MAPPING OF NATIONAL STATUS QUO ON CIRCULAR ECONOMY AND SUSTAINABILITY IMPLEMENTATION GENERALLY AND FOR YOUTH

CIRCULAR ECONOMY - SUSTAINABLE COMPETENCES FOR YOUTH AUGUST 2020



Co-funded by the Erasmus+ Programme of the European Union This report is the first intellectual output of the Circular Economy -Sustainable Competences for Youth ("CESCY") Project, co-founded by the Erasmus+ Programme of the European Union and written by the partners in said project, as follows:



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Definitions

For the purpose of this report, the following words or expressions should be understood as:

Circular Economy: a circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems (by *Ellen McArthur Foundation*). Industrial symbiosis and circular business models are also part of circular economy practices.

Civil Society: is a private stakeholder comprising informal networks, formal organisations such as NGOs and Foundations, and online communities (all including youth).

Private sector: private stakeholders include civil society (comprising informal networks, formal organisations such as NGOs and Foundations, and online communities), companies and private universities.

Public sector: include the State (comprising national government, regional/local government and municipalities) and other public bodies (eg. public companies, public universities).

Sustainability: circular economy is one sustainable practice. Therefore, the term "sustainability" is a synonym of circular economy within the scope of this project.

Executive summary

The aim of this study is to report on the status quo of circular economy and sustainable practices implementation at the EU level, and then also in Estonia, Italy, the Netherlands, Portugal and Spain (home countries of the partner organisations on this project).

A circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems (Ellen MacArthur Foundation, 2017). Additionally, this study also aimed to include industrial symbiosis and circular business models, which also encompass circular economy practices. Moreover, practices concerning climate-change were mentioned as well, since the circular economy can play an essential role tackling such issues: designing out waste, keeping materials in use, and regenerating farmland can reduce emissions (Ellen MacArthur Foundation, 2017).

This study focuses on reporting said status quo from different perspectives – rules, social norms, funding, knowledge and education, knowledge dissemination vehicles and implementation of the circular economy vision –, comprising different stakeholders: state (national government, regional/local government and municipalities), public companies, public and private universities, civil society, private businesses, cooperatives, association of companies and transnational corporations.

At the EU level, the Circular Economy Action Plan and the European Green Deal set the EU on the course towards a cleaner and more competitive Europe following the principles of the circular economy and towards a climate-neutral continent by 2050. Several measures and initiatives support the fulfilment of these objectives, including a proposal for the first European Climate Law, the European Climate Pact currently under development, the Circular Economy Package, and the European Circular Economy Stakeholder Platform. More specific actions and mechanisms towards implementing the circular economy vision are also in place, including regular reviews mapping out the situation of environmental policies in the EU member states. Moreover, there are EU funding mechanisms supporting initiatives related to the environment and climate.

Furthermore, a number of civil society organisations and foundations also work actively at the European level and beyond towards making the economy more circular, partly by engaging with and bringing together various stakeholders from the civil society, government and business sectors, advocating towards a more circular economy, and carrying out different projects and initiatives for a wide range of target audiences. Youth wise, European university networks are also taking actions to facilitate the participation of European universities in environment-related policies and programmes. Finally, several companies operating in Europe support the transition to a more circular economy, either as their core business or as part of their corporate social responsibility initiatives.

Notwithstanding these EU measures and EU wide public and private initiatives, each partner state is in a different stage of the implementation process towards more sustainable practices:

It is felt in Estonia a great general need for a systematic approach to the circular economy in politics, entrepreneurship and consumer behaviour. In fact, the state, including public companies, have not invested in many circular economy initiatives yet - circular business ideas mostly find funding at business idea competitions. Moreover, Estonia does not have strict enough laws to demand individuals to sort waste, offers few opportunities to study or research circular economy (although many business development centres are moving)

towards educating companies about the circular economy, and a few events on the topic, both on the state and municipality level, are being held), and does not have many large companies systematically implementing circular economy principles throughout their activities. Nevertheless, Estonia can pride itself on being one of the few countries in the world that has a deposit bottle system, which results in 90% of deposit bottles being recycled. Furthermore, 30 Estonian IT companies have signed a Tech Green agreement to become climate neutral by 2030. Estonia also started the first nation-wide cleanup (Teeme Ära) in 2008 and in 2018 organised the first World Cleanup Day.

- Italy is amongst the major European economies in the circularity of production. Even so, there seems to be no national strategy or action plan able to guide associations, administrations and companies to invest in circular economies. Still, the Budget Law for 2020 sets up a fund to revive the public investments in reference to the circular economy and projects with high environmental sustainability and, in general, the separation of waste collection is encouraged and, in recent years, it has been registered a rise on shared transport, goods and services. To counterbalance the lack of simplified procedures and norms at a national level, some municipalities are running every innovative initiative, such as the "Civil Economy Districts", to promote circular economy and a collective cultural change. Ministry of Education, University and Research signed protocols to carry out environmental and sustainable projects in primary, secondary and upper secondary schools to stimulate young people to adopt green lifestyles and new green skills. Also, universities present a wide range of curricula aimed at studying and deepening the Circular Economy. Moreover, there are collaborations promoted with public institutions, such as the Ministry of the Environment and the Protection of the Territory and the Sea, to create documents, websites, research centers, annual events/festivals where the best practices on the circular, green and sustainable economy are discussed.
- The Netherlands are one of the leading European countries regarding the transition to a circular economy. In fact, the government-wide programme for a Circular Economy is aimed at developing a circular economy in the Netherlands by 2050, having a 50% reduction in the use of primary raw materials (minerals, fossil and metals) by 2030. All the municipalities have the circular economy theme in their agendas and have special placements for people to work solely on that matter. For the last two years, a lot of bottom-up and companies' initiatives have been popping up. Contrary to other partner countries in this project, waste collection/sorting is mandatory and there is a waste management program where the kg of waste per person are monitored. Furthermore, the Netherlands have now more than 100 educational programmes on the circular economy.
- Portuguese legislators have passed several resolutions related to the circular economy, including a Resolution creating the Action Plan for the Circular Economy, but not many of those have translated into laws or regulations. Even so, mostly from 2018 onward, more laws started entering into force, mainly regarding the use of plastic, and local regulations regarding conscious public procurement. As for available funding, most of it is granted by the Portuguese State, and is mostly aimed at start-ups and companies, events/outdoor entertainment, education, local parishes and local councils. On the other hand, there are many social and educational projects as well as campaigns aimed at youth concerning sustainability and the circular economy. Moreover, there are many reoccurring conferences and seminars

taking place, and a relevant website (created by the State) which aims to share knowledge regarding this subject. Circular economy related subjects are also available in many universities/degrees. As regards to actually implementing circular economy practices, even though there are quite a few initiatives, they appear to work mostly locally, and not nationwide, which diminishes their impact.

Spain is the main producer of organic food and the european country with the largest area of *Natura2000* natural areas. Nevertheless, the Spanish State is mostly only implementing impositions from the EU on circular economy related practices. Even so, all the Spanish autonomous communities have developed and are implementing their own strategies directly related to the circular economy, honouring the Circular Europe 2030 agreement. Diversely, the civil society and private companies (eg. Ecolife) are carrying out more innovative, impactful and sometimes pioneering initiatives. Although, apparently, there is not a general citizen knowledge and awareness about the circular economy, the Spanish Government built a platform to offer didactic material to teachers and trainers on the subject, and there are universities (more each year) offering courses and master studies in circular economy. Recycling has become a trend in the last few years, but it is still optional and not sufficient awareness is being raised in that respect by the state. Even so, it is interesting to note that organisations are responsible for the collection and treatment of packaging and garbage (Ecoembes, Ecovidrio, Emulsa), and raise very positive citizen awareness.

I. European Union

1. Framework

1.1. EU bodies

1.1.1. European Commission

The European Commission department responsible for EU policy on the environment, including the circular economy, is the Directorate-General for Environment (DG Environment). Its objectives are to protect, preserve and improve the environment by proposing and implementing policies that ensure a high level of environmental protection and preserve the quality of life of EU citizens. DG Environment also ensures that Member States apply EU environmental law correctly and represents the EU in environmental matters at international meetings. This DG works under the political leadership of the Commissioner for Environment, Oceans and Fisheries, Virginijus Sinkevičius, and is organised in six directorates which are, in turn, divided into thematic units (European Commission, 2019c). The directorate focusing on circular economy is *Directorate ENV.B Circular Economy & Green Growth* and is divided into three units: *Sustainable Production, Products & Consumption, Sustainable Chemicals*, and *Waste Management & Secondary Materials* (European Commission, 2019b).

Since 2010, the European Commission also has a Directorate-General for Climate Action (DG CLIMA), which leads the EC's efforts to fight climate change, a priority which was previously handled by DG Environment. DG CLIMA aims to ensure that the European Union meets its climate targets, and focuses specifically on greenhouse gas emissions, the ozone layer, and reducing the EU's vulnerability to the impacts of climate change (European Commission, 2019e).

1.1.2. European Parliament

Together with the Council, the European Parliament is responsible for the adoption of EU legislation, including environmental legislation aiming at making the EU move towards a more circular economy. The European Parliament committee most involved with the circular economy is the ENVI Committee. The ENVI Committee, which counts 81 members and is currently the largest committee in the EP, works towards generating the legislative framework to achieve carbon neutrality in Europe by 2050, which includes the transition to a greener economy. Next to the greener and circular economy, the ENVI Committee works on several other policy priorities, including biodiversity, public health, food safety, air and water quality, and the use of chemicals and pesticides (European Parliament, 2019).

1.1.3. Council of the European Union

Around four times a year, the EU member states' ministers responsible for matters specifically relating to the environment meet in the Environment Council configuration (ENVI). The

European Commission is also represented in these meetings, with both the Commissioner for the environment and the Commissioner for climate action taking part. The Environment Council is responsible for EU environment policy, and it also deals with international environmental issues, especially in the area of climate change. The priorities of the Environment Council during the Croatian presidency (January-June 2020) include discussions on the new Circular Economy Action Plan and defining the first European climate law in the context of the European Green Deal (Council of the European Union, 2020).

1.2. Roadmaps and action plans

In December 2015, the European Commission adopted a first Circular Economy Action Plan with the aim to set the EU on the course of the transition towards a more sustainable model for economic development. This action plan looked at the whole lifecycle of products and adopted a systemic approach promoting partnerships along the entire value chain and across different sectors, with a balanced mix of voluntary initiatives and regulatory actions along production, consumption, waste management and secondary raw materials. Four years after its adoption, the 54 actions of this action plan had been delivered or were being implemented. These actions included, for instance, the enhancement of the effectiveness of the Ecolabel, the development of quality standards for secondary raw materials, and improved cooperation with the Member States for better implementation of EU waste legislation (European Commission, 2019a).

In January 2018, the European Commission adopted a new set of measures, including a Monitoring Framework on progress towards a Circular Economy at EU and national level, a Report on Critical Raw Materials and the circular economy, and a Europe-wide EU Strategy for Plastics in the Circular Economy. This strategy for plastics aims to transform the way plastic products are designed, used, produced and recycled in the EU in order to ease the transition towards a circular economy, while also contributing to reaching the UN Sustainable Development Goals (European Commission, 2018a).

In December 2019, the European Commission presented the European Green Deal, a roadmap for making the EU's economy sustainable by turning climate and environmental challenges into opportunities across all policy areas. The European Green Deal provides a roadmap with actions setting out to make Europe the first climate-neutral continent by 2050, to boost the efficient use of resources by moving to a clean and circular economy, and to restore biodiversity and cut pollution (European Commission, 2019d). The actions to be completed in the first trimester of 2020 include the creation of a new Circular Economy Action Plan and a proposal on a European 'Climate Law' enshrining the 2050 climate neutrality objective.

Following the completion of the first Circular Economy Action Plan and the introduction of the European Green Deal, a new Circular Economy Action Plan for a Cleaner and More Competitive

Europe was adopted in March 2020. This new Action Plan introduces legislative and nonlegislative measures, and announces initiatives along the entire life cycle of products, aiming to ensure that the resources used are kept in the EU economy for as long as possible (European Commission, 2020b).

More specifically, the measures presented in this plan cover the following actions:

- 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; food; water and nutrients;
- Ensure less waste;
- Make circularity work for people, regions and cities,
- Lead global efforts on circular economy.

1.3. Legislation

European Parliament and EU Council adopted the Circular Economy Package that includes four directives. This revised waste legislative framework entered into force on 4 July 2018 and Member States should implement the directives within two year (05/07/2020). This package amends the Waste Framework Directive (2008/98/EC), the Landfilling Directive (1999/31/EC), the Packaging Waste Directive (94/62/EC), the Directives on end - of- life vehicles (2000/53/EC), on batteries and accumulators and waste batteries (2006/66/EC) and on waste electrical and electronic equipment (2012/19/UE).

In order to set into legislation the ambition for Europe to be the first climate neutral continent by 2050, the European Commission prepared a legislative proposal for the first European Climate Law and submitted it in March 2020 to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions for further consideration under the ordinary legislative procedure. With this European Climate Law, the European Commission proposes a legally binding target of net zero greenhouse gas emissions by 2050, binding the EU Institutions and the Member States to take the necessary measures at EU and national level to meet the target (European Commission, 2020a). The proposal also includes measures to keep track of progress and adjust actions accordingly.

2. Funding (2014-2020)

The EU provides funding for a broad range of actions and initiatives, including projects and programmes supporting the circular economy.

More than 75% of the EU budget is managed in partnership with national and regional authorities through a shared management system, largely through 5 big funds known as the Structural & Investment Funds.

Under these European Structural and Investment Funds, \in 35 billion are specifically allocated to environment and resource-efficiency (European Parliament, 2018). The following sub-investments are particularly relevant to support the circular economy:

- €5.5 billion for improved waste management focusing on waste prevention, reuse and recycling. This €5.5 billion is divided as follows: €2.1 billion for prevention and recycling, €2.8 billion for incineration and thermal treatment, €0.6 billion for hazardous waste management. According to estimations, these investments have led to 5.9 million tonnes/year of additional waste recycling capacity in Europe.
- €2.3 billion to support SMEs with environmentally-friendly production processes and resource efficiency (European Commission, 2015). This helps SMEs save costs and creates new opportunities by turning waste into resources.

Other EU funds are managed directly by the EU and are provided in the form of grants for specific projects in relation to EU policies (usually following a public announcement known as a 'call for proposals'), and contracts issued by EU institutions to buy in services, goods or works they need for their operations (awarded through calls for tender).

When it comes to grants, the EU established in 1992 a funding instrument for the environment and climate, known as the LIFE programme. One of the objectives of this programme, which has a total budget of \notin 3.4 billion for the period 2014-2020, is to help move towards a resourceefficient, low carbon and climate resilient economy (European Commission, n.d.). Any entity registered in the EU can apply for LIFE grants and make a proposal for traditional, integrated, preparatory, and technical assistance projects under the sub-programmes for environment and climate action. In addition, NGOs that are primarily active in the field of environment or climate action and are involved in the development, implementation and enforcement of EU policy and legislation can also apply for operating grants supporting certain operational and administrative costs.

Another relevant EU financial instrument is Horizon 2020, the EU's biggest Research and Innovation programme with nearly \in 80 billion of funding available for the period 2014-2020. Although the scope of Horizon 2020 goes beyond environmental sustainability, one of the four focus areas of the Horizon 2020 Work Programme for 2018-2020 is 'Connecting economic and environmental gains – the Circular Economy', with a total budget of over \in 1 billion. Funding in 2020 amounts to \notin 400.7 million and includes \notin 20 million for upcycling plastics of food and drinks packaging and €97.5 million for sustainably using and re-using raw materials and water in industry (European Commission, 2018b).

3. Implementing the circular economy vision

It is difficult to map out all the implementations of EU initiatives and laws, but some key initiatives will be discussed.

3.1. Environmental Implementation Review

In 2019, the European Commission published the second Environmental Implementation Review (European Commission, 2019f). The Review maps out the situation of environmental policies and rules implementation in 28 EU countries and identifies the causes of implementation gaps. In this way, the European Commission wants to find solutions before problems become urgent and to assist national decision-makers by outlining the priorities requiring their attention. The implementation of EU environmental policy and law is seen as essential for a healthy environment, opening up new opportunities for sustainable economic growth, innovation and jobs and to save costs for the EU economy.

The results of the Review related to circular economy state that the overall policy framework has been strengthened, but waste prevention remains an important challenge for all Member States. On waste management, nine countries are on track and five have already reached the recycling targets, but fourteen are at risk of not achieving the 2020 municipal waste recycling target. It is unclear to what extent the other components have been met.

Water is a critical input resource to the world economy and has been under pressure because of the current linear economy and hence including water in the circular economy approach is important (Abu-Ghunmi et al., 2016). Where water is concerned, much remains to be done to fully achieve the objectives of the water directives, and in particular good status for our water bodies until 2027. Urban wastewater is still not treated properly in two thirds of Member States.

3.2. Circular Economy monitoring framework and indicators

In order to monitor the progress towards a circular economy, the European Commission set up a monitoring framework along with 10 indicators, some of which broken down in sub-indicators. This monitoring framework provides detailed overviews of the situation in the European Union and in each EU member state regarding the different indicators. These indicators were selected to capture the main elements of a circular economy and are divided into four categories (Eurostat, n.d.):

- Production and consumption:
 - Self-sufficiency of raw materials for production in the EU;
 - Green public procurement (as an indicator for financing aspects);

- Waste generation (as an indicator for consumption aspects);
- Food waste.
- Waste management:
 - Recycling rates (the share of waste which is recycled);
 - Specific waste streams (packaging waste, biowaste, e-waste, etc.).
- Secondary raw materials:
 - Contribution of recycled materials to raw materials demand;
 - Trade of recyclable raw materials between the EU Member States and with the rest of the world.
- Competitiveness and innovation:
 - Private investments, jobs and gross value added;
 - Patents related to recycling and secondary raw materials as a proxy for innovation.

3.3. The EU ban on single-use plastics by 2021

From 2021 a ban will be in place for single-use plastic cotton bud sticks, cutlery, plates, straws, oxo-degradable plastics, drink stirrers and balloon sticks, as well as food and beverage containers – including cups – made of expanded polystyrene (European Parliament, 2019b; European Commission, n.d.). The new EU rules on single-use plastic products are aimed at the 10 plastic items that pollute the beaches and seas of Europe most often. Furthermore, the new rules also apply to lost fishing gear for which the manufacturers will be held accountable instead of the fishermen (European Parliament, 2019b). The 10 most polluting plastic items and the fishing gear account for 70% of marine litter (European Commission, n.d.). In addition, plastic bottles will have to contain at least 25% of recycled content by 2025 and 30% by 2030, and by 2029 member states will have to achieve a 90% collection target for plastic bottles (European Parliament, 2019b).

Other measures aim to reduce the consumption of the most frequently littered plastic products; to extend the producers' responsibility; to change the design of some products; and to inform and raise awareness among consumers.

The ban on single-use plastics calls for more multiple-use products and better recycling which can, in turn, stimulate more innovative solutions that contribute to the transition towards a circular economy. Europe's 2018 Plastics Strategy for a circular economy sets the path for additional EU actions in line with the 2015 Circular Economy Action Plan (European Commission, n.d.).

3.4. Pilot project Boosting the circular economy among small and medium-sized enterprises

Directorate-General for Environment (also referred to as DG Environment) implemented a pilot project to explore what route is most effective and efficient in the transition towards a circular economy among small and medium-sized enterprises (SMEs) (European Commission, 2019g). According to the European Commission, there is an increase in corporations that take up circular economic practices, but SMEs often experience more difficulties due to a lack of organisational, financial and technological resources and less access to financing for circular solutions. This consequently reduces the pace at which the European economy can transition towards a circular economy because SMEs represent 99% of all businesses in the EU and account for 85% of new jobs created over the last years and provided two-thirds of the total private sector employment in the EU (European Commission, 2019g).

The project set three tasks to assist SMEs:

- Task 1: training 28 SME support organisations on how to set-up and/or expand their support programmes on the subject of circular economy;
- Task 2: helping 13 promising Green Solution Providers (GSPs) to scale-up across Europe;
- Task 3: advising 5 regional authorities on how they can boost the transition towards a circular economy.

It is thought that by executing these tasks, approximately 800.000 SMEs have been reached. In addition, a two-day closing event was held in Brussels to help more SMEs and to bring these assets to more SME support organisations and Regional authorities who in turn can help more SMEs.

3.5. European Climate Pact

The European Climate Pact will be part of the European Green Deal and aims to engage citizens and communities in actions involving the climate and environment and will be launched before the UN climate conference in Glasgow (COP26) in November 2020 (European Commission, 2020c). It will function as a platform where new climate actions can be designed, grassroots initiatives are launched and where information and solutions can be shared with others as inspiration. In this way, cooperation can be fostered on multiple scale levels, between all sorts of stakeholders.

Listed beneath are some of the main activities mentioned in the Climate Pact:

Talking about climate change

Through communication activities and events, and by using multiple channels and tools. It aims to inspire people and organisations to become involved and encourage sustainable behaviours.

Triggering action

The Commission will promote public commitments and support relevant initiatives with knowledge/capacity-building, to boost their impact and inspire further action across Europe and globally. In selected areas, the Commission could provide targeted support.

Working together

The Climate Pact will provide opportunities for communication, cooperation, learning and networking, online and offline. These platforms will link to existing initiatives.

Although the Climate Pact is not specifically focussed on circular economy, these activities can be very beneficial for the transition as it requires a strong network, cooperation and the availability of sufficient information and tools. For example, most greenhouse emissions come from the extraction and processing of raw materials to produce goods. European Climate Action is an ambitious package of measures ranging from cutting greenhouse emissions and promoting circular economy principles (recycling, reuse) might change our behavior in relation to environmental and sustainable development. During the events and communication activities, organisations and businesses come into contact and acquire these elements and share experiences to help them become more circular.

3.6. European Circular Economy Stakeholder Platform

The first EU Action Plan for the Circular Economy adopted in 2015 included actions aiming at engaging with stakeholders through existing fora and supporting the exchange of good practices. For these purposes, the European Commission and the European Economic and Social Committee launched the European Circular Economy Stakeholder Platform in 2017. This virtual platform aims at involving a broad range of stakeholders, including public authorities, businesses, trade unions, consumers, and civil society, in order to foster the exchange of ideas and information and to make the circular economy happen faster to the benefit of all (European Union, 2019). Through this platform, stakeholders are invited to contribute by submitting content (good practices, publications, events, etc.), to engage with other stakeholders via the discussion forum, and to stay up-to-date with all ongoing activities of the Platform. The Platform's activities are guided by a Coordination Group of 24 people selected from civil society organisations, business and trade union representatives, think-tanks, research centres and public bodies that have a stake in the circular economy. The Coordination Group also designs and leads workshops on themes such as consumer insights into the circular economy, tools for measuring the transition, circular cities and climate change mitigation.

