the space to practice home-composting. Since 2013 in the city of **Besançon**, **France** (**Zero Waste Europe**, 2018), larger composting boxes have been installed in green public spaces, where the small-scale community composting sites turned out to be the best solution to divert bio-waste from residuals, while creating good social dynamics. The community's inhabitants in condominiums have to request formally to the public authority for the installation of the composter, the provision of kitchen bins and also the tools. Technical support for a year is provided by a local association. But in the case of apartments belonging to the same lessor, it has been a big challenge to split the fees among tenants, which reduces the incentive to participate in the separation of the bio-waste for composting.



5.3. IDENTIFICATION OF THE MAIN RESULTS AND BENEFITS OF CIRCULAR ECONOMY PROJECTS AND THEIR INTERSECTION WITH THE NDC AND SDGS ENDORSED BY EACH COUNTRY

5.3.1. REGIONAL LEVEL

Based on the assessment of the European Union's circular economy deployment experience, the main **results and benefits** observed from the implementation of the circular economy at a **regional level** that respond to the Nationally Determined Contributions – NDCs and the UN Sustainable Development Goals (SDGs), are:

- (1) The expansion in the adoption of national strategies across countries in the region;
- (2) Building a vision of economic development committed to climate change mitigation and adaptation and the SDGs;
- (3) Opportunities for international cooperation with a common interest;
- (4) Job creation and increase in added-value production;
- (5) Improvements in criteria for standards, eco-labels, and green public procurements;
- (6) Articulation of different funding programs for innovation;
- (7) Creation of common frameworks for monitoring broad progress; and
- (8) Improvements in rules and fees for Extended Producer Responsibility and common waste management targets.

These eight outcomes and benefits observed from the experience of the European Union are considered relevant for the deployment of circular economy solutions or approaches at the regional level and are further described below.

(1) Expansion in the adoption of strategies in different scales and contexts to address local challenges.

According to Ellen MacArthur Foundation study (Ellen MacArthur Foundation, 2020), in the EU at least 14 Member States, 8 regions, and 11 cities have put forward a circular economy strategy. Some countries such as France, Catalonia (Spain) (Generalitat de Catalunya, no date), and Flanders (Belgium) (Vlaanderen, no date) have adopted long-term circular strategies. France has adopted an anti-waste law for the circular economy in early 2020, which bans the destruction of unsold goods, encourages donations, and fosters secondary markets. Some federal governments of Belgium and Germany have opted for more short-term circular initiatives. The Netherlands has created specific regulations that go beyond the EU requirements. For instance, to reduce its use of primary raw materials by 50% in five economic sectors by 2030.

This multi-level approach to circular economy transition brings with it a benefit that more actors are involved in learning, exploring, identifying, discussing, and cooperating on bringing about circular economy compatible solutions from the local municipal level up to the European level.

(2) Build a vision of economic development committed to climate change mitigation and adaptation and the SDGs.

A key outcome of the European Union process of promoting the circular economy is that after several years of actively creating awareness and building support, it has now



reached the point of being able to launch a bold strategic development agenda for the union based on the circular economy principles, which responds to climate change and other sustainable development goals.

In the EU, the circular economy is now considered a means to achieve the climate commitments in a just, sustainable, and socially fair transition. "To achieve climate-neutrality by 2050, to preserve our natural environment, and to strengthen our economic competitiveness, requires a fully circular economy" stated Executive Vice-President for the European Green Deal.

This makes and positions Europe as a key leading region (as economic block) to drive an international agenda toward a global circular economy.

(3) Opportunities for International cooperation with a common interest.

Europe has understood the value and relevance of the circular economy, not only as an effective means to respond to climate change and the degradation of the environment, but also as a useful instrument for facilitating and influencing international trade, commerce, and technical cooperation. In 2018, EU and China signed the "Memorandum of Understanding on Circular Economy Between the European Commission and the National Development and Reform Commission of the People's Republic of China" (European Commission, 2018c). Based on the updated Circular Economy Action Plan, there are strategic interests in the Americas and where several new international cooperation programs are set up and being deployed to enable policy dialogues with focus on circular economy with several countries of interest in the Americas.

(4) Job creation and increase in added-value production.

The adoption of the circular economy leads also to the creation and transformation of economic sectors that on their turn lead to new and additional job opportunities. The linkage between circular economy businesses and activities with job creation makes it more receptive by governments. According to Ellen MacArthur Foundation study (Ellen MacArthur Foundation, 2020), the Eurostat information is that jobs related to the circular economy increased by 6% between 2012 and 2016. In 2017, circular activities such as repair, reuse, and recycling, generated almost EUR 155 billion in value-added producing goods and services.

(5) Improvements in criteria for standards, eco-labels, and green public procurements.

A relevant outcome of the efforts brought about by the European Union on promoting the circular economy is that this has triggered global attention and initiatives to revisit existing standards, eco-labels and procurement protocols.

The Eco-design Working Plan 2016-2019 extended the scope of eco-design requirements to account for the whole life cycle of products and materials. A forthcoming report "Strategy for Sustainable Chemicals", expected in late 2020 aims to remove legal barriers which prevent recycling and the use of recycled materials. The European Standardization Organizations are now responsible for developing criteria to measure the circularity of a product. EU Green Public Procurement aims to adopt new criteria for recycled content integration.



(6) Articulation of different funding programs for innovation.

The European Commission's commitment to its circular economy agenda and targets has led to allocation of significant funding to support and sustain the transition process in Europe and beyond.

Between 2016 and 2020, more than EUR 10 Billion of public funding for innovation was made available to support the industrial sector's transition to a circular economy. Many EU programs, including Horizon 2020, the Cohesion Policy, the European Fund for Strategic Investments, Innovfin, and LIFE provided support. Specifically, for SMEs EUR 1.8 billion of Cohesion Policy funding was provided for eco-innovative technologies, and at least EUR 100 million went to more than 80 circular economy projects through LIFE funding.

(7) Creation of common frameworks for monitoring broad progress.

A key observation and relevant outcome is that the European Union has endeavored to design a common monitoring system (including its set of circular indicators) to assess the region's progress on its circular economy transition.

The European Commission implemented a Monitoring Framework for the Circular Economy at both the EU and national levels. In 2019, the report of progress towards circular economy implementation was presented based on these metrics. This allows for a concerted action and accountability European-wide.

(8) Improvements in rules and fees for Extended Producer Responsibility and common waste management targets.

New Extended Producer Responsibility (EPR) schemes for EU, and new rules for EPR fees based on real end-of-life costs of products, are being introduced. The European Strategy for Plastics adopted in January 2018 aims to make all plastic packaging recyclable by 2030. Some single-use products are banned.

The new revision of the EU waste legislation has led to the raise of the target for recycling packaging from all materials to 70% in 2030. Specific recycling rate targets were increased to 85% for paper and cardboard packaging, 55% for plastics, and 30% for wood. It also sets obligations for separate collection of specific waste types such as biowaste and textiles. Landfilling rates are limited to 10% by 2035.

These initiatives taken by the European union serve as ideas and recommendations for other regions and nations aiming to engage in the transition toward circular economy.

5.3.2 NATIONAL LEVEL

Based on the assessment of the international case studies, the main **results and benefits** from the implementation of the circular economy at a **national level** that contribute to responding to the NDCs and SDGS endorsed by the countries, are:

- (1) Alignment of a vision with commitments for climate change mitigation and responding to the SDGs;
- (2) Reducing the dependency on materials imports;
- (3) Better harmonization of current standards and eco-labels;
- (4) Support of projects for social innovation and solidarity economy;



- (5) Create more business for local, permanent, and non-relocatable jobs;
- (6) Substitution of finite resources from extractive activities with biological renewable resources;
- (7) Small businesses that see opportunities in more sustainable production and products;
- (8) Emissions mitigation by increasing local service-based business models;
- (9) Coordination of actions at different levels to reach the SDGs and the NDCs;
- (10) Measures interlinked to achieving the national climate agreements;
- (11) Guidance for geopolitical matters in the direction of sustainability; and
- (12) Envisioning systemic changes to drive sustainable growth.

These twelve factors identified for their contribution to the endorsed SDGs and NDCs of countries assessed are elaborated in more detail below.

(1) Alignment of a vision with commitments for climate change mitigation and responding to the SDGs.

In the circular economy roadmaps/plans reviewed, not all explicitly referenced that the circular economy is a means to achieve climate change mitigation (Nationally Determined Contributions – NDCs) or to respond to the 2030 Agenda (17 SDGs). In the case of Denmark, France and Finland the intersection with the SDGs is clearly highlighted as an underlying motivation for developing their respective circular economy roadmaps/plans.

In the **Danish roadmap**, the circular economy strategy is in alignment with the government action plan for the 17 UN Sustainable Development Goals and is expected to contribute to the government program for an ambitious and sustainable green transition.

In **France**, the circular economy is expected to contribute to achieving some of the targets of the Agenda 2030 Sustainable Development Goals (SDGs).

While in **Finland**, the circular economy focus is to provide support for achieving national sustainable development targets and economic performance, improving the sustainability of society with regard to environmental, economic and social well-being.

(2) Reducing the dependency on materials imports.

An identified outcome and benefit among the assessed countries is that the development of industrial policies inspired by circular economy thinking serve to maximize the added value associated with recycling operations nationwide and helps position local companies in the market and build economic resilience and in this way contribute in particular to **SDG 9 – Industry, Innovation and Infrastructure**.

An example is the **French approach** where their industrial policy enables French **companies** position themselves among the European leaders in the circular economy. This should lead to a reduction in France's dependence on imports of raw materials and its vulnerability to global economic uncertainties.

(3) Better harmonization of current standards and eco-labels.

The implementation of requirements for circular economy for the **Nordic Swan** and the **EU Flower eco-labels** gives a competitive advantage for **Danish enterprises products**.



Danish Standards association is dedicated to the creation of a harmonized framework for products among all EU Member States.

This indicates that by being proactive in the development of critical tools and instruments to create a level playing field and stimulate innovation toward circular economy solutions, one can position itself as a leading entity or within a leading alliance to extract most benefits from the use of the developed and deployed solution. The harmonization of standards and eco-labels help create clarity, elevate quality standards, better inform consumers, thus stimulate sustainable production and consumption practices (SDG 12 – responsible production and consumption).

(4) Support projects for social innovation and solidarity economy.

An important and relevant observation from the countries assessed is that most roadmaps and plans are focused on material cycles and involvement of stakeholders, and to a lesser extend focused on social equity or addressing poverty issues (SDG 1 – No Poverty, and SDG 10 – Reduce Inequality).

In the case of **France roadmap**, is clear stated that the circular economy can be a way to open opportunities for social innovation and solidarity economy, and for projects to meet needs that are not completely covered by conventional companies. It involves mobilizing regions around meaningful projects and employment opportunities for those who are the most vulnerable.

(5) Create more business for local, permanent, and non-relocatable jobs.

Circular economy stimulates the increased use of digital solutions and technologies which will impact the job market and functions over time. Therefore, new business models such as "product-as-a-service" (PaaS) models are critical in preparations for the new economy and relating to this, the new skills set required for securing employment. The circular economy will lead to significant shifts in the job market, where on one hand jobs within traditional linear business models and value chains will increasingly become obsolete, and on the other hand a significant increase in job demand is expected in new and circular economy compatible businesses and value chains.

A positive outcome is that this, if well managed, can lead to more stable local job opportunities and respond to **SDG 8** (Decent Work and Economic Growth).

The transition to a circular economy will boost digital technology to enable networking and access to information and data for new services as well as to support consumer decision-making. In **France roadmap**, business models for product-service systems within the "economy of functionality" (Mont, 2002) are expected to create more local, permanent and non-relocatable jobs.

(6) Substitution of finite resources from extractive activities with biological renewable resources.

As observed in most or all circular economy roadmaps/plans of assessed countries, the replacement of use of non-renewable resources with renewable and biological resources and thereby the prevention of contamination of water bodies is a common objective and contributes to responding to among other SDG 6 – Clean Water and Sanitation and SDG 12 – Responsible Production and Consumption.

Most food production relies on the use of artificial fertilizers produced by limited phosphorous reserves. The use of chemical fertilizers has also adverse environmental



impacts in water bodies specifically (in Europe) the eutrophication in the Baltic Sea. The use of organic fertilizer products improves the biological activity and the growth of the humus content of soil, which also reduces soil erosion and reduces the eutrophication of water bodies. The long-term goals are to reduce risks to food quality and purity, as well as to the environment.

(7) Small businesses see opportunities in more sustainable production and products.

Small scale or community level deployment of circular solutions is deemed an interesting option for many cities and communities, including the local businesses, to build local economic resiliency and offset dependency on external sources and factors. Such approaches contribute to SDG 11 – Sustainable Cities and Communities.

On a small island in **Denmark**, a cooperative of seven farmers aim to turn fully organic milk production, shifting to only locally sourced fodder, also to contribute to lowering the levels of nitrogen deposition – a major environmental challenge on the island. Their aim is to shift to only locally sourced fodder, turn fully organic and set up a more resilient production with minimal dependence on external inputs like compound feed combined with higher biodiversity is expected to ensure a greater stability in feed production.

(8) Emissions mitigation by increasing local service-based business models.

Local services-based business models which may include repair, renovation or upgrading activities, can help extend the life or improve the resource efficiency of products or services. Such activities contribute to responding to, among others SDG 7 – Affordable and Clean Energy and SDG 13 – Climate Action.

An example of a repair services-based business model is the 'Renovation Leap change' project in Helsinki, Finland with the aim to introduce new practices for repair construction. One of their objectives was to improve the energy efficiency in buildings. Where based on their estimations, if 80% of residential multi-story buildings in the Helsinki Region built in 60s-80s were renovated to become more energy efficient (with an average energy demand for heating of max. 40 kWh/m²), the emission reduction potential would sum to approximately 87% (303.000 ton $CO_2e/year$) compared to current emissions of buildings (SmartClean, no date,c).

In addition, the Technical Research Centre of Finland Ltd – VTT (VTT, no date), has created a tool to help set clear qualitative objectives for repair construction in the design, construction, and the final commissioning stage.

(9) Coordination of actions in different levels to reach the SDGs and the NDCs.

The Netherlands intends to contribute to the Sustainable Development Goals (SDGs) by implementing measures to accelerate the transition to a circular economy, by decoupling the economic growth from environmental degradation. This will be accomplished through many actions, for instance actions to improve industries' adoption of cleaner and environment-friendly technologies and processes, and increased efficiency in the use of resources. Actions will also look for integrating ecosystem and biodiversity values into national and local planning and development and reach a more inclusive and sustainable urban development.

The Dutch government is taken actions to ensure that the biobased chemistry and materials value chains can achieve CO₂ reduction by developing methodology for calculating CO₂-eq reduction. Biomass is seen as of essential importance for reducing



 CO_2 emissions and the dependence on fossil resources. It is committing to developing a methodology for calculating CO_2 -eq sequestration in forestry materials and products (climate smart forestry).

(10) Measures interlinked to achieve the national climate agreements.

The interlinkage between circular economy and climate change is not explicitly mentioned in most of the assessed circular economy roadmaps or plans, but mainly are considered implicitly as a consequence of improved management of natural resources and bringing about sustainable production and consumption patterns. Whether explicitly or implicitly, circular economy contributes to SDG 13 – Climate Action and the NDCs.

According to an Ellen MacArthur study (Ellen MacArthur Foundation, 2019) there is increasingly more expressed interlinkage between circular economy and climate change mitigation efforts in the latest formal documentations as can be observed in the **national draft Climate Agreement of December 2018 of the Netherlands** which includes numerous circular economy measures to make a contribution to the climate objectives. Circular economy measures appear in the proposal within the 'agriculture and land use', 'industry' and 'built environment' forums, and arrangements have been made about biomass cascading or cycling in the draft national Climate agreement (The Ministry of Infrastructure and Water Management, 2019).

(11) Guidance for geopolitical matters in the direction of sustainability.

The countries whose roadmaps were assessed are all EU member states. It is clear that in addition to the beneficial effects of circular economy to prevent waste and contamination, there is also an important geopolitical agenda. In order to secure continued supply of energy and materials, circular economy is also considered to provide a critical strategic opportunity to make Europe less dependent on external supplies of key materials. There is a desire in the European Union to optimize the use of resources, sustain economic growth and decouple this from the continued unsustainable extraction of natural resources. The circular economy therefore contributes to almost all SDGs.

The necessity to strive for a circular economy for the stability of the Dutch and European economies comes from a concurrence of factors related to the explosive demand for global raw materials and its interconnectivity with the climate (CO_2 emissions), the global environmental degradation, and the dependency of the European Union on third countries (strategic national security perspective).

(12) Envisioning systemic changes to drive sustainable growth.

The Finnish government aims to maximize the circulation of products, components and materials and the value bound to them as much as possible, moving towards a systemic change in the economy, making the circular economy a driver of sustainable growth, investment and export for the country. And therefore, circular economy contributes to achieving in particular SDGs 6-15.