4. Tools for good practices

4.1. Eco-Management and Audit Scheme (EMAS)

EMAS is designed by the European Commission as an instrument to help companies and other organisations in their transition towards circular economy. In 2017, the EMAS Awards were held. At this event, organisations were awarded that have performed outstandingly well in the following categories: procuring and sourcing sustainable services/products, optimising the yield of resources, improving the design of products and processes and minimising waste (e.g. through recycling, remanufacturing or industrial symbiosis). In the '*Moving towards a circular economy with EMAS*' report (European Commission, 2017) five best practices were identified for implementing circular economy (Figure 1).



Figure 1: overview of the five best practices of EMAS.

These best practices are still relatively vague in their description but, in the report, each best practice is illustrated by examples of good practices of EMAS organisations. In addition, three case study examples are included that serve as an inspiration for what measures the EMAS organisations can put in place to become more circular. These case studies also include what role EMAS had in their good practices. All in all, the report is designed as a guidance document for organisations, authorities, etc., who would like to use EMAS strategies. EMAS has proven to be an effective tool in aiding organisations to become more circular by providing them with guidelines and tools to start, and continue with.

4.2. EU Ecolabel

The EU Ecolabel has already been established in 1992 and has been continuously updated since then (European Commission, 2020d). It is awarded to products and services that comply with a large set of environmental criteria throughout their life-cycle. These criteria are checked by third parties, which ensures credibility. It has therefore established itself as a tool to distinguish good practices of products compared to other products.



The Ecolabel promotes circular economy by encouraging producers to generate less waste and CO2 (European Commission, 2020d). Like the EMAS, the Ecolabel has a guiding function, with regard to how companies can lower their environmental impact in the manufacturing process and become more circular.

For consumers, the label ensures that the product is environmentally friendly and of good quality (European Commission, 2019h). For a company, it is also favourable to be able to put the EU Ecolabel on their product not only because consumers are nowadays paying more attention to the environmental impact of products, but also because it can increase a company's profitability and reputation (European Commission, 2019i).

4.3. Level(s)

The sector of buildings is one of the most resource consuming sectors in Europe (European Commission, 2020e). Therefore, a lot of progress can be made with a transition towards a circular economic model in this sector. The European Commission has made it one of their key targets in the Circular Economy Action Plan. Level(s) is a tool for designing and constructing more sustainable buildings and focuses on the life cycle of a building. Sustainable buildings in this context are understood as using less energy and materials and have a lower environmental impact than non-sustainable buildings.

Level(s) has the potential to be an effective tool to help work towards, and identify, a 'good practice' sustainable building. However, the test phase has just been completed and according to the conference held in February 2020 to evaluate the test phase (which 82 participants finished),

there are still many improvements that need to be made. In general, "Attention needs to be focussed overall on the accessibility of 'Level(s) as a whole' - simpler/more intuitive to use, greater clarity on the objectives and use of the 'levels'" (European Commission, 2020f).

5. European University Networks

5.1. European University Association (EUA)

5.1.1. Framework

The European University Association (EUA) represents more than 800 universities and national rectors' conferences in 48 European countries (European University Association, n.d.). The EUA works to bring together its members to develop a European vision for higher education and research. The association tries to influence EU policies on higher education, research and innovation. Furthermore, the EUA provides opportunities for members to share best practices by participating in projects, events and other mutual-learning activities involving a wide range of universities.

In their key activities report and annual report of 2019, accessible on their website, sustainability or circular economy have not been mentioned. However, the EUA does have an Energy & Environment Platform. The Association's goal is to facilitate the participation of European universities in energy- and environment-related EU programmes and to support the realisation of the Energy Union and a sustainable energy future for Europe (European University Association, n.d.). To accomplish this, EUA represents the university sector in EU energy and environment policy.

5.1.2. Implementation

EUA-Green have mostly done documentation activities for climate change prevention, yet they still work on their future aims such as being the agency for collaboration between the universities and businesses, NGOs, governments and increasing citizen awareness about climate change.

What they have done so far can be described under two main categories.

5.1.2.1. Mobilising the Research, Innovation and Educational Capacities of Europe's Universities in the SET-Plan (UNI-SET)

The biggest contribution so far from EUA's Energy & Environment Platform was the UNI-SET (Universities in the SET-Plan) project. The project was concluded in 2017 and its aim was to mobilise European universities to the energy goals spelled out in the SET plan. It mapped the activities of European universities in the energy field and produced an online, interactive tool-

called <u>European Atlas of Universities in Energy Research & Education</u>- displaying master's, doctoral and research programmes related to the sector. Additionally, the UNI-SET project surveyed potential energy field employers to gain insight into the current and future demand for professional skills and knowledge in the sector. Moreover, it organised six Energy Clustering Events addressing the key priorities of the SET-Plan and overarching topics. The main outcomes of UNI-SET are published for public usage at the platform's website.

5.1.2.2. Events

While working on the UNI-SET project, EUA-Green organised a variety of energy clustering events. The aim of those events was to bring together institutional and research leaders to discuss the strategic role of universities in reaching the objective of a sustainable, low-carbon European society; and they still continue to be held, even though the UNI-SET project has been finished. Other events include workshops, webinars and meetings – often organised in collaboration with partner organisations - in Brussels and throughout Europe.

The Energy & Environment platform organised the "Energy & Environment Clustering Event" on 23-24 September 2019. This event focused on the need for new skills and knowledge for the energy transition while highlighting the need for a change in the mindset to increase efficiency in the use of raw materials and reduce harmful emissions. This event also addressed the concept of the circular economy in relation to the energy transition. One of the five sessions was specifically dedicated to discussing the circular economy and included three lectures: "Assessing sustainability implications of circular strategies within the building sector"; "Strategising under highly regulated conditions: Lessons from university- waste refinery collaborations in the circular economy context"; "Clean- Tech Clusters Development for Local Communities" (EUA, 2019).

5.2. Network of Universities from the Capitals of Europe (UNICA)5.2.1. Framework

Compared to EUA, UNICA is a relatively modest network with 53 universities from 37 capitals of Europe. Its environment focused platform, UNICA GREEN, helps Sustainability Coordinators in a certain number of universities across Europe to discuss practices of the implementation of environmental sustainability strategies at universities. The sustainability coordinators are not necessarily but mainly from the universities belonging to the network. The universities from the capital cities in Europe form the core of the network while universities from the other cities are accepted as partners. As of now, there are 9 core members and 2 partners of UNICA-Green, which includes universities from Estonia, Italy and Portugal.

According to their website, their goals can be characterised as follows:

- Promote environmental sustainability in every aspect of work at universities;
- Set environmental sustainability as a top priority;
- Work closely with policymakers, municipalities & communities, industry & business and other universities;
- Share examples of the network's green practice, evaluate and report its status, plans and progress to all stakeholders.

5.2.2. Implementation

The main activity of UNICA GREEN are the annual workshops gathering Sustainability/Environmental coordinators, Vice-Rectors responsible for the implementation of institutional sustainability strategy from UNICA member universities, as well as representatives of UNICA GREEN Partners, peer networks, governmental bodies, and city authorities. Every annual workshop has a central theme related to sustainable development and the participants share their findings and experiences through them.

Other activities include:

- Publishing news about the green practices in the core members of the network;
- Creating a sustainability map for the documentation of key activities of European universities in order to increase collaboration between them;
- Creating and updating an online library containing different kinds of selected materials focusing on sustainability;
- Showcasing "green corners", places in the member university campuses for recreation. These include campus gardens & parks hosting rare species of greenery, lakes & ponds to monuments of nature & rooftop gardens;
- Presenting the "Green Your University" award to encourage student projects that contribute to improving sustainable development on university campuses.
- 5.3. European Institute for Technology (EIT)

5.3.1. Framework

The European Institute of Innovation and Technology (EIT) is an independent EU Body created by the European Union in 2008 to strengthen Europe's ability to innovate. The Institute drives innovation across Europe by integrating business, education and research organisations to collaborate and find solutions to pressing global challenges. The EIT mainly operates through its "Knowledge Innovation Communities (KICs)", autonomous entities under the institute whose strategic goals are set by the EIT via individual agreements. By using the grant from the institute, these KICs support the development of dynamic, long-term pan-European partnerships among leading companies, research labs and universities. Among these partners, there are 249 higher education institutions. As of now, there are 8 different KICs, and EIT-Climate and EIT-InnoEnergy are the ones which relate the most to the circular economy principles. To that end, EIT-Climate aims to support innovations that focus on reducing greenhouse emissions, and EIT-InnoEnergy focuses on creating a European energy sector based on sustainable energy usage.

5.3.2. Implementation

Innovation Communities bring together businesses (industry and SMEs), research centres and universities as partners. They allow:

- innovative products and services to be developed and launched on the market;
- new companies to be started and existing ones to be scale;
- a new generation of entrepreneurs to be trained.

While EIT operates mainly through innovation communities, these communities operate mainly through "Innovation Hubs". These hubs are spread across the EU to increase the impact of the EIT's activities. There are currently 50+ innovation hubs across Europe that include co-location centres, where education, research and business meet and interact. Both EIT-Climate and EIT-InnoEnergy were able to bring together a numerous number of universities across Europe to form interdisciplinary Master's and PhD programmes focusing on the prevention of climate change. The students who attend those programmes graduate with double degrees from two different host universities they decided to attend, thus joining the workforce with a widened mindset. As a partially connected result, the innovation communities paved the way for the creation of thousands of new jobs and start-ups operating in green technology.

6. Civil society & foundations

A number of civil society organisations and foundations work actively at the European level (and beyond) towards making the economy more circular. CSOs and foundations with a significant reach, as well as impactful initiatives, will be brought forward in this report.

6.1. Coalitions of youth and youth organisations

In 2019, Generation Climate Europe (GCE) was launched as the first environmental coalition of the main youth-led organisations and networks active at the European level. This coalition now counts 8 youth organisations: AEGEE / European Students' Forum, Erasmus Student Network (ESN), European Students' Union (ESU), Organizing Bureau of European School Student Unions (OBESSU), Youth and Environment Europe, FIMCAP, CliMates and International Young Naturefriends. The GCE coalition's aims are to ensure that the EU recognises and promotes the interests of young people in Europe when it comes to the climate crisis. GCE highlights the need for concrete and drastic actions to tackle this crisis and demands that EU leaders demonstrate their

commitment through strong policies (Generation Climate Europe, 2020). GCE currently has five working groups, including a working group on circular economy launched in 2020. One of the first tasks of this working group is to contribute to the preparations of a youth summit on climate scheduled to take place in the second half of 2020 in Brussels, and of which one of the main topics will be the circular economy.

At the United Nations level, a self-organised space for children and youth to contribute to and engage in certain intergovernmental and allied policy processes has been mandated by the UN General Assembly: the United Nations Major Group for Children and Youth (UN MGCY). Since 1992, the UN MGCY has been a bridge between young people and the UN system, ensuring that young people's right to meaningful participation is realised. The UN MGCY does so by engaging formal and informal communities of young people in the design, implementation, monitoring, follow-up, and review of sustainable development policies at all levels (United Nations Major Group for Children and Youth, n.d.). When it comes to environmental policies, a youth constituency of the UN MGCY is specifically involved with the UN Environment Programme (UNEP), the UN programme dealing with circularity and the green economy.

6.2. Non-for-profit associations and networks

A first relevant non-profit organisation to mention is Zero Waste Europe. Zero Waste Europe is a movement of communities, local leaders, businesses, experts, influencers and other changemakers working towards eliminating waste in our society. The Zero Waste network currently counts 31 national and local NGOs promoting the zero-waste strategy, managing and monitoring a network of Zero Waste municipalities, and engaging with companies and decisionmakers. Zero Waste Europe works on a number of projects and policy areas with the aim to influence policies at the European level and to support the grass-roots implementation of zero waste initiatives. Zero Waste Europe advocates for the circular economy through their work on a number of policy areas, including waste trade, consumption and production, and chemical recycling (Zero Waste Europe, n.d.).

Another relevant non-for-profit association in the field of circular economy is Reloop. Reloop was founded in 2015 as a membership-based platform aiming to connect stakeholders from the civil society, government and industry sectors in order to allow for information-sharing between different stakeholders while also influencing decision-makers to adopt and implement policies and systems that promote a circular economy. The Reloop platform also works as a catalyst to generate economic and environmental opportunities for all stakeholders in the value chain. Reloop is primarily based in Belgium and operates across Europe, North-America and the Pacific region. When it comes to advocacy at the European level, Reloop has been particularly involved in topics related to banning single-use plastics and managing waste in the circular economy (Reloop, n.d.).

When it comes to advocating for a circular economy at the European level, another relevant nonprofit organisation to mention is Ecopreneur.eu. Ecopreneur.eu is a European sustainable business federation based in Belgium. This federation currently counts six member associations from different EU countries and represents over 3000 businesses, mostly SMEs, striving to deliver sustainable products and services. Ecopreneur.eu's advocacy work focuses on circular economy, sustainable development goals and financing. Their positions on the circular economy aim to bring a cross-sectoral perspective while advocating for more ambitious and comprehensive implementation of circular economy policies to achieve systemic change at the EU level and in the member states (Ecopreneur.eu, n.d.). Ecopreneur.eu's circular economy advocacy is supported by their EU Circular Economy Advocacy Group consisting of partner companies.

6.3. Global social enterprise

Founded in 2012, Circle Economy is a global non-for-profit social enterprise based in the Netherlands whose mission is to accelerate the implementation of the circular economy by providing insights in what a circular future might look like for a company, a region or even worldwide, and by coming up with scenarios for how to get there. Together with their members and partners, Circle Economy also prepares and provides tools and resources to help turn these scenarios into reality. Circle Economy members include businesses and institutions dedicated to developing solutions to bring the circular economy concept to fruition (Circle Economy, n.d.). Circle Economy also works with a broad range of partners, including academic institutions, individual experts and media outlets. Key initiatives developed by Circle Economy include programmes on preventing and reducing waste from the textile industry, creating more circular jobs, making the built environment sector more circular, and supporting cities and businesses to embed circularity at the core of their strategies.

6.4. Global foundation

In 2010, the Ellen MacArthur Foundation was launched with the aim to accelerate the transition to a circular economy, establishing the circular economy on the agenda of decision makers across business, government, and academia. With the support of a number of partners, the Ellen MacArthur Foundation's work focuses on different interlinking areas, such as developing the vision, skills and mindsets needed to transition to a circular economy, providing evidence about the benefits and implications of the transition, and engaging a global audience around the circular economy. Although the scope of the Ellen MacArthur Foundation goes beyond Europe, the Foundation is carrying out a number of activities with a particular focus on Europe (Ellen MacArthur Foundation, n.d.). These activities include initiatives aiming at making the fashion industry circular, finding solutions for a more regenerative food system, and rethinking the way plastics are designed, used, and reused. As an example, the initiative on making fashion circular was launched in 2017 with the aim to bring together leaders from across the fashion industry

(businesses, NGOs, innovators, governments, etc.) in order to stimulate the level of collaboration and innovation necessary to redesign the operating model of the textile industry to align it more with the principles of the circular economy. Another example is the Foundation's Food Initiative. This initiative, which was launched following the World Economic Forum 2019, aims to bring together key actors to stimulate a global shift towards a regenerative food system based on the principles of a circular economy over the three following years. This initiative is particularly engaging cities (including the European cities of London, Barcelona, Milan and Lisbon) along with food producers, retailers, waste managers and innovators on a journey to a circular economy for food.

6.5. Good practices

6.5.1. Circularity Check

The Circularity Check is a free online self-evaluation tool for companies to assess the circularity of the products and/or services they develop and put on the market. This tool entails an online questionnaire of about 60 questions that provides the circularity score of a product or service, along with partial scores on five indicators, namely design/procurement/manufacturing, delivery, use, recovery and sustainability (Ecopreneur.eu, 2019). Red flags are also raised if a product or service scores zero on one of the phases of the value cycle or on sustainability. The Circularity Check was created by Ecopreneur.eu together with two companies part of their network: WeSustain and Circular Future.

6.5.2. RENEW2020

RENEW2020 is an Erasmus+ KA2 project which took place in 2016-2017 and aimed to give young people and people from disadvantaged groups entrepreneurial skills allowing them to seize the opportunities of the circular economy related to reuse, repair and upcycling. Through this project, 25 students took part in training sessions across Europe and visited local social enterprises, design studios and waste management companies (RREUSE, 2017). The students also got first-hand information about waste prevention and innovative business models through an online learning platform and direct consultations. This project was led by a consortium of partners from different EU countries and active in the green economy, waste management, sustainable design, and professional training.

6.5.3. Creating a methodology for zero waste municipalities

Creating a methodology for zero waste municipalities is a toolkit created by Zero Waste Europe, Hnuti DUHA and Ekologi Brez Meja with the aim of providing an introduction to the concept of zero waste, its guiding principles, and steps for designing a zero-waste plan at the municipal level. This toolkit addresses municipality officials, waste professionals, civil society actors, business owners and residents, providing them with skills and knowledge to begin their journeys towards zero waste. In addition to the toolkit, a number of practical tools for municipalities and communities have also been developed, including a calculator showing the expected benefits of adopting a zero-waste approach at the municipality level when it comes to the costs of waste management, the levels of waste generated and greenhouse gas emissions (ZeroWasteCities, n.d.).

7. Europe-wide companies

It is difficult to pinpoint circular economy-driven companies that operate in several different countries around Europe, not to mention all around it. Thus, we will also include some businesses that are small but with the right amount of funding, have a good potential for growth.

7.1. Implementation and good practices

Fairphone is a campaign turned social enterprise operating since 2013, with more than 70 employees. The company is based in Amsterdam, and its main focus is on creating impact in four different areas: fair materials, good working conditions, long-lasting design and reuse recycling. The company uses raw materials from conflict-free and recycled sources while creating smartphones and pays its employees a local living wage. The design of the phone is completely modular, so the users can repair and recycle the phone much more easily compared to traditional smartphones, thus extending the lifecycle of the product considerably high.

Another Dutch company, **DyeCoo**, developed a process of dyeing cloth that uses CO_2 instead of water, and only pure dyes instead of toxic chemicals. When the dyeing process finishes, the carbon dioxide evaporates and is in turn recycled and used again. 98% of the dye is absorbed by the cloth, so a very minimal amount of dye is wasted in the process. And because there is no water usage, there is no need to evaporate water from the cloth, thus the energy usage is also lower. As of now, DyeCoo has set up long-term and far-reaching collaborations with major industry players Nike and Ikea.

By installing its photovoltaic glass in more than <u>250 projects across the planet</u>, **Onyx Solar** probably fits the description of a Europe-wide operating company. Their product, the photovoltaic glass, simply generates electricity in a building, bus stop, etc. It is installed, as long as the sun is up. Even though the company's business model is not very circular (because of the waste that comes out during the glass production), it helps public and private sector entities to reduce energy costs. Its presence in Europe can be accessed <u>here</u>.

French-based **Schneider Electric**, which specialises in energy management and automation, won the Award for the Circular Economy Multinational. Employing 142,000 people in more than 100 countries, it uses recycled content and recyclable materials in its products, prolongs product lifespan through leasing and pay-per-use, and has introduced take-back schemes into its supply

chain. Circular activities now account for 12% of its revenues and will save 100,000 metric tons of primary resources from 2018-2020.

7.2. Corporate Social Responsibility

A number of large companies shaping European consumers' habits, although not necessarily European themselves or focused on environmental issues, are developing initiatives related to the circular economy as part of their corporate social responsibility. The examples given below do not constitute an exhaustive list of CSR initiatives on the circular economy.

Swiss-based multinational food and drink processing corporation Nestlé has set to make 100% of its packaging recyclable or re-usable by 2025, acknowledging that plastic waste is one of the biggest sustainability issues the world is facing today (Nestlé, 2018). Nestlé aims to achieve this ambition by eliminating non-recyclable plastics, encouraging the use of plastics that allow better recycling rates, and eliminating or changing complex combinations of packaging materials.

French cosmetics company L'Oréal has committed to improve the environmental and social profile of 100% of its products. To do so, the company has engaged in a policy of packaging optimisation, which includes supporting the circular economy by using post-consumption recycled materials, encouraging consumers to recycle, promoting rechargeable or refillable systems, and reducing the weight and size of packaging (L'Oréal, 2019).

Brussels originated ABInBev has a variety of sustainability goals, with one of them being circular packaging. Starting from a baseline of 46, the world's largest brewer wants 100% of its product to be in packaging that's returnable or made from majority-recycled content by 2025.

7.3. Challenges

The challenges for creating a Europe-based scalable enterprise are mainly due to the disintegrated nature of the markets in Europe and lack of funding.

Compared to economic superpowers like China and the US; European markets operate under different laws and have different consumer characteristics due to the cultural differences. Thus successful European startups either move into the US to enter into a bigger consumer market and grow more quickly, or they get acquired by much bigger multinational companies coming from the US or China.

With respect to funding, even though the capital raised in Europe cannot be considered as small, it certainly is in comparison with the big venture capital firms located in the tech hubs in Boston or California. This kind of financial conservativeness reduces the innovators' chances of raising capital in Europe, especially for the very unorthodox ideas that may give birth to born-global companies.

The above problems form the major setbacks of all kinds of startups and SMEs that are based in Europe. On the other hand, the problems of European multinational firms operating with linear business models are mostly related to their inability to transform quickly. Since established businesses think that they have too much to lose if they try to change in a short period of time, they don't want to risk big investments that may close the production loop. We believe that the biggest driver for their change can come from consumer pressure; even though the awareness around sustainability is high in Europe, at least compared to the rest of the world. If the European citizens become more actively involved with the environmental costs of what they are consuming, they can force both the policymakers and corporations for circular ways of doing business.

Lastly, it is important to mention that the problems facing the start-ups and SMEs indirectly affect big businesses as well. Some among those small firms make revenues by helping a traditional corporation to transform into a more circular company; but if they cannot grow fast, those changes occur slowly.

7.4. Funding

In 2014, Landbell Group, an international supplier of service and consulting solutions for environmental and chemical compliance, launched the Green Alley Award, Europe's first startup prize for the circular economy. The Green Alley Award aims to facilitate circular economy innovations by nurturing and promoting promising business ideas that use new services, products and technologies to turn waste into a resource. Therefore, this award targets European startups and young entrepreneurs who have developed a business model in the areas of a digital circular economy, recycling and waste prevention and who are about to launch their products or services, are already in the growth phase, or want to expand into other European markets. Each year, such start-ups and entrepreneurs are invited to apply for the Green Alley Award, and the successful applicant is awarded $\pounds 25,000$ to take their business to the next level, along with feedback from circular economy experts and start-up mentors, networking opportunities and new business contacts (EU-Startups, 2019).

II. Estonia

1. Rules

1.1. Brief summary of the decision making power in Estonia

The Republic of Estonia is dependent on general rules set by the European Union. It is a parliamentary republic. The Estonian Parliament, Riigikogu, makes national decisions about laws and regulations that are passed through. The Estonian Government has the national executional power to implement governmental power directly or through public institutions. Locally, the decisions are made by 79 local governments (15 cities and 64 municipalities). Laws can be initiated by the parliament (also its fractions and members), the government or the president. The municipalities have the right to make regulations.