The Dutch government is committed to promote continuing, inclusive, and sustainable economic growth, full and productive employment, and decent work for everyone by decoupling economic growth from environmental degradation, by adapting industries in order to make them sustainable, with a focus on greater efficiency in the use of resources and cleaner and environment-friendly technologies and industrial processes.



5.3.3 SECTOR LEVEL

The main issues of relevance relating to **results and benefits** from the implementation of the circular economy at **a sector level** are:

- (1) Integrating the assessment of environmental impacts into businesses;
- (2) Evolve and transform the current organizations and agencies' structures;
- (3) Implementing projects that create the basis and support for scaling of sustainable products;
- (4) Creation of business ecosystems with improved dialogue between stakeholders;
- (5) Changing the approach from waste management to waste prevention to create citizens engagement and lower costs;
- (6) Combine strategies and new approaches for waste management that can lead to high public engagement; and
- (7) Digital marketplaces to empower local innovative business and producers.

These seven identified benefits from the implementation of circular economy inspired solutions at the sectorial level are further described below.

(1) Integrate the assessment of environmental impacts into the business.

Circular economy compatible businesses are generally committed to increasingly integrate environmental impacts in their overall business performance and products. The effective communication of the business' strategic growth targets and the footprint of the product or business leads to a stronger marketing and story-telling effect which results in increased business.

An example is the Sustainable Dairy Chain in Netherlands which has formulated goals for 2030 for a future-proof and responsible dairy sector (Duurzame Zuivelketen, no date). The 'biodiversity monitor' is a pilot project under development that offers rewards and recognition to dairy farmers for their positive environmental impact. By measuring seven key performance indicators (KPls): (1) greenhouse gas emissions, (2) nitrogen soil surplus, (3) ammonia emissions, (4) share of permanent grassland, (5) protein from own land, (6) nature and landscape management and (7) herb-rich grassland, this offers an integrated understanding of the impact of a dairy farm on biodiversity. It shows the farmer which environmental measures improve the soil and reduce the emission of greenhouse gases, and how these measures are favorable for businesses. Through a unique, comprehensive approach to biodiversity, Dairy farmers can check or consult the 'biodiversity monitor' to see their scores, which provides insights for opportunities to improve their farms.

(2) Evolve and transform the current organizations and agencies' structures.

Key sectorial organizations, either associations or cooperatives, can also evolve into new entities that can carry forward circular economy initiatives in key sectors of the economy. Leadership combined with a proper organizational structure can enable a longer-term commitment, continuity, and progress to improve market conditions and enable the adoption of circular solutions in the sector of interest.

In Finland, activities relating to the promotion of sustainable and responsible management of biodegradable organic materials was initially led by the national



Biofuels Association acting as the project coordinator, later this role was transferred to the Finnish Biocycle and Biogas Association (SBB) in 2019. The Finnish SBB is a nationwide association dedicated to biogas for transport and energy production, organic fertilizer products and recycled chemicals, created from a merger of the Biological Waste Treatment and the Biogas Association. SBB's main task is now to promote sustainable and responsible activities related to the treatment, processing, and sale of biodegradable waste and other biodegradable organic materials, to ensure good operating conditions for the industry and increased competitiveness of their products.

(3) Implementing projects that create the basis and support for scaling of sustainable products.

Having a common circular economy strategy, framework, and compatible tools, stimulates sectorial cooperation which can lead to generating a benefit of bundling skills and capacities to scale up the production of sustainable products.

In **Finland**, **the Quality Assurance System (QAS)** for recycled nutrient products in biogas and composting and other similar plants, is a service and tool developed for the users of fertilizer products from recycled nutrients as well as for involved producers, advisors, researchers and authorities in the sector⁵. The milestones achieved by the project include (1) a study on the principles for the QAS; (2) a quality handbook and graphic instructions for the quality label; (3) a pilot-process for testing the QAS in 6 companies; (4) a database software for QAS; and (5) an economic plan for QAS. This will increase the use of recycled nutrients taking advantage of the waste streams from other sectors.

(4) Creation of business ecosystems with improved dialogue between stakeholders.

Circular economy is realized through cooperation among various actors within or among sectors. This demand for exchange and dialogue can lead to the establishment of strategic business ecosystems where un-likely actors are stimulated to meet and exchange needs and services which can result a new business-alliances and an improved understanding of service or product requirements.

For the 'Renovation Leap change' (SmartClean, no date,c) project in Finland, a new business ecosystem enables builders and services providers of construction repair activities, start a dialogue with property owners, rental housing companies, and the real estate consultancy companies to exchange information and identify business opportunities.

(5) Changing the approach from waste management to waste prevention to create citizen engagement and lower costs.

A benefit to be obtained from a proper understanding of circular economy principles is that it may enable structural changes in management approaches, such as shifting from an end-of-pipe management of waste to a more proactive visionary preventive approach to avoid or reduce waste generation.

A good example is the case of the region of Besançon, France, where in 2008 the local councilors of SYBERT (Sybert, no date), a joint public authority in charge of waste treatment of 165 municipalities in great Besançon, France agreed to re-think their waste management system and not rebuild the old furnace where most of the waste was

⁵ Authorities in the sector are: Finnish Biocycle and Biogas Association; The Finnish Association for Biological Waste Treatment; The Finnish Biogas Association; The Finnish Water Utilities Association.



incinerated. The main reason was the concerns about impacts to public health from incineration. A program based on the extensive use of decentralized composting and a 'pay-as-you-throw' fee scheme was launched. From 2012 to 2016, the city of Besançon reduced waste generation by 30% and rolled out an extensive system of decentralized composting, managing to cover 70% of its population and to significantly reduce the waste sent for disposal.

The program created a real dynamic around waste prevention. The improved separate collection of waste has resulted in the increase of the income generated from selling high quality materials, which has, in turn, reduced the shared costs covered by citizens for waste management from 80% to 65%. As a result, the average waste fee per inhabitant in Besancon and the surrounding municipalities dropped to 72€ a year, lower than the French average of 89€ per inhabitant (Zero Waste Europe, 2018).

(6) Combined strategies and new approaches for waste management can lead to high public engagement.

Circular economy solutions not only stimulate cooperation among key actors, but also leads to the understanding of integrating various strategies into a holistic plan, where if this is well designed, can lead to a high public or citizen engagement and successful outcomes.

Based on the same case of Besançon, France (Zero Waste Europe, 2018), another identified benefit is that the amount of bio-waste per capita sent to treatment, dropped 50% from 2009 to 2014. The combination of the 'pay-as-you-throw' (PAYT) scheme for waste management and the support of SYBERT (Sybert, no date), the public authority in charge, to promote composting without offering separated collecting for bio-waste, led to the extensive adoption of decentralized composting of bio-waste. In 2016, 70% of the population in greater Besançon had a composter or was covered by a community composting site. Over 50% of the citizens were composting their food scraps at home, in small community composting sites. This has in 2016 saved 792,900 € in waste treatment costs.

(7) Digital marketplaces can empower local innovative businesses and producers.

Circular business models, such as the sharing economy model, are best implemented using digital sharing platforms or marketplaces and enable local companies to sell, share and/or exchange services and strengthen the local economy while reducing environmental footprint or impacts.

In Finland, the 'Smart & Clean Urban Food project' (SmartClean, no date,b) resulted in the development and piloting of market and platform-based solutions for the selling and distribution of local food. The project developed digital markets and platforms for many types of local food, from wild herbs to food waste. Better traceability of local food enhances consumer choices with positive impacts in the vitality of the local economy.

In **Finland**, several online platforms for improving information flows were created by the companies **'Forest Foody'** (Forest Foody, no date), a marketplace focused on natural foods, **KORJUU** (*Korjuu*, no date), a marketplace for local and organic food, and **'Local Foodhub'** (*Uudenmaanruoka*, no date) (Uudenmaan ruoka), a local food distribution center, to offer a better information and offering of natural and organic food to the costumers.



5.4. IDENTIFICATION OF POLICIES, INCENTIVES OR CONDITIONS DEVELOPED FOR A SUCCESSFUL IMPLEMENTATION OF THE CIRCULAR ECONOMY

5.4.1 REGIONAL LEVEL

The main issues of relevance relating to **policies**, **incentives or conditions developed** for the implementation of the circular economy at a **regional level** are:

- (1) Gradually raising ambitions; and
- (2) More stakeholder engagement and cross sectors cooperation.

The two identified measures brought about to enable the successful implementation of circular economy at the regional level are described in more detail below.

(1) Gradually raising ambitions.

Based on the European Union experience, it is observed that an effective approach to enable the successful implementation of circular economy efforts is by tackling this through a gradual increase of ambitions. Start with generic goals and targets, and that require less restrictive or complicated measures or requirements, and over time as awareness and capacity is built, gradually increase the ambitions and demands for more specific compliance to circular economy principles.

In the case of the EU, its **CE action plan (2015)** was key to enable to awareness raising and buy-in of decision makers and member states, coupled with the adoption of additional policies, such as the **European Green Deal** and the **new Circular Economy Action Plan (2020)**. The European Commission's strategies are in a development process starting from the 'Roadmap for a Resource-Efficient Europe', the 'Circular Economy Action Plan' (2015) until the European Green Deal which includes the new CEAP (2020), gradually raising its level of ambition and broadened the scope for action.

(2) More stakeholder engagement and cross sector cooperation.

Several member states, NGOs, members of European parliaments and significant sections of industry have demonstrated support to the circular economy agenda. This helped to push the EU Commission to recognize the potential of the circular economy strategy to unlock economic opportunities and a means to achieve climate neutrality, reconciling with the environment.

The Action Plan and most of its actions were implemented at the EU level, yet they supported the adoption of actions at country and regional level. Even so, waste legislation was imposed, with legally binding targets for EU Member States.

Integrating the circular economy principles across several EU Commission's policy areas has encouraged cooperation across all the Commission's services. This has promoted an alignment and more consistency between different sets of regulations.

5.4.2 COUNTRY LEVEL

The main issues of relevance relating to **policies**, **incentives or conditions developed** for the implementation of the circular economy at **a country level** are:

- (1) Improving current policies for transition;
- (2) Finding easier ways to fit new innovative businesses with current regulations;



- (3) New platforms to build knowledge for implementing a green and circular procurement;
- (4) Common guidelines and structures to harmonize waste management systems;
- (5) Co-financing support for the development, implementation, and upscaling of circular business models:
- (6) Development of new innovative plans for multiple and emerging sectors like bioeconomy, sustainable construction, and the sharing economy;
- (7) Joint efforts to design new legislation, requirements, and methodological approaches; and
- (8) Building a governance system.

The eight identified measures for the successful implementation of circular economy at a national level are further elaborated below.

(1) Improving current policies for transition.

Circular economy thinking offers the opportunity to revisit existing policies and regulations. In some of the countries assessed initiatives were taken to either modify, update or improve policies and laws in order to create the enabling environment for the transition toward circular economy.

In **Denmark**, for instance, the **Strategy for Circular Economy** is considered as a follow-up to the **'Utility Strategy'**. The Utilities Strategy aims to create a more competitive market for waste management and improve the access of other business to recyclable waste. It is introduced to incentivize the establishment of sorting plants to increase the amount of segregation of recyclable waste. It also aims to support enterprises to establish take-back schemes and pursue new innovative solutions for citizens to opt for private services for end-of-use products instead of using municipal incineration services.

(2) Easier ways to fit new innovative business with current regulations.

Streamlining efforts, in particular the easing of requirements for business registration, startup, and other requirements, is considered important among some of the assessed countries. Eliminating "red-tape" helps reducing the cost of doing business and in some cases even leads to attraction of foreign investments to help support the transition toward circular economy.

Denmark in particular is planning to implement easier ways for enterprises with circular business models to get clarification with authorities whether a new technology, business model, or production method can be applied under current regulations.

(3) New platforms to build knowledge for implementing a green and circular procurement.

An effective means to enable the successful implementation of circular economy measures is the creation of platforms and mechanisms to inform, create awareness, and offer tools for proper decision making relating to procurement of circular products and services.

In order to improve procurement for green and circular products and services, the **Danish** government is developing many platforms like the 'Partnership for green public procurement', the 'Forum on sustainable procurement', also the portal "the responsible



procurer" and a "**task force on green procurement**". Moreover, an analysis of environmental and economic consequences of procuring in a circular manner in various fields is planned to be conducted. In a future digital strategy for buildings, new guidelines are to be prepared in order to integrate total costs of ownership as well as a number of new total cost and life cycle tools.

(4) Common guidelines and structures to harmonize waste management systems.

The integration and harmonization of waste management strategies and regulations thought out to enable the circular economy transition are critical.

In **Denmark**, common guidelines are being created to harmonize the conditions and enforcements of rules on sorting criteria and collection schemes for household waste. For example, the deposit-return system for plastic bottles within the national plastics action plans is being expanded to achieve the recycling of 52 million more bottles. Another intended action is to gather in one same unit, the administration and supervision for waste and for recycling management. A proper functioning market for waste and recycled raw materials may have a catalyzing effect on circular economy.

(5) Co-financing support for the development, implementation, and upscaling of circular business models.

A critical element identified to enable the successful implementation of circular economy solutions, products and businesses is the availability or allocation of financial resources to cover the costs or needed investments. This can be set-up in different manners, such establishing a public-private fund, or having the government subsidize some critical aspects and needs to empower businesses to engage in circular economy practices.

In **Denmark**, a governmental program will be established for co-financing consultancy services for the development, implementation and upscaling of circular business models, as well as machinery and equipment. Also, Danish green investment fund will be authorized to provide guarantees in support of green enterprises, including circular ones, to increase options for financing.

(6) Development of new innovative plans for multiple and emerging sectors like bioeconomy, sustainable construction, and the sharing economy.

Creating the framework conditions for new market-driven value chains on biomass utilization is part of **Denmark's 'National Bioeconomy strategy'** (Danish Agriculture and Food Council, 2019). This sets a long-term direction for the development of bioeconomy in alignment with circular economy.

A voluntary 'sustainability course' for building managers in Denmark is being developed, to increase the understanding in the extent and value of reusing and recycling of construction materials, the reduction of the total energy consumption, accelerate the phase-out of substances of concern in buildings, and to create the early conditions to prepare the market for a future international standard for 'buildings materials passport'.

The implementation of circular economy through data and digitalization is in line with the governmental strategy for Denmark's Digital Growth (Ministry of Industry, Business and Financial Affairs, 2018) and the sharing economy. The existing digital platform with special focus on green innovative solutions is being expanded.



(7) Joint efforts to design new legislation, requirements, and methodological approaches.

Cooperation among nations on circular economy initiatives and policies can generate many cross-border benefits and enable each nation to be actively engaged in promoting their respective technologies and solutions and commercial interests. In the European Union it is clear that nations with a proactive stand can anticipate upcoming laws, standards and regulations to create competitive edge and position their national businesses in the wider economic zone.

Denmark for instance intends to increase efforts to take part in more working groups in the European standardization for circular economy, to contribute on forming the guidelines for future legislation, requirements for enterprises, and methodological approaches for the frameworks of the circular economy.

(8) Building a governance system.

An important identified condition for enabling the successful implementation of circular economy is the establishment of a clear and effective governance structure.

In **Denmark**, a governmental **Advisory Board for Circular Economy** backed by the Confederation of Danish Industry, the Danish Chamber of Commerce, the Danish Construction Association, and the Danish Agriculture & Food Council, has set objectives from 2014 to 2030 for the business community to increase resource productivity by 40 percent and recycling rate from 58 percent to 80 percent in this period. Also, a **governmental think-tank** for food waste was established, gathering private players to enhance the knowledge level and cooperation across the value chain and disseminate knowledge.

The **Danish government** is expanding the statistics for assessing the country's resource productivity and the analysis of public and private data with a potential to support circular business development. To account the economic value (in GDP) generated from the materials used in the production of products and services, Denmark's adopted the **Raw Materials Consumption (GDP/RMC)** and the **share of recycling of total waste**⁶.

5.4.3 SECTOR/PROJECT LEVEL

The main issues of relevance relating to **policies**, **incentives or conditions developed** for the successful implementation of the circular economy at a **sectorial** and/or **project level** are:

- (1) Building the basis for new standards and stakeholder platforms;
- (2) Programs for supporting the increase in environmental sustainability for farmers;
- (3) Quality certifications to demonstrate the value of circular products with transparency;
- (4) Provide knowledge for stakeholders and test pilot projects in real environments; and
- (5) Refining and scaling tested platforms.

These five identified measures for the successful implementation of circular economy at the sector and/or project level are further described below.

⁶ Using Raw Materials Consumption (RMC) in replace of Domestic Materials Consumption (DMC) as the basis for resource productivity monitoring, enables to account for resource use outside the EU and capture some of the hidden resource use associated with services.



(1) Building the basis for new standards and stakeholder platforms.

An important condition to enable the development of new relevant standards and platforms is working closely with key stakeholders and critical actors to build the institutional capacity and eventually transition from initiative to a new organization that can carry forward circular economy initiatives.

The 'biodiversity monitor' being now piloted in the Netherlands is expected to turn into the standard basis for recognizing farmers' environmental performance and reward, for example, with a lower interest rates for specific funds. The initiative can evolve to make more parties join in, such as lessors, district water boards, provinces and the government. The biodiversity monitor can also be transformed in an independent organization, enabling as many parties as possible to use it to stimulate nature restoration.

(2) Programs for supporting the increase in environmental sustainability for farmers.

Programs that support the increase in environmental sustainability of business are suitable starting points to instill the circular economy principles as the actors involved tend to be more receptive to exploring new business models, standards, and tools.

In the Netherlands, the program Foqus planet (FrieslandCampina, no date,b) is the sustainability and quality program of FrieslandCampina created to support the dairy farmers to increase sustainable business operations and reward their efforts to improve biodiversity with a bonus depending on the KPIs achievements in the Biodiversity Monitor.

The FrieslandCampina is also offering workshops for capacitation on the opportunities available in terms of sustainability and how it can be implemented at the farm. This allows member farmers to exchange knowledge and learn from external consultants to implement measures that fit their business.

(3) Quality certifications to demonstrate the value of circular products with transparency.

Quality standards and certifications can be effective instruments to stimulate circular design, manufacturing, purchase or import of circular products.

In Finland, the Quality Fertilizer Certificate (Laatulannoite, 2020) is a national quality system suitable for Finnish conditions, for fertilizer products produced from recycled nutrients to be used in the packaging and marketing of products in compliance with a national quality system (Laatulannoite, no date). It is open to all interested manufacturers of recycled fertilizers to demonstrate that their products meet higher quality standards than the legislation. The quality system and certificate, support stakeholder cooperation, information exchange, and transparency, and enable improvement of quality, reputation and sales of recycled fertilizer products and the nutrient recycling activities.

(4) Provide knowledge for stakeholders and test pilot projects in real environments.

Awareness raising and building collective knowledge regarding circular economy is critical for the long-term success of circular economy implementation. Through real-case pilot applications field data and empirical evidence is gathered regarding the effectiveness of circular solutions that help inform decision makers for development of new policies and regulations.

The 'Renovation Leap change' (SmartClean (no date,c) project creates ecosystems formed by companies to bring new construction solutions to the market for housing



repair. In Finland, this market is worth over 8.2 billion USD (7 billion Euros). Several of the project's solutions are being tested in a real environment provided by Helsinki City Apartments Ltd's (Heka, 2020), Kojamo Oyj (Koyamo, no date) urban housing company and others. Workshops provide rental housing companies with information on what new solutions are available and the role of the public sector and developed procurement methods to help them create new solutions and services.

(5) Refining and scaling tested platforms.

There are plenty of innovative ideas and solution under development in the assessed countries. For these to get traction and get scaled up, the underlying business model needs to be tested in the market. Facilitating and providing space for the exploration of the viability of circular solutions and platforms is an important precondition for success implementation of these circular solutions.

In Finland, the models created in the 'Smart & Clean Urban Food project' (SmartClean (no date,b) are being tested and refined into a more functional system to serve restaurants in the Helsinki metropolitan area, utilizing digital platforms and interactive trading channels with a network of operators from different levels. The aim is to further expand to the 'Farm to Restaurant' project, for which, funding is being sought from the Helsinki-Uusimaa Regional Council.



6. COMPARATIVE ANALYSIS

In order to create a clear overview and showcase the findings from the review of each selected roadmap, **Chapter 6** presents the results in table formats as shown in the following sections.

A comparative matrix is showcased, based on (1) the main sectors, (2) areas of interest identified in the international circular economy initiatives assessed, and (3) their relationship with the sectors and areas of interest reported by Brazil, Chile, Mexico and Uruguay previously identified in Chapter 2. The results of the comparative analysis also help to understand potential areas for technical cooperation opportunities and South-South exchanges of best practices, and to identify the potential opportunities and actors that could participate in knowledge exchanges and/or partnerships for planning and developing circular economy pilots/projects in or among the four countries.

6.1. COMPARATIVE MATRIX OF MAIN FOCUS SECTORS IN THE COUNTRIES

A critical first step to the planning for implementation of circular economy projects for each of the four project countries is the selection of priority sectors and focus areas most relevant to that country's economy.

Collectively as well as individually, countries in the European Union are among the most active in planning and starting the implementation of strategies and actions supporting the transition to a sustainable circular economy.

The four project countries can use the detailed sectoral information provided in **Chapter 3** and **4** for each relevant country circular economy roadmap to learn how and why other countries have approached the same priority sector.

A comparative matrix in Table 10 was created to show the economic activities prioritized by each of the five roadmap countries — Finland, Netherlands, France, Denmark and Spain — as being most relevant to their national situation and the circular economy. The four project countries, Brazil, Chile, Mexico and Uruguay can use this table to find other countries that have similar priority sectors of interest to their own county.

From the information presented, some conclusions can be drawn that show geographical particularities that are based on the specific context of a country or region, arising from cultural, economic or certain sustainable development changes desired, and chosen by the country.

The comparative matrix shows that the economic activities related to "Industrial Manufacturing" and the "Consumer Goods and Services" are called out by all the five roadmap countries, the European Union as a region, and by the majority of the four project countries in this study. It is fair to say that these are common and relevant sectors for circular economy activity and should be considered of high priority in all countries involved in this study.

In addition the economic sector of most relevance that were identified from the circular economy initiatives were: "Urban Infrastructure and Construction", which is prioritized across all countries in this study; "Agriculture, Farming, Fishery and Forestry" in seven countries, including all four study countries; the "Digitalization/Industry 4.0" sector in six countries including three of the 4 study countries; and "Bio Economy and Biomass Technologies" included in seven countries including all of the four study countries.



Other economic activities such as "Waste Management", "Industrial Symbiosis", "Plastics", "Textiles", "Bio and Renewable Energy", "Tourism", "Mining", and "Transport" are prioritized by 4 or less countries from the nine presented in the Matrix. This does not mean there are no initiatives in these sectors for the roadmap and studied countries.

It is reasonable to suggest that each of the four study countries should look at the priority sectors that have been identified by several other countries to see if these sectors also fit with the economic priorities of their respective countries and then learn and apply lessons from what's already been done elsewhere.



TABLE 10: COMPARATIVE MATRIX OF SPECIFIC INITIATIVES WITHIN PRIORITIZED SECTORS IN THE ASSESSED COUNTRIES AND PROJECT COUNTRIES

The following table presents the relation of circular economy activities and initiatives with economic sectors reported in the five countries assessed together with the circular economy activities and initiatives in the four project countries of this technical assistance presented in the previous reports. From this table it is possible to find the economic sectors and focus areas that are common between the countries and identify potentialities for opportunities in regional south to south and/or broader cooperation with countries leading the implementation of the circular economy in Europe.

The projects and initiatives presented in this comparative matrix table that are related to the four study countries, Brazil, Chile, Mexico and Uruguay, have been compiled mostly from the previous reports developed by specialists in circular economy and information added by the NDEs from each of the four mentioned countries. Although these study countries have many important initiatives on important topics associated with economic and social development and climate mitigation and adaptation, this table only summarizes selected projects and initiatives that have their focus directly related to the Circular Economy.

SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
Food and Agriculture	Food and Agriculture:	Food and Agriculture:			Food and Agriculture:	Food and Agriculture	Food and Agriculture	Food and Agriculture	Food and Agriculture
	- Create a market for organic recycled nutrients. - Minimize food waste by eliminating obstacles and creating incentives.	- Support the connection between for sustainable biomass and food production.			- Foster the production of better-quality food at affordable prices. - Guarantee sustainable use of natural resources, ecosystem and biodiversity conservation, waste reduction, valorization of waste whenever possible and the development of	Sectoral plan for a low carbon economy in agriculture, ABC Plan, for adoption of sustainable production technologies through the programs: Recovery of Degraded Pastures; Crop-Livestock-Forestry Integration (LPF) and Agroforestry	- Production of amino- acid rich feed from poultry feather by a high- performanc e enzymatic process.	- Business models of circularity in the agricultural sectors and industrial symbiosis. - Research for knowledge transfer on Dutch tomato greenhouses technology for sustainable and resilient agriculture.	- Functional food research to revalue byproducts from the food industry. - Alternative use of grape marc to elaborate cattle food. - Technologies in milking systems applied in areas like fertilizer-irrigation with use of biodigesters.



FI	NL	FR	DK	ES	BR	CL	MX	UY
				sustainable food models.	Systems (SAFs); Direct Planting System (SPD); Biological Nitrogen Fixation (BNF); Planted Forests; Animal Waste Treatment; and Adaptation to Climate Change.		- Financing pilot projects for production of certifiable biofertilizers from urban solid waste in cities. - Pig farms with management systems to generate and capture methane from animal excreta.	



SECTOR INITIATIVES	FI	NL	FR	DK	ES	BR	CL	MX	UY
Forestry, Biomass Technologies and Bioeconomy	Biomass and bioproducts: - Support investments to demonstrate bioproducts and bioservices on a commercial basis. Forestry: - Maximize of the overall value of Finnish forest-based products and services rather than the just the 'amount of wood'. - Implement public procurement to encourage the market of wood-based products and those made from other renewable raw materials when life cycle analysis demonstrates that they are more sustainable overall.	Biomass and bioproducts: - Bio-based chemical production based on biomass and green chemistry. Bioplastics: - Discourage the use of non-recyclable products. - Expand the use of renewable (recycled and bio-based) materials. Expand the use biodegradable plastics.		Biomass and bioproducts: Get more value out of Biomass Strategy for Circular Economy.		Biomass and bioproducts: - Project to make the sururu's production chain (malacocultu ra), the wasted shells are cleaned, crushed and sold to the industries that will use a resource material. - Government al Bioeconomy Action Plan to support technological and innovation in biomaterials and biotechnologi es associated with biodiversity and ecosystem services. - Bioeconomy Value Chains Program: where circular economy is	Biomass and bioproducts: - Prototype of intumescent /ignifuge paint based on polyphenols extracted from agro-industrial waste. - Reuse of waste yeast in the brewing process to obtain a natural and nutritious extract without the addition of salt or other chemicals. - A minimum viable unit that transforms the waste from the fruit and vegetable industry to meet the requirement s of the insect that transforms organic	Biomass and bioproducts: - Reduction of fertilizers, water, biomass boilers and symbiosis opportunities (Tequila production receives bagasse from other companies) - Innovative technology to extract and recycle water from milk. - Sustainable forestry projects.	Biomass and bioproducts: - Production of ingredients with antioxidant and phenolic content, from blueberry leaf from pruning waste, for formulations for female intimate care. - Production of leather with a metal-free industrial process. - Recovery of perchloroethyl ene from lamb hides by a distillation process to reduce pollution from aggressive contaminants. - Effluents from combed wool tops production are treated anaerobically and aerobically with biodegradabl



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
						one of the guidelines of selected projects.	waste into protein. - Method of extraction of natural pigments (anthocyanins) for use in cosmetics, from fermentation waste in the Wine Industry. - Collection and purification of GHGs from wine production where the CO2 can be used for inserting the vats and in other stages of the production process.		e organic substances. Forestry: - National Native Forest Strategy focused on the preservation and valorization of the ecosystem services of forests.
Bio- and Renewable	Bioenergy:	Bioenergy:				Bioenergy:	Bioenergy:	Bioenergy:	Bioenergy:
Energy	- Support biogas systems and other renewable energy solutions in agriculture.	- Replacement of fossil energy sources by biomass and bioeconomy.				- Technologies development for agricultural biomass residues use in industrial and	- Agro- industrial waste recovery through vermicomp osting for	- Financing pilot projects for low- carbon electricity and heat generation from	- Change of the extensive treatment of anaerobic reservoirs for a compact and more efficient system to



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
	- Promote the implementation of biofuels produced in a sustainable manner.					agricultural production such as energy cogeneration and research in LCA for agri-industrial products. Research on production of biorenewable energy through sugarcane, return of agri-industrial residues to the soil as nutrients (e.g. straw, vinasse) and use plant compounds (e.g. lignin and cellulose) to biomaterials and biochemicals. BiogasBrasil technical support strengthening biogas production and technological innovation chains in the	mushroom cultivation. - Prototype of an extraction process of pectin, hydroxytyros ol and energy from anaerobic digestion of apples and pomace and olive oil production waste. - Developme nt of a technology for the recovery of residual biosulfur from the anaerobic digestion of sludge from water treatment for the production of biogas in biofactories.	anaerobic bio digestion of urban solid waste in cities. - Energy generation from methane capture in landfills being used by car manufactures , public lighting and the metro transport system. - Energy generation from harvest biomass at sugar mills. - Co-processing technology to urban solid waste in the cement industry.	obtain biogas as an energy source.



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
						conversion of organic waste into electric, thermal or fuel energy from rural and agro-industrial sources, also resulting in organic material with high potential for agricultural and agro-industrial use. - Government al program to support mechanisms to create a carbon credit market to improve clean energy matrix and investments in renewable biofuels (e.g. biomass, biogas, ethanol, 2nd generation, bioAQV, biodiesel).			



SECTOR INITIATIVES	FI	NL	FR	DK	ES	BR	CL	MX	UY
Consumer Goods and Procurement	Public procurement: - Use public procurements to focus on purchasing solutions and products that support the circular economy.	Consumer Goods: - Promote sharing, reuse, and repair among residents. - Develop a more effective collection and return systems. - Foster a high-grade use of recyclables.	Consumption: - Combat food waste - Create sustainable jobs in the repair sector, particularly from the social and solidarity economy. - Give consumers the means for more responsible consumption. - Increase the lifespan of products. Public procurement: - Rely on the key driver of public procurement.	Public procurement: - Promote circular procurement. - Increase the focus on total cost of ownership in public procurement.	Consumer Goods - Expand the range of products included under the Ecodesign Directive. - Include circular economy characteristics in the Ecodesign Directive (such as improving durability, increasing the contents of recycled materials). - Establish restrictions to marketing single use products and planned obsolescence.	Public procurement: - Public procurement law includes sustainable development as a principle for encouraging the application of sustainability parameters in all stages of contracting products and services, including for public buildings life cycle.		Consumer Goods: - Collaboration between industries from different sectors for recycling of PET, HDPE, LDPE and BOPP materials, glass bottles and aluminum cans, with social benefits. - Using mycelium of fungi as a biodegradabl e alternative for packaging applications made from agro- industrial waste.	
Tourism					Tourism: - Work on reducing extensive use of water resources, high waste levels in tourist areas and the				



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
					continuous growth of an inland tourism associated to nature.				
Transport and Logistics	Transport and Logistics:	Transport and Logistics:						Transport and Logistics:	Transport and Logistics:
	- Develop incentives and policy instruments to accelerate change towards a more service-based transport system. - Develop a tax and other steering mechanisms to support the end of fossil fuel use in private cars.	- Support sustainable circular economy construction by road and rail networks.						- Plan to install small biorrefineries to produce 2G bioethanol for the transportation sector in 16 states of the country.	- Installation of 50 electric transport recharging stations for the expansion of electric mobility located in 34 locations or sites in the country.
Digitalization and Industry 4.0	Data and digitalization:			Data and digitalization:	Data and digitalization:	Data and digitalization:	Data and digitalization:	Data and digitalization:	
	- Promote digital and service- centered circular economy incentives.			- Support digital circular options by commercial use of data and challenges.	- Launch a process of digital transformation with the goal of complying with the demands of a highly technological, increasingly	- A technology action plan developed for Industry 4.0 which aim is to create a circular economy network to	- Developme nt of a digital platform for a recycling logistic system to determine optimal	- Use of IoT technologies, to predict possible failures and optimize processes in	



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
					demanding society. Reinforce the initiative 'Industria Conectada 4.0' to promote circular economy	overcome specific barriers for its implementati on in the country.	routes for collection and traceability of waste from origin to disposal and a mobile modular system to reduce the volume of waste on site. Development of web platform for IOT stock monitoring system, for the reduction of packaging and inventory in automotive chemicals, available to suppliers and users.	the CEMEX industry.	
Mining and Raw Materials		Mining and raw materials:				Mining: - Government			
		- Take the lead in EU regarding risk management for the supply of several metals by initiating the establishment				al Funding Authority for Studies and Projects coordinating international consortium to support			



ITIATIVES								
FI	NL	FR	DK	ES	BR	CL	MX	UY
	of a EU Partnership for responsible minerals. - Meet material needs by reuse, placing an active focus on the rapid reuse of residues to cover part of the Dutch need for new raw materials. - Take actions to boost the EU Raw Materials Initiative (RMI). - Track businesses and knowledge institutes, in the aim of building a long-term strategy for raw materials supply security. - Implement 'green' agreements with sectors and value chains that are vulnerable in terms of supply security.				research and innovation programs to foster circular economy in mineral raw materials and their secondary sources.			