1.2. National regulations regarding circular economy advancement

The Waste Management Law (Riigikogu, 2004) (est *Jäätmeseadus - JäätS*) lays down waste management arrangements, requirements to prevent the generation of waste and the health and environmental risks of waste. It includes measures to increase the efficiency of the use of natural resources and limit the adverse effects of such use, as well as liability for non-compliance.

The Packaging Law (Riigikogu, 2004) (est Pakendiseadus) provides general requirements for packaging and packaging use, measures to prevent and reduce packaging and packaging waste, the organization of a recovery system for packaging and packaging waste, and liability for non-compliance with established requirements.

The European Union's plan to switch to circular economy will change a lot of the requirements that Estonia has locally.

1.3. Brief description of relevant legal initiatives on the municipality level

The capital city Tallinn has forbidden the use of single-use plastic and cutlery at public events. Currently, we do not have much other information about regulations regarding circular economy besides the general waste management law. As the point of describing laws is to show whether municipalities are doing something to implement a circular economy, we will mention some relevant activities.

There are 15 counties in Estonia with different municipalities under them. Each of these counties has its own development centre for entrepreneurship that affects municipalities too. They counsel local entrepreneurs and try to shape the local economy of the municipality. We contacted them during December 2019 to January 2020 and asked them to describe in their own words what is done in their county to implement a circular economy and what kind of companies there are.

County	Activities
Harjumaa	Lääne-Harju Cooperation Council (Lääne-Harju Koostöökogu, 2019) has trained entrepreneurs on circular economy: what is circular economy, why it should be implemented in your company, tips on making a company more effective, circular design and business models, marketing environmentally friendly companies.
	Keila city (Keila Linnavalitsus, 2019) made a public procurement in November 2019 to find a waste manager that follows circular economy principles. The task is to monitor and map Keila city's biowaste life cycle among companies and residents. Then, a technological solution and a plan to switch to a carbon neutral circular economy must be made.
Hiiumaa	The practical implementation of circular economy is among the PATEE programme's 2020-2023 goals.
Ida-Virumaa	The region does not have any activities around circular economy.
Jõgevamaa	The region does not have any activities around circular economy.
Järvamaa	The practical implementation of circular economy is among the PATEE programme's 2020-2023 goals.
Läänemaa	N/A
Lääne- Virumaa	Implementing circular economy principles in industries is in Lääne-VIru county's development strategy. The practical implementation of circular economy is among the PATEE programme's 2020-2023 goals.
Põlvamaa	N/A
Pärnumaa	Has organized an event (Pärnumaa Arenduskeskus, 2019) for local entrepreneurs to introduce a circular economy with funding from the Environmental Investment Centre.

Raplamaa	N/A
Saaremaa	Bioeconomy and biowaste resources were mapped in 2018.
Tartumaa	The region does not have any activities around circular economy.
Valgamaa	N/A
Viljandimaa	N/A
Võrumaa	Circular economy principles are in the Võru county's renewed waste management plan. According to the development centre, there is a big interest in collaboration and projects in the circular economy. One of the goals is to increase circular economy regarding construction and demolition waste

2. Social norms

2.1. Public sector

The Ministry of Environment organizes a yearly open Circular Economy Conference, European Ecolabel Week and has a separate webpage for information about Circular Economy (ringmajandus.envir.ee). The Estonian Association of Environmental Management manages the Estonian Circular Economy Forum. The Ministry of Environment has had recycling campaigns like Prügihunt, #kõrrevaba to reduce straw usage and "Võta Vabalt" to be a more environmentally-friendly consumer. Samm-samm (Samm-samm, 2019) is another campaign to prevent waste with small consumer actions.

2.2. Civil society

There are several organizations, campaigns and events which aim to change the social norms of what it means to be an environmentally friendly person, organization and country. Kompostiljon (Kompostiljon.ee, 2020) shares information about how to compost at home on their website, in the media and during workshops. JCI Koda organizes different events to promote sustainable thinking. In the summer of 2019, they had a campaign, where they collected lots of reusable dishes from all over Estonia to prevent plastic waste at their event. After the event, they used these dishes to create a dishware rental called Nõukoda.

Estonians started the "Let's Do It" campaign cleanups in Estonia in 2008 (Teeme ära, 2020) and then created the world cleanup day in 2018. In 2019, it had 20 million participants from 180

countries (World Cleanup Day, 2019). During the COVID-19 emergency, they organized a digital world cleanup day. They also organize workshops and teach waste prevention. It is considered as one of Estonia's key brands (World Cleanup Day, 2020).

There have also been several other campaigns in the past. *"Ära joo plasti" (eng "*don't drink plastic*") campaign invited people to use reusable bottles and fill their bottles at restaurants that are mapped. "Killerkott" (kilekott means plastic bag in Estonian and killer was taken from English) was a campaign to promote using a reusable bag instead of taking a single use plastic bag. "Prügihunt" (eng "*trash wolf*" or "*food waste shredder*") was a campaign about teaching children how to recycle and sort waste. They created materials that can be used to teach today.

"Ära rääma" is a campaign by Eesti Pandipakend for young people. The aim of this campaign is to draw attention to the importance of sorting deposit containers. There are collection points at schools for deposit bottles and schools get different prizes for collecting (Eesti Pandipakend, 2020).

An eco-village called Väike Jalajälg (*small footprint* in english) organizes events and enables visitors to learn about sustainable living. They even organize events for companies and take in guests. Lilleoru is another bigger and older eco-village. Both belong in the European eco-villages network GEN-Europe and the Association of Estonian Eco-communities. (Väike Jalajälg, 2020).

NGO Lelukogu is a toy library in Tallinn that a parent can join for 15-25 euros per month (Lelukogu, 2020).

2.3. Businesses, cooperatives and association of companies

One of the biggest supermarket chains, Rimi, has a campaign called "Tarbime targalt" They have a Facebook group (as of 04.2020 there are 6805 members) where important information about sustainable consumption is shared. They have signs in their shop that invite us to use reusable bags and cut food waste. They even collaborated with a fashion designer to make reusable bags out of textile waste. Recently, the shop put a 5-cent price to all small plastic bags and started using an app that helps them prevent food waste.

30 Estonian digital companies signed the Tech Green pledge in 2019 and promised to become climate neutral by 2030. Among them is a taxi app service provider Bolt whose rides are all already climate neutral (Tech Green Pledge, 2020).

3. Funding

3.1. Public sector

The Ministry of Environment currently (March 2020) offers different funding opportunities (Ministry of Environment, 2019):

- Measure of the resource efficiency of enterprises;
- Measure of recycling of waste and preparations for its reuse;
- Circular economy programme;
- Other support measures.

Several environmentally friendly business idea competitions are also funded. These are managed mainly by cleantech start-ups umbrella NGO Cleantech ForEst: Climathon, Climate Launchpad etc. The government offers the opportunity to get funding for different projects (at the moment of speaking green ICT etc) (Enterprise Estonia, 2019). The Environmental Investments Centre also organizes Negavatt and Mini-Negavatt. In these competitions, they look for ideas that include circular economy as a method and resource efficiency. Archimedes is involved in developing international collaboration in science and education and also coordinating the funding of this specific project.

Environmental Investment Centre (Keskkonnainvesteeringute Keskus, 2020) also gives out funding for circular economy projects. In the past, in addition to the aforementioned Pärnumaa development centre's project, they have funded the following circular economy projects:

- 01.07.2019, Tallinn Technical University (now TalTech): development of textile waste shredding technology and innovative materials to enhance textile waste and support the circular economy.
- 01.08.2019, Keila City Government: development of a bio-waste management solution based on the circular economy for the city of Keila.
- **01.06.2019, SEI Tallinn:** research into best practices in the circular economy and circular design.
- 26.03.2018, OU Telliskivi Maja: Waste management of Tallinn and Tartu Street Food Festivals - more efficient implementation of the principles of the circular economy at large outdoor festivals.
- 03.09.2018, Estonian Association for Environmental Management: increasing the capacity of the circular economy and circular design in Estonian companies

3.2. Civil society

The National Foundation of Civil Society (KÜSK) is a state financed civil society fund in Estonia that supports non-governmental organizations in developing their different capacities, so that they can pursue their objectives consciously and purposefully. This may be used to fund purposes related to circular economy, among others.

3.3. Businesses, cooperatives and association of companies

We currently have no information about private companies giving out funding for the circular economy.

4. Implementing the circular economy vision

4.1. Public sector

Estonia has had a deposit bottle system since 2005. Besides recycling aluminium, glass and plastic, some bottles are also refilled. Eesti Pandipakend and Topsiring offer reusable cups with a washing solution for public events. Estonian Recycling Organization created a unified symbol system for sorting waste to make it easier for people. Thanks to this system, 90% of the deposit bottles in Estonia are recycled (Rohegeenius, 2020). Currently, it is expected that this system will expand to syrup and dairy drink bottles, liquor and light alcoholic drinks.

4.1.2. Public companies

There are 30 companies that are owned by the state (Eesti.ee, 2020). Before speaking about a few companies implementing a circular economy vision, we have to mention a company that is strongly related to this topic. It is not necessarily talking about a circular economy. Ökosil is an environmental company (35% owned by the Republic of Estonia). Its purpose is to manage large environmental projects and provide other environmental management and monitoring related services. Its projects include waste management, close-down of an ash field and radioactive tailings pond remediation.

We will further discuss the other two companies (Estonian Energy and Estonian Environmental Research Centre) below who actually seem to be implementing a circular economy vision. The important thing here is to mention that as far as we are aware, our public companies do not have any campaign initiatives to promote circular economy.

Eesti Energia (eng *Estonian Energy*) is a company that provides electrical energy. Although it produces energy from oil shale and deals with mining, it is worth mentioning because of its renewable energy aspirations. The company claims it is aiming to move towards a circular economy. They bring an example of using old tyres to make oil, electricity and semi-oxide gas. They also say that they replace 10% of oil shale with tyres. Their definition of circular economy thus does not quite match our definition. They also produce more than a fifth (ERR.ee, 2020) of Estonia's energy from wind, sun and water and promote renewable energy.

4.2. Civil society

Toidupank (Foodbank) takes leftover food from restaurants, shops and similar donators and gives it to those in need.

4.3. Businesses, cooperatives and association of companies

Sustinere helps companies to become more sustainable. They teach societal consciousness, sustainable strategies and responsible leadership. They help companies with managing their

strategy, products, services and relations responsibly and environmentally sustainably (Sustinere, 2020).

Puidukäitlus OÜ accepts all kinds of wood leftovers, sorts and gives them a second life in the form of new products. They make wood chips for hiking and sporting trails from wood waste. They repair pallets and send wood leftovers to be burned for warmth. They accept everything for free.

Stella Soomlais is a small business that makes leather products that can be lent, repaired and upcycled into new products. The backpacks and bags can be worn in multiple ways. They try to source sustainably and use all the material (they even make price tags and gift cards from leather). Currently they only create 2-4% of leather waste (in a factory, 25% is wasted) and are aiming for zero waste. The studio has an open concept. People can go and see how the products are made and participate in workshops themselves.

KIRA is a company that makes ballerinas from recycled tyres, plastic bottle felt and recycled cotton in Tartu. Their shoes are made to be durable and fit a capsule wardrobe. If the shoes break, they can be sent back to KIRA. They will repair the shoes and donate them to charity.

Several Estonian natural cosmetics companies take back their old containers and refill them: Tilk!, Bonobo, Hoia Home Spa and Oma CareThere are many small businesses that fully follow circular economy principles, but not so many bigger ones. The bigger ones tend to do it on a smaller scale.

There are also some interesting distillery companies. Liviko produces alcohol-free Junibeer and Gingerroot drinks, which reuse juniper berries and ginger root processed in gin distillation and are thus made zero waste (Liviko, 2019). Lahhentagge makes tonic water infused with christmas trees (Lahhentagge, 2020).

Fotografiska Tallinn is a photo museum that hosts photo exhibitions. Many of these are critical about socially and environmentally important issues. The museum that was founded in 2019 has hosted socially and environmentally critical photo exhibitions such as Mandy Barker's "Sea of Artifacts", Sebastião Salgado's "Gold". This museum also has a very popular zero waste restaurant which uses up everything from nose to tail, root to leaf. Here are some examples of the seasonal and mostly local dishes served: potatoes baked in compost, eggs marinated in coffee grounds from the cafe, kombucha made from the leftover coffee grounds, desert foam from leftover champagne, noodles from leftover bread, fermented veggies, cocktails from leftovers from preparing other foods etc. These dishes are served on dishes made out of recycled materials (Fotografiska, 2020).

Replace OÜ is a company that purchases leftover electronic devices, upcycles them and then sells them. In 2019, they increased their revenue by 86%: from 38,1 million euros in 2018 to 70,9 million (Replace Group, 2020).

5. Knowledge dissemination vehicles

5.1. Public sector

Estonian Environmental Research Centre is the leading company of environmental, chemical and physical research in Estonia that provides analyses of the quality of water, food, fuel etc to a wide range of clients. From October 2017 to September 2020, they have a project where they research three companies in each of the five partner countries near the Baltic Sea. One of the goals is to see how to recycle production waste and implement a circular economy in some companies (Eesti Keskkonnauuringute Keskus, 2020).

Another relevant company is the State Forest Management Centre (ee *Riigimetsa Majandamise Keskus*, in short RMK). Approximately half of Estonia is covered with forests and 40% of it is owned by the state. RMK's operating areas are land use management, forest management, forest survey, timber marketing, visitor management and nature education, nature conservation, seed and plant management (RMK, 2020).

Several public libraries lend out other things such as sports and sewing equipment, a photo studio, robots, board games etc. (Tallinna Keskraamatukogu, 2020).

5.2. Civil society

Prügihunt's materials about sorting and recycling waste are available for free and meant for use from fifth to sixth grade (Tallinn, 2018). Junior Achievement Estonia organizes the student company programme. Within this programme, students create their own company for an academic school year. Within the past two years, they have also included events about sustainability (greenwashing, zero waste, green marketing etc).

Let's Do It foundation spreads knowledge about waste prevention and recycling. Estonian Association for Environmental Management has a circular economy forum where they also spread knowledge about the circular economy. CleanTech ForEst organizes events to improve green technologies and move towards a more sustainable and circular economy.

6. Knowledge and education

6.1. Teaching6.1.2. Public universities

University of Applied Sciences (Tallinna Tehnikakõrgkool) has a circular economy department. Estonian Arts Academy (Eesti Kunstiakadeemia) taught circular and eco design. Estonian University of Life Sciences has several opportunities to learn about circular economy as a part of a student's thesis. Estonian University of Life Sciences studies bioeconomy, zero waste (food, cosmetics, fertilizers), ecological change, plants, animal products, upcycling etc. Taltech teaches industrial ecology (TalTech, 2020) which is much related to the circular economy.

6.1.2. Private universities

There are not so many private higher education facilities. Those existing do not provide circular economy education or research opportunities according to our knowledge.

III. Italy

1. Rules

1.1 Italian legislative framework

A transition to a Circular Economy is considered one of the solutions to global environmental problems in a world where population is increasing and natural resources are limited, as declared by the United Nations. At a regional level, the European Union is working to reduce the use of natural resources and the impacts of economic activities. Indeed, on December 2nd, 2015, the EU launched the *Circular Economy Package* and the *EU Action Plan for the Circular Economy*: these documents established a programme of 54 actions to strengthen global competitiveness, promote sustainable economic growth and encourage the creation of new jobs. Their aim was to tackle all phases in the lifecycle of a product, from production and consumption to waste management and the market for secondary raw materials.

In 2018, the EU included the *Strategy for plastic in the Circular Economy* (European Commission, 2018a) and *Monitoring Framework of Indicators for the Circular Economy* (European Commission, 2018b). That same year, precisely on July 5th, a new legislative framework on waste entered into force in the EU to improve recycling rates and clarify legal definitions for recycled materials (European Union Regulation, 2018).

At a national level, Italy is a constitutional republic and the legislative power is in the hands of Parliament, whose main activity is to make laws. Italy is organised into Regions, Provinces, Municipalities and metropolitan cities. There are 20 regions, and between them, 5 Regions (Valle D'Aosta, Friuli Venezia Giulia, Trentino Alto Adige, Sardegna and Sicilia) have a special autonomous status, meaning their governments have additional legislative and administrative powers. The Constitution of the Italian Republic contains fundamental principles, rights and duties of citizens, the organization of the Republic, and grants legislative powers in all subjects that are not expressly covered by State legislation (art. 117 Cost). The State exercises concurrent legislative power with the Regions in a number of other fields, as education, food, sport, civil protection, energy production and distribution, complementary social welfare, and development of cultural and environmental resources. Provinces and Municipalities have fundamental functions about managing the local resources according to circular and sustainable development principles.

The main Italian normative references in the field of circular economy are contained in the *Legislative Decree on 3 April 2006*, *n. 152*, (Environmental Code) that sets out rules about environmental impact assessment, the integrated pollution prevention control regime (II part), soil and water protection (III part), waste management and remediation of contaminated sites (IV part), air pollution and the reduction of emissions (V part), claims for environmental damage (VI

part) and the *Law on 28 December 2015, n. 221*, containing Environmental provisions to promote green economy measures and containment of the excessive use of natural resources. This law provides significant changes to Code of public Contracts, facilitating the application of minimum environmental criteria in public contracts.

The Italian legislative pursues the application of some principles of Circular Economy in others legal measures, among which:

- Ministerial Decree on May 24th, 2016 determines the rewarding points for the awarding of design services and works for new construction, renovation and maintenance of buildings, as well as the management of public administration yards;
- Ministerial Decree on May 26th, 2016 defines the guidelines to calculate the percentage of differentiated waste collection;
- Ministerial Decree on June 10th, 2016, no.140 establishes the criteria for the ecological design and production of electronic and electrical equipment;
- Law no. 166 on August 19th, 2016 provides for the recovery and donation of food, medicines and other products in favour of non-profit organisations;
- Ministerial Decree on October 13th, 2016, no. 264 contains the indicative criteria to demonstrate the existence of requirements for the classification of production residues as byproducts and not waste;
- Ministerial Decree on December 29th, 2016, no. 266 defines the criteria and simplified procedures for the composting of organic waste in Municipalities;
- Environmental Ministry Regulation on March 21st, 2018, no. 56 introduces the Made Green in Italy, a national volunteer scheme on based of PEF (Product Environmental Footprint) for goods and services;
- Law no. 160 on December 27th, 2019 (Budget law 2020) establishes the tax on the consumption of single use items made by plastic materials, used to contain, protect or deliver goods or foods. In addition, the tax credit is granted to undertakings producing plastic products to encourage technological adaptation in the manufacturing of products (art.1, c. 634). The law also set up a fund to revive the investments of administrations in reference to the circular economy, the decarbonisation of the economy, the reduction of emissions, energy savings, environmental sustainability and for innovative projects that have social impacts, such as public administrations must purchase or rent more vehicles used for public transport powered by electricity, hybrid or hydrogen (art.1, c.14);

There is not yet an adequate and complete organic regulatory framework of reference, although with the European Delegation Law on October 4th, 2017 n. 117, the Italian Government has to transpose the European directives on waste, packaging, batteries and accumulators, end of life

vehicles and electronic waste. At the moment, some Circular Economy principles were accepted exclusively into the waste management legislation.

1.2 Italian regions legal framework

Italian Regions have to include the *Green Public Procurement* into regional legal framework and identify some funds and economic incentives to support and promote the procurement. Moreover, the Regions must promote the purchase of goods, services and works of local authorities towards criteria of environmental sustainability. For example,

- Toscana Region adopted Regional Law on August 7th, 2018, no. 48 concerning rules in circular economy that modified the Regional Law 1/2015 with the aim of orienting through the coordination of regional sector plans with the Regional Development Program by identifying objectives and minimum contents. With Law on May 31st, 2018, no. 9, the region introduced the circular economy as aims in the Regional Statute.
- Marche Region adopted Regional Law on July 17th, 2018, no. 25 concerning Enterprise 4.0: Innovation, research and training. The region promotes a synergy between research and innovation related to information and communication and new technologies and the cross application of circular economy methods and tools. This innovation processes are accompanied by training and learning about new professional skills necessary.
- Basilicata Region with the Regional Law March 4th, 2016, no. 5 introduced the permanent forum for the circular economy to discuss about information and educational activities especially for the reduction of waste, reuse and recycling of goods. The region encourages community composting for the treatment of organic fraction of waste.
- Emilia Romagna Region adopted Regional Law on October 5th, 2015, no. 16 to implement the circular economy principles with reference to reduction of waste and promotion of prevention and recycling. The regional law established the permanent forum for the circular economy in which local institutions, civil society, economic organisations representing companies and environmental associations participated. This forum worked between September 2016 and December 2017.
- Umbria Region adopted the circular economy principles in the management of waste to reduce the percentage in landfills (Regional Law on December 27th, 2018, no. 14).
- Lazio Region adopted new disposition in Budget Law that establishes the donation of Amazon products gave back in favour of no profit organisations (Region Law on December 27th, 2019, no. 29).

1.3. Municipalities legal framework

The Municipality of Genova has introduced the reduction of TARI, municipal tax on waste, with Resolution n. 2018 – DL – 30 on January 30th, 2018, for the subjects participating in the

Recibo project, promoted by the Municipality in 2017 (Resolution n. 2017 - DL - 157 on May 2nd, 2017). *Recibo* is a municipal network project for the recovery and redistribution of food surpluses in local territories. With different instruments, for example, WhatsApp group and *Bring the Food App*, partners of the project can practice activities to promote neighbourhood policies, sharing vehicles to recuperate foods.

- The Municipality of Fondi with Ordinance n. 9/2019, has forbidden plastic containers for food and drinks, for both commercial and receptive activities in the municipal area, also for parties and public events also. It was possible to use stocks lying in warehouses until June 30th 2019. Many municipalities are adopting plastic free ordinances. This disposition is aimed to introduce bio compostable tableware, reducing waste destinated to landfill.
- The Municipality of Limbiate, Monza and Brianza Province, has promoted Social Housing with Act C.C. n. 75 on November 11th 2015. The aim is to create a sustainable community that shares common spaces and organises activities during their free time. In exchange for a rented accommodation, young people carry out social activities in the neighbourhood (solidarity lunches, Italian courses, after school) in renovated and animated spaces.

2. Social norms

- 2.1. Public sector
 - National campaign for circular economy and sustainable development "Spreco Zero" promoted by ANCI (National Association of Italian Municipalities) and the Ministry of Environment changes and improves attitudes regarding food waste. The campaign is directed towards municipal administrations that develop various initiatives and events, such as laboratories and workshops raising citizen awareness. Spreco Zero has generated the Zero Waste Document, signed by over 800 Italian mayors, Primo non sprecare campaign with famous chef, Massimo Bottura, made lunches and dinner with waste recovery food. Every February 5th, on the National Wastefulness Prevention Day, the General States of Waste in Italy is convocated to discuss this issue, starting with analysis of data collected by Waste Watcher, the national observatory on wastefulness, a scientific, information and communication instrument on the causes of wastefulness, from food to water, from energy to medicine and clothing (Spreco Zero, 2020).
 - Ministries of the Environment, Infrastructure and Transport with *Foundation for Sustainable Development* have created National Sharing Mobility Observatory, a platform that unites public and private institutions and transport operators to analyse, support and promote the phenomenon of sharing mobility in Italy. From 2015, every year the Observatory organises a national conference to present information about the urban mobility in Italy. Shared mobility generates a transformation of the behaviour of individuals who tend to access

mobility services rather than using a car or scooter (Osservatorio Nazionale Sharing Mobility, 2015).