	FI	NL	FR	DK	ES	BR	CL	MX	UY
Production and Manufacturing ndustry	Manufacturing Industry: - Develop and implement pilot projects involving e-waste urban mining. - Develop and implement pilot projects involving sustainable urban mining in collaboration with the maritime sector. - Close the loop of industrial resources.	Manufacturing Industry: - Develop business models with circular potential and substantial export prospects, specially focused on products requiring energy-intensive production.	Production: - Promote the upgrading and differentiation of products through better environmental performance.	Production: - Incorporate circular economy into product policy. - Increase the participation in European work on circular standards.	Manufacturing Industry: - Foster changes in business models and in the processes and dynamics of industrial companies.	Manufacturing Industry: - Government al program to coordinate public and private initiatives in circular economy for productive integration between different activities into value chains, as an instrument for the development of regions and metropolitan areas. - Studies, seeking trends, making proposals to solve bottlenecks and creating a strategic vision for the circular economy in the Brazilian industry, to bring together state industry	Manufacturin g Industry - Laboratory developme nt to manufacture water-based paints using EPS waste. - Prototyping of machinery lines focused on the recycling of windshields used in the manufacture of automobiles. - Prototype of air conditioning using the thermal energy wasted from the vehicle engine to feed the absorber evaporation process.	Manufacturing Industry: - Create a market for revaluation of metallic materials that increases their value in the different stages and cycles of use. Geothermal energy 3D prints low-cost turbine prototype for small-scale electricity generation. - Development of the baseline for a national emission trading system (carbon market) targeting GHG emissions reduction, with participation of various actors from the industry sector.	



SECTOR INITIATIVES						_			
	FI	NL	FR	DK	ES	BR	CL	MX	UY
						federations, industry associations and business representatives.		- Research development on Industry 4.0 for: Automation, microelectron ics, robotics, clean energy, joining technologies, surface engineering, oil industry and cold technologies. - Development of a strategy to measure impacts, assess consumption and waste generation, and define long-term objectives for production and mitigation in industry. - Waste Management Network for creation of a local industry to reuse wasted resources for job creation	



SECTOR INITIATIVES							_		
	FI	NL	FR	DK	ES	BR	CL	MX	UY
								in vulnerable communities. - Use of steel scrap as a raw material in the metallurgical and paper industry.	
Plastics		Plastics: - Discourage the use of non-recyclable plastic products. - Support the change in product design. - Work to close the plastics value chain internationally.				Plastics: - Recycling expired plastic credit cards, through a pioneering and innovative technology.		Plastics: - Recycling and use of plastics in various sectors such as cement and repaving material (ECOCE).	Plastics: - Interdisciplinar y projects to increase efficiency of post-consumer and post- industrial plastic recycling and the formalization of the informal activities in the chain.
Textile and Garment					Textile and Garment: - Implement a plan for separate collection and management of textile waste.	Textile and Garment: - Collection points available in more than 150 fashion stores, receives clothes in good condition that are sent		Textile and Garment: - Promotion of the circular economy in the fashion and textile sector by global brands.	



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
						for reuse by people in vulnerable conditions or for recycling and reprocessing of parts that cannot be reused.			
Infrastructure	Construction:	Construction	Construction	Construction	Construction	Construction:	Construction:	Construction:	Construction:
and Construction	Incentivize the development of wood construction and the design of wooden furniture and promoting the interior design sector.	- Support more innovative and circular construction projects. - Implement sectoral agreements for example for the concrete sector. - Implementation of an innovation agenda in the construction sector. - Use the Central Government Real Estate Agency (RVB) to use life cycle costs approach for business and convert circular	Set sorting and recycling targets for building demolition and construction phase.	- Develop a voluntary sustainability class. Propagate selective demolition.	Progress towards waste separation and classification of those waste materials used in construction and demolition activities.	- A Life Cycle Assessment protocol for construction materials to collect data on environmenta I impacts on water, energy, raw materials, CO2 emission and solid waste.	- Evaluation of the use of black steel slag as an artificial aggregate in concrete.	- Recycled concrete to produce gravel back as input to the building industry.	- Recycling from the construction industry waste to produce new construction materials.



SECTOR INITIATIVES									
	Fl	NL	FR	DK	ES	BR	CL	MX	UY
		ambitions into practice.							
		- Reduce material consumption by natural capital solutions.							
		- Develop pilot projects targeting CO2 reduction.							
		- Develop pilot projects for reuse of materials.							
Water Management						Water management:		Water management	
						- Develop integrated water management for urban, rural and industrial, applying circular economy to teach the need for a new mindset for water cyclical management - Research projects related to		- Wastewater treatment plant generates energy for self-consumption and heating for digesters and reuses treated water in agriculture, contributing to the ecological restoration of a dam.	



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
						water reuse in semi-arid regions, rainwater consumption in urban areas and reuse of treated sewage to agricultural, urban and industrial purposes.			
Waste Management			Waste Management:	Waste Management:		Waste Management:	Waste Management:	Waste Management:	Waste management:
			- Incentivize the recovery of all biowaste (amounts to 22 million tons). - Collect 100% of potentially recyclable waste. - Make the sorting of waste easier for citizens. - Ensure that companies and government agencies which are large waste producers meet recovery obligations for metal, paper,	- Liberalize Waste Electrical & Electronic Equipment (WEEE) management. - Create a level playing field on the market for waste and recycled raw materials.		- Living laboratory processes focused on the reduction and recycling of consumer electronic products and zero waste. - Business models supporting waste picker organizations in post- consumer packaging recycling helping business associations in the	Recovery of used lubricating oils, achieving reuse in industrial equipment, through a process of elimination of solid and liquid contaminatin g elements.	- Ley General para la Prevención y Gestión Integral de los Residuos [LGPGIR] - Ley de Economía Circular a nivel estatal en varias entidades federativas - iniciativa de Ley General de Economía Circular. - Energy generation from urban	- Improvement, monitoring and evaluation of waste and effluent management systems for nutrient circulation in the dairy production Management of solid waste for reducing, reusing and recycling the waste generated by Technological Laboratory.



SECTOR INITIATIVES									
	FI	NL	wood, plastic and glass. - Accelerate the introduction of pricing incentives for waste management systems.	DK	ES	commitment with the National Solid Waste Policy.	CL	solid waste to use in municipalities (FELICITY project). New business model for electronics reverse logistics, through market places.	UY
Education and R&D	Education: - Implement an education and research policy that enables a circular economy.		Education: - Inform, educate and train all actors about the circular economy. - Create jobs and meet training needs for new occupations or new skills in the circular economy.			R&D: - Government al funding for business R&D+I initiatives, products and processes that minimize energy use and waste generation and contribute to a low carbon economy.		Education: - Learning Network in a circular economy where large companies anchor the SMEs associated with their productive chains to promote knowledge sharing.	Education: - Seedbed for circular at the school of design, to consolidate an interdisciplinar y working group to apply the principles of circular and regenerative economy for sustainability.



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
								- Academic program for students to foster innovation projects, pilot projects and funding with the local industry. - Research development associated with the development of resilient cities and territories, materials technology, clean energy and water.	
Taxes and Regulations	Regulations and tax: - Eliminate regulations barriers and create incentives for circular economy initiatives. - Change the focus of taxation towards the circular economy.			Regulations and tax: - Establish a fund for the handling of regulatory barriers to circular economy. - Set up a single point of entry to the authorities for enterprises with circular business models.				Regulations and tax: - Development of NDC instrumentati on routes for GHG mitigation in the country (study 2017-2018) - Recent initiative to create a Circular	



SECTOR INITIATIVES									
	FI	NL	FR	DK	ES	BR	CL	MX	UY
	- Improve guidelines to build collaboration among the public administration areas.							Economy Law.	
Financial	Financial:		Financial:	Financial:		Financial:		Financial:	Financial:
	- Fund and promote exports and co-operation between private and public sectors to accelerate circular economy.		Support the transition to a circular economy with appropriate financing.	Expand the access to financing of circular business models.		- Funding of innovation projects to business develop circular economy, to new products development , use of fewer raw materials for product, waste reuse and new applications.		- Implementati on of an Emissions Trading System.	- EC financing program for demonstration projects, seeks to promote waste recovery technologies, reducing GHG emissions.
Transversal initiatives enabling CE	CE Indicators: Create indicators for circular economy.		CE governance - Mobilize local authorities and businesses in the regions. - Establish governance for sustainability.	CE Promotion: - Promote circular business development in SMEs.	-	LCA application: - Life Cycle Assessment studies propose metrics to account for circularity and externalities of environmenta I and social		CE Promotion: - Initiatives are being carried out on GHG mitigation.	CE Program: Circular Opportunities is a program that promotes the validation of ideas, new business lines and prototypes and the implementation of projects for the transition to a CE for



SECTOR INITIATIVES						_			
	Fl	NL	FR	DK	ES	BR	CL	MX	UY
						impacts in the life cycle of products and services to improve management of waste and bio economy. TNAs implementation: - Technology Needs Assessment for support development and capacity building in climate technologies, aiming an action plan to identify and disseminate priority technologies to guide successful implementati on and help funding from public and private investments.			sustainable productive development.



In addition to the prioritized sectors described in **Table 10**, there is a commonly expressed need to take action to promote "**Education**", "**R&D and Innovation**" in support of the transition to a circular economy across all sectors. For example, **Spain**, **Mexico** and **Brazil** explicitly reference this need.

The circular economy is first and foremost about flows of materials and products. Importantly, proper management of these flows make a significant contribution to climate change mitigation and other SDGs.

To drive change across all sectors of the economy, the focus of action relies on improving (1) **production activities** and (2) **improving how society uses or consumes stuff**, with particular attention to "improving" material management, and how to get all actors across the whole economy on board.

From this analysis, it is noticeable that:

- (1) The **Dutch circular economy roadmap** is in essence focused on selection or prioritization of sectors in a more 'thematic approach'.
- (2) The **Finnish circular economy roadmap** is structured on the basis of biological (food and forest-based) and technical loops (use of secondary raw materials) cycles, with particular focus on how to move materials rationally to, within and out of (through) their economy (transport and logistics).
- (3) The **French circular economy roadmap** with a differing approach, where the focus is much more on how to get everyone across the economy involved, in essence structured on the general value chain or materials flow through their economy (production to consumption to reuse).
- (4) The **Spanish approach** includes both a recognition of the participation and involvement of the entire society is needed to make transition to circular economy and a recognition that a sustainable, low-carbon economy which uses resources efficiently is needed.
- (5) The **Danish approach** focuses on enterprises as the driving force to create a transition towards a more circular economy. It also, recognizes the importance for more harmonized and common standards for circular economy within the country and for the EU region.
- (6) The **European Union's regional circular economy approach** promotes a climate neutral and resource efficient, competitive economy. It recognizes that this is a global, cross-border issue, requiring multi-lateral and international agreements and a need to co-create with economy actors, consumers, citizens and civil society organizations to do so.

6.2. KEY STAKEHOLDERS

Many varied organizations were noted as stakeholders who were involved in the creation of the roadmaps and subsequent projects. **Table 11** identifies the types of stakeholder organizations who typically need to be included in discussions and helps project countries in the identification of potential individuals and organizations that could participate in knowledge exchanges and/or partnerships on particular topics, to promote a concept or type of project and or help bolster the concept of circular economy as a whole.



TABLE 11: COMPARATIVE MATRIX OF KEY STAKEHOLDERS INVOLVED IN THE NATIONAL CIRCULAR ECONOMY ROAD MAPPING PROCESS IN ASSESSED COUNTRIES

Finland

More than 50 organizations, among them:

- (1) The central government as responsible for the articulation and cooperation across ministries;
- (2) The municipalities with focus on developing the discussion on public procurement, education, teaching, smarter land use;
- (3) The private sector to find ways of cooperation among companies and with the public sector and evaluate new circular business models and strategies; and
- (4) The general public, especially on contributions for awareness raising and behavioral change towards more sustainable consumption choices.

The Netherlands

- (1) The government to foster new legislation and regulations and create market incentives;
- (2) Banks and investors to create ways for financing the transition;
- (3) Businesses to support knowledge creation and innovation in new business models and strategies; and
- (4) Consumers (citizens and companies) making the choices in the purchasing and discard of products.

France

Over 1,800 contributions and 16,000 votes. In 2018 the output was presented to stakeholders and working groups, and launched to continue dialogue with communities, businesses and NGOs. With more than 3,000 contributions and nearly 30,000 votes, this second consultation confirmed citizens' strong interest in the circular economy.

- (1) Communities;
- (2) Businesses; and
- (3) NGOs.

Denmark

The Danish government wishes to create such framework conditions that support the realization of economic and environmental benefits of the circular economy in a joint effort among Danish enterprises, consumers, and public institutions.

Spain

- (1) Inter-ministerial commission for circular economy
- This commission is formed by representatives of those Ministries whose policies have a direct impact in the transition towards a circular economy
- (2) Work group on the circular economy of the Commission of Waste Coordination This Work Group is formed by representatives of the Ministry for Ecological Transition and Demographic Challenge, as well as by other representatives of the National Administration, Regional Administrations and the Spanish Federation of Municipalities and Provinces.
- (3) Council for circular economy Including social agents, economic agents from the primary, secondary and tertiary sectors, waste management agents and extended producer responsibility systems, as well as research centers that promote innovation.

European Union

In co-creation with **economic actors**, **consumers**, **citizens** and **civil society organizations**, this action plan proposes initiatives for the entire life cycle of products aiming to ensure that resources are kept in the EU economy for as long as possible with maximum utility.



6.3. CIRCULAR ECONOMY PUBLIC SECTOR LEAD

An important element identified in each roadmap reviewed is that these are usually led by one or more key ministries of each respective national governments.

Finland is the exception. It is the first circular economy roadmap to be developed and this work was led by an Innovation Fund which is not a ministry within the Finnish Government. Although the Fund is linked to the Finnish Parliament, this roadmap was in essence launched as an independent initiative which gained support and is now carried by the Finnish Government.

In all other cases, one or more ministries took the leading role in promoting, developing and guiding the implementation of their national circular economy roadmaps.

The table below lists the key ministries and quasi-government organizations per reviewed country.

TABLE 12: COMPARATIVE MATRIX OF LEADERSHIP ROLES IN NATIONAL CIRCULAR ECONOMY ROAD MAPPING PROCESS IN ASSESSED COUNTRIES

Finland

(1) Sitra Innovation Fund, of which its operation is funded from returns from an endowment originally granted by the Finnish parliament.

The Netherlands

- (1) The Ministry of Infrastructure and the Environment;
- (2) The Ministry of Economic Affairs;
- (3) The Ministry of Foreign Affairs and the Ministry of the Interior and Kingdom Relations, and
- (4) The Social and Economic Council (SER).

France

- (1) The Ministry for an Ecological and Solidarity Transition; and
- (2) The Ministry for the Economy and Finance

Denmark

- (1) The Danish Ministry of Environment and Food; and
- (2) The Danish Ministry of Industry, Business and Financial Affairs.

Spain

(1) Inter-ministerial Governing Board on Circular Economy (incl: Ministry for Ecological Transition and Demographics; the Ministry of Science and Innovation; the Ministry of Agriculture, Fishery and Food; the Ministry of Industry, Commerce and Tourism; the Ministry of Consumption; and the Ministry of Social Rights and the 2030 Agenda).

European Union

(1) European Commission.



6.4. STRATEGIC INSTRUMENTS

Some specific strategic instruments or approaches are described in **Table 13** and may serve as inspiration for the design and development of the upcoming circular economy roadmaps in the project countries.

TABLE 13: COMPARATIVE MATRIX OF THE STRATEGIC INSTRUMENTS FOR THE DEVELOPMENT OF THE CIRCULAR ECONOMY ROADMAPS IN ASSESSED COUNTRIES

Finland

- (1) A structure of related policy actions; and
- (2) Pilot project categories and examples of initiatives.

The Netherlands

- (1) Fostering legislation and regulations;
- (2) Intelligent market incentives;
- (3) Financing;
- (4) Knowledge and innovation; and
- (5) International cooperation.

France

- (1) Launching of working groups;
- (2) Use an online platform for outreach and stakeholder engagement;
- (3) Develop roadmaps per priority intervention areas.
- (1) The anti-waste law for a circular economy was put into effect on February 10, 2020.

Denmark

- (1) Deploy business sector surveys;
- (2) Established a National Advisory Board on Circular Economy;

Spain

- (1) Establishment of a Governing Board on Circular Economy;
- (2) Deployment of 3-year Action Plans; and
- (3) Use of a Monitoring and Evaluation system (10 indicators used by EC).

European Union

(1) Presents a set of interrelated initiatives to establish a strong and coherent product policy framework for more sustainable products, services and business models, by promoting circular economy in product design, processes and new consumption patterns.



EU-LATAM Relations:

- (1) Policy dialogues, trade, technical and financial assistance and investments as part of its broader efforts to promote climate neutrality and sustainable development;
- (2) Alignment, where appropriate, with EU norms and standards, product policy (including ecodesign);
- (3) New business models, resource-efficient production and uptake of clean technologies;
- (4) The sound management of chemicals;
- (5) Ambitious waste prevention and management measures (including through waste prevention and management plans aligned with the waste hierarchy and circular economy objectives; targets for recycling of key waste streams and reducing landfills; extended producer responsibility schemes and deposit return schemes for plastic products and packaging);
- (6) Sustainable consumption and consumer information (including through the product environmental footprint method, to enable companies to optimize their operations, avoid green washing and ensure consumers' informed choices);
- (7) Strategies for action in priority sectors (e.g. plastics, textiles, buildings); and
- (8) Up-skilling and re-skilling in a way that responds to the needs of the circular economy.



7. INSIGHTS FROM THE ANALYSIS

This chapter provides **ten insights** from the review of circular economy roadmaps studied. Each insight is accompanied by a short explanation based on information gathered from the roadmaps, plans, and projects at regional, national and sectoral levels.

Based on the scope in this technical assistance, these insights are intended to be useful across the different contexts of the four countries targeted in this study, Brazil, Chile, Mexico and Uruguay, rather than grounded in specific scenarios or cases. In addition to these insights, more information about circular economy initiatives may be included in **Deliverables 6.1** of this Project regarding pilot projects with specific focus in these study countries.

Key elements from the **international experiences** of conceptualizing and implementing a circular economy roadmap **can be applied in the context across the four project countries**, taking account of the differences between the study countries and those roadmaps predominantly from the European region.

Overall, the European Union has been discussing and creating circular economy roadmaps and piloting circular economy approaches for longer than the Latin American countries have. European countries have also had access to funding dedicated to Circular Economy to test out new innovations and business models. For this reason, the presented international roadmap initiatives provide a valuable source of pre-identified and often pre-tested potential opportunities for Latin American countries to "mine" approaches where these sectors are relevant to each individual Latin American country.

The ten insights:

- (1) The circular economy is a transformational concept;
- (2) International economic relations and global supply chains;
- (3) There are common circular economy approaches that can be used by all countries;
- (4) Governments need to support the transition to a circular economy by leading and creating new incentives through legislation and regulations;
- (5) Multi-stakeholder groups are needed to deal collectively with complex circular economy issues;
- (6) The social reality in Latin America demands a different circular economy approach than that seen in developed countries;
- (7) There are potential opportunities for partnership and cooperation on circular economy in the common priority sectors of countries;
- (8) Circular economy is expected to contribute positively to Sustainable Development Goals and Climate Change mitigation;
- (9) Circular economy is expected to provide new employment opportunities; and
- (10) Pilot Projects help with experimentation and finding ways to implement the circular economy and inform the creation of specific sectoral plans.



7.1. THE CIRCULAR ECONOMY IS A TRANSFORMATIONAL CONCEPT

The concept of a circular economy is intended to be a transformative, paradigm shifting idea that replaces the current linear business model. It describes an alternative economic model for global, regional, national and local economies.

Efficiency improvements are an important part of a transitional strategy. These efficiencies help to allow businesses to continue operating while they learn how to create new business that is more aligned with the circular economy approach. But many actions are not taking advantage of the circular economy positive impacts to sustainability but are still aimed at reducing the negative impacts of the current linear economy with focus only on improvements in waste management and the efficiency of industrial processes.

So, to improve efficiency and waste management there is a need to empower a change in the direction of increasing materials management after each product or service use, through multiple use cycles. By changing the focus from 'waste' to 'resources', ways can be found to value, revalue and reutilize materials that otherwise are considered to have small or no value as a waste.

It is noteworthy that in some examples in the roadmap countries and also in the study countries, wasted materials are being identified, diverted and transformed into new value. Many of these examples are transforming materials to energy, which is not the most valuable circular economy approach. So, more examples of material to material reuse and re-valuation should also be encouraged.

In addition to looking at opportunities in existing linear economy products and systems, new innovative design approaches are needed. For example, Mexico is reporting new bio-based materials, such as mycelium for some packaging uses which provides the potential to reutilize them in the biological cycle after their intended use.

It has to be noted however, that such POTENTIAL for reuse does not guarantee they are reutilized after use. To this aim, new reverse logistics systems also need to be developed in parallel to guarantee reuse of these innovative materials.

7.2. INTERNATIONAL ECONOMIC RELATIONS AND GLOBAL SUPPLY CHAINS

The creation of a national roadmap is first focused on the country's priority economic sectors and needs. However, the national economy is also intimately connected to the international market and is part of the complex web of global supply chains. Therefore, the national roadmap also needs to include the wider, cross-border regional and international context, and understand the nations' main economic activities' place in the global economy.

It is critical to understand that the circular economy is considered by some importdependent nations or regions as a means to address a matter of national security, where focus is placed on reducing the dependency on the import of increasingly limited access to raw materials, minerals, food, and/or energy while investing in building the capacity to reuse these assets/goods in multiple cycles or loops, as efficient as possible to sustain their economies and lifestyles.

On the other hand, nations of which their economies are highly dependent on the export of commodities, as is the case for most Latin American nations, are confronted with a



reality where they have to reinvent their economic model from an export-oriented economy to a more added-value economy. This brings with it the challenge of needing to increase their productivity within existing value-chains to make sure their main economic activities remain relevant, while anticipating changes in the international market (more specifically access to the European market) and having to invest in building their capacity to retain as much value as possible from the extracted natural resources and agricultural commodities within their frontiers.

The countries assessed acknowledge the need to act locally in a regional and global context. Thus, while acting locally, regionally and nationally the country's circular economy strategies will have to take in account their economies' relationship to the international market dynamics and their connectivity to global supply chains.

7.3. COMMON CIRCULAR ECONOMY APPROACHES

From this analysis of the roadmaps from Finland, the Netherlands, France, Denmark & Spain, it was possible to identify two main roadmap design approaches:

- Focus on Materials Management and
- Focus on Mobilization of People.

Both materials-focused and people-focused considerations are important and are fully compatible with each other. For example, the Netherlands, Finland, Denmark started with materials and products, France started with the engagement of key stakeholders, and Spain combined both approaches together.

The manufacture, distribution, sale, use and safe reuse of materials in technical and biological nutrient cycles is central to the circular economy. Everyone in society acting in different stakeholder roles from individuals acting as consumers and users of goods and services to companies, organizations, academia and government, all need to understand the need for this change and play active roles in implementing the change.

Both roadmap approaches (material-focused and people-focused) are recommended for the four project countries.

7.4. NEED FOR NEW INCENTIVES THROUGH LEGISLATION AND REGULATIONS

In most countries studied, national governments played a significant and usually leading role in the creation of national roadmaps. Only in the case of Finland, was the roadmap work undertaken by a non-governmental organization (which was itself funded by a governmental program).

Governments play a vital role in leading and enabling the circular economy transformation through coordination of meetings and through the development and implementation of new supportive legislation and regulations.

Governments need to lead and actively support the transition to a circular economy by creating the conditions and incentives for the transition from linear to circular to take place.

In some cases, existing legislation actively disincentivized the new circular approaches needed. The enactment of new legislation and regulations was found to be needed in order to support and incentivize the transition to circular.



There are projects underway in all study countries, which begin to create new laws, guidelines and public procurement initiatives to support and encourage the implementation of sustainability and the circular economy. These approaches should be encouraged and expanded on by all study countries.

7.5. MULTI-STAKEHOLDER ENGAGEMENT

In the studied countries, a lot of effort has been made to bring together various multistakeholder groups comprising government, business, and other associations to discuss and plan actions to include circular economy considerations in their future planning. This is the approach recommended for the four project countries.

While formulating a national roadmap, an open, collaborative approach with multiple stakeholders is required to gain the buy-in and involvement of all parties. All five (5) national roadmap processes studied were open to participation with broad stakeholder engagement. Typically, they led to new governmental policy measures, key projects and pilot projects being agreed by working groups.

There is a clear recognition that multi-stakeholders need to be engaged in the transition to a circular economy. This requires the creation and implementation of strategies by engaging a broad range of stakeholders with the intention to create systemic change shifting from linear to circular business models. This involves much more than just more efficiency and better waste management of current systems.

The creation of multi-stakeholder groups with representation from important actors and organizations, such as government, business, academia, NGOs and civil society is vital to help build a shared understanding and foster a collaborative commitment to possible change.

Not everyone will agree on what the problem is, but stakeholders should be able to understand each another's positions sufficiently to be able to discuss and work together to solve it. The planning process becomes more complex, but it can expand the potential for creativity. Achieving buy-in to initiatives is an important result in and of itself.

7.6. THE SOCIAL REALITY IN LATIN AMERICA DEMANDS A DIFFERENT APPROACH

Currently, the most advanced initiatives on circular economy are still in European countries. But in many aspects, in the project countries of this study, the social environment is significantly different from Europe. Learning from approaches and experiences of other countries is important, but their proper application requires thinking about each country, region, city, town or village as a unique and individual place with its own local needs.

The countries of this study should adapt the lessons learned from countries with different contexts to their own socially-focused circular economy initiatives that speak directly to ways to improve their country's specific social and economic situation while creating a sustainable, circular economy that is climate compatible and more resilient to future global crises and economic shocks.

Unlike the perceived technocratic based approach to circular economy in Europe, the importance of providing circular solutions in response to the social realities in the Americas and the need for a more human-centric perspective to the circular economy



were among the key take-aways of the inaugural Circular Economy Forum of the Americas held in November of 2017 in Medellin, Colombia, which gathered leading regional and international experts, thought leaders, and academia to discuss what Circular Economy stands for and mainly to respond on how it can benefit the American communities, recognizing the diversity of realities, needs, and priorities present in the Western Hemisphere. This confirms that the social realities in Latin America demand a different understanding and approach to circular economy implementation.

It is apparent in some of the initiatives noted by the study countries, that the unique social situation in South America is being recognized and is being included in the process of seeking for circular economy solutions. For example, there are social targeted outcomes in the recycling of plastics and other packaging materials in Mexico. Also, used textiles are being collected and made available to vulnerable populations, in Brazil. In particular, the fashion/textile industry is making strides to learn and apply learning from Europe in countries in Latin America, where there is a pickup of efforts by global fashion brands recognizing the potential of the circular economy to the sustainability issues of this sector.

7.7. OPPORTUNITIES FOR PARTNERSHIP AND COOPERATION ON CIRCULAR ECONOMY

Next to the opportunities for South-South and North-South Cooperation identified in this study, there are an increasing number of new initiatives being launched that aim to facilitate regional dialogue and the establishment of regional and international partnerships. In particular, the European Union, through its European Green Deal, is aiming to intensify the EU's international diplomacy, and therefore presence in Latin America. The goal is to focus on instilling circular economy practices and standards in, for example, the management of materials, minerals, and products originating from Latin America and as part of the global supply chains toward the European Union.

This opens up new opportunities for tapping into allocated international funding, such as described in **Table 9**, creating strategic alliances and identifying technical cooperation needs between the project countries and the EU member states on topics of common interest. A general description of these opportunities is provided in **Annex 4** of this report, where several existing partnerships and cooperations between various global and regional organizations in Europe and organizations in Latin America and the Caribbean are reported. These provide additional opportunities for the project countries to build upon and further the development of these existing circular economy partnerships.

7.8. CIRCULAR ECONOMY'S CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS AND CLIMATE CHANGE MITIGATION

The inclusion of sustainability in the circular economy is important because circularity, per se, is not automatically sustainable. A transition towards a circular economy ought to connect all circular economy activities to all the prior work on sustainable development goals with the understanding that ultimately, all sustainability takes place locally.

Many aspects of the assessed roadmaps are implicitly related to climate change (NDCs) and compliance to the 17 UN SDGs. However, it is important to highlight the fact that the studied roadmaps mainly presented general compatibility between meeting climate change goals and reduction in material use or increases in reuse/recycling in a Circular Economy. Not all studied roadmaps explicitly mention SDGs or NDCs explicitly.



To help retain focus on economic, equity, social justice and environmental regeneration, a national roadmap and pilot projects should aim to contribute positively to sustainable development goals and climate change mitigation.

7.9. NEW EMPLOYMENT OPPORTUNITIES

All national roadmaps studied reported an expectation that new employment opportunities would be created by transitioning to a circular economy. This new employment is expected to come from innovation in creating new products and services, and in the creation of the reverse logistics infrastructure needed to implement the circular economy business models described in **Annex 2**.

7.10. PILOT PROJECTS AS MEANS TO INFORM THE CREATION OF SPECIFIC SECTORAL PLANS

The report "National Agreement on the Circular Economy" from the Netherlands dated January 24th, 2017 states that: "...the circular economy will involve a time-consuming, complex process in which the partners involved join efforts to innovate and experiment" (Dutch Government, 2017).

The creation and implementation of pilot projects is commonly used as one way in which experimentation and learning on circular economy can be advanced.

The priority sectors identified in the national roadmap may inspire pilot projects and may subsequently be further elaborated by the development of more detailed sectoral circular economy roadmaps from which pilot programs can also be identified.



8. REFERENCES

Adelante (2020). Lessons Learned from Triangular Cooperation between the European Union and Latin America and the Caribbean [Online]. Available at: https://www.adelante-i.eu/en/lessons-learned-triangular-cooperation-between-european-union-and-latin-america-and-caribbean-0/ (Accessed: September 2020).

Advisory Board for Circular Economy (2017). Recommendations for the Danish Government.

Available
at:
https://en.mfvm.dk/fileadmin/user_upload/MFVM/Miljoe/Cirkulaer_oekonomi/Advisor_y-Board-for-Circular-Economy-Report-2017-Content_Single_pages_WEB.pdf
(Accessed: September 2020).

AFEP (2019). AFEP publishes its 2019 monitoring report on large companies' commitments for a circular economy. Available at: https://afep.com/en/publications-en/afep-publishes-its-2019-monitoring-report-on-large-companies-commitments-for-a-circular-economy/ (Accessed: September 2020).

ARAGON CIRCULAR (no date) [Online]. Available at: https://aragoncircular.es/ (Accessed: September 2020).

Arjowiggins Graphic (2016). Sustainable Development Report. Available at: https://wikirate.s3.amazonaws.com/files/3542994/14518001.pdf (Accessed: September 2020).

Baines et al. (2017). Servitization: Revisiting the State-of-the-Art and Research Priorities. January 2017. International Journal of Operations and Production Management 37(2): 258 – 278. DOI 10.1108/IJOPM-06-2015-0312. Available at: https://www.researchgate.net/publication/304249258 Servitization Revisiting the State-of-the-art and Research Priorities (Accessed September 2020).

Biodiversiteitsmonitor (no date). Op weg naar een biodiverse melkeenhouderij [Online]. Available at: http://biodiversiteitsmonitormelkveehouderij.nl/index.html (Accessed: September 2020).

Bioenergy International (2017). City of Helsinki shifts to renewable transportation fuels. Available at: https://bioenergyinternational.com/biofuels-oils/city-helsinki-shifts-renewable-transportation-fuels) (Accessed: September 2020).

Biomassa-Atlas (no date). Biomass atlas makes Finnish biomass maps freely available to everyone. Available at: luke.fi/biomassa-atlas/en/ (Accessed: September 2020).

Biom—ssa – Atlas (no date). Utilization of nutrient rich biodegradable municipal wastes in plant production. Available at: https://www.luke.fi/biomassa-atlas/en/utilization-nutrient-rich-biodegradable-municipal-wastes-plant-production/ (Accessed: September 2020).

Bouyues Immobilier (no date). Campus Sanofi Val de Bievre [Online]. Available at: https://www.bouygues-immobilier-corporate.com/en/references/campus-sanofi-val-de-bievre (Accessed: September 2020).



BAMB (2020). Buildings as Materials Banks, Materials Passports and Circular Economy. Availab e at: https://www.bamb2020.eu/topics/materials-passports/circular/(Accessed: October 2020).

Chatam House (2019). An Inclusive Circular Economy: Priorities for Developing Countries. [Online]. Available at:

https://www.chathamhouse.org/publication/inclusive-circular-economy-priorities-developing-countries (Accessed: September 2020).

Circle Economy (2018). The Circular Dairy Economy. Available at: https://assets.website-

files.com/5d26d80e8836af2d12ed1269/5e1d76b3a12b0a174b858215 the-circular-dairy-economy.pdf (Accessed: September 2020).

Circle Economy (2016). The Circular GAP Report. An analysis of the circular state of the global economy. Available at: https://bfc732f7-80e9-4ba1-b429-7f76cf51627b.filesusr.com/ugd/ad6e59-733a71635ad946bc9902dbdc52217018.pdf (Accessed: September 2020).

Circular Economy Leadership Coalition (2019). A Circular Economy For Plastics In Canada A bold vision for less waste and more value. Available at: http://circulareconomyleaders.ca/downloads/A Circular Economy for Plastics in Canada.pdf (Accessed: September 2020).