- City for the Circular Economy is a Protocol signed by the Ministry of Environment and cities of Bari, Milan and Prato aimed to promote initiatives on the reuse, sharing and distribution of goods according to circular economy principles and more sustainable development models. The initiative implemented through this protocol will be shared to make similar experiences replicable in other cities. The project is defined as a pilot because in terms of size, geographical position and experience accumulated on the theme of circular economy, the cities will have a positive impact in the larger regional area, especially in urban and business sectors.
- 2.1.1. Public companies
 - ATAC, Tranvie and City bus Company, is the largest transport company in Europe and first in Italy. It manages the public network transport in Rome Municipality, which is its sole shareholder. Atac, in collaboration with Coripet, Italian consortium for PET recycling, promotes the pilot campaign + Recicli, + Viaggi: it provides for the collection of PET plastic bottles through eco-compacting machines present in 3 metro stations. Ecobonus is delivered for each recycled bottle and people can use them to buy transport tickets (30 bottles for a free ticket valid for a metro trip). The campaign was promoted in July 2019; it was considered an excellent example of circular economy to be adopted everywhere and promote recycling and using public transport.
 - ENI, National Hydrocarbons Authority, is an Italian multinational oil and gas company. It promotes the campaign *Eni* + 1: it outlines the initiatives that Eni is putting in place as part of its decarbonisation strategy, combining them with some individual virtuous attitudes which, if carried out by the community, can help to overcome challenges and change the future (plastic recycling, choosing recycled products, reducing the use of water in the house, preferring public transport in the city).

During *FuoriSalone* 2019, an event running on April 2019, Eni presented the Circular Garden, an installation made from fungus mycelium, an innovative natural material that use a second life as fertiliser. Through this installation, visitors to the event have taken on an engaging interactive journey showcasing Eni's strategy for the circular economy.

• ENEL is an Italian multinational Energy Company that is active in the sectors of electricity generation and distribution and in the distribution of natural gas. The company promoted the Manifesto "The Alliance for Circular Economy" signed on November 29th 2017 in Confindustria with Intesa Sanpaolo Bank. Its aim is speeding up the transition towards a circular model to increase the competitiveness of Italian industry at an international level. This Alliance can work in several areas, such as the identification and dissemination of Italian best practices on circularity; the implementation of criteria and approaches within

their activities; the development of common projects; the strengthening of the circular theme in the relationship with start – ups and research centres. The document was signed by famous Italian brands. Enel has created a specific area on its website to talk about circular economy (<u>https://corporate.enel.it/it/economia-circolare-futuro-sostenibile</u>). (Meini L, 2019)

• Hera Group is a national multiutilities that works mainly in the environmental, water and energy sectors. The company promoted SCART, an artistic project, born in 1998 in Tuscany to promote waste recycling. It utilises waste collected in the plants as raw material for the creation of new objects and artistic creations, such as clothes, toys, lamp, furniture, jewels. Many objects produced are used as scenography and costumes during festivals, concerts or in itinerant exhibitions.

2.2. Civil society

- Ethic Cash Mob is promoted by ANCC Coop, the Association of consumer cooperatives, and is an initiative that aims to measure the choice of products by the same consumers. Participating in Ethic Cash Mob means influencing the market offer, choosing the product of a company leader in social, environmental and fiscal sustainability. The purchase becomes a real vote in favour of the most virtuous companies; a concrete support to developing a sustainable market. Today more than 90 Ethic Cash Mob are active (Next Nuova Economia per tutti, nd).
- From 1994 Legambiente promotes the campaign **Comuni Ricicloni**: the annual initiative rewards municipalities who have obtained the optimal results in waste management. It considers the percentage of recycling and the purchase of goods and services which enhance the materials recovered form differentiated collection. From the 2016 edition of the initiative, the focus is on Free Waste Municipalities, considering the ability of management systems to contain and reduce the quantity of waste destinated to landfills and promotion of the best prevention policy (Comuni Ricicloni, nd).
- Symbola is a non-profit organization that networks personalities and associations belonging to economic, cultural and institutional sectors and civil society aimed at promoting new quality-oriented development. In partnership with companies and associations, From February 25th to March 1st, 2020 Symbola Foundation organises the Green Economy Festival in Trento to talk about themes on green economy. The meeting will focus on sustainable fashion, tourism, architecture, logistics, financial and agriculture (Symbola, nd).

2.3. Businesses, cooperatives and associations of companies

• **Confindustria** is the association representing manufacturing and service companies in Italy. It launches the competition to reward the most virtuous companies in terms of circularity. The initiative is part of the project Management and companies challenge of the Circular Economy. Its aim is to promote of sustainable production cycles and identify the best experience from the various sectors. With workshops and e-learning, Confindustria gives information and tools to develop new opportunities for Italian companies (Confindustria website, nd).

- Ecomondo is an international exhibition in Rimini with an innovative format that brings together all sectors of the circular economy in a single platform organized by Italian Exhibition Group Providing for the future. The 24th edition held from the 3rd to 6th of November, 2020; during the event the company will present new priorities in legislation and regulation, research and training in relation to circular economy, as well as new processes including 4.0 and products relating to its adoption in industry and cities. Also, attention on bio based industry, bioenergy and agri-food, blue growth and integrated water cycles (Ecomondo website, 2020).
- **Rifiuti Zero** is a training and information project that Eataly offers its employees and customers to promote recycling and the reuse of waste materials. This includes differentiated waste in stores, kitchens, warehouses and public spaces, as well as recycling initiative where organic waste is transformed into enriched soil and other waste materials become new object returning in circulation. Eataly uses biodegradable and compostable goods. Eataly is a store that introduces a new way of distributing high quality agricultural products, inspired by sustainability, responsibility and sharing (Symbola, nd).

3. Funding

- 3.1. Public sector
 - State funding is available for up to €247 million for research projects development in information and electronic communications technologies and €82 million in sustainable industry. A share of 20 % of total resources are devoted to research and development projects in the field of conversion of production processes into circular economies. Companies that carry out industrial activities to produce goods and services, agro industrial, artisan, transport research centres, start ups and sip off of research organisations can access funding (Ministerial Decree on August 2nd, 2019). The amount has increased with Ministerial Decree on February 6th, 2020 and it will last until the funds have been spent.
 - State funding, up to € 10 million in tax credits for companies that reuse the packaging returned by buyers within one month of the purchase of the goods (Decreto Crescita, Dl n. 34/2019).
 - Tax credit for companies and self employed who purchase semi finished or finished product made for around 75% of composition by recycling of waste, scrap or from the treatment of organic waste. This contribution ranges from a maximum of €10 thousand for businesses and a maximum of €5 thousandth for goods that are not intended for economic or professional activity (Decreto crescita, Dl n. 34/2019).

- Fund Macchinari Innovativi, up to €265 million for manufacturing companies in the regions of Basilicata, Calabria, Campania, Puglia and Sicily. This fund encourages technological and digital transformation into circular economy models through the purchase of machinery, plants and equipment strictly functional to the implementation of investment programs for 4.0 Companies and for the purchase of IT programs and licenses (Ministerial Decree on October 30th, 2019).
- The Marche region has published the call for proposal to grant local companies that carry out development projects aimed at reshaping production processes according to the logic of environmental improvement and circular economy based on the re-circulation of materials, goods and energy to promote economic and social growth of communities through a more efficient and sustainable use of resources. The Region has allocated a total amount of € 1,9 million and must concern one of the following thematic areas: 1. Reuse and recycling of composite materials and plastic materials; 2. Eco-design and new business model applied to the furniture and packaging sectors; 3. Treatment and enhancement of organic and inorganic waste; 4. Digitalization and industrial symbiosis approaches (DDPF n. 348 on December 11th, 2019).
- The Lombardy Region has published the call Circular economy Supply Chain Innovation to encourage the transition of small and medium sizes enterprises towards a circular economy model. The Region has allocated €1,64 million. The project must concern one of the following criteria: 1. Reuse and recycling of materials; 2. Eco-design according the Life Cycle Thinking approach.
- Invitalia is the National Agency for Inward Investment and Economic Development, owned by the Italian Ministry of Economy. It aspires to boost Italy's economic growth, focusing on strategic sectors for development and employment. Invitalia manages the Accelerathon Change! Which rewards 10 start ups that propose innovative projects about sustainable tourism and green economy for a total of € 100 thousand and gives support with specific services.
- Law n. 160 on December 27th, 2019 (Budget law 2020) contains the first disposition about European Green Deal. It has created a fund for public investments for 4, 24 billion of euro from 2020 to 2023. This fund is powered by the proceeds of CO₂ emission allowances and will be used to economically support projects with high environmental sustainability, circular economy, sustainable tourism, urban regeneration and decarbonisation. The fund can also be increased by other resources as *Fondo rotativo per il sostegno alle imprese e agli investimenti in ricerca* (FRI) or from green bonds issued by Italian State.

3.2. Civil society

- Welfare che impresa! is promoted by Fondazione Italiana Accenture, Fondazione Bracco, Fondazione Snam, Fondazione CON IL SUD and Ubi Banca. The call rewards the best social start up projects in different areas as social agriculture, services to the person and community welfare, circular economy to create new economics productions models. The project must generate social and employment impact, especially for young adults, create local networks and be replicable and economically sustainable. Its competitions will award the best four ideas for North, Central and Southern Italy; each of them receiving a cash prize of €20 thousand, a loan of up to € 50 thousand at 0% rate from the UBI Community line of non-profit entities, the programme for 4 months (Welfare che impresa website, nd).
- Circular Economy for a sustainable future is a call promoted by Cariplo Foundation on 2019. It intends to focus on a restricted number of projects for the productions and services innovation in one of the following areas: design and development of new material, products and processes fostering a shift towards innovative and sustainable organisation models; design and develop more efficient resource regeneration systems, including waste water mud depuration; foster use of organic and inorganic waste as well as their transformation in products characterized by high added value. The budget available for this call for proposal was 3.5 million euros (Fondazione Cariplo, 2019).

3.3. Businesses, cooperatives and association of companies

Although Italy exhibits excellences in circular economy, there are few funding opportunities, especially from the private sector, to encourage companies and organizations to invest in a sustainable economy.

The European Investment Bank launched a Join Initiative on Circular Economy to support the development and implementation of circular economy projects with **Cassa Depositi e Prestiti**, an Italian Investment bank. The amount is allocated to Fondo Investimenti per Abitare, a real estate fund for social housing, and innovative businesses plans from 2019 to 2023 (Cassa Depositi e Prestiti, 2019).

Banca Generali is a leading company in Italy in private banking that has launched its **Sustainable Revolution** by a series of new tools to create investment portfolios that focus on sensitivity related to Environmental, Social and Governance sphere in collaboration with families and experts. The banking institute make an accurate assessment regarding social-environmental impact of project before lending economic benefits. Companies, whose activities generate negative impacts from a social and environmental aspect, could be excluded from access to credit, while activities with positive impacts, accurately measured and reported, can benefit from privileged channels and conditions (Banca Generali Private, 2019).

4. Implementing the circular economy vision

4.1. Public sector

- The Municipality of Campi Bisenzio from 2013 worked to create the Civil Economy District, a permanent laboratory of participation and experimentation inspired by the principles of new economy capable of improving the quality of job, strengthening social life and the protecting of environment. To develop innovative responses to social, economic and environmental needs in the community, the District brings together institutions and civil society. During the first year, the team has studied actions, practices, processes that produce value for the community, territory, institutions and universities. These practices have civil, social, cultural and economic value and are actions that activate or improve common areas or goods, promote training and job opportunities especially for young people, and improve the relation between people and the environment. Indeed, the areas of study are community welfare, regeneration of community place and space, new energy models and circular economy, work, youth and training processes. The economy entity is the dominant and new actor in the process of community development started with the District. In 2016, the Municipality organised the first Festival of civil Economy to discuss about community welfare, civil jobs and business, socio – urban regeneration and new energetic models. The District promotes several projects in recycling and reuse of waste, as well as incentives for young business activities. After Campi Bisenzio experience, some other Municipalities such as Salerno, Pontecagnano, Caserta and Marcianise launched a "Civil economy district" in their territories (Festival Economia Civile, 2016).
- The Municipality of Milan from 2013 promotes development of shared or coworking workplaces, especially in peripheral areas. It has published a Qualified Coworking List which can be accessed through periodically published regulation. This list responds to the principles of the circular economy since it favours the form of collaborative or sharing economy activities as an alternative to property and exclusive consumption typical of the traditional economic model.
- The mayor of the Vallesaccarda Municipality, a small city in the Campania region, has promoted the project Agricoltura di Comunità that encourages recycling waste and supports typical local products: for every 5 litres of waste oil returned, the Municipality gives one litre of local oil; for every kilo of aluminium returned, the Municipality gives one kilo of local cheese or honey. The local products are bought using allowance for administrative activity that administrators voluntarily renounce. The project also included the creation of a public laboratory for the transformation of agri food products to serve the community. This site is used by companies especially in the experimental phase. In the case of constant and long lasting use of the laboratory, the Municipality can request

the company to donate part of its processed products to the local school lunch (mensa) (Comune di Vallesaccarda, 2015).

- The Municipality of Turin, with the funds of European project H2020 Urban Wins, has installed about 4 drinking fountains for water in public places, offices and schools. The Municipality is monitoring distribution of water and quantity of plastic bottles avoided, also giving reusable glasses for public office employees. This activity, supported by communication campaigns, aims at prevention and recycling of products related to water consumption. Within the project H2020 Urban Wins, guidelines are also being prepared, addressed to private operators, to incentivize the promotion and realization of cultural / recreational / sporting events according to sustainable / circular criteria. The action will be supported by an evaluation system which provides, on the degree of compliance with the criteria of the guidelines, the assignment to the promoter of the event of a useful score to receive an incentive in the form of discounts on space occupation, sweeping waste, energy consumption, etc (Urban wins, nd).
- the same European project H2020 Urban Wins is promoted by the Municipality of Albano Laziale, in Lazio Region. The Municipality encourages a transition towards a more efficient economy that refers to an optimal commitment of materials and produce value. It increases in the reuse of goods and products by citizens and public administrations. The municipality has set up a reuse and barter area in its Sunday farmer's market. This area is managed by associations already engaged in recycling or by interested private citizens. In addition, the Municipality has created a document for sustainable tourism through the involvement of main local players in the restaurant sector, tourist reception and representatives of other local authorities. The action provides for the assignment of a *Sustainable Tourism quality city of Albano Laziale* to those operators who carry out their activity according to the sustainability criteria contained in the document.
- the Municipality of Acquaviva delle Fonti, a city in the Puglia Region, promotes the Hair Bank project. Anyone who wants to can donate strands of hair that will be used to make wigs for women undergoing cancer treatment (Banca dei capelli, n.d.).
- the Municipality of Alessandria has realised a creative reuse area where local enterprises bring their waste products. Citizens, with an annual card, can take the products and give them new life. Workshops, training and creative moments, courses for adults and children are also organized within the area called **ReMix**. All activities have as main purposes those of recycling and reuse in order to contribute to promoting more sustainable lifestyles.
- the Municipality of Oristano has created "The 4R of Oristano: reduce, reuse, recycling and respect" project to invite local businesses to respect a set of guidelines

about better behaviour, such as selling bulk products or with environmentally friendly packaging, or selling goods produced respecting the environment and people in order to offer an ecological example to citizens. Shops are recognizable thanks to a sticker displayed on their windows as "Traders friends of the Environment". The initiative as a whole shows how trade can contribute to greater sustainability of the city and offer citizens savings and waste reduction opportunities.

• the Lazio Region and ENEA promoted the project DECORUM: DEmolition and Construction Recycling Unified Management. It's a platform to support the interaction of various actors who intervene in all phases of the life cycles in public work (clients, designers, construction managers, analysis laboratories and companies). The platform allowed the integrated management of various phases, improved environmental performance and management of sustainable and circular public works with significant effects on the management and improvement of processes, waste and the correct valorisation of resources (Il progetto DECORUM per il settore dell'edilizia, 2019).

4.1.1. Public companies

Enel is developing the Futur -e project. It's a program, inspired by the principles of the circular economy, for the conversion of 23 disused plants and a mining area. The plan, presented as a successful circular model, involves all stakeholders in the process and adopts a participatory approach with local communities to best meet their needs and promote the achievement of the 2030 Agenda for Sustainable Development Goals. For example, the Porto Tolle plant will become an innovative tourist, sports and agri–food centre for the local community.

Enel promotes Vehicle to Grid project that transforms e -cars into mobile batteries: cars take energy from homes' renewable systems and then transfer it to another structure that can be powered, guaranteeing an economic return to the donor (Meini L., 2019).

- Valori Ritrovati project is promoted by Poste Italiane in collaboration with the Caritas Roma Onlus Foundation to give new life to abandoned parcels instead of treating them as waste. The Post Office entrusts them to Caritas to help socially disadvantaged families. Caritas stores the goods received, taking care to select and allocate them to their best use, with the support of volunteers and Poste Italiane employees who join the corporate volunteering initiative.
- Ricreazione project: it's an environmental educational project promoted from Sei Toscana, a public and private owned company that manages the integrated municipal waste service in several provinces. The educational project has been performed since 2015 in primary and secondary schools and the aim of this is to reduce the negative impact on the environmental that is caused by waste and promote recycling of them. Educators

encourage personal and civil responsibility and promote the exchange of good practice in this regard, such as the correct methods of separate collection.

4.2. Civil society

- Panta Rei, from 1989, is an ecological village that sprawls on 162 hectares, built from the recovery of zootechnical and abandoned structures, respecting all the principles of green building: natural and environmentally friendly and recyclable materials in every construction phase and alternative energy sources. Straw, land and wooden reeds are transformed into bricks and other elements to build house. The village has applied the bio climatic principles by using insulating materials that save energy. Water comes from a phytodepuration system and rainwater collection. Part of the food for guests of the rural hospitality center comes from a vegetable garden. The entire center becomes a permanent laboratory for training architects and sustainable national and international development experts, as well as educational spaces for schools and associations. The ecovillage is built in the city of Passignano sul Trasimeno in the Umbria Region and it's managed by nonprofit association (Storie di Economia Circolare website, nd).
- BancoBuilding Onlus uses the innovative principle of circular economy to do charity. Since 2009 the Association has been an intermediary in operations that allow the donation and recovery of non – perishable goods for companies in the construction sector. Companies that donate these products optimize their warehouse and / or disposal costs, taking advantage of special tax legislation regarding the transfer of goods to non-profit organizations; the organizations and the beneficiaries pay only transport costs; the community limits consumption of resources, reduces their environmental impact and reduces the costs of services (Banco Building website, 2009).
- Solidary co housing was born by a Social Promotion Association of a group of citizens of Ferrara named Cohousing Solidaria. It's a model of co-housing oriented towards principles of solidarity, sharing, respect for the environment, decrease in consumption and intergenerational community formation based on active coexistence and mutual help. The property was built in 2015 according to green building criteria (largely recyclable waste, energy efficiency and rainwater recovery) and in the same year, the project won the "Green Building Solutions Awards" (Cohousing Solidaria website, 2008).
- The Regional Association Legambiente Basilicata Onlus created the Mobile Dishwasher. Three industrial dishwashers mounted on a container trailer equipped with dishes for an efficient onsite washing service during outdoor events. The aim is to reduce plastic waste production during food and wine festivals and promote sustainable local development based on the correct use of natural and environmental resources available.

• Ama, the citizens' association in Maddalena area, was born in 2012 among the inhabitants of the area to think about shared rules in public spaces. The knowledge and skills of each citizen are useful tools for carrying out concrete activities and starting a path of collaboration and revitalization for the area and improvement in the quality of life. Among the projects proposed by the Association, there is **Si Chiama Pietro**, a web portal to promote a lifestyle attentive to intelligent consumption. In fact, among the citizens of the area, objects that are not used daily are shared. Each makes something available to the other and the project also promotes the culture of reciprocity between neighbours who have the opportunity to get to know each other (Storie di Economia Circolare website, nd).

4.3. Businesses, cooperatives and association of companies

- Replant is a startup born from a researcher's group at Turin Polytechnic. The Company transfers technological knowledge and applied research in the field of sustainability to face climate change and create the sustainable communities. Replant transforms forest resources into an innovative perspective of participatory planning and networking, addressing local supply chains. It produces wood chips made with wood obtained from cleaning and management of public or private forests, capable of burning in large or medium sized boilers. The project creates a perfect participatory system in which local authorities, businesses and private landowners are actively involved in the management of a common good, such as forests (Replant, nd).
- The food sector is one of the first to have taken initiative in terms of sustainable development thanks to the advent of organic products and supply chain traceability. There are, in fact, many Circular Economy projects, including one promoted by Barilla, an Italian multinational food company, leading pasta producer, in collaboration with the Cartotecnica FAVINI company. The two companies started the CartaCrusca project aimed at recovering bran, (deriving from the grinding of wheat, barley, rye and other cereals that Barilla uses in its production processes), and in subsequent processing of bran, together with cellulose, make raw material for production of paper and new packaging (Favini website, nd).
- The textile sector has a strong impact on the environment and sustainable development. Companies try to find an alternative to materials to fossil-fuel and animal derived products to be used in the world of fashion and design. Orange Fiber is an Italian company that patented and produced sustainable textiles from citrus fruits. The goal is to create a sustainable fabric that responds to the need for innovation of fashion brands, reusing tons of by-product that the Italian citrus processing industry produces annually, destined to landfill with costs for the industry and the environment. In 2014 Orange Fiber

was established, based in Catania and Trentino with the first prototype composed of citrus acetate and silk in two variants, plain satin and lace, and almost a year later the first pilot plant for the extraction of citrus pulp. It launched a campaign of equity crowdfunding to optimize its industrial production process, increase production capacity and satisfy numerous requests from fashion brands. It produces citrus fruits textiles to famous brands such as H&M (premium collection) and Salvatore Ferragamo (Orange Fiber Collection) (Storie di Economia Circolare website).