City of Copenhagen The Technical and Environmental Administration City Development, Sustainability (2018) Resource and waste management plan. Available at: resource and waste management plan —018

- https://kk.sites.itera.dk/apps/kk pub2/pdf/1184 LfcAsFCDJS.pdf (assessed: September 2020)

Council of European Commission (2019). More circula—ity – Transition to a sustainable soc—ety – Council conclusions. Available at: https://www.consilium.europa.eu/media/40928/st12791-en19.pdf (Accessed: September 2020).

Danish Agriculture & Food Council (2019) The circular bioeconomy in the Danish food cluster, From waste to resource and new business opportunities. Available at: <a href="https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ah_UKEwiB4oqogofsAhV5HrkGHQk7DbMQFjAAegQIBRAB&url=https%3A%2F%2FIf.dk%2F~%2Fmedia%2FIf%2Fviden-om%2Fb%25C3%25A6redygtighed%2Fcirkulaer-biooekonomi-uk—019--002-.pdf%3Fla%3Dda&usg=AOvVaw25W5NdCB5OMBttTU7KIJaR_(assessed: September 2020)

Danish Ministry of Environment (2013). From land filling to recovery – Danish waste management from the 1970s until today [Online]. Available at: https://eng.ecoinnovation.dk/media/mst/8051407/Affald_Baggrundsartikel_affald_web_15.01.13.pdf (Accessed: September 2020).

Danmarks Gronne Investeringsfond (no date). Green loans. Available at: https://gronfond.dk/en/green-loans/ (Accessed: September 2020).



Design-Driven Value Chains in the World of Cellulose (2018). Designing Cellulose for the Future. Available at: https://cellulosefromfinland.fi/wp-content/uploads/2018/09/DWoC_Loppuraportti_FINAL_s%C3%A4hk%C3%B6inen.pdf (Accessed: September 2020).

Digipolis (no date). The Circular and Bioeconomy Centre [Online]. Available at: https://www.digipolis.fi/en/teollinenkiertotalous. (Accessed: September 2020).

Dutch Government (2017). National Agreement on the Circular Economy. Letter of Intent to develop transition agendas for the Circular Economy together. Available at: https://www.government.nl/binaries/government/documents/discussion-documents/2017/01/24/national-agreement-on-the-circular-economy/Letter+of+intent+to+develop+transition+agendas+for+the+Circular+Economy+together.pdf (Accessed: September 2020).

Duurzame Zuivelketen (no date). Biodiversiteitsmonitor [Online]. Available at: https://www.duurzamezuivelketen.nl/onderwerpen/biodiversiteitsmonitor/ (Accessed: September 2020).

Eco3 (2019). Developing the wood cycle requires the right patterns. Available at: https://eco3.fi/en/nutrient-cycle/wood-cycle/_(Accessed: September 2020).

Eionet (2019). Resource efficiency and circular economy in Europe – even more from less. An overview of policies, approaches and targets of Finland in 2018. Available at: https://www.eionet.europa.eu/etcs/etc-wmge/products/b-country-profile-finland_final.pdf (Accessed: September 2020).

Enviu (no date). Enviu launches Latam office to kickstart a circular economy in Chile [Online]. Available at: https://www.enviu.org/2019/07/30/enviu-launches-latam-office-to-kickstart-a-circular-economy-in-chile/ (Accessed: September 2020).

Ellen MacArthur Foundation (no date,a). Our Mission is to Accelerate The Transition To A Circular Economy [Online]. Available at: https://www.ellenmacarthurfoundation.org/ (Accessed: September 2020).

Ellen MacArthur Foundation (no date,b). Latin America [Online]. Available at: https://www.ellenmacarthurfoundation.org/our-work/regions/latin-america (Accessed: September 2020).

Ellen MacArthur Foundation (2020). The EU's Circular Economy Action Plan, Setting the world's largest single market on a transition towards a Circular Economy. Available at: https://www.ellenmacarthurfoundation.org/assets/downloads/EU-Case-Study-june2020-EN.pdf (Accessed: October 2020).

Ellen MacArthur Foundation (2019). Completing the Picture, How the Circular Economy tackles Climate Change. Available at: https://www.ellenmacarthurfoundation.org/assets/downloads/Completing_The_Picture_How_The_Circular_Economy-_Tackles_Climate_Change_V3_26_September.pdf (Accessed: October 2020).

ETS Andre Cros (no date). Etablissements Andre CROS. Availab e at : . (Accessed: September 2020).



European Commission (2020a). Environment Action Programme to 2020 [Online]. Available at: <a href="https://ec.europa.eu/environment/action-programme/#:~:text=The%207th%20Environment%20Action%20Programme,Union%20to%20be%20by%202050%3A&text=to%20safeguard%20the%20Union's%20citizens,risks%20to%20health%20and%20wellbeing (Accessed: September 2020).

European Commission (2020b). Product Groups and Criteria [Online]. Available at: https://ec.europa.eu/environment/ecolabel/products-groups-and-criteria.html (Accessed: September 2020).

European Commission (2020c). Annex To The Communication From The Commission To The European Parliament, The European Council, The Council, The European Economic And Social Committee And The Committee Of The Regions [Online]. Available at: https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF (Accessed: September 2020).

European Commission (2020d). Commission Staff Working Document Leading The Way To A Global Circular Economy: State Of Play And Outlook. Available at: https://ec.europa.eu/transparency/regdoc/rep/10102/2020/EN/SWD-2020-100-F1-EN-MAIN-PART-1.PDF. (Accessed: September 2020).

European Commission (2020e). Circular Economy Missions to Third Countries [Online]. Available at: https://ec.europa.eu/environment/international issues/missions en.htm (Accessed: September 2020).

European Commission (2019a). Annex To The Communication From The Commission To The European Parliament, The European Council, The Council, The European Economic And Social Committee And The Committee Of The Regions. Available at: https://eur-lex.europa.eu/legal-content/FN/TXT/2 gid=159/4429119128.uri=CFI FX:F2019DC0/40#de.gument2

content/EN/TXT/?qid=1596443911913&uri=CELEX:52019DC0640#document2 (Accessed: September 2020)

European Commission (2019b). Annex of the Commission Implementing Decision On The 2019 Phase II Annual Action Programme For The Partnership Instrument Action Document For Reducing Plastic Waste In The Americas – Ensuring Sustainable Consumption And Production Patterns. Available at:

https://ec.europa.eu/fpi/sites/fpi/files/annex 21 reducing plastic waste in the americas - ensuring sustainable consumption and production patterns.pdf (Accessed: September 2020)

European Commission (2019c). Annex 21 of the Commission Implementing Decision On The 2018 Partnership Instrument Annual Action Programme Action Fiche For International Urban Cooperation – luc (Additional Funding And Extension Of The Implementation Period). Available at:

https://ec.europa.eu/fpi/sites/fpi/files/annexes_aap_2018_phase_ii_2.pdf (Accessed: September 2020).



European Commission (2019d). Annex 6 Of the Commission Implementing Decision on the 2019 Annual Action Programme for cooperation with third countries to be financed from the general budget of the European Union Action Document for Low Carbon and Circular Economy Business Action in the Americas. Available at: https://ec.europa.eu/fpi/sites/fpi/files/annexe-6-low-carbon-and-circular economy_in_the_americas_part1_v2.pdf (Accessed: September 2020).

European Commission (2018a). EU Plastics Strategy. International platform on sustainable finance. The ultimate objective of the IPSF is to scale up the mobilization of private capital towards environmentally sustainable investments [Online]. Available at: https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/international-platform-sustainable-finance_en (Accessed: September 2020).

European Commission (2018b). EU Plastics Strategy. Available at: https://ec.europa.eu/commission/news/eu-plastics-strategy-2018-nov-20 en (Accessed: September 2020).

European Commission (2018c). The Dialogue. High-Level policy dialogue on Circular Economy, Memorandum of Understanding on Circular Economy between the European Commission and the National Development and Reform Commission of the People's Republic of China. Available at: https://ec.europa.eu/environment/circulareconomy/pdf/circular_economy_MoU_EN.pdf (Accessed: October 2020).

European Commission (2017a). Annex 7 of the Commission Implementing Decision on the 2017 Annual Action Programme for the Partnership Instrument. Available at: https://ec.europa.eu/fpi/sites/fpi/files/ann-7-action-fiche-for-environmental-diplomacy-in-g7g20 en.pdf (Accessed: September 2020).

European Commission (2017b). Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions Achieving Prosperity Through Trade And Investment Updating The 2007 Joint Eu Strategy On Aid For Trade Updating The 2007 Joint Eu Strategy On Aid For Trade. COM/2017/0667. Available at: https://eurlex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52017DC0667 (Accessed: September 2020).

European Commission (no date). Environmental and health risks of microplastic pollution Scientific advice on the risks from microplastic pollution in the absence of comprehensive and detailed evidence [Online]. Available at: <a href="https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/scientific-support-eu-policies/group-chief-scientific-advisors/environmental-and-health-risks-microplastic-pollution en (Accessed: September 2020).

European Parliamentary Research Service (2018). EU trade with Latin America and the Caribbean – Overview and figures. Available at: https://www.europarl.europa.eu/RegData/etudes/IDAN/2018/625186/EPRS_IDA(2018) 625186 EN.pdf (Accessed: September 2020).

EU – Latin America Mineral Development Network Platform (no date). The Platform [Online]. Available at: https://www.mineralplatform.eu/index.php/about/the-platform/background (Accessed: September 2020).



EU-LAC Foundation (2018). Case studies on Circular Economy models and integration of Sustainable Development Goals in business strategies in the EU and LAC. Available at:

https://eulacfoundation.org/en/system/files/case studies circular economy eu lac.p df (Accessed: September 2020).

Extractive Industries Transparency Initiative (no date). The Extractive Industries Transparency Initiative [Online]. Available at: https://eiti.org/ (Accessed: September 2020).

Food And Agriculture Organization of the United Nations (no date). Livestock Environmental Assessment and Performance Partnership [Online]. Available at: http://www.fao.org/partnerships/leap/en/ (Accessed: September 2020).

Forest Foody (no date). Forest Foody [Online]. Available at: https://www.forestfoody.fi/ (Accessed: September 2020).

FrieslandCampina (no date). Biodiversity: ensuring a healthy ecosystem [Online]. Available at: https://www.frieslandcampina.com/sustainability/sustainability-on-the-farm/biodiversity/ (Accessed: September 2020).

FrieslandCampina (no date,b). Foqus Planet: quality and safety in the chain [Online]. Available at: https://www.frieslandcampina.com/our-farmers/foqus-planet/ (Accessed: September 2020).

FrieslandCampina (2017). Nature Conservationists and companies build and alliance to promote Farmland Nature [Online]. Available at: https://www.frieslandcampina.com/news/nature-conservationists-and-companies-

Generalitat de Catalunya (no date). Catalunya Circular: Observatori d'Economia Circular. Available at:

build-an-alliance-to-promote-farmland-nature/ (Accessed: September 2020).

http://mediambient.gencat.cat/ca/05 ambits dactuacio/empresa i produccio sost enible/economia_verda/catalunya_circular/ (Accessed: September 2020).

Gobierno de España (2018). España Circular 2030 [Online]. Available at: https://circulareconomy.europa.eu/platform/sites/default/files/espanacircular2030.p df (Accessed: September 2020).

Government of the Netherlands (2016). A Circular Economy in the Netherlands by 2050. Available at: https://www.government.nl/documents/policy-notes/2016/09/14/a-circular-economy-in-the-netherlands-by-2050. (Accessed: September 2020).

Groupe SEB (no date) Groupe SEB [Online]. Available at: https://www.groupeseb.com/en/central-role-circular-economy-sustainable-innovation (Accessed: September 2020).

Heka (2020). Helsingin kaupungin asunnot Oy (Heka) is a company wholly owned by the City of Helsinki, whose business is to own or manage plots of land and residential buildings on or under construction, the apartments for which are rented [Online]. Available at: https://www.hekaoy.fi/fi/heka/organisaatio/helsingin-kaupungin-asunnot-oy-heka (Accessed: September 2020).



Helsinki Smart Region (no date). The Helsinki-Uusimaa Region. [Online]. Available at: https://helsinkismart.fi/cases/ (Accessed: September 2020).

Host Bio-Energy Installations (no date) Host Bio-Energy Installations [Online]. Available at: https://www.host.nl/en/ (Accessed: September 2020).

Innovayt (no date) Innovayt [Online]. Available at: https://innovayt.eu/funding-programmes/ (Accessed: September 2020).

International Climate Initiative (2020). Strategic Partnerships for the Implementation of the Paris Agreement (SPIPA) [Online]. Available at: https://www.international-climate-initiative.com/en/details/project/strategic-partnerships-for-the-implementation-of-the-paris-agreement-spipa-17 I 364-2993 (Accessed: September 2020).

International Labour Organization (no date). The Green Initiative [Online] Available at: https://www.ilo.org/global/about-the-ilo/history/centenary/WCMS_467270/lang-en/index.htm (Accessed: September 2020).

Kalundborg Sumbiosis (no date) Kalundborg Sumbiosis [Online]. Available at: http://www.symbiosis.dk/en/ (Accessed: September 2020).

Khrishna, R. (2009). Selective Demolition [Online]. Available at: https://ezinearticles.com/?Selective-Demolition&id=2640905 (Accessed: September 2020).

Kojamo (no date). Vision, strategy and values [Online]. Available at: https://kojamo.fi/en/company/vision-and-strategy/ (Accessed: September 2020).

Korjuu (no date). Korjuu [Online]. Available at: https://korjuu.com/ (Accessed: September 2020).

Kringloop Wijzer (no date) Kringloop Wijzer [Online]. Available at: https://mijnkringloopwijzer.nl/ (Accessed: September 2020).

Laatulannoite (no date). Laatulannoite [Online]. Available at: https://www.laatulannoite.fi/ (Accessed: September 2020).

Laatulannoite (2020). Laatujärjestelmä laajenee: haluatko tuotteesi Laatulannoitejärjestelmän piiriin? [Online]. Available at:

https://www.laatulannoite.fi/2020/08/27/laatujarjestelma-laajenee-haluatko-tuotteesi-laatulannoite-jarjestelman-piiriin/ (Accessed: September 2020).

Laudes Foundation (no date). Redefining Value for all [Online]. Available at: https://www.laudesfoundation.org/ (Accessed: September 2020).

Lignin Club Ecosystem (no date) Lignin Club [Online]. Available at: https://ligninclub.fi/ (Accessed: September 2020).

Low Carbon Business Action in Brazil (no date). Low Carbon and Circular Economy Business Action in the Americas [Online]. Available at: http://www.lowcarbonbrazil.com.br/announcement-of-the-launching-pt.php (Accessed: September 2020).



Machaon (no date). Our Company [Online]. Available at: http://machaongroup.com/en/company/ (Accessed: September 2020).

Microbiome Support (no date). Lla-BioEconomy, Research and Advisory, Denmark [Online]. Available at: https://www.microbiomesupport.eu/project-partners/lla-bioeconomy-research-and-advisory-denmark/ (Accessed: September 2020).

Ministère de l'Économie, des Finances et de la Relance (no date) [Online]. Available at: https://www.economie.gouv.fr/ (Accessed: September 2020).

Ministère de la Transition Écologique (no date) [Online]. Available at: https://www.ecologie.gouv.fr/ (Accessed: September 2020).

Ministère de la Transition Écologique (2020) [Online]. Available at: https://www.ecologie.gouv.fr/decrets-dapplication-loi-anti-gaspillage-economie-circulaire (Accessed: September 2020).

Ministère de la Transition Écologique (2018). Roadmap for the Circular Economy. Available at: https://www.ecologie.gouv.fr/sites/default/files/FREC%20-%20EN.pdf. (Accessed: September 2020).

Ministère de la Transition Écologique (2019). La feuille de route économie circulaire (FREC). Available at: https://www.ecologie.gouv.fr/feuille-route-economie-circulaire-frec (Accessed: September 2020).

Ministry for the Environment (2017). Statement of Intent 2017 – 2021 Annual Report 2016/17. Available at: https://www.mfe.govt.nz/sites/default/files/media/About/soi-annual-report-2017.pdf (Accessed: September 2020).

Ministry of Economic Affairs (2016). Strategic Biomass Vision for the Netherlands towards 2030. Available at: https://ec.europa.eu/knowledge4policy/sites/know4pol/files/92465 visie biomassa e https://ec.europa.eu/knowledge4policy/sites/know4pol/files/92465 visie biomass e https://ec.europa.eu/knowledge4policy/sites/know4pol/files/92465 visie biomass e https://ec.europa.eu/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/knowledge4policy/sites/kn

Ministry of Environment and Food (2018a). Plastics without waste – The Danish Government's plastics action plan. Available at: https://en.mfvm.dk/fileadmin/user-upload/ENGLISH-FVM.DK/Regeringens-plastikhan-dlingsplan-UK.pdf (Accessed: September 2020).