- YouKoala.com was born on 2018 and is a unique sharing website that help people donate their used baby clothes. According to gender, date of birth and baby's height that parents request, the organisation will send a kit of clothes. It's possible to choose amongst three types depending on personal needs of the family: small contains 12 garments and costs €30,00, big contains 48 garments and costs €80. When a baby grows, the organisation provides garments of different sizes and the parents return the first pack received. Returned clothes are inspected, washed and disinfected for future. According to the Organisation, clothes are typically used 6 times and at end of their life donated to an ONG which uses them as padding for pillows or material in building. Anyone may take part in this exchange system, sending their almost new clothing to be evaluated. Each garment that is approved is assigned for credit that can be used to buy other items or plastic free products (Storie di Economia Circolare website).
- In the last few years, a new business model is developing which sees a company's product turned into a service. With this model products are not purchased but used by one or more users through a pay-per-use contract. In this business model, you don't pay for ownership but usage price (e.g. leasing, rental, performance agreement). Similar to how Michelin leases tires. Keeping full control of its tires, Michelin can withdraw them at any time when they are worn, thus extending through reconstruction or regrooving their resale (Rinnovabili.it, 2018).
- ESO Società Benefit provides office waste management and environmental consultancy in Opera, province of Milan. It organises two initiatives aimed at contributing to circular economy and promoting public awareness or regenerating materials. The first is Esosport Run aimed at collecting and recycling sporting footwear; the second is Esosport Bike aimed at bike shops, municipalities and bike sharing systems to collect, transport and treat used inner tubes and tires which can be recycled. Secondary raw materials are produced and donated to public administrations for the implementation of sport projects (Esosport, nd).
- The National Confederation Coldiretti and ENI signed on July 2019 a Memorandum of understanding that defines their collaboration areas in circular economy. The companies will examine projects about using agricultural biomass for the production of

advanced biofuels for the energy and bio – chemical sectors; the research and promotion of crops for the production of alternative charges for green refineries, more sustainable management of the end life products, reducing scraps and wastes in food and packaging as well as sustainable use of digital tools and renewable technologies. Finally, the companies will implement joint training and information initiatives on sustainable development issues as programs for the dissemination of knowledge of the principles of circular economy destinated at schools and universities, promoting collaboration with the main national and international research centres to implement the testing of innovative crops. Last but not least, they also promote rural development projects. Among the initiatives, Eni will supply fuels and lubricants for agricultural machinery with a low environmental impact biodegradable and formulated with raw materials from renewable sources to associates, consortia and subsidiaries of Coldiretti (Eni website, 2020).

Officina Casona is a social company formed by young people that works to promote integration, autonomy and inclusion at the local level. It develops sustainable projects addressed to young and foreign people in peripheral areas, including *ParalleloLab* that realises handicrafts by secondary raw materials, reducing the quantity of waste destinated to landfill. The cooperative recovers textiles and hides, bicycles and wood from public and private companies in the area. During workshops, that involve vulnerable people, products are made and sold online. The participants, now trained, can offer craft projects on request as well as communication and promotion of events for businesses. The social sector and handicrafts intertwine to weave a new circular economy scenario that give the possibility to work on social cohesion, inclusion, sustainable development and new job opportunities in local territories (Parallelo Lab website, nd).

5. Knowledge dissemination vehicles

5.1. Civil society

CDCA (Documentation Centre on Environmental Conflicts) and ECODOM (Italian Household Appliance Recovery and Recycling Consortium) founded a History of Circular Economy website that contains sections about practices on circular economy in Italy divided in different field, such as agriculture, business and markets, cosmetics, culture and sport, packaging, mobility, waste, clothes. The web platform is a tool to raise awareness, inform and document those who wish to direct their consumption responsibility. Every year, the web platform promotes a prize competition dedicated to virtuous circular economy stories. The competition is aimed at journalists, videomakers, photographers, writers and illustrators and aiming to promote environmental sustainability and new models of production that create benefits for the environment and society (Storie di Economia Circolare website, 2007).

- On November 19th, 2019 Legambiente presented the ECCO Project (*Economie Circolari di COmunità*) financed by the Ministry of Labour and Social Policy. The aims of the project are reducing wastes and promoting sustainable lifestyle in cities, but also reintegrating young people into the labour market through the acquisitions of new green skills. Activities will take place within Ri-hubs, 13 territorial change places where citizens, students, professors, associations and institutions are going to do pedagogical activities concerning sustainability and principles of circular economy. Legambiente created an e learning course about circular economy to teachers and professors of first and upper secondary schools. The course, that start on April 2020 and will finish on January 2021, is part of national project ECCO and improves environmental and social sustainability skills. The aim is to increase awareness and change lifestyles of students and improve teachers' skills to guide students towards some green professions in the civil economy (Legambiente website, 2019).
- Ecofesta Puglia is a certificate that attests the sustainability of organisations and development of events, parties and festivals. Ecofesta Puglia Certificate is an opportunity to raise awareness and information on green practice through waste separated activities and reduction of CO₂ emissions. The certification is granted to food and wine, sporting, cultural, music events which respect the specific criteria defined by a regulation, as using of biodegradable dishes, ecologic info points and adoption of electromechanical compost bins. The project was promoted by an association in 2011 and on 2012 it won the Smart Cities and Communities and Social Innovation funded by the Ministry of Instruction, University and Research (EcoFesta Puglia, nd).
- Since 2008, Fondazione per lo Sviluppo Sostenibile (Sustainable Development Foundation) involves 100 associated companies and 50 expert members in order to advance sustainable development and circularity. It works to build awareness and information on circular economy and efficient use of materials and waste management for both private and public bodies. It provides support and assistance for developing policies and programmes to implement circular resource management. It is part of circular economy group of *Italy's Stati Generali of Green Economy National Council*, and it has instituted a specific area of related activities, producing studies, research and stakeholder action. It produces dossier that provide an updated picture of recycling and waste recovery in Italy (Fondazione per lo Sviluppo Sostenibile, nd).
- Festival Diffuso, promoted by the Giacimenti Urbani Association, takes place in Lombardy and promotes information and laboratories every year between the months of November and December. Among the topics covered are good practices against the abuse of plastic, food safe workshops discussing the Agenda and the Sustainable Development Goals, the promotion of a barter system and the storytelling of circular economy. The aim

of the Association is developing a circuit of virtuous activities to connect people and promote a correct use of energy and the reduction of waste. The festival, in fact, promotes the culture of recycling and repairing objects (Giacimenti Urbani, 2019).

- Cresciamo circolare project: it's an educational project promoted from Adioconsum (Protection Consumers and Environment Association) for students in primary schools, who learn:
 - the basic concepts and strategies of a circular economy, such as recycling, reuse, design for repair;
 - to translate theorical concepts and definitions to practical actions and real life examples;
 - to stimulate reflection and encourage virtuous behaviour;
 - to increase a culture of solidarity and social activism (Adiconsum, 2020).

6. Knowledge and education

In Italy, Ministry of Education, University and Research signed protocols to carry out environmental and sustainable projects in primary, secondary and upper secondary schools to stimulate young people to adopt green lifestyles. Partners are Legambiente, WWF Italy Onlus, Pentapolis, Green Cross Italia, Earth Day Italia, Isola della sostenibilità, Giornalisti nell'erba, Ministry of the Environment, ENEA, Ferchimica. Some of these projects are mentioned in other paragraphs because promoted by non-profit associations or companies (Ministry of Education, University and Research, 2018).

6.1. Teaching

6.1.2. Public universities

The Italian public university system presents a wide range of curricula aimed at studying and deepening the Circular Economy in an academic manner, among these we can mention:

- The Engineering and Management (LM 31) master course, Padua University, promotes a specific course on Circular Economy: during the path drivers, enablers and barriers of circular economy and sustainability practices are evaluated, analysing the potential impact and implications for a company adopting circular economy, understanding and analysing technological cycles through the 6R framework, skilled on materials selection for engineering applications with particular reference to eco-design and issues linked to critical raw materials;
- **Turin University** has created a Thesis Lab in Innovation for the Circular Economy within master's degree in Environmental, Cultural and Territorial Economy. The Laboratory offers a stimulating opportunity to deepen the conceptual tools acquired for

understanding and analysing environmental problems related to the relevance of innovative dynamics for the emerging paradigm of the circular economy;

- The master's in economics management and Policies for Global Challenges (LM- 77), at Ferrara University, promotes a curriculum in Green Economy and Sustainability. The main topics of this course are eco – innovation, green economy and sustainable development;
- Siena University promotes a training course in Economy and civil innovation that examines actions, processes for the development on civic economy on the territory and develops instruments and methods for sustainable development;
- Sant'Anna School promotes a master's in environmental Sustainability Planning and Management. The program provides an interdisciplinary understanding of energy management from The United Nations Agenda 2030 and circular economy models. The master was the first program being started in Italy for waste management and recycling in 2007, but now includes both renewable and conventional energy;
- The Department of Economic Studies, University of studies G. D'Annunzio, has a subject on circular business models in the Environmental Management course (L-18). The path provides the skills for design and management of sustainable production processes;
- The Master of Science in Environmental and Development Economics, Romatre University provides classes about the sustainable management of economic activities, the promotion of processes of economic development, planning and valorisation of the territory, the development of new circular economy processes and spread of new green technologies;
- Tuscia University has a master's course in Circular Economy (LM 76), that aims at providing students with a series of innovative tools to work in a financial and environmental sustainability context. It has two curricula: the first, green economy, has a sustainable approach through a reduced use of traditional raw materials, new forms of energy, recovery and recycling; the second, blue economy explores the circular approach in maritime economy (tourism, nature, logistics, commerce);
- Federico II University has a post graduate Master course II Level in Bioeconomy in the Circular Economy (BIOCIRCE). It offers a highly advanced path for the training of professional figures in the circular economy sectors that are based on a responsible and sustainable use of biological resources and biotechnological processes.

6.1.2. Private universities

The Italian private university system has the curricula regarding Circular Economy in some courses, such as:

- Executive Master in Circular Economy Management, LUISS Business School: after the first part of the core course dedicated to its legal framework, one of three specialization courses is chosen between waste management, energy management and smart mobility management.
- Master in Green Management, Energy and Corporate Social Responsibility, Bocconi University, promotes skills in economics, regulatory and managerial aspects of environmental and energy issues.
- 6.2. Science and research

6.2.1. Public universities

Studies and research regarding circular economy have grown in recent years. Below we mention some examples:

- Verso un modello di Economia Circolare per l'Italia. Documento di inquadramento e di posizionamento strategico, 2017, is a public consultation document drawn up by the Ministry of the Environment and the Protection of the Territory and the Sea in collaboration with the Ministry of Economic Development. The document analyses the International, European and Italian framework, the principles and the circular economy goals. The Third capitol explains various new business models and the strategic role of design for companies. Last but not least, it presents some indicators on how to measure the circular economy (Ministero dell'Ambiente, 2017).
- The 2018 Lombardy Report, drawn up by Polis Lombardia (public institution under the supervision of Lombardy Region), is the second report that analysed the achievement of the United Nation's Sustainable Development Goals for 2030 in Lombardy Region: for each UN 2030 Goal, there is an indication of how Lombardy stands in relation to the 21 EU countries. The document is specifically designed to provide a benchmark for sustainability issues, offering policy that local entities and parties should adopt. The Circular Economy theme is addressed in relation to UN 12 Goal, Responsible consumption and production (Polis Lombardia, 2019).
- The University of Padua has set up the **Digital Manufacturing Laboratory** to study the evolution of Italian manufacturing after the introduction of digital technologies. The institution also promotes research on the adoption models of digital technologies and studies their impact on the company's strategy and business model. With Legambiente (Italian non-profit organization) they launched a study in 2018 on Italian companies that practice circular economy to investigate the profile and business model, analyze the reasons, results and critical issues, identifying the effects of the circular economy. 231 manufacturing companies participated in this research conducted by telephone survey (Di Maria E., De marchi V., Blasi S., Mancini M., 2018).

- The Center for Economics and Regulation of Services, Industry and Public Sector (CESISP) of the University of Bicocca carries out multidisciplinary analysis and research in the sectors of economics and industry, with attention to the circular economy. In fact, it carries out research to measure the urban circularity and assess the impact of environmental regulation, starting from a mapping of the citizen's proximity policies (CESISP, n.d.).
- The Universities of Ferrara and Bologna, ENEA and 5 local companies promoted the practical research Green Smart Technology for waste: System for processing and communicating water consumption to managers and users. It's a real time monitoring system of the water consumptions at user level, considering both the total amount of water consumed by the user and the amount of water consumed within the house at each device (tap, toilet flushing, shower, dishwasher, washing machine, etc). The monitoring system consist of a "kit" based on a single board computer device and a dedicated software architecture based on cloud database and an internet application able to collect with a five minutes frequency all water consumption data. The research improves the water distribution network management and promotes more aware water use and an alert system in case of indoor leakages (Green Smart Technology for Water, 2016).
- University of Bari Aldo Moro presented the project PECCEI (Euro Mediterranean Partnership for Circular Economy and Innovation) in September 2019. The project aims to carry out training interventions, research and the creation of three Knowledge for Sustainability HUB (KSH), information spaces and discussion about the theme for companies, young Italian and foreigners present on the territory of the Euro – Mediterranean Area.
- ECOCeo it's your business: is an interactive and engaging educational game for the classroom. It increases awareness and transfers knowledge about circular economy strategies and circular business models. It was developed in collaboration between the National Research Council (CNR, the largest public research institution in Italy under the Research Ministry), Tallinn University of Technology in Estonia, the Wuppertal Institute (it's a research institute aimed at developing models, strategies and instruments for transitions to a sustainable development) and Vito (European independent research and technology organization in the area of sustainable development). In Italy, the game is part of structured project for the upper secondary schools. During the game, students run an electronic company and they make decisions on resource management, production processes and model to apply. It shows the impact of linear and circular business strategies on the performance of a company and its resilience against external events, such as availability of resources. This activity teaches students about the opportunities of

circular strategies such as recycling, take – back systems, reuse, and repair (ECOCEOTM, 2018).

6.2.2. Private universities

- Circular Economy: connecting research, industry, and policy, promoted by Cattolica University and the Eni Foundation Enrico Mattei (Feem). The report published on May 2019 contains some strategies and initiatives regarding circular economy, both from the point of view of the legislation as well as an innovative contribution that circular economy gives to the economic system.
- CentoCè Project promoted by Luiss University, ENEA and Transition Italia Movement from 2016 to 2018 in s neighbourhood of Roma named Centocelle identifies some models of urban circular economy. The citizens of the neighbourhood have founded 14 actions in the area regarding civic agriculture (urban garden), coworking, km0 restaurants, second – hand markets, vegetable patches and drinking fountains free of charge (Centoc'è, verso la sostenibilità, 2016).

IV. The Netherlands

1. Rules

1.1. Decision making power in the country

The Dutch national government is a constitutional monarchy and parliamentary democracy consisting of a House of Representatives (Tweede Kamer) and Senate (Eerste Kamer) for the enactment of laws. The Netherlands consists of 355 municipalities, 12 provinces, 21 water boards and 29 environmental services (omgevingsdiensten). Waterboards are decentralized governing bodies responsible for the quality and quantity of water. The environmental services are concerned with granting permits, monitoring and enforcing environmental policy commissioned by municipalities and provinces. Provinces and municipalities are governing bodies with relative autonomy to carry out tasks within the prevailing legal framework and policy guidelines provided by the higher administrative layer (state > province > municipality). Within the responsibilities of the province are spatial planning, public transport, environmental management and supervision of municipalities and water boards. Municipalities are responsible for the provision of social services, housing, subsidies, the creation of zoning plans and the execution of the Law of Environmental Conservation (Wet Milieubeheer), among which the collection and processing of household waste.

1.2. National legal framework

- Netherlands Circular in 2050: On 14 September 2016, the Dutch national government launched the programme "Netherlands Circular in 2050" in order to provide guidance to the ongoing transition to a circular economy (I&W and EZ, 2016). The current Dutch economy is classified as a recycling economy, in which economic growth has been decoupled from waste production. However, the input of second-life materials to the economy amounts 8% (Potting et al., 2018). The overall ambition is to achieve a reduction of 50% primary resources (fossil, minerals, metals) by 2030, and a complete circular economy (CE) by the year 2050. Five priority industries have been identified based on environmental impact: (1) biomass and food, (2) plastics, (3) manufacturing, (4) construction and (5) consumer goods.
- Commodity Agreement: Given the different dynamics, stakeholders and legislation in each of these sectors, sector specific transition agendas are formulated with respect to CE. To each sector a transition team is assigned, consisting of representatives from governments, business and civil society. As a common start for the further development of these 5 transition agendas, 180 parties (both public and private) signed the Commodity Agreement (Grondstoffenakkoord) in January 2017. As of February 2019, this agreement has been signed by over 400 companies, NGOs, financial- and knowledge institutions.

Partners agree to further develop the transition agendas, concerning translation into projects, identification of knowledge gaps, societal impacts such as on the labor market and investment programmes. The Commodity Agreement is a declaration of intent and does not include legally binding agreements.

- Normalisation: The Dutch Normalisation Institute (NEN, corresponding to the European CEN) is active in 8 sectors to create standardized norms for circular definitions, products, processes and certificates. Each of these sectors along with recent developments are briefly listed here (NEN, 2020a):
 - Biomass and Food
 - STAR4BBI is creating a coherent regulatory framework for the bio-based industry
 - Commission on the use of algae in bio-based products and food
 - Quality requirements for the secondary use of fertilizers
 - Plastics
 - Quality standard for recycled plastics
 - Certificate for recycled content (TAFI)
 - Manufacturing
 - Commission "Material-efficiency in eco-design" (parallel to CEN commission JTC10), concerning norms on the R-strategies (see Appendix) for products
 - Commission NEC 111 (i.a. parallel to CEN commission CLC/TC 111X), concerning norms on electronic devices, ecodesign and material passports
 - Construction
 - Platform Building Circular in '23 (CB'23) to connect parties in the construction industry to arrive at industry-wide circular agreements in 2023
 - Norm NTA 8086 for the circular design of bridges
 - Consumer Goods
 - Workgroup for norm (NTA) on circular textiles. Expected mid 2020.
 - Development of a 'Mattress Label' to create insight in the structure and composition of mattresses
 - Healthcare
 - Green Deals (GD190 & GD226) to promote circular working in the healthcare sector and reduce drug residues in surface water
 - Connecting stakeholders in the Platform Sustainability & Medical instruments
 - Platform normalisation-agenda for healthcare concerning norms on the reuse of medical equipment
 - Circular Entrepreneurship
 - 'Innovation broker' to support entrepreneurs in standardisation related issues

- Commission Circular Economy to contribute to international ISO norm for the implementation of CE in all types of organisations
- Training and tools to support circular procurement under ISO 20400
- Space between Rules: the initiative "Space between Rules" (Ruimte in Regels) 2016-2019 creates space for experimentation of sustainable initiatives that are hampered by law and regulation. In existing policy, over 130 barriers have been identified that need to be replaced (Potting et al., 2018). The Ministry of Infrastructure & Water Management (I&W) assigned a taskforce (Taskforce Herijking Afvalstoffen) to present an independent advice on how to deal with these barriers in relation to circular economy. Two of the main barriers are highlighted here:

As soon as a material flow has been classified as waste according to the legal definition of waste, permits are required for the reuse of these materials.

The competition law (mededingingswet) is at odds with required collaboration in circular business models for the optimal reuse of waste streams.

Besides, the taskforce found that the majority of barriers are in the implementation of waste legislation. This is decentralized to provinces, municipalities and environmental services (omgevingsdiensten), resulting in interpretation differences. In turn, this leads to legal inequality and insecurity for businesses to scale up circular pilots. Recently, the Law of Space for Sustainable Initiatives (Wet Ruimte voor Duurzaamheidsinitiatieven) has been presented to the House of Representatives in order to overcome the barriers as mentioned above by providing a legal status to the agreements that are made between private parties in sustainable initiatives.

- National Waste Management Plan: on 28 December 2017, the third version of the National Waste Management Plan (LAP3) came into effect. In line with the European Waste Framework Directive, this policy framework is updated every 6 years under the Law of Environmental Conservation (Wet milieubeheer art. 1 & 10). It concerns all local governments in the collection, recycling, incineration, dumping and transportation of waste as well as licensing and monitoring guidelines for waste producing industries. The LAP 3 consists of 85 sector plans for different waste streams, including minimum standards for how each waste stream is to be processed. Compared to LAP2, LAP3 elaborates on the role of waste management in the transition to a CE.
- Extended Producer Responsibility (EPR) (Producentenverantwoordelijkheid): EPR holds producers and importers partially responsible for the waste that results from the products they bring to the Dutch market. Currently, EPR is in effect for 5 product categories: (1) electronic devices, (2) batteries, (3) car wrecks, (4) car tires and (5) packaging. The aim is to extent EPR to more product groups. Opportunities for EPR in textile, mattresses,

single use products and facades are currently being explored. Besides, rate differentiation is being implemented to encourage high-value reuse over downcycling.

1.3. Municipalities - 3 best practices

Municipalities are responsible for waste management in the Netherlands. In 2018, the municipal waste streams amounted to 554 kilograms per resident, of which 58% was separated at the source (CBS, 2019). 31% of the municipal waste streams had been reused, 27% composted, 25% incinerated with energy recovery and 1% dumped. 16% was separated after collection.

On 11 November 2016, a two-year Green Deal Circle City was signed by 9 municipalities, 3 ministries and 3 knowledge parties. A continuation of the deal (Circular City 2.0) is currently being explored. At the end of 2019, 24 Circle Cities were active with implementing CE. Partners agreed to stimulate supply and demand within the CE market by sharing experience on an online platform and implement at least 2 CE projects in their own municipality. Two of these municipalities are showcases here. As a third best practice, the municipality Horst aan de Maas is highlighted.

- The municipality of Almere has the ambition to become a city without waste, aiming for an amount of 50 kilograms residual waste per resident. Rather than just focusing on household waste, the municipality takes its responsibility as owner of all the material streams that become available in the maintenance of public space. On 11 January 2018, Almere organised the competition Upcycle City to create business cases for these streams. A circular concrete plant and a circular couch made for 70% out of local waste streams (plant waste and lime) came out as winners. In 2017, the Resource Collective Almere (GCA) was signed as a matchmaking platform for municipal waste stream and the coordination of circular projects. The GCA is currently signed by 40 partners. In order to showcase successful circular projects, the Upcycle Centre opened in the port of Almere in 2018. A modular building made out of demolition waste where circular entrepreneurs are located to demonstrate their upcycling activities to the public.
- The municipality of Haarlemmermeer is the first Dutch municipality to become a member of the CE100 platform of the Ellen MacArthur foundation. In their Sustainability Programme 2015-2018, the municipality Haarlemmermeer positions itself as *the* circular hotspot of the Netherlands (municipality Haarlemmermeer, 2015). Haarlemmermeer is developing a circular neighbourhood called Lincolnpark, covering an area of 32 hectares for approximately 850 houses. Buildings are designed as multifunctional and demountable material depots, provided with solar panels and without gas connection. Besides, there is the ambition to make the Schiphol Trade Park (STP) into the most sustainable business park of Western Europe. Although this ambition has not been

quantified yet, the park scores 4 out of 5 stars for BREEAM (Building Research Establishment Environmental Assessment Method).

The municipality of Horst aan de Maas is one of the leading municipalities in terms of waste collection and recycling. In 2018, the municipality collected an amount of 23 kilograms of residual waste per resident, well below the national goal of 100 kg (CBS, 2019). The recycling rate amounted 96%. This success can be explained by the implementation of the diftar-system (charging different rates per waste stream) in 2012. Before, these figures were 170 kg and 67% (Graaf, 2019). Residents of Horst aan de Maas pay an amount of €1,20 per bag for residual waste, which is collected once every two weeks. Recyclable waste streams are collected more often and are free of charge. Waste collectors control the waste bags and refuse the ones that are not separated properly. Bulky waste such as mattresses and furniture are collected on demand without additional charge. Besides, the municipality invested in a sophisticated network of public bins for the remaining waste streams such as diapers and garden waste. Nevertheless, the municipal waste charge remains below the national average.

2. Social norms

- Week of the Circular Economy: annual event (03.02-07.02 2020) initiated by the Netherlands Circular! Acceleration House (Nederland Circulair! Versnellingshuis). Throughout the country, more than 100 events are organised to expose the potential of the CE. Most promising initiatives are rewarded with the Circular Awards. The winners of 2020 are the province of North-Holland (category state) and Schijvens (category business) out of 121 submissions (Nederland Circulair!, 2020).
- Sustainable Tuesday: every first tuesday of September, the 'sustainable-tuesday-suitcase' including hundreds of sustainable ideas and initiatives is handed over to the Cabinet in the Hague since 2012. Last year, the suitcase contained 522 initiatives (82%) and ideas (18%), 44% of which were related to CE (Duurzame Dinsdag, 2020). Moreover, a sustainable ribbon is awarded and a sustainable speech is given by the number 1 of the Sustainable 100.
- Sustainable (Young) 100: newspaper Trouw presents an annual top 100 sustainable initiatives since 2008. The first 10 editions were devoted to sustainable scientists, politicians and businessmen. Last year, the Sustainable 100 was devoted to bottom-up initiatives and presented in a podcast (Trouw, 2019). The top 25 was announced at the Festival Trouw Duurzame 100 with 717 attendees (Pakhuis de Zwijger, 2019). Project agency SustainableMotion organises a similar overview (not a ranking) for young professionals and students: the Sustainable Young 100 (DJ100, 2020).

- National Recycle Week: public-private initiative since 2019 to promote recycling of electronic waste (E-waste). It includes an online tool (Heel Holland Recyclet) with information on how to dispose of E-waste (NVRD, 2019).
- Campaign "Appreciate it, Repair it": foundation SIRE stimulates consumers to repair consumer goods by advertising on television, radio and on posters. An online platform is hosted to inform on how to repair everyday products (SIRE, 2020).
- Campaign "Everybody does something": linking the CE- and climate transition, the national government promotes reuse and CO2 reduction among consumers by sharing stories and tools for consumers (Rijksoverheid, 2020).
- Circular Economy Festival: annual event with approximately 500 circular professionals from the public and private sector to raise awareness and discuss scale-up of circular business models (Euroforum, 2020).

3. Funding

3.1. State

- MIA (Environmental Investment Deduction) / Vamil (Arbitrary Depreciation Environmental Investment): MIA and Vamil provide fiscal exemption to investment in sustainable assets. In 2018, 182 assets qualified for MIA/VAMIL, of which 72 were related to CE. This amounted to a fiscal exemption of €43 million, corresponding to a total CE investment of €300 million. This amount has tripled of the course of 2015-2018 (RVO, 2020a). In 2020, the available budget for MIA/Vamil is €149 million (RVO, 2020b).
- WBSO (Promotion and Research Act): scheme to support innovation by the provision of tax benefits. In 2018, €1,4 billion of tax benefits were provided, of which €35,6 million was devoted to CE related projects (2.5%). Half of this budget belonged to research and consultancy firms, more than a quarter to the manufacturing industry (RVO, 2020). From these numbers a total of €230 million CE investment (public and private) can be extrapolated (RVO, 2020a).
- MIT (SME Innovation stimulation region and Topsectors): scheme to support SMEs with innovation by feasibility studies and technological development. To be eligible for MIT, the application must correspond to the innovation agenda of the top sectors. This includes CE. In 2018, the national budget for MIT was €56 million, of which €5.5 million (10%) was devoted to 112 CE projects. ²/₃ of the budget belonged to Biomass & Food, 20% to Manufacturing, 15% to Construction, 10% to Consumer Goods and 10% to Plastics (RVO, 2020a).
- PPS (Public-Private Collaboration): the national government makes an additional 30% budget available in the next year for every investment of the industry in PPS projects. In

2018, the total PPS budget was €133 million, of which €11.2 million (8%) was devoted to 24 CE projects. The budget mainly ended up at knowledge institutions for research on recycling scarce resources (RVO, 2020a).

- KIEM-CE (Knowledge Innovation Mapping Circular Economy): scheme to support explorative and practical research into CE. The total budget in 2019 is €520.000, with a maximum of €20.000 per application and €10.000 contribution (regieorgaan SIA, 2019).
- VFF (Early Stage Financing): loan for start-ups and SMEs to get from planning to introduction phase. In 2018, €6.3 million was committed to VFF, of which €0.7 million (9%) was devoted to 2 CE projects (RVO, 2020a).
- IK (Innovation Credit): loan to support promising technical innovation. In 2018, €55.3 million was committed to IK, of which €4.8 million (9%) was devoted to 3 CE projects (RVO, 2020a).
- Green Projects Scheme: scheme to reduce the interest rate on loans provided by green banks. In 2018, the scheme co-financed 1363 projects, of which 34 were related to CE. This corresponds to an amount of respectively €1.1 billion and €92 million (2.47%) (RVO, 2020a).
- Seed Capital: loan of maximum €6 million to a fund manager that invests at least an equal amount of private funds in startups. In 2018, the Seed Capital budget was €24.6 million, of which €11.95 million (49%) was devoted to CE projects. At the fund level, 33% was devoted to CE (RVO, 2020a).
- GO (Guarantee Corporate Financing): this instrument provides 50% state guarantees to private loans so that banks can lower their risk. In 2017, the state committed €91 million to GO, of which €17.5 million (19.27%) to 2 CE projects (RVO, 2020a).

For 2019-2020, an additional budget of \notin 84 million is made available with a call to decentralised governments and businesses to put forward circular projects that fit into the transition agendas (Rijksoverheid, 2019):

- €17.5 million for civil engineering (Literally: Ground, Roads and Waterworks: GWW);
- €22.5 million for recycling and application of bio-based plastics and textiles (eg. Plastic Pact and Dutch Circular Textile Vallies);
- €44 million for other circular projects with a focus on innovative start-ups and SMEs through the subsidy DEI+ Circular Economy. €10 million of this budget has been issued, €11 million is pending.

3.2. Private sector

Despite the wide array of state funding, financing is of major concern in the transition to CE. This is especially the case for startups. One study shows that 65% of the Dutch circular start ups face financing difficulties (Oliver Wyman, 2017). It is estimated that circular startups experience a

funding gap of 37% corresponding to \notin 150-200 million over the course of 2017-2022. The total supply of risk capital for circular startups in the Netherlands over this period is estimated at \notin 250- \notin 300 million. 20% of this is provided by state funding, 60% by venture capitalist, 15% through crowdfunding and the remaining 5% by own capital and an occasional angel investor. The platform *Social Enterprise NL* has created a finance tool that shows 29 financers, funds and crowdfunding platforms that have CE in their portfolios (Social Enterprise NL, 2020).

As for SMEs, the banking sector becomes one of the most important sources of financing (60% credite lines, 45% bank loans, 41% leasing) (Oliver Wyman, 2017). Although it has been found that the Netherlands has one of the highest rejection rates for bank loans in the EU, Dutch banks are collaborating to make financing for CE more accessible. In January 2016, three major Dutch banks (ING, Rabobank and ABN AMRO) signed an agreement to strengthen the financing of circular business models (MVO, 2016). Together the banks are members of the international consortium FinanCE Working Group connected to the Ellen MacArthur Foundation. In 2018, the banks introduced financing guidelines as a common framework to identify, select and finance circular business models (ING, 2018).

For corporates, funding is not of major concern in the transition to CE, given that they are highly bankable and have internal Research & Development budgets available (Oliver Wyman, 2017). A lack of willingness to engage in the CE transition is mostly due to absence of direct economic incentives. Institutional investors such as pension funds are increasingly investing in CE businesses and encouraging corporates to increase their circular ambition (SPIL, 2019).

In order to provide transparency and lower administrative costs associated with extensive collaboration in a circular business model, the Sustainable Finance Lab in collaboration with Circle Economy proposed the *Circular Service (CISE) platform* in April 2019. It incorporates new technologies such as DLT and cryptocurrencies to provide a decentralised digital administration system and facilitate circular ownership. A proof of concept has been run, but some technical and privacy issues still need to be resolved before CISE can be brought to the market (Achterberg, 2019).

4. Implementing the circular economy vision

4.1. State

Green Deals: since 2011, the national government has supported sustainable initiatives by making agreements with business, local governments, civil society organisations and other parties in Green Deals. The role of the national government in this regard is to create market incentives and leeway in restrictive regulation as well as to facilitate negotiations and network building. As of 2019, 227 Green Deals have been signed with 1785 participating parties, ranging from a wide variety of themes (water, biodiversity, mobility, construction, climate, energy, biobased economy, food, etc). Of these deals, 85 are related to the circular economy. In one of these deal the government takes an active role in implementing the CE:

- Circular Procurement 2.0 (GD223): signed by 30 public and private parties that start at least 2 circular procurement trajectories and share their experience in biennial Community of Practice meetings.
- Van Afval Naar Grondstof (VANG) / From waste to Resource: The VANG program has the goal to drastically reduce the amount of residual waste (non-recyclable) of citizens and businesses. It is divided into a programme for households (goal: 100 kg residual waste per citizen and 75% waste separation) and for businesses (goal: halving the 2 million tons of residual waste that are now released). Municipalities and industries are informed and parties are brought together to overcome barriers and create impact. An example is the realisation of 10 'Circular Craft Centers': one central point to go where waste is collected, reused, repaired or recycled (VANG, 2020).

4.2. Private sector

The overall resource usage of the Dutch economy is monitored along two indicators: (1) the Domestic Material Input (DMI) and the Raw Material Input (RMI)¹ (Potting et al., 2018). The DMI amounted to 314 billion kilograms in 2016, a 7% decrease relative to 2010. The RMI amounted to 614 billion kilograms, a 3% increase relative to 2010. About a third of the DMI originates from domestic extraction (predominantly natural gas, sand and gravel), with a 15% decrease over the course of 2010-2016. The Dutch economy relies heavily on export, using nearly two thirds of the material input for export products.

- Green Deals: for most of the Green Deals, the government plays a facilitating role whereas private parties are the actual implementers of the CE vision:
 - Circular Festivals (GD231): signed by 16 festival organisers to implement a roadmap to 100% circularity in 2050 along with tools for monitoring and behavior change of visitors

The circular economy in the Netherlands includes roughly 85,000 activities, accounting for 420,000 jobs (PBL, 2019). The majority of these activities are not considered as 'circular', but operate in the more traditional repair and refurbish domain (Figure 1). Examples of these are bicycle repair or platforms to sell second hand clothing and furniture.

¹ The DMI measures the sum of the domestic extraction of resources and the import of raw materials. Next to the direct input, the RMI also includes the input of resources for imported (semi-finished) products).

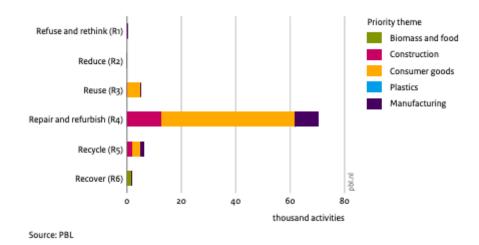


Figure 1. Circular acitivties per R strategy (2018)

The number of innovative circular initiatives lies around 1.500, consisting of three categories: products, technologies and business models. Examples of new circular products are the circular headphone (Gerrard Street) and the circular cell phone (Fairphone), of which damaged components can easily be replaced. The production of aromatics from biomass (Biorizon) and high-quality components for the food industry from orange peels (PeelPioneers) are examples of innovative technologies. New circular business models include product as a service (e.g. Gispen for furniture as a service), or paying a monthly subscription for a bicycle (Swapfiets) or lightning (Philips). The majority of these activities operate in the recycling domain (Figure 2). It has been recommended that more attention needs to be paid to high-ranked R-strategies (see Appendix) (PBL, 2019).

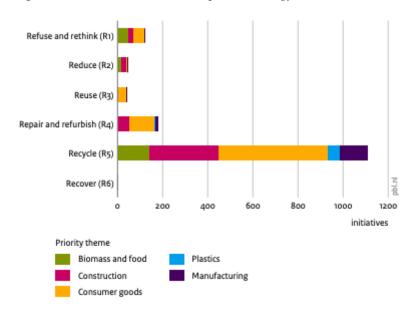


Figure 2. New circular activities per R-strategy (PBL, 2018)

5. Knowledge dissemination vehicles

Implementation programme CE: in order to promote action, the national government presents an annual Implementation program (*Uitvoeringsprogramma*) in which the transition agendas are translated into actions and projects for the period 2019-2023 (I&W and EZ, 2019). The publication of 2019 outlined over 200 actions and projects, half of which have already started (Potting et al., 2018). A large share of these actions are bottom-up initiatives and are mainly focussing on the back of the product chain, i.e. recycling and waste management.

One action in particular is worthy to mention here: the establishment of the Acceleration House Netherlands Circular (Versnellingshuis Nederland Circulair!). An initiative of the national government in close collaboration with the public-private platform Holland Circular Hotspot, with the goal to support circular entrepreneurs in terms of knowledge, finance and regulation. It hosts a matchmaking platform and organises awareness raising campaigns such as the Week of the Circular Economy and the Circular Awards. Every February, the involved parties discuss the progress during a National Conference Circular Economy.

- Circle Economy: NGO with the goal to accelerate the implementation of CE. Circle Economy hosts a Knowledge Hub, matchmaking platform for circular challenges and offers circularity assessment tools for governments and businesses. A number of programmes are run with more in-depth knowledge and services around specific themes (Circle Economy, 2020):
 - Textiles;
 - Finance;
 - Built Environment;
 - Cities & Regions;
 - Designs & Brands;
 - Circular Jobs Initiative.
- Circle: a circular pavilion created by the bank ABN AMRO to share acquired knowledge on the CE with the public and advise clients on circular entrepreneurship. It includes circular catering, a rooftop bar, a circular design store and space for sustainability related workshops and events (Circl, 2020).
- DuurzaamDoor: stakeholder platform and knowledge programme that brings stakeholders together around sustainability themes hosted by the government. CE is one of these themes that is also published on on the platform. A 'learning cycle CE' is hosted once a month to discuss how the CE can be realised (DuurzaamDoor, 2020).
- Milieu Centraal: one of the most prominent platforms for practical sustainability tips, advice and tools is Milieu Centraal (literally, Environment Central). Milieu Centraal is

active on Twitter, Facebook and Youtube and hosts a website with 2 million visitors annually. A knowledge base is maintained and fact-checked based on scientific and policy publications along with their own consumer research (Milieu Centraal, 2020)

- Dutch Normalisation Institute (NEN): Besides the setting of CE standards as described in section 1.2, the NEN is active in informing the public on the importance of CE. On a CE theme site, they share success stories and host a CE podcast (NEN, 2020b).
- Servicepoint Circular: every Dutch province has a Nature and Environment Federation that jointly developed the Servicepoint Circular where both citizens and entrepreneurs can go with their circular questions. It includes a catalog with circular products and services. Information on how to repair and separate waste for citizens and a local professional per province to support entrepreneurs (Servicepunt Circulair, 2020)
- TNO (Dutch Organisation for Applied Natural Sciences): Organisation with the goal to make knowledge applicable to governments and businesses. The CE is one of the focus areas of TNO, more specifically circular plastics, infrastructure and construction. A roadmap is created to outline the transition to a sustainable and circular society (TNO, 2020).
- Sustainable Finance Lab: informal network of academics established in 2011 with the goal to bridge theory and practice in the field of sustainable financing. SFL host a knowledge bank with over 200 publications, 11 of which have the subject CE (SFL, 2020).
- StartCirculair: a company that supports businesses and education with circular entrepreneurship. They organise in-house inspiration sessions and workshops on how to implement CE and deal with policy and financing. In a newsletter they inform about the leaders in the CE (StartCirculair, 2020).
- Next to general knowledge platforms, sector specific platforms are arising in priority sectors:
 - Dutch Green Building Council is a foundation with over 360 members (from building industry, financial- and knowledge institutions) to make the building sector future proof. Circularity is one of the key themes that is published on on the platform (DGBC, 2020).
 - LogiCE is a matchmaking and knowledge sharing online community (51 members) for the logistics industry in transition to CE hosted by Het Groene Brein (LogiCE, 2020).

6. Knowledge and education

Integration of CE in the curricula of all education levels (primary, secondary and higher education) has been incorporated in the Implementation Program CE of the national government (I&W and EZ, 2019). In section 4.1, some initiatives at primary and secondary education are

presented. The educational programmes for CE at higher education are listed in section 6.1.2. Section 6.2 includes developments in the field of scientific research on CE.

6.1. Teaching

6.1.1. Primary & Secondary Education

Cooperation Leren voor Morgen (Learning for Tomorrow) is a network of organisations that is committed to sustainable development in education. Leren voor Morgen offers a wide array of projects in all layers of education 'from toddler to professional'. The most striking initiative related to CE is the project Circular Skills which is aimed to bridge the gap between education and practice of circular building and construction In January this year, the first of a series of reports was published to explore the required skills in the transition to a circular construction industry (Coöperatie Leren voor Morgen, 2019).

The *Manifest 'Circular & Education'* was signed by 15 big educational institutions (from primary to universities, providing education to over 225.000 children and young adults) in the region of Amsterdam on 7 February 2019. By signing the manifest, the institutions pledge to incorporate CE in their curricula (Amsterdam Economic Board, 2019).

Ikcirculeer (literally: I circulearn) develops CE teaching programs for pre-vocational secondary education (VMBO)² since 2014. In 2018, the foundation circuLEREN (circuLEARN) was established with the goal to structurally incorporate CE in education (Ikcirculeer, 2020).

Technasia (95 technical-oriented high schools) includes practical CE cases from businesses and organisations in their curriculum. Startcirculair provides a training for teacher to support pupils in these projects (Startcirculair, 2020).

6.1.2. Higher Education

A total number of 106 educational programmes for CE in higher education³ institutions are identified here and listed below. This number is rapidly increasing. In 2015, only 9 educational programmes (1 master specialisation, 2 minors and 6 courses) were offered at these institutions (SustainableMotion, 2015).

² The Dutch system for secondary education is divided into three levels: pre-vocational education (VMBO), higher secondary education (HAVO) and pre-university education (VWO). VMBO is followed by vocational education (MBO), HAVO and VWO are followed by higher education (HBO & universities).

³ The Dutch system for higher education is divided into practical-oriented Higher Professional Education (HBO) and scientific-oriented Universities. HBO institutions are also referred to as Universities of Applied Sciences (UAS).

- 17 Educational programmes at Higher Professional Education (HBO) with CE as a core theme (Het Groene Brein, 2020)
 - Associate Degree Sustainable Business Administration at Aeres
 - Master Sustainable Reuse of Resources at Avans
 - Master Circular Economy at HAN
 - Minor Biobased Economy in the Agrifood Sector at HAS
 - Minor Circular Business (Transitions) at UAS The Hague
 - Minor Circular City at the UAS Utrecht
 - o 5 minors Circular Economy (at Fontys, HAN, HZ, Saxion, & Zuyd)
 - Minor Circular Plastics at NHL Stenden
 - Minor Circular Start-up at NHL Stenden
 - Minor Fieldlab Circular Economy and Business Innovation at UAS Rotterdam
 - Semester Circular and Social Design at UAS The Hague
 - Course Circular Production at UAS The Hague
 - Course Economic and Circular Controlling at HAN
- Besides, 30 educational programmes are offered at HBO-level with CE as a subtheme (Het Groene Brein, 2020). These include 11 bachelors, 2 master specialisation, 16 minors and 1 course.
- 36 Educational programmes at universities with CE as a core theme (Het Groene Brein, 2020):
 - Bachelor Circular Engineering at the University of Maastricht
 - Bachelor Design for Sustainability at the Technical University of Delft
 - Master Biobased Materials at the University of Maastricht
 - Master Biobased Sciences at the University of Wageningen
 - Master Biobased Chemistry and Technology at the University of Wageningen
 - Master Bio Inspired Innovation at the University of Utrecht
 - Master Circular Design in the Built Environment at the Technical University of Eindhoven
 - Master Corporate Sustainability at the University of Nijmegen
 - Master Industrial Ecology at the Technical University of Delft/University of Leiden
 - Master Sustainable Entrepreneurship at the University of Groningen
 - Minor Biobased Sciences at the University of Wageningen
 - Minor Seagriculture at the University of Wageningen
 - Course Biobased Economy at the University of Utrecht
 - Course Biobased Economy at the University of Wageningen
 - Course Biobased Materials in a Circular Economy at the Technical University of Delft
 - Course Bioeconomy at the University of Nijmegen

- 3 Courses Circular Economy (at the University of Amsterdam, Rotterdam & Wageningen)
- Course Circular Entrepreneurship: Co-creating the Circular Economy at the University of Wageningen
- Course Circular Economy: from Challenge to Opportunity (extracurricular) at the University of Leiden
- Course Circular Sustainable Business Development at the University of Twente
- Course Energy, Water and Nutrient Cycles in the Built Environment at the University of Wageningen
- Course Geo-Design for a Circular Economy in Urban Regions at the Technical University of Delft
- Course Green Business Models at the Technical University of Eindhoven
- Course Law, ICT and the Circular Economy at the University of Groningen
- Course Modelling of Biobased Production Systems at the University of Wageningen
- Course Project Sustainable Future at the University of Amsterdam
- Course Sustainability and Circularity in Civil Engineering at the University of Twente
- Course Sustainable Entrepreneurship at the University of Nijmegen
- Course Sustainable Entrepreneurship at the University of Tilburg
- Course Sustainability in a Circular Economy at the University of Leiden
- Course The Circular Economy LAB at the Free University of Amsterdam
- Course The Material City at the University of Leiden
- Course Towards Circular Product Design at the Technical University of Delft
- Course WEconomy: Exploring Transitional Business and Society Trends at the University of Nijmegen
- Besides, 23 educational programmes are offered at university level with CE as subtheme (Het Groene Brein, 2020). These include 8 master specialisations, 2 minors and 13 courses.
- MOOCs: 2 Dutch universities (Wageningen and Delft) provide a total of 14 circular economy MOOCs that are openly and freely available at edX (edX Inc., 2020).

6.2. Science and research

The research groups behind the above mentioned educational programmes have joined forces under the *Lecturer's Platform Circular Economy (LPCE)* in 2017. The community has 95 participants that share knowledge, engage in multidisciplinary research and support businesses with CE related questions. In March 2019, the platform published "*Circular Economy in Practice*" with success stories of 2 years of collaboration (LPCE, 2020).

The brain behind the LPCE is *Het Groene Brein*, a network organisation of 144 scientists in the field of sustainable development and CE since 2012. Het Groene Brein maintains interactive websites with 'knowledge and education cards' with the state of affairs regarding the CE transition in the Netherlands. Besides, Het Groene Brein is the initiator behind Leren voor Morgen, Nederland Circulair! and a research programme on sustainable business models (Het Groene Brein, 2020).