Ministry of Environment and Food (2018b). Strategy for Circular Economy. Available at: https://circulareconomy.europa.eu/platform/sites/default/files/eng_mfvm_cirkulaer_o ekonomi_as5_uk_final_web.pdf (Accessed: September 2020).

Ministry of Higher Education and Science (2019) [Online]. Research 2025. Available at: https://ufm.dk/en/research-and-innovation/research2025 (Accessed: September 2020).

Ministry of Industry, Business and Financial Affairs (2018). Strategy for Denmark Digital Growth. Available at: https://eng.em.dk/media/10566/digital-growth-strategy-report-uk-web-2.pdf (Accessed: September 2020).



Ministry of Infrastructure and Water Management (2019). Circular Economy Implementation Programme 2019-2023. Available at: https://hollandcircularhotspot.nl/wp-content/uploads/2019/09/Circular-Economy-Implementation-Programme-2019-2023.pdf (Accessed: September 2020).

Mont, O.K. (2002). Clarifying the concept of product–service system, Journal of Cleaner Production. Volume 10, Issue 3, June 2002, Pages 237-245, 2002. Available at: https://doi.org/10.1016/S0959-6526(01)00039-7 (Accessed: October 2020).

NONTOX (no date). Partners [Online]. Available at: http://nontox-project.eu/?page id=20 (Accessed: September 2020).

Nordic Ecolabel (no date). The Official Ecolabel of the Nordic Countries [Online]. Available at: https://www.nordic-ecolabel.org/the-nordic-swan-ecolabel/ (Accessed: September 2020).

OECD (2019). Organization for Economic Cooperation and Development (OECD) Environmental Performance Reviews: Denmark 2019. Available at: https://www.oecd-ilibrary.org/sites/dleaaba4-en/index.html?itemld=/content/component/dleaaba4-en (Accessed: October 2020).

One Planet (no date) One Planet. [Online] Available at: https://www.oneplanetnetwork.org/ (Accessed: September 2020).

OpenNESS (no date). CASE 06 – Integrating Ecosystem Services Into Forest Policy And Management In Finland. Available at: http://www.openness-project.eu/node/82 (Accessed: September 2020).

Packaging Valley (no date). Packaging Valley. Available at: https://packagingvalley.org/ (Accessed: September 2020).

Partnership for Action on Green Economy (no date). Partnership for Action on Green Economy [Online] Available at: https://www.un-page.org/ (Accessed: September 2020).

PIICTO (no date). Platform for Industry and Innovation at Caban Tonkin [Online]. Available at: https://piicto.fr/en/ (Accessed: September 2020).

Platform for Accelerating the Circular Economy (no date). Platform for Accelerating the Circular Economy. [Online]. Available at: https://pacecircular.org/ (Accessed: September 2020).

Programa Internacional de Cooperación Urbana (2019). Documentación de Buenas Prácticas de Desarrollo Urbano Sostenible en América Latina y el Caribe. Available at: http://iuc-la.eu/1372/ (Accessed: September 2020).

Rotterdam Partners (no date). Floating Farm: Rotterdam is home to the world's first floating dairy farm [Online]. Available at: https://en.rotterdampartners.nl/stories/floating-farm-rotterdam/ (Accessed: September 2020).



Ruiz, E., R. Canales and T. Fe, rnandez (2020). La Ambición Empresarial para avanzar hacia la nueva economía de plásticos [Online]. Available at: https://foretica.org/wp-content/uploads/2020/07/La ambicion empresarial para avanazar hacia la nueva economia de plasticos.pdf (Accessed: September 2020).

SITRA (no date,a). A Circular Economy [Online]. Available at: https://www.sitra.fi/en/topics/a-circular-economy/ (Accessed: September 2020).

SITRA (no date,b). World Circular Economy Forum 2017 [Online]. Available at: https://www.sitra.fi/en/projects/world-circular-economy-forum-2017/ (Accessed: September 2020).

SITRA (no date,c). A regional sustainable food system [Online]. Available at: https://www.sitra.fi/en/projects/regional-sustainable-food-system/#what-is-it-about (Accessed: September 2020).

SITRA (no date,d). Circular Economy teaching for all level of education. Ended project 2017 – 2019 [Online]. Available at: https://www.sitra.fi/en/projects/circular-economy-teaching-levels-education/#for-teachers (Accessed: September 2020).

SITRA (2019a). The critical move – Finland's road map to a circular economy 2.0. Available at: https://www.sitra.fi/en/publications/critical-move-finlands-road-map-circular-economy-2-0/ (Accessed: September 2020).

SITRA (2019b). Building database enhances the circulation of materials [Online]. Available at: https://www.sitra.fi/en/cases/building-database-enhances-circulation-materials/ (Accessed: September 2020).

SITRA (2019c). The quality system for recycled nutrient products promotes the use of recycled nutrients. [Online]. Available at: https://www.sitra.fi/en/cases/quality-system-recycled-nutrients/ (Accessed: September 2020).

SITRA (2107). A new lease of life for textile waste [Online]. Available at: https://www.sitra.fi/en/cases/new-lease-life-textile-waste/ (Accessed: September 2020).

SITRA (2016). Leading the cycle – Finnish road map to a circular economy 2016–2025. Available at: https://media.sitra.fi/2017/02/28142644/Selvityksia121.pdf (Accessed: September 2020).

SmartClean (no date,a). Developing Sustainable Transport Solutions. Available at: https://smartclean.fi/en/projects/developing-sustainable-transport-solutions/ (Accessed: September 2020).

SmartClean (no date,b). Sustainable Urban Food Through a Food Network. Available at: https://smartclean.fi/en/projects/best-urban-food/ (Accessed: September 2020).

SmartClean (no date,c). A New Era of Repair Construction. Available at: https://smartclean.fi/en/projects/smart-elements-for-renovation-leap/ (Accessed: September 2020).



Smart Prosperity (2016). Canada's Roadmap to Smart Prosperity. Available at: https://institute.smartprosperity.ca/sites/default/files/newthinking.pdf (Accessed: September 2020).

SMICVAL (no date). Vos Services [Online]. Available at: https://www.smicval.fr/ (Accessed: September 2020).

State of Green (no date). Billund BioRefinery [Online]. Available at: https://stateofgreen.com/en/partners/billund-biorefinery/solutions/billund-biorefinery-1/ (Accessed: September 2020).

Statistics Denmark (2020). Resource Productivity. Available at: https://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/resource-productivity (Accessed: October 2020).

STRADE (2018). Latin America's Policy Priorities on Mining and Sustainable Development, and Opportunities for EU Cooperation. Available at: http://stradeproject.eu/fileadmin/user_upload/pdf/STRADE_PB_LATAM_policy.pdf (Accessed: September 2020).

Sybert (no date). Sybert [Online]. Available at: https://www.sybert.fr/presentation/ (Accessed: September 2020).

System Of Environmental Economic Accounting (no date). Natural Capital Accounting and Valuation of Ecosystem Services Project [Online]. Available at: https://seea.un.org/home/Natural-Capital-Accounting-Project (Accessed: September 2020).

Switch 2 green. The EU Switch to Green Flagship Iniative [Online]. Available at: https://www.switchtogreen.eu/?p=128(Accessed: September 2020).

The Finish Biocycle and Biogas Association (2020). LARA Laaturavinnehanke – Finnish Quality Assurance System for Recycled Nutrient Products. Available at: https://www.compostnetwork.info/wordpress/wp-content/uploads/Report_E_Bulletin_Gold-medal-for-Life-Project.pdf (Accessed: October 2020).

Udbudsportalen (no date). Udbudsportalen [Online]. Available at: https://csr-indkob.dk/ (Accessed: September 2020).

United Nations Environment Programme (no date). The Special Programme on Institutional Strengthening for the Chemicals Cluster [Online]. Available at: https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/special-programme/goal-special-programme (Accessed: September 2020).

Uudenmaanruoka (no date). Uudenmaanruoka [Online] Available at: https://uudenmaanruoka.fi/en/#home (Accessed: September 2020).

Vaekstfonden (no date). Vaekstfonden [Online]. Available at: https://vf.dk/formaal-og-strategi/ (Accessed: September 2020).



Vruchtbare (no date). Vruchtbare Kringloop [Online]. Available at: https://vruchtbarekringloopachterhoek.nl/ (Accessed: September 2020).

VTT (no date). Welcome to VTT [Online]. Available at: https://www.vttresearch.com/en (Accessed: September 2020).

Waste Management World (2015). Dutch Dairy Farm Injecting Biogas from Animal Waste into Grid [Online]. Available at: https://waste-management-world.com/a/dutch-dairy-farm-injecting-biogas-from-animal-waste-into-grid (Accessed: September 2020).

World Benchmarking Alliance (no date). World Benchmarking Alliance [Online]. Available at: https://www.worldbenchmarkingalliance.org/ (Accessed: September 2020).

Vlaanderen (no date). Circular Flanders. [Online]. Available at: https://vlaanderencirculair.be/en (Accessed: September 2020).

Zero Waste Europe (2018). The Story of Besancon. Available at: https://www.oneplanetnetwork.org/sites/default/files/cs9-besancon-en.pdf (Accessed: September 2020).



ANNEX 1: SUMMARY OF OTHER NATIONAL ROADMAPS ASSESSED

Additional countries reviewed to provide a broad diversity across the world from a small Caribbean island nation to North and South America, Europe and Asia-Pacific.

A.1.1. ARUBA

As a first step, the island government has completed a circular economy Policy Vision and a Statement of Intent for 2050. The Government's overarching goal is to concentrate on Aruban people as the most valuable asset for Aruba's sustainable future with the intention to accelerate the transition to become the leading Sustainable Circular island economy in the globe. This circular economy Vision document contains:

- A concept vision with regard to the transition to a more circular economy;
- Possible strategic objectives within the transition to a more circular economy;
- An overview of the most important stakeholders and mutual relationships;
- Possible interventions that can be deployed in the short term and that promote the transition to a more circular economy; and
- Possible instruments that the Government can use to facilitate interventions.

In Aruba, the circular economy is being initiated within the existing Sustainable Development Goals (SDG) framework and with the "National Resource Management" – accelerator, one of nine (9) accelerators for implementing and reporting on Aruba's UN 2030 Agenda compliance.

Five (5) strategic objectives are proposed:

- Build Aruban people's awareness, knowledge and skills;
- Build up capacity to manage preferred (circular) materials on the island;
- Create innovative and circular solutions;
- Develop and use suitable and available renewable resources; and
- Export Aruban knowledge and skills.

Short- and medium-term interventions are noted for each of these strategic objectives.

A.1.2. CANADA

Canada will be the host of the 2020 World Circular Economy Forum, co-organized by the Government of Canada and the Finnish innovation fund Sitra. The Forum will be held in Toronto from September 29 to October 1, 2020, marking the very first time the global forum is held in North America.

Some Canadian companies are testing out new circular business models. Universities are conducting research into different pathways to a more circular economy, and policy initiatives are underway at all levels of government, including the Canada-Wide Action Plan on Zero Plastic Waste.

A plastics circular economy in Canada would:



- Recirculate plastics, to either displace the demand for raw materials or to be consumed as nutrients in living systems without harm;
- Use renewable energy to power each life-cycle stage of plastic; and
- Shift to adopting renewable resins if they are compatible with the recycling process.
 - The Canadian circular economy leadership coalition (Circular Economy Leadership Coalition, 2019) has identified five initial practical policies and market instruments that need to be explored and embraced in order to catalyze a circular economy for plastics:
- Assign property rights for end-of-life plastic waste to producers and set end-of-life performance-based regulatory requirements such as recycling targets;
- Set recycled content performance standards;
- Create common definitions, performance standards, measurement and assessment protocols;
- Economic instruments and/ or prohibitions ("bans"); and
- Price greenhouse gas emissions associated with various stages in the life cycle of plastics.

A report "New Thinking – Canada's Roadmap to New Prosperity" (Smart Prosperity, 2016) published in February 2016 by leaders from business, think tanks, labor, Indigenous Peoples, youth, and NGO communities, states that Canada can lower costs and grow economic opportunity with more attention to resource efficiency.

The Enerkem biorefinery in Edmonton is mentioned as the world's first major collaboration between a large city and a waste to-biofuels producer to address waste disposal challenges and turn municipal solid waste into clean fuels and renewable chemicals. This facility will help to increase the City of Edmonton's waste diversion rate from 50% to 90% and reduce greenhouse gas emissions by 60% when compared with gasoline. This facility created more than 610 jobs in Canada during its construction and will generate 150 direct and indirect jobs during operations.

Other examples of Canadian manufacturing initiatives include turning pulp-and-papermill waste into renewable bioproducts to launching product buy-back programs that enhance customer interaction and recover usable materials such as metals and alloys.

A.1.3. COLOMBIA

The government issued a Colombian Circular Economy Plan. In addition, there is a new regulation (#1407) on packaging waste. This regulation mandates the collection of up to 30% of post-consumer packaging materials by 2030 but there is no clarity yet on how these materials should be transformed and reutilized in a circular economy. Initial efforts are underway by actors in the business sector, such as the trade association (ANDI) to take on this responsibility along with manufacturers. At the moment, the reality on the ground remains predominantly linear. This is the case in many countries. A lot of interest in transforming to a circular economy is evident, but, as yet, mainly early stage discussions are underway on exactly how to effect this change. Some entrepreneurial actions with



new start-ups are beginning to look at the opportunity to create new circular solutions in their business offerings. These are mainly nascent opportunities and have not yet had a meaningful effect in the economy, as a whole. It is noteworthy that the National Center for the Reclamation of Vehicles of SURA is doing an admirable job of deconstructing crashed and scrapped vehicles, revaluing and reusing as much material as possible. They are hampered from creating higher levels of reutilization by the fundamental design of vehicles which is outside of their control and which lies with the global automakers. Countries can start dialogues with the suppliers of goods that are imported and begin to put them on notice that in future they will prefer products that are sustainably circular. Until this message is heard, the exporters have no incentive to design better, more circular solutions. A private sector initiative has launched a sharing economy platform in Medellin to help optimize the use and reuse of unused and underutilized assets.

A.1.4. JAPAN

Japan is somewhat unusual as its recycling rates are extraordinarily high relative to those of other countries. For example, Japan recycles 98 per cent of its metals and, in 2007, just five per cent of Japan's waste ended up in the ground, compared to 48 per cent for the UK in 2008. Japan's appliance recycling laws ensure that the great majority of electrical and electronic products are recycled, compared with 30–40 per cent in Europe.

Of these appliances, 74–89 per cent of the materials they contain are recovered. Perhaps more significantly, many of these materials go back into the manufacture of the same type of product.

The system for collecting old appliances for recycling is so comprehensive and easy for consumers to use that it is harder not to recycle them. Old appliances are collected by retailers either in store or when delivering a new appliance. For old IT equipment, the manufacturer can be requested to collect it by local authorities from the doorstep, or it can be taken to any post office to be returned to them. This is routine across Japan, making it well understood and widely used.

Consumers pay (disposal) fees up front. For electronics, the cost of transport and recovery is paid for at the point of purchase, meaning that the customer does not have any disincentive to participate when a product comes to the end of its life. Penalties for fly tipping are also stiff.

Recycling infrastructure is co-owned: Japanese law requires a consortium of manufacturers to run disassembly plants, ensuring they directly benefit from recovering materials and parts. Companies therefore invest for the long term in recycling infrastructure. And because they own both manufacturing and recovery facilities, companies send product designers to disassembly factories to experience the frustrations of taking apart poorly designed products. Some companies even put prototype products through the disassembly process to make sure they are easy to recover.

Measuring the circular economy in Japan. At a national level, Japan employs a "belt-and-braces approach" including:

- A resource productivity indicator measuring material use as a proportion of GDP;
- An indicator for cyclical use rate of materials in the economy, measured by the material reused as a proportion of total material used by the economy; and



An output indicator, measuring how much waste is ultimately landfilled.

These indicators have associated targets. Japan supplements these with a host of sector-specific measurements, for which there are sometimes industry specific targets.

Japan also measures indicators of societal effort toward a circular economy, looking at:

- The size of the market for rental and leasing of goods
- The amount of reusable packaging sold
- The number of local authorities that charge for residual waste collection
- The sales of disposable chopsticks as a proxy for the proportion of the population that uses reusable chopsticks.