As the number of research(ers) on CE is growing, the number of collaboration platforms is growing as well. *The Centre of Expertise Circular Transition* was established in February 2020 by UAS Fontys with the ambition to be the knowledge hub for the CE and energy transition in the South of the Netherlands (Duurzaam-ondernemen.nl, 2019).

V. Portugal

1. Rules

1.1. Decision-making power in the country

The rules issued by international organisations, of which Portugal is a partner, enter directly into force in Portugal, provided that such is established in their respective constitutive treaties. Furthermore, the provisions of the treaties that govern the European Union and the rules issued by its institutions, in the exercise of their respective powers, are internally applicable, under the terms defined by European Union law (article 8, no. 3 and 4 of the Portuguese Constitution).

The legislative power in Portugal belongs to the National Assembly and the Government. On the one hand, the National Assembly may legislate regarding any matter, except certain topics which are reserved to the Government (article 161, c) of the Portuguese Constitution). On the other hand, the National Assembly also has an absolute reserve of legislative competence regarding certain issues, and a relative reserve of legislative competence regarding others - concerning the latter, the National Assembly may give the Government authorisation to legislate (articles 164, 165 and 198 of the Portuguese Constitution).

Mainland Portugal is divided politically into administrative regions, "municípios" - local councils - and "freguesias" - parishes (article 236 of the Portuguese Constitution). Although these forms of local government do not have legislative power, they have their own regulatory power within the limits of the Constitution, laws and regulations issued by authorities with supervisory powers (article 241 of the Portuguese Constitution).

The Portuguese autonomous regions - Madeira and Azores - have political-administrative statutes and self-governing bodies (article 6, no. 2 of the Portuguese Constitution): regional parliament and regional government (article 231 of the Portuguese Constitution). Both have legislative, regulatory and executive powers to deal with issues concerned directly with the regions, but cannot vote any decision or exercise powers which contradict the Constitution or general laws of the Portuguese Republic (articles 227 and 228 of the Portuguese Constitution).

1.2. National regulations

- Council of Ministers Resolution no. 100/2017, 11/07: adopting the National Environmental Education Strategy, which aims to establish a collaborative, strategic and cohesive commitment in the construction of environmental literacy in Portugal, leading to a civilizational paradigm shift, translated into sustainable conduct models in all dimensions of human activity, including the circular economy model.
- Council of Ministers Resolution no. 38/2016, 26/07: adopting the National Strategy for Ecological Public Procurement 2020, whose essential purpose is to constitute a

complementary instrument for environmental policies by promoting the reduction of pollution, lower consumption of natural resources and, by inherence, the increase in systems efficiency.

- Council of Ministers Resolution no. 113/2005, 06/06: adopting the National Program for the Efficient Use of Water - Bases and Guidelines, whose main objective is to promote the efficient use of water in Portugal, especially in the urban, agricultural and industrial sectors, contributing to the minimization of water scarcity risks and to the improvement of environmental conditions in water environments.
- Council of Ministers Resolution no. 11-C/2015, 16/03: adopting the National Waste Management Plan, aiming at promoting the prevention and management of waste integrated in the products life cycle, centered on a circular economy, thus guaranteeing greater efficiency in the use of natural resources.
- Order no 14202-B/2016, 25/11: creating the National Commission to Fight Against Food Waste whose mission is to promote the reduction of food waste through an integrated and multidisciplinary approach.
- Decree-Law no. 178/2006, 05/09: amid other rules and policies, it created the Waste Management Monitoring Commission - a technical support entity for the formulation, monitoring and evaluation of sustainable waste management policies, in particular of specific waste streams, aiming at a more efficient management of resources which promotes an effective transition from a linear to a circular economy.
- Decree-Law no. 42-A/2016, 12/08: creates the Environmental Fund in order to support environmental policies for the pursuit of sustainable development objectives, namely those related to climate change, water resources, waste and the conservation of nature and biodiversity, financing entities, activities or projects who meet certain goals, namely the transition to a circular economy.
- Decree-Law no. 119/2019, 21/08: establishing the national statutory scheme for the production of water for reuse, obtained from wastewater treatment, as well as from its use.
- Council of Ministers Resolution no. 190-A/2017: creates the Action Plan for the Circular Economy in Portugal, aiming to act at three levels: transversal and nationwide actions; sectoral agendas, especially for more resource-intensive and export-oriented sectors; regional agendas, to be adapted to the socio-economic specificities of each region.
- Council of Ministers Resolution no. 141/2018: promotes a more sustainable use of resources in Public Administration by reducing the consumption of paper and plastic products.
- Council of Ministers Resolution no. 107/2019: approves the Roadmap for Carbon Neutrality 2050 with the goal of exploring the feasibility of paths that lead to carbon

neutrality, identifying the main vectors of decarbonisation and estimating the reduction potential of the various sectors of the national economy.

- Law no. 76/2019, 02/09: Determines the non-use and non-availability of single-use plastic tableware in the restaurant and/or beverage sector and in the retail trade;
- Law no. 77/2019, 02/09: Providing alternatives to the use of ultralight plastic bags and plastic cuvettes at points of sale of bread, fruits and vegetables.
- 1.3. At the municipality level
 - Notice no. 20811-B/2019 of Lisbon Local Council, adopting the Lisbon Waste Management, Cleaning and Urban Hygiene Regulation, adding changes and innovations into the previous regulation, namely a ban on the sale of drinks in disposable plastic cups.
 - Porto Local Council has included sustainability criteria in all public procurement processes (namely, extension of environmental requirements to the supply chain; use of recycled materials; use of ecological raw materials and products; low energy consumption machinery; equipment and processes; use of products with low or zero levels of toxicity, pH, biodegradability, corrosion; use of energy sources that promote the reduction of carbon footprint; low noise machinery, equipment and processes) and has adopted a Code of Conduct enforceable to every service/product provider. Failure to comply with this Code can result in disqualification of the supplier and eventual contractual termination (Câmara Municipal do Porto, 2017).
 - Torres Vedras City Council adopted in 2014 the Sustainable Public Procurement Policy and the Code of Conduct for Suppliers. In order to encourage suppliers to adopt environmental and social concerns in the development of its products/services, the municipality of Torres Vedras undertakes to include environmental and social criteria, wherever possible, in all public procurement procedures (CCDR LVT, 2018).

2. Social norms

- 2.1. State and Public companies
 - "Tâmega e Sousa CIRCULAr" project, from the Shared Local Council Community of Tâmega and Sousa, aimed at stimulating local public entities, namely local authorities, local council companies and shared local-council entities to promote the circular economy. It has developed the manual "Circular Economy in Public Procurement", to support the local councils that are part of the Shared Local Council Community. This manual not only presents an "X-ray" of public procurement within this community, it is also an informative manual on the circular economy and the National Strategy for Ecological Public Procurement, in addition to giving indications on how to approach the

principles of circular economy criteria and procedures associated with public procurement, with practical examples (Ministério do Ambiente, 2020).

- The campaign "Educating for a Circular Economy 2019" from the municipality of Bragança, promotes educational activities and raises awareness regarding both the prevention and reduction of waste, as well as education for reuse and recycling (Câmara Municipal de Bragança, 2018).
- The one-minute TV-show "Minuto Verde" Green Minute broadcasted by RTP (Portugal's national Radio and Television), and produced by Quercus Portugal shares with the general public simple advice and/or good examples from an environmental point of view, at national and international level. Already with more than 3600 episodes broadcasted, the rubric achieved a notorious recognition by the public, being requested and used as an environmental education tool (Quercus, 2020).
- "Biosfera" Biosphere is a TV-show, in a format of a magazine, broadcasted by RTP (Portugal's national Radio and Television), that marks the Portuguese weekly environmental agenda, presenting sustainable paths (RTP, 2018).
- "Iniciativa Nacional Cidades Circulares (InC2)" National Initiative for Circular Cities (Direção Geral do Território, 2019) is a national collaborative network for the circular economy in an urban context, aiming to support and empower municipalities and their communities in the transition to the circular economy.
- "Educating for a Circular Economy" is an awareness campaign developed by Resíduos do Nordeste, a Shared Local Council Company, which comprises the advertisement and promotion of more environmentally friendly habits. 300 new ecopoints will be installed, betting on vehicles that use cleaner fuels to convey to citizens that it is necessary to embark on the process of recycling and separation of garbage in order to achieve ambitious goals. Citizens will be contacted by mail or email to join the campaign and receive a home composter: there are 700 to distribute. A community composter will also be created and a reinforced bet on the promotion of environmental habits, such as the use of reusable cups at parties and events, as well as the implementation of several education and awareness actions, with special focus on the first levels of the waste pyramid (prevention, reuse and recycling), in rural and urban environments (Resíduos do Nordeste, 2020).
- The project "EPAL Circular por Natureza" (EPAL Circular by nature) was developed by EPAL – Empresa Portuguesa das Águas Livres and comprises two different awareness programmes (EPAL, 2020):
 - "Aqui bebo Água da Torneira" (Here I drink from the tap) was developed in partnership with Zomato, and challenges restaurants in Lisbon to make tap water available to their

customers, raising awareness for a more sustainable consumption, as well as reducing the use of plastic bottles.

• "Chef's Circulares" (Circular Chefs) invited the well-known and inspiring Chef Chakall to give some ideas on how we can save and reuse water in the kitchen, what are the advantages of doing so and how to enjoy food in its entirety, thus eliminating the waste of resources.

2.2. Civil society

- The "Green Chef Project" by DECO (Portuguese Nonprofit Association for Consumer Protection) was a consumer education initiative aimed at schools, encouraging students to make culinary recipes using leftover food, in a contest format, and editing it in an ebook, with the aim of sensitizing young consumers to the importance of fighting waste and adopting responsible consumption behaviours (DECO, 2017). There were 4 editions, from 2014 to 2018.
- "Missão 360, Salvar a Terra é o nosso papel" Mission 360, Saving the Earth is our role

 is a pedagogical project for environmental awareness promoted by CELPA (Paper Industry Nonprofit Association), aimed at children from 2nd to 6th grade and their communities. Its main objectives are: promoting notions and principles related to the circular economy among children, their families and communities; showing these audiences the role of the paper industry as an example of good practices in the context of the circular economy (CELPA, 2019). This year (2019/2020) is its second edition, but there is still no information regarding future editions.
- The "MundON" project by DECOJovem (a program of consumer education promoted by DECO) encouraged young people as consumers to adopt more sustainable consumption behaviours, to reduce consumption, to make more responsible choices and to make more efficient use of natural resources. New generations are more sensitive to emerging environmental challenges such as climate change, over-exploitation of resources, but as consumers they need to be more aware of the collective and environmental impact of their individual consumption acts (DECOJovem, 2020). This project was a single edition in 2017/2018.
- The "EcoCasa" EcoHouse project was developed by Quercus Portugal and, in addition to the awareness and counselling component, it aims to present concrete solutions and modify behaviours and habits in the management, renovation or acquisition of a house. This project will soon also present four savings simulators: water efficiency (aims to find solutions for water saving), energy efficiency (aims to bring together more efficient consumption habits and household appliances), energy certification of buildings (useful for determining the energy class of each house) and waste management (by

defining the best options on waste, achieving at home what is called 'zero waste') (Quercus, 2019).

• "What is Circular Economy?" is a video produced by Sociedade Ponto Verde as part of an awareness campaign presented during the music festival Rock-in-Rio 2018. The video gives very practical examples regarding circular economy, such as the clothing production process and how we can implement measures that foster circular economy in this and other systems (O que é a Economia Circular?, 2018). Sociedade Ponto Verde facilitated the separation of packaging during said event so that everyone could better enjoy the music and all the animation (Influencers SPV - Rock in Rio Lisboa 2018, 2018).

2.3. Businesses, Cooperatives and Association of Companies

- "TransforMAR" (TransformSea) is a project developed by LIDL Portugal which aims to raise awareness on the importance of a more responsible behaviour towards plastic materials and the principles of circular economy. This initiative toured the beaches from the north to the south of the country in a major campaign of plastic waste collection, avoiding its final destination being the sea. Moreover, it also aims at transforming the plastic waste produced on beaches into physical activity circuit devices to equip the beaches themselves (LIDL, 2018).
- "Turma imbatível" (Unbeatable Class) is a project developed by LIDL Portugal in primary schools, with the goal of making children aware of the importance of adopting a sustainable lifestyle, raising awareness of a change in behaviour, seeking to encourage new and good habits more sustainable and responsible (ATM Edições e Publicidade, 2015).

3. Funding

3.1. State

- The Environmental Fund was created by Decree-Law no. 42-A/2016, 12/08, in order to support environmental policies for the pursuit of sustainable development objectives, namely those related to climate change, water resources, waste and the conservation of nature and biodiversity, financing entities, activities or projects who meet certain goals, namely the transition to a circular economy. It unfolds unto different funding initiatives, for example:
 - "CIRCULAr: startups" (Notice no. 7659/2019, 03/05): intends to support an entity that offers a circular economy acceleration program for the startup and business community. This acceleration program should focus on: startups that want to develop and scale business opportunities identified within the scope of the circular economy; and about companies that already exist, but want to develop/scale business opportunities within

the circular economy or adapt their product, service or business model to the circular economy model. Amount granted: $\notin 150.000$.

- Programa Sê-lo Verde 2019" Be Green/Green Stamp Program 2019 (Notice no. 3486/2019, 05/03): aims to encourage the adoption of environmental good practices innovative and with environmental, social and economic impact in major events, through the financing of policies and actions to be adopted through said events, including: encouraging the adoption of environmental criteria contributing to a reduction of impact and promoting the efficient use of material and energy resources; encouraging the adoption of innovative approaches, such as new technologies, integration of renewables, fostering a collaborative economy, ecological design; contributing to the education and environmental awareness of the groups involved promoters, brands, municipalities, spectators and adjacent local businesses. Amount granted: depending on the type of beneficiary, either €20.000 or €50.000 per application, up to the maximum amount of €600.000.
- "JUNTAr+ (Economia Circular em Freguesias)" JOIN+ (Circular Economy in Parishes) (Notice no. 6519/2019, 09/04): designed to support local circular economy solutions evidencing the associated economic, social and environmental benefits of such approach. Amount granted: €25.000 per application, up to the maximum amount of €1.000.000.
- " Re-Educa: Educar para uma economia circular" Re-Educate: Educating for a circular economy (Notice no. 4656-B/2019, 19/03): aims to promote Environmental Education operations (e.g., programs, projects, actions), encouraging its replication by other agents or regions and encouraging the creation of partnerships as a way to promote the circular economy. The operations should be aimed at citizens, namely schoolage youth, and the beneficiaries of the fund are direct, indirect and autonomous administration, state and local business sector, educational establishments, universities and polytechnic institutes, research centers, companies regardless of their legal form, associations and foundations, and non-governmental environmental organizations and similar.
- Decarbonized logistics and circular economy for traditional fresh markets (Notice no. 10310/2018): aims to value and promote fresh markets in urban centres as equipment flagships, structuring centres and inducers of good environmental and socially sustainable practices. Amount granted: €45.000 per application, up to the maximum amount of €900.000.
- Support for an incentive system for the return of non-reusable beverage plastic packaging (Notice no. 12599/2019): aims to fund the pilot project to test the incentive

system for the return of non-reusable beverage plastic packaging. Maximum amount granted: $\in 1.665.000$.

- The Innovation, Technology and Circular Economy Fund was created by Decree-Law no. 86-C/2016, 29/12, in order to support policies for the development of scientific and technological knowledge and its transformation into innovation; encouraging cooperation between Higher Education Institutions, technological interface hubs and Portuguese businesses; and training for a more efficient use of resources, preserving their usefulness and value throughout the production and use chain, namely through material and energy efficiency.
- "Vale Economia Circular" Circular Economy Voucher was created by Decree no. 57-A/2015, 27/02 (articles no. 40 to 58) in order to enable Portuguese companies to make a diagnosis and then develop an action plan for the implementation of management and growth models aligned with national and international strategies, with emphasis on circular economy (IAPMEI, I.P. - Agência para a Competitividade e Inovação, 2020). Amount granted: €7.500 per project.
- Portugal 2020" is a partnership agreement adopted between Portugal and the European Commission, establishing the policy of economic, social and territorial development in Portugal from 2014 to 2020. One of the four areas of the program regards Sustainability and Efficiency in the Use of Resources, for which 25% of the total budget (€6.259.000) has been allocated. Since the beginning of the program, and within the scope of the aforementioned area, around 100 Notices for tenders have been opened, meeting one or more of the following objectives: to move towards a low carbon economy; invest in the use of renewables, energy efficiency and smart grids; increase the capacity to adapt to climate change; protect the coast from erosion, reduce fires and prevent flooding; reduce and recycle waste and promote efficient water management (Agência para o Desenvolvimento e Coesão, I.P., 2020).
- "Casa Eficiente 2020" Efficient Home 2020 aims to provide loans on favourable terms for operations that promote the improvement of the environmental performance of private housing buildings, with a special focus on energy and water efficiency, as well as on urban waste management. From 2018 to 2021, the total financing amount of the Program is €200.000.000 (CPCI Confederação Portuguesa da Construção e do Imobiliário, 2018).
- "Jump" is a competition promoted by the local council of Vila Nova de Famalicão, in partnership with UPTEC Science and Technology Park of the University of Porto, that aims to reward start-ups with business models that promote the circularity of the economy, through new ideas, new solutions and services for industry, the city and citizens. The objective is to promote the development of an entrepreneurial culture in the

municipality, and installing new companies in the Famalicão Made In Incubator hubs, since the three projects with the highest score will be entitled to one year of free installation and access to the acceleration of the Famalicão Made In incubator. Monetary prizes will also be awarded: 5000 euros for the first place; 1500 euros for the second place and 1000 euros for the third place (UPTEC, 2020).

3.2. Civil society

Between 2008 and 2017, the Foundation for Science and Technology (Fundação para a Ciência e a Tecnologia - FCT) has awarded a total of 436 circular economy related research projects with a funding of €39.100.000 (5.2% of the total budget allocated to projects financed by FCT), showing a clear commitment to the creation of critical mass in this area and the promotion of competences in scientific and technological institutions. Furthermore, between 2008 and 2017, FCT funded 551 doctoral or postdoctoral grants, corresponding to a funding of around €30.200.000 representing 2.3% of the total grants awarded by FCT in all scientific areas. In terms of evolution, there is a gradual increase in the funding of scholarships within the scope of the circular economy, which has stabilized from 2010 until 2017 (Agência Nacional de Inovação, 2018).

3.3. Businesses, Cooperatives and Association of Companies

- "FITEC Credit Line Decarbonization and Circular Economy" is a credit line entered into between SPGM, Mutual Guarantee Societies (Agrogarante, Garval, Lisgarante and Norgarante) and several banking institutions active in Portugal, which aims to support the financing of projects in the energy efficiency and circular economy categories, namely by creating new economic opportunities that promote circularity, from redesigning processes, products and new business models to optimizing the use of resources, based on research, technological development and innovation (Ministério do Ambiente, 2020).
- "Circular Economy Award for Non-Business Institutions in Alentejo" is promoted by ADRAL and its aim is the dissemination and recognition of ideas, projects and initiatives in the area of sustainability and the circular economy, implemented or to be implemented in the Alentejo region, with an innovative and differentiating character. The prize is €1.500 (ADRAL, 2019).
- "Prémio Inov.ação Valorpneu" Valorpneu Innov.action Award aims to reward great "green ideas", new services, products or technologies related to used tires or its byproducts resulting from recycling. There are two prizes: €25.000 and €10.000 (Valorpneu, 2020).

4. Implementing the circular economy vision

- 4.1. State and Public companies
 - "From expired bank cards to urban furniture", a project developed by Caixa Geral de Depósitos, developed a recycling circuit for expired or damaged cards. Thanks to this initiative, bank cards (expired or at the end of their service lives) and non-bank cards (for example, loyalty cards made of plastic), can be valued through plastic recycling. The PVC waste resulting from the destruction of these cards is used in the manufacture of urban furniture items for the community made from 100% recycled plastic (Caixa Geral de Depósitos, 2020).
 - LIPOR Shared Local Council Community Waste Management of Greater Porto is responsible for the management, recovery and treatment of the Local Council Waste produced in the eight associated municipalities. Based on modern MW management concepts that stand for the implementation of integrated systems and reduction of waste disposal in landfills, Lipor has developed an integrated strategy for the recovery, treatment and confinement of MW, based on three main areas: Multi-material Recovery, Organic Recovery and Energy Recovery, which are complemented by a Landfill where rejected and previously prepared waste is sent to (Lipor, 2020).
 - The "Dose Certa nos Eventos" Right Portions in Events is a project by LIPOR, aiming to work with catering services to define measures to reduce food waste, waste production (seasonal/season products, national, biodegradable packaging) and provide for the donation of surplus food of LIPOR's events to a charity. During the first half of 2018, LIPOR organized 10 events, putting in practice the "Right Portions in Events" methodology: about 146 kg of food were sent for donation (Lipor, 2020).
 - Guimarães Local Council is sending firewood resulting from the transformation of "green waste" from pruning and deforestation of paths to the heating boilers of 11 schools, pursuing a circular economy strategy and reuse of materials. The initiative started in 2016 and annually distributes more than 38 tons of firewood, which previously would go unused to a landfill (Bomdia a.s.b.l., 2001).
 - EPAL Empresa Portuguesa das Águas Livres, through its project "Circular Design/EPAL Circular by nature", aims to partner up with social solidarity institutions that develop eco-design products, in order to deliver their surplus or expired materials, for example, papers, cards, stationary, leaflets, billboards, defective Fill Forever bottles, among others, so that they can be transformed into objects that will become their eco-friendly merchandising (EPAL, 2020).
 - Tomar City Council launched a pioneering project of intelligent street lighting for total replacement of luminaries with the placement of 13,772 LED lamps over six months in its eleven parishes. The project will also have an innovative system which allows real

time communication and monitoring in a network: in the event of a fault in a light fixture, it automatically alerts the municipality's picket for its maintenance or repair (O Mirante, 2019).

Wastewater Reuse for the cleaning of public spaces is an initiative adopted by Cascais City Council. About 9,000 m3/year of treated water are reused in 42 washing circuits with different frequencies, weekly, bi-weekly and monthly, according to the specific washing needs of the public spaces. This practice has made possible a 50% reduction in the costs of the water tariff for consumption. The aim in the short term will be to increase the reuse of treated water in the washing of urban waste containers throughout the municipality of Cascais (CCDR LVT, 2018).