A.1.5. NEW ZEALAND

The New Zealand government issued a Statement (Ministry for the Environment, 2017) of Intent. It sets out the purpose for Aotearoa New Zealand to become the most livable place in the world. In April 2019, - a Pacific Summit on circular economy looked at the role of Nature and the application of Systems Thinking to the topic of the circular economy. Examples from local Maori communities reviewed how indigenous knowledge can inform and guide us in this radical shift towards a global circular economy. Topics including sustainable food sourcing, use of micro-hydro dams to generate more energy than the local communities need, and other regenerative activities were included. Waste minimization remains a major emphasis on activities. In 2011 Flight Plastics received \$30,000 from the Waste Minimization Fund to assess the economic viability of installing a plant to recycle PET (number 1) plastic in Wellington. The plant which makes PET foodsafe packaging using recycled PET flakes went ahead. In 2013 the company was awarded further funding of \$4 million from the WMF to build a wash plant to enable complete onshore recycling of PET. Previously PET collected from recycling was shipped in bales to overseas markets for processing. Now, every ton of PET plastic that is recycled at Flight prevents a ton of plastic being imported and another ton being shipped overseas for recycling. One can spot a recycled Flight Plastic container by the NZ RPET and Flight logo on the container's base. Innocent Packaging produces disposable food packaging made from plants. It is the first and only packaging company in Australasia to only produce plant-based packaging. Since 2013, the company has provided a wide range of plant based compostable alternatives to petrochemical based packaging, enabling used products to be diverted from landfill. Plates and takeaway containers are made from wheat straw (waste left over after the production of wheat). The process creates muddy wastewater which is used on the company's worm farm. Smartass, the company's toilet paper, is tree-free and made from bagasse (waste from processing sugar) and fast-growing bamboo. For every carton sold it plants a tree with partner Million Metres. Cups, bowls and lids are lined with poly lactic acid (corn starch), which uses 80% less greenhouse gases.

A.1.6. Wales

In the United Kingdom, Wales published a discussion document, "Beyond Recycling: How we want to move Wales to a more circular economy". The aim is to move to a circular economy where waste is avoided and the things we use are kept in use as long as



possible. This is considered to be an important part of the action needed on climate change. It also expects to bring new job opportunities as part of the move to a low carbon economy. Wales will do this with eight core actions relating to waste generation and use:

- Become the world leader in recycling.
- Phase out single use plastic.
- Make waste collection greener.
- Avoid food waste by looking at the whole food chain.
- Prioritize the use of wood and remake and recycle more items.
- Help and educate communities to do the small things that add up to making a big difference.
- Help businesses make more from their waste and accomplish positive environmental action.
- Take full responsibility for our waste.



ANNEX 2: THE FIVE CIRCULAR BUSINESS MODELS

In the following table we highlight with a check mark (\checkmark) the main elements which each project uses in its approach to create a circular solution. It is clear that reducing the impact of the existing linear economy is the most prevalent element, but there are examples of the five new circular business models being introduced as well.

TABLE 14: THE FIVE PRIMARY CIRCULAR ECONOMY BUSINESS MODELS

Circular Supplies:	Use renewable energy, bio based- or fully recyclable input material to replace single-use cycle inputs and choose input materials that are safe to cycle as technical &/or biological nutrients.
Resource Recovery:	Recover useful resources/energy out of used (disposed) products or by-products. This is more than simply increasing recycling of existing materials. It includes designing products from the outset to eliminate the concept of waste and redesign for recovery and reutilization.
Product "Life" Extension:	Extend working use cycle of products and components by repairing, upgrading and reselling. Note: Products are not alive and are not usually literally "consumed", rather they are used. Products which enter the biosphere do get consumed in use and need to be designed to be safe for the biological cycle. Technical materials need to cycle safely in a technical cycle.
Sharing Platforms:	Enable increased utilization rate of products (and services) by making possible shared use, access and ownership. Enabling unused or underutilized ASSETS to become productive provides a way to reduce the need to make and use more new products and can be a way to make money from existing assets.)
Product as a Service:	Offer product access (as a service) and retain ownership to internalize benefits of circular resource productivity. We don't have to own the molecules of everything we use! Businesses can effectively become a "material bank".

TABLE 15: RELATION OF CASE STUDIES AND THE CIRCULAR ECONOMY BUSINESS MODELS

CE Business Models	Circular Supplies	Resource Recovery	Product Life/Use Extension	Sharing Platform	Product as a Service	Reduce Negative Environmental Impact			
FINLAND	Bamomas: Battery Intelligence								
			√		√	V			
	Naava: Smart Green Wall & Healthy Indoor Air Service								
					✓	✓			
	Honkajoki: Reusing animal-based waste								
		√							
CE Business Models	Circular Supplies	Resource Recovery	Product Life/Use Extension	Sharing Platform	Product as a Service	Reduce Negative Environmental Impact			
The	Repair Café: Community repair centers								
NETHERLANDS			√			V			
	H2-Share: Hydrogen fueled trucks								
						V			



	Corbion: PLA biodegradable plastic								
	√								
	Black Bear Carbon: Upcycling of used tires								
		√				√			
	Fairphone: Cell Phone								
	√	√	√			V			
	Delta Development: Business Park								
	√					√			
	Mud Jeans: Circular Denim – Leased jeans								
					✓	V			
	Fashion for Good: Innovation platform								
	√	√				V			
	Sharing Platforms: Floow2								
				V		√			
CE Business Models	Circular Supplies	Resource Recovery	Product Life/Use Extension	Sharing Platform	Product as a Service	Reduce Negative Environmental Impact			
FRANCE	Recycling so	oft plastics resu	ulting from sorti	ng (at Mach	aon region)				
	✓	✓				√			
	A '10-year repair guarantee" logo on products (at Seb region)								
			√						
	Incentive charging scheme "by weight and collection" (at Grand Besançon Conurbation Doubs, 69 municipalities, 192,000 residents)								
		√				√			
	Place for experimentation hosting several demonstrators and pre-industrial pilots (at Platform Industry and Innovation at Caban Tonkin PIICTO - Marseille, Fos-sur-Mer, Bouches-du-Rhône)								
				√					



ANNEX 3: EXISTING PLATFORMS AND ORGANIZATION FOR COOPERATION ON CIRCULAR ECONOMY IN THE GLOBAL SOUTH

Many for profit and not for profit organizations are emerging that focused on the circular economy. The following is a non-exhaustive, indicative list from further an overview online search for national and international organizations dedicated to support exchanges for the circular economy in the global South, and organizations cooperating with the European Union with potential to create additional opportunities for south-south cooperation.

TABLE 16: EXAMPLES OF EXISTING ORGANIZATIONS AND COLLECTIVE INITIATIVES ON CIRCULAR ECONOMY IN THE AMERICAS

Circular economy Platform of the Americas - Is the first regional Platform in the globe, established in 2016 with particular focus on linking people, ideas and actions to facilitate the transition toward a circular economy in the Americas (a.k.a. Western Hemisphere). The Platform includes individuals, businesses, governments, academia and organizations willing and able to engage in promoting, facilitating and helping circular economy adoption and enabling implementation in the Americas.

https://www.cep-americas.com/ https://www.pec-americas.com

The Circular Economy Forum of the Americas (CEFA) is organized by the Americas Sustainable Development Foundation (ASDF) and the circular economy Platform of the Americas (CEP-Americas), based in Aruba and Colombia. CEFA launched in 2017 is the premier annual meeting on the circular economy for and by the critical actors and leaders in the Americas, (1st edition was in Medellin, Colombia 2017, 2nd in Santiago, Chile 2018,, 3rd in Medellin, Colombia 2019, and CEFA2020 is planned for Aruba, Dutch Caribbean in November 2020) https://www.circulareconomyamericas.com/video-cefa

The Latin-American Circular economy Forum (FEC), launched in 2017 with the purpose to inspire, dynamize and activate the community to trigger the transition toward a circular economy in Uruguay and the region. The first edition was held in Montevideo, Uruguay 2017 and Santiago, Chile 2018. No known meetings in 2019 or planned for 2020.

https://foroeconomiacircular.com

The first edition of the **South American Forum on Circular economy** was due to be held on March 31, 2020. Postponed by Covid-19 pandemic. http://economiacircular.fiesp.com.br

TABLE 17: EXAMPLES OF EXISTING EVENTS AND COLLECTIVE INITIATIVES ON CIRCULAR ECONOMY IN THE FOUR PROJECT COUNTRIES

Brazil:

Exchange for a Change - For profit organization, Exchange 4Change Brasil (E4CB) is a specialized consultancy that aims to drive the transition to the circular economy in Brazil by co-creating and adapting solutions to the Brazilian context.

http://e4cb.com.br/tag/hub-de-economia-circular/?lang=pb

Ideia Circular - Nonprofit organization, Ideia Circular, is a digital educational platform for developing CE design in Brazil.

https://www.ideiacircular.com

National Confederation of Industry (CNI) - Brazilian industry, they have circular economy Initiatives like: Coordination of the Special Study Commission on Circular Economics of ABNT, which will define Brazil's positions for the elaboration of the standard; circular economy in Brazilian Industry survey which brings the perception of Brazilian entrepreneurs for national industry; Launch of the Roadmap Economia Circular: Strategic Path for Brazilian Industry, proposes initiatives to improve public policies; increase investment in RD&I; identification of sources of financing, and positioning Brazilian industry in the market.

http://www.portaldaindustria.com.br/cni/canais/industria-sustentavel/temas-de-atuacao/economia-circular/

Chile:



For profit organization, **Centro de Innovación y Economia Circular** - CIEC is a do-tank providing intelligence, consultancy services and circular solutions, functioning as a business platform in Latin America for companies, governments, international organizations and professional's alike addressing societal needs and contributing to prosperity. With support and partnership with world-class companies and well-respected universities and research organizations, CIEC focuses on areas and industries. https://ciecircular.com/en/

The **Roadmap of the Chilean Plastics Pact (PCP)** - has the objective of guide the action plan of Chile's national plastics pact and be a tool to provide concrete guidelines at the country level to all actors involved in the plastics value chain to share a common vision and guide their strategies. https://fch.cl/wp-content/uploads/2020/01/roadmap-pacto-chileno-de-los-plasticos.pdf

Mexico:

Centro Mexicano de Derecho Ambiental, A.C. - CEMDA is a non-governmental, apolitical and non-profit organization that has been working for the defense of the environment and natural resources for 25 years. One of the main organizations of environmental civil society in Mexico whose fundamental axis of work is the strengthening, consolidation, harmonization, application and effective compliance of the current legal-environmental system.

https://www.cemda.org.mx/moda-circular/

Ecología y Compromiso Empresarial A.C. - ECOCE, works under the Producer Shared Responsibility scheme established by the current General Law on Prevention and Waste Management (LGPyGIR). Performs the administration of the Private Collective National Plan for the Management of Post-Consumer Containers Waste of PET, HDPE, Aluminum and other materials (folio SEMARNAT PM-ROTR-008-2013) for the recovery of waste. It also carries out environmental education programs, communication campaigns and events to prevent improper disposal of waste and take advantage of it in recycling. https://www.ecoce.mx/reciclaje

Uruguay:

Programa Oportunidades Circulares - Program organized in 2018 and 2019 by the National Development Agency ANDE & BIOVALOR, a project of the Uruguayan government, which seeks to promote waste recovery technologies by reducing greenhouse gas emissions. The general objective of the program is to promote the validation of ideas, the launch of new business lines and prototypes, and the implementation of projects that promote an effective transition to the circular economy, contributing to sustainable productive development. http://oportunidadescirculares.org/

BIOVALOR - a project of the Uruguayan government that articulates and is executed by the Ministry of Industry, Energy and Mining (through the National Energy Directorate, the national executing agency): the Ministry of Housing, Land Management and the Environment (through the National Directorate for the Environment) and The Ministry of Livestock, Agriculture and Fisheries. It is co-financed by the Global Environment Facility (GEF), as well as by public and private organizations. The project implementing agency is the United Nations Industrial Development Organization (UNIDO).

http://biovalor.gub.uy

TABLE 18: EXAMPLES OF ORGANIZATIONS RELATED TO CIRCULAR ECONOMY IN OTHER COUNTRIES IN THE GLOBAL SOUTH

Africa:

African Circular economy Network - ACEN cooperates with specialists from Africa in relation with the many fields of expertise required to build an African circular economy as well as with geographic representatives of the Network. Today they have representatives from North, West, East and Southern Africa. https://www.acen.africa/

India:

Circular Apparel Policy Innovation Lab - CAPIL is an initiative of Centre for Responsible Business (CRB), supported by C&A Foundation, which will support well-informed policies and implementation mechanics to accelerate circular apparel in India. CRB has partnered with Intellecap and Fashion for Good in this initiative. CRB is a thinktank engaging multiple stakeholders to develop action plans for promoting sustainable/responsible business, across various sectors in India.

https://www.c4rb.org/circularapparel

Indonesia:



The Zero Waste Living Lab - is a three-year market development program in which the objective is to build disruptive business models that skip single-use plastic and radically reduce plastic pollution in Indonesia and beyond. https://zerowastelivinglab.enviu.org/living-lab/

New Zealand:

The Circular economy Accelerator is part of the Sustainable Business Network. It is focused on speeding up the adoption of the circular economy in New Zealand. The Sustainable Business Network is New Zealand's largest and longest standing organization dedicated to sustainable business. It includes hundreds of corporates, small and medium-sized businesses, social entrepreneurs and government agencies. They are united by their desire to create change for good. They connect organizations, enabling them to collaborate on solutions. They inspire their members to succeed through events and sharing their stories.

https://www.circulareconomy.org.nz/

TABLE 18: EXAMPLES OF INTERNATIONAL ORGANIZATIONS RELATED TO CIRCULAR ECONOMY

ADELANTE Program has been a joint effort between the European Union and Latin America and the Caribbean to work in a different and innovative way. It has enabled a pooling together diverse experiences and varying capacities to achieve more significant impact. In addition, the triangular cooperation has redefined the connection that unites both regions, enabling a more effective response to the development challenges facing the Latin American region (ADELANTE, 2020).

ENVIU_- is a social venture building studio, founded in 2004, with a proven methodology for building social ventures and systemic change. Over the past 15 years they have co-founded 16 social ventures through their teams in Kenya, India, Indonesia, Chile and the Netherlands. ENVIU uses expertise in running circular programs and ventures to build companies to fuel Impact-driven entrepreneurship to create long lasting change in Chile's economy (Enviu, no date).

Strategic Dialogue on Sustainable Raw Materials for Europe (STRADE). This report set out Latin America's Policy Priorities on Mining and Sustainable Development, and Opportunities for EU Cooperation. This is of particular interest to Chile which has indicated mining as a priority sector (STRADE, 2018)

EU-LAC Foundation the Foundation has 62 members: the 33 States of Latin America and the Caribbean, the 2 the Economic Commission for Latin America and the Caribbean (ECLAC) of the United Nations 8 Member States of the European Union, and the European Union itself. In 2018 it published a report entitled, "Case studies on Circular Economy models and integration of Sustainable Development Goals in business strategies in the EU and LAC". It presents a series of case studies of companies and institutions interested in making visible their best practices. The report identifies 16 cases of companies showcasing best practices. These include, 7 cases on circular economy business models and 9 cases on the inclusion of the SDGs in business strategies. The case studies are followed by two implementation guides, one for CE and another for the SDGs (EU-LAC Foundation, 2018).

Latin America and the Caribbean office of the International Urban Cooperation program (IUC-LAC) completed the documentation of around 165 sustainable urban development best practice cases in Argentina, Brazil, Chile, Colombia and Peru (Programa Internacional de Cooperación Urbana, 2019). Collectively, the case studies outline successes at local, regional and national levels across the region. The 165 case studies are separated into 11 thematic areas:

- Low-carbon urban planning
- Clean energy systems
- Sustainable transport
- Green buildings
- Urban regeneration
- Water wastewater flood control
- Waste management
- Environmental management
- Green industries & circular economy
- Smart city development
- Green finance

European Union (EU) reports on low carbon and circular economy establishing long-term small and medium sized enterprises (SMEs) and clusters of business partnerships in the areas of low carbon and circular economy between the EU and selected partner countries in the Americas. Mexico, Brazil, Argentina, Colombia and Chile are included in this program (European Commission, 2019d).

Laudes Foundation - Provide their partners with philanthropic capital, expertise and connections, Laudes Foundation works collectively with and through specific industries to help catalyze systems change. At the same time, they work across all industries, influencing the financial sector to move towards a new economy that values all people and nature (Laudes Foundation, no date).





Ellen Macarthur Foundation - The Ellen MacArthur Foundation takes an interdisciplinary approach to initiate and develop activities related to the circular economy with businesses, governments and academia. The Foundation conducts research in key thematic areas to reinforce the logic behind a transition towards a circular economy. Through their systemic initiatives, they promote an unprecedented level of multi-sector collaboration and innovation to transform flows of key materials in the economy Ellen Mac Arthur Foundation (no date,a).

The Ellen MacArthur Foundation (EMF) has created a section on its webpage for news and cases from Latin America. It recognizes the social innovation culture of the region which also provides a unique perspective from low- and middle-income countries Ellen Mac Arthur Foundation (no date,b).

Platform for Accelerating the Circular Economy_- launched in 2018 at the World Economic Forum (WEF), is a global community composed of Ellen Macarthur Foundation and other private and public organizations, leading the way towards a circular economy. PACE provides leaders in the circular economy with the connections, learning, and opportunities to pilot and rapidly scale best practices. It is an initiative supported by the PACE Hub, a team hosted by the World Resources Institute in the Hague, the Netherlands (Platform for Accelerating the Circular Economy, no date).



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