4.2. Civil society

- The "ShareToy" project, developed by students from the Department of Electronics, Telecommunications and Informatics at the University of Aveiro, aims to collect toys, with good or damaged electronic components, to be fixed and then donated to charity institutions (Universidade de Aveiro, 2019).
- Maria Granel store is the first "zero waste store" in Portugal, and one of the pioneers in Europe and the world, to dispense with packaging and sell exclusively in bulk. It aims to provide everyone with top quality, nutritious and organic food, promoting healthy eating and responsible and conscious consumption, which contributes to the reduction of waste and, as such, to the sustainability of the planet (Maria Granel, 2020).
- "Troca-te!" is an initiative by Teresa Simões and Adriana Fernandes which involves quality second-hand article exchange events (clothes, accessories, books, music, films, toys, etc.) and has been, since 2011, promoting the circular economy for a more sustainable lifestyle (Simões & Fernandes, 2011).
- In Lisbon, the Circular Economy Portugal platform, in collaboration with FabLab Lisbon and volunteers from AltLab and ReFaz, has been organizing Repair Cafes on a regular basis, including one dedicated to textiles, Re:Sewing, which in addition to enabling the repair of clothing items, also allows an upcycling with the help of designers and seamstresses (Ministério do Ambiente, 2017).
- 4.3. Businesses, cooperatives and association of companies
 - "Vintage for a cause" is a Portuguese fashion brand whose mission is to make affordable, ethical and sustainability clothing inspired in vintage styles. The design process begins with the selection of fabrics rescued from raw materials, a reduction in water consumption and CO2 emissions (Vintage for a cause, 2019).
 - "Kitchen Dates" is a restaurant which functions within these three principles: zero waste; circular economy; truly local. Everything that comes through the door has one of three

possible destinations: it is 1) consumed, 2) reused or 3) transformed into compost by an electric composter that transforms organic matter into compost in 24 hours - which is then delivered to the small producers with whom the restaurant works (Kitchen Dates, 2020).

- Eco2Blocks is a start-up company whose mission is to develop and produce sustainable building materials with high performance, low cost and based on industrial waste. As so, it develops and produces construction materials, always aiming at the principles of circular economy. Products consist of industrial waste, non-potable water and carbon dioxide (Eco2Blocks, 2016).
- SKREI is a firm of architects, engineers, artisans and technical specialists who believe there is much to improve in the ways we craft our cities and ecosystems. In this firm, project design, building construction, and applied materials research combine into an experimental practice where overarching notions of the human body and ecology are weighted against the specifics of local culture and resources. Skrei is currently pioneering the first normalized hempcrete building in Portugal and is architect to several experimental agricultural enterprises (SKREI, 2020).
- SECIL uses by-products from other industries in order to produce cement. Recycling demolition waste from buildings and infrastructure is a way to reduce the use of new aggregates by lowering the environmental costs of operation and transport and the amount of waste to be landfilled. In a circular economy logic, SECIL also uses by-products from other industries, such as cork, to manufacture, for example, mortars and light concrete with cork. In recent years SECIL has been investing heavily to reduce its CO2 emissions by increasing its thermal and electrical efficiency, increasing co-processing of alternative fuels, using secondary raw materials and testing innovative technologies for carbon capture (microalgae) and low carbon cement and clinker production (Secil, 2016).
- Optimising the use and consumption of cork throughout the production cycle is one of Corticeira Amorim's recommended sustainability strategies. By-products generated during the production process of cork stoppers, or cork that does not have adequate characteristics for its production, are incorporated into other high value-added applications. The part that cannot be incorporated into products is valued as an energy source, biomass, neutral in terms of CO2 emissions. There is therefore no waste or residues of cork - nothing is lost, everything is valued (Amorim, 2015).

5. Knowledge dissemination vehicles

- The National COTEC Innovation Meeting: in 2016 the theme of this annual meeting was "Exploring the Circular Economy" (COTEC Portugal, 2020).
- "Smart Waste Portugal 2019 a Circular Future" is a website and conferences developed by Smart Waste Portugal - Business Development Network, a non-profit association,

whose mission is to create a national platform, involving all players in the sector, promoting and valuing waste as an economic and social resource, creating conditions to the competitive acting across the value chain through a collaborative approach, promoting innovation, research, development and implementation solutions. SWP Association intends to join the movement to boost Portugal competitiveness, based on a circular economy, by identifying and contributing to create new business and innovation opportunities as well as new business models and more efficient production and consumption forms (Smart Waste Portugal, 2015).

- "É p'ra Amanhã" ("It's for tomorrow") is a documentary series that presents initiatives in Portugal in key areas of sustainability. Inspired by the French documentary "Demain", it sets out on a journey to meet the people and initiatives in Portugal who work daily to build a more sustainable future (Circular Economy Portugal, 2018).
- JEAmbi Environmental Engineering Sessions 2020 is the main event of the Environmental Engineering Students Nucleus of the Instituto Superior Técnico of the University of Lisbon. The 11th edition of JEAmbi will be two days long, with conferences on current and relevant topics such as the Circular Economy, Sustainable Production, the Influence of the Environment on Health and the Energy Transition (Instituto Superior Técnico, 2020).
- Business Council for Sustainable Development (BCSD) Portugal is a non-profit company-based association that aggregates and represents more than 90 leading businesses in Portugal, which are actively committed to the transition to a sustainable world. Its mission is to encourage and support members in their journey towards sustainability, inspiring them to build competitive, innovative and sustainable organizations and business models at the Environmental, Social and Economic/Governance levels; and to contribute to the development of public policies and to the awareness of Portuguese society, accelerating the sustainable development of Portugal (BCSD Portugal, 2020).
- Open Innovation in Portugal is an annual conference organised by the National Innovation Agency. In 2020, the theme of this conference was "Circular Economy and Sustainability of Territories through Open Innovation" (Agência Nacional de Inovação, 2020).
- "Eco.nomia" Eco.nomy is a website creating a space for sharing knowledge. On the one hand, disseminating the advantages and opportunities of financing to consumers and companies, and, on the other, launching an interactive forum for collaborative investment projects in Circular Economy (Ministério do Ambiente, 2020).
- Environmental Seminars presented by the Local Council of Fornos de Algodres. In 2020, the subject of this Seminar is the excessive use of plastic, its effects on the planet and

ways to reduce its use. The initiative aims to involve the residents of Fornos de Algodres, science students, other municipalities, teachers and all those with responsibilities for education or planning of political strategies (Câmara Municipal de Fornos de Algodres, 2020).

- Conference "Transition to the Circular Economy in the Water Sector" developed by IAPMEI - Agency for Competitiveness and Innovation (APDA, 2020).
- Circular Economy Conference Thinking about the future in a circular way, developed by Sociedade Ponto Verde (ATM – Edições e Publicidade, 2015).
- "Vida Lixo Zero" (Life Zero Waste) is a book, written by Ana Milhazes, describing how to live in a simple, sustainable and happy way. In this inspiring book, and starting from her own example, Ana Milhazes shows us how we can be happier with less and gives us tips to facilitate and transform our lives: from sustainable consumption to technology, means of transportation, home organization and cleaning, hygiene, zero kitchen waste and economy of sharing. The author also addresses the social challenges, the myths surrounding sustainability and shares some ideas for the future. This book is made of recycled paper and without plasticization (Wook, 2020).
- "Plasticus maritimus" is a facebook page regarding aiming to inform and educate about the serious problem of the plastic in the oceans (Plasticus Maritimus, 2018).

6. Knowledge and education

6.1. Teaching

- Postgraduate degree in Circular Economy Environment as a Sustainability Factor, Lusófona University (Universidade Lusófona, 2019).
- Postgraduate degree in Local Sustainability: Main Instruments and Practices, University of Coimbra (Universidade de Coimbra, 2020).
- Continuing Training Unit in Circular Economy, Faculty of Economics of the University of Porto, developing the following themes: Introduction to Circular Economy; Management Theories and Models; Technology and Innovation; Applied Circular Economy (Faculdade de Economia da Universidade do Porto, 2017).
- Continuing Training Unit in Waste Prevention and Circular Economy, University of Coimbra, developing the following subjects: integrated waste management; European Union and national waste legislation and policies; waste prevention, reduction and reuse; how to implement waste prevention programs, in order to achieve the new European Union goals; application of circular economy in waste prevention, practical examples (Universidade de Coimbra, 2020).
- Fundamentals of Circular Economy, a subject of the Bachelor Degree in Environmental Engineering, Lusófona University (Universidade Lusófona, 2019).

- Product Design in Circular Economy, a subject of the Bachelor Degree in Design, University of Aveiro developing the following themes: sustainability and circular economy; life cycle thinking; industrial ecology and symbiosis; integration and optimization of processes, materials and energy; recycling and waste recovery processes; specific legislation on circular economy; design for the circular economy; business models for slowing, closing and narrowing loops; the bases for value creation: the power of inner circle – circling longer – cascade use – pure circles. (Universidade de Aveiro, 2019).
- Recycling and Waste Recovery, a subject of PhD programmes in Sciences and Materials Engineering, University of Coimbra, developing the following themes: waste sources; factors that characterize the hazard of waste; waste management in a community without internal borders; unit operations in the processing of secondary metals; physical separation methods; processing of fragmented metallic waste, shredders and nonmagnetic processing; processing of solid urban waste; processing of industrial effluents for the recovery of water for industrial processes, raw materials and secondary products; bio refinery in the cellulose industry and in the agro-food industries (Universidade de Coimbra, 2020).
- Materials and Recycling, a subject of the Master's Degree in Environmental Technologies, University of Coimbra, developing the following themes: material knowledge for true environmental engineering; material properties and in-service performance of components / devices / systems; fundamentals of materials science and engineering; types of materials of industrial interest; metal alloys; thermal treatments; recycling and property limitations; ceramics and glass - types: traditional and technical; processing; exceptional properties of ceramic materials; types of glass; processing; ceramics and recycling: processing and properties; ceramics as a waste receiver; glass and recycling; polymers - types; properties; applications versus glass transition and melting temperatures; composites; nanomaterials (Universidade de Coimbra, 2020).
- Circular Construction, Conscious Design and Certification, a subject of the Master's Degree in Architecture, Faculty of Architecture of the University of Porto, developing the following themes: circular economy and circular construction; biomimetics, or the lessons of nature; the lessons of vernacular architecture; hygiene, health, comfort, and economy; natural materials, earth, wood, and other vegetal materials; life cycle analysis; design for deconstruction; building maintenance and conservation; building rehabilitation and reuse; environmental and energy certification; the role of technology and innovation; social equity and built environment (Faculdade de Arquitetura da Universidade do Porto, 1996).

- Environmental management in organizations, a subject of the Bachelor Degree in Environmental Sciences, University of Trás-os-Montes and Alto Douro, developing the following themes: strategic planning in organizations, mission, vision, objectives, performance evaluation and sustainable development in organizations; evaluation and communication of sustainability; methodologies for environmental performance assessment, evaluation of eco-efficiency, environmental benchmarking, communication strategies of environmental performance, sustainability reports; eco-entrepreneurship and eco-innovation; green economy and markets for environmental goods and services, ecoindustry, eco-business, key aspects for the definition and development of innovative products and services and the differentiation of organizations (Universidade de Trás-os-Montes e Alto Douro, 2002).
- Industry 4.0 and Circular Economy, a subject of the Postgraduate degree in Digital Transformation for Industry 4.0, Information Management School of the NOVA University of Lisbon (NOVA Information Management School, 2020).
- Environmental sustainability for businesses, a subject of the Bachelor Degrees in Economics, Finances, Management and Applied Mathematics for Economics and Management, Lisbon School of Economics and Management, University of Lisbon, developing the following themes: global concepts of sustainability and environment useful for businesses; national and international reference policies and regulations; introduction to environmental sustainability tools; case studies of environmental and sustainable intervention areas in companies (ISEG, 2020).
- Ethics, Corporate Responsibility and Sustainability, a subject of the Master's Degrees in Business Management, University Institute of Lisbon, developing the following themes: basic terminology and the need for this curriculum; business ethics; sustainability, circular economy and the sustainable development goals; strategic corporate social responsibility; the future: our role and commitment (ISCTE - Instituto Universitário de Lisboa, 2020).
- Circular Economy and Sustainability, a subject of the Bachelor Degree in Bioanalytical Technologies, Polytechnic Institute of Beja, developing the following themes: know the concept of circular economy and national and European legislation; evaluation of the physical-chemical composition of natural and secondary raw materials in order to evaluate the potential application of these raw materials in the context of a circular economy; importance of quality control in the context of the circular economy (Instituto Politécnico de Beja, 2016).
- Training of teachers in Sustainable Consumption promoted by DECO. Through these
 actions it was possible to transmit informative contents on sustainable consumption and

present the didactic materials created for the development of environmental and consumer education activities in the classroom (DECOJovem, 2020).

- 6.2. Science and research
 - "Alentejo Circular" research project is a partnership between ISQ and the University of Évora. This project aims to raise awareness and mobilize the economic agents of the olive oil, wine and pig farming sectors of Alentejo to adopt the circular economy model, seeking to promote interest and awareness of this issue, taking a first approach to the barriers and opportunities identified and establishing the basic conditions for the future implementation of circular economy projects in the referred economic sectors (Universidade de Évora, 2016).
 - The thematic agenda for research and innovation Circular Economy was developed by the Foundation for Science and Technology (FCT) in order to identify scientific research and innovation challenges and opportunities, and framing the activity of creating and valuing knowledge with a benchmark of sustainable development, in a medium/long term perspective until 2030 (Fundação para a Ciência e Tecnologia, 2019).
 - From 2008 to 2017 there were 1.792 ongoing research projects on the Circular Economy theme in Portugal. The five main technological areas of such projects are (in decreasing order of magnitude): Information and communication technologies; Materials technology; Chemical engineering; Agricultural and food technologies; Mechanical Engineering (Agência Nacional de Inovação, 2018).

VI. Spain

1. Rules

1.1. Decision making power in the country

Spain is a decentralized unitary state, formed by 17 autonomous communities ("comunidades autónomas") and two autonomous cities, that are first level political and administrative divisions governed according to the constitution and their own organic laws (Statutes of Autonomy). It is a civil law system is based on comprehensive legal codes and laws rooted in Roman Law. Civil law is applied throughout the entire territory of Spain, but the autonomous communities have their own civil law system.

The sources of Spanish law are statutes, custom and general legal principles.

Spain and its autonomous communities are also divided into 50 provinces, electoral districts for these national elections, with their own provincial councils and these are subdivided into municipalities. Each municipality is a corporation with an independent legal personality, "ayuntamiento". Municipalities enjoy a large degree of autonomy in their local affairs.

1.2. National legal framework

- At a national level, the Government is elaborating the **Spanish Strategy of Circular Economy**, in order to promote the transition towards a more sustainable model. The strategy is led and coordinated by the Ministry of Agriculture, Fisheries, Food and Environment, and the Ministry of Economy, Industry and Competitiveness, in collaboration with the rest of the ministries involved, autonomous communities and the Spanish Federation of Municipalities and Provinces (FEMP).
- The Ministry of Agriculture and Fisheries, Food and Environment published (18th September 2017) a Pact for a Circular Economy (Miteco, 2016), this was signed by over 300 stakeholders, involving the major economic and social agents of Spain involved in the transition to a new economic model.
- The draft of the Spanish Circular Economy Strategy (Miteco, 2018), includes an Action Plan (2018-2020) with 70 measures aimed to achieve a development model with more innovative, competitive and sustainable growth, reducing the generation of waste, funded with over an 836 million euros budget.
- Spain has made some progress in drawing up plans for managing Natura 2000 sites (Miteco, 2016). Natura 2000 is a network of protected areas in Europe, home to valuable and threatened habitats and species.

In April 2018, 77% of the Natura 2000 sites had been designated as special areas of conservation and had management plans. Spain is the country that contributes the most

surface to the Natura 2000 network, with over 2,000 spaces, covering 138,000 km2 of land surface (representing 27,35% of the Spanish territory) and 84,000 km2 of marine surface. The biogeographical territory is distributed into land regions: Atlantic, Alpine, Macaronesia and Mediterranean; and marine regions: Atlantic, Macaronesia and Mediterranean. These territories include the conservation of 118 types of habitats, 263 species of the Habitat Directive plus 125 species of the Birds Directive.

The Strategic Plan for Natural Heritage and Biodiversity 2011-2017 objectives related to the Natura 2000 Network in Spain included:

- Promotion of the development of the Natura 2000 network in accordance with community requirements.
- Declaration and management of the sites under state competence, guaranteeing their conservation.
- Evaluation of the network in climate change scenarios.
- Development of a priority action framework that identifies objectives and priorities in relation to EU co-financing of the Natura 2000 conservation measures.
- A project proposal of a **Law of Climate Change and Energy Transition** (Miteco, 2018), (APLCCTE) was presented at the end of November 2018 and will suppose an essential support for the development of circular economies on a national and autonomic level. It is currently in the last phase of administrative processing. This tool will facilitate and guide the decarbonisation of the Spanish economy by 2050, a just transition towards low carbon development.0
- Since 2008, Spain has relied on a Green Public Procurement Plan (BOE, 2017), which involves the General State Administration, its Public Organizations and the Social Security Management Entities. This plan expresses purchase objectives that include ecological criteria. With its publication, the new law is being transposed into the Spanish legal system and will include the new legal European requirements guaranteeing sustainable development through green public procurement.
- PEMAR (2016-2022) (Plan Estatal Marco de Gestión de Residuos) Is the State Plan for Waste Management (Miteco, 2014), with four fundamental strategies to reduce waste: reduction of the amount of waste; reuse and extension of the useful life of products; reduction of the content of harmful substances in products & materials and reduction of adverse impacts on human health and the environment of waste generated.

1.3. Autonomic level

Many autonomous communities have adopted or are elaborating their own regional strategies relating to sustainability and circular economy.

- Catalonia: Strategy to promote Green and Circular Economy, 2016 L'Estratègia d'impuls a la economía verda i a l'Economia Circular, 2016.
- Basque Country: Euskadi's 2030 Circular Economy Strategy, 2018 Estrategia de Economía Circular de Euskadi 2030, 2018.
- Andalusia: Andalusian Strategy for Sustainable Development 2030 Estrategia Andaluza de Desarrollo Sostenible 2030 – includes circular economy, 2018.
- Murcia: The Region of Murcia's Circular Economy Strategy Estrategia de Economía Circular de la Región de Murcia, 2018.
- Navarra: Navarra's Intelligent Development Strategy Estrategia de Desarrollo Inteligente de Navarra, 2018.
- Extremadura: Estremadura's 2030 Green and Circular Economy Strategy Estrategia de Economía Verde y Circular de Extremadura 2030, 2018.
- The Circular Economy Strategies of the Canary Islands, Galicia and Castilla-Leon -Estrategias de Economía Circular de las Islas Canarias, Galicia y Castilla y León, 2018/19
- First Autonomic Circular Economy law in Spain: Ley 7/2019, de 29 de noviembre, de Economía Circular de Castilla-La Mancha.

1.4. Local level

Declaración de Sevilla (FEMP, 2017) - El compromiso de las ciudades por la Economía Circular, 2017, is a local strategy for circular economy launched by the Spanish Federation of Municipalities and Provinces (FEMP), this consists of a document providing local governments with a tool to address challenges for a new, more sustainable, efficient and productive model, including policies and actions as practical recommendations. The Modelo de Estrategia Local de Economía Circular de la FEMP (FEMP, 2019), is the model for a local circular economy strategy which contains 25 measures, structured in 4 areas: reducing the use of natural resources, water consumption management, city decarbonization and spaces and healthy conducts.

2. Social norms

Ecoembes (environmental NGO) and the Community of Madrid present: MADRID7R Circular Economy (MADRID7R, 2017), an initiative pushing for transition from a linear to a circular economy model. The goal is to encourage citizens, businesses, NGO's and public administrations to change the logic of "extract, produce, use and throw away" to "reuse, repair, renew, and recycle".

The 7R stands for: redesign, reduce, reuse, repair, renovate, recuperate and recycle. The goals are to improve competitiveness, promoting smart, sustainable and inclusive lines of growth; increase the economic leadership of the Community of Madrid and place the region among the most advanced in Europe; detect and promote synergies between various promoters to launch initiatives in which the circular economy materializes; give visibility and provide coherence to the projects and decide priorities for action in cultural, financial, regulatory, training and legislative spheres thus progressing change in the economic model.

• Ecoalf, a company supported by the HAP foundation, created the Upcycling the Oceans (ECOALF, 2019), project, the goals of which are to clear waste from the oceans, give a second life to materials through circular economy, creating high quality fibres for clothing at the same time as raising awareness of sea pollution.

Fishermen's collaboration is essential. Once recovered and brought ashore, the marine debris is classified and stored according to its nature for later recycling PET plastic bottles that constitute Ecoalf's primary raw material, are first converted into flakes and pellets, then into high-quality 100% recycled polyester filaments. This reduces depletion of the planet's natural resources.

In 2018, Ecoalf & Ecoembes worked together to remove 140 tons of plastic from the sea with the help of 2,500 fishermen and 550 boats.

The objective is for there to be more fish than plastic in the seas by 2050.

• The Institute of Sustainability presented a virtual workshop Opportunities in the Circular Economy (Sostenibilidad, 2020), with the aim to educate attendees and provide the tools and experiences thus laying the foundation for implementing a circular economy as a system.

This conference was provided on a virtual platform accessible on April 22, 2020. Registered persons will be able to see the video conference, of data of speakers, download additional documents in digital format and participate in debates and networking spaces. Those with premium access will be able to enjoy additional benefits.

3. Funding

3.1. State

3.1.1 Spanish Circular Economy Action Plan 2030 - Budget

The actions included in the **2018-2020 Action Plan** (Miteco, 2018), have received sufficient personal and support for its correct execution. In some cases, the actions may be executed by the personal means provided by the proponent department, and in others, a provisional indicative budget has been provided in order to ensure its execution. The indicative budget adds up to $\in 836,789,110$ distributed into the following categories:

- Production: 3,79% €31,740,000
- Consumption: 2,41% €20,158,216

- Waste treatment: 3,40% €28.479.648
- Secondary raw materials: 0,12% €997.362
- Water reuse: 57,15% €478.200.000
- Investigation, innovation and competitiveness: 28,81% €241.080.000
- Awareness and participation: 0,06% €533.883
- Employment and training: 4,25% €35.600.000

Listed budget for the main lines of action:

- 9. Main lines of action: Production.
 Title: Development of comprehensive sustainability of the agri-food industry.
 Ministry of Agriculture and Fisheries, Food and Environment.
 Department: General Direction of the Food Industry.
 2018-2020 Budget: €240,000
- 11. Main lines of action: Production.
 Title: Development of the production of wood and other raw forestry materials.
 Ministry of Agriculture and Fisheries, Food and Environment.
 Department: General Direction/Directorate for Rural Development and Forestry Policy.
 2018-2020 Budget: €1,5M
- 12. Main lines of action: Production.
 Title: Support of the reconversion of touristic destinations, revitalisation plans and the State Financial Fund for modernising of tourist infrastructures (FOMIT).
 Ministry of Energy, Tourism and Digital Agenda.
 Department: Secretary of State of/for Tourism.
 2018-2020 Budget: €30M
- 14.3. Main lines of action: Consumption.
 Title: Development of the purchase and consumption of forestry products.
 Ministry of Agriculture and Fisheries, Food and Environment.
 Department: General Directorate of Rural Development and Forestry Policy.
 2018-2020 Budget: €4,1M
- 15. Main lines of action: Consumption.
 Title: Implementation of "More food, less waste" 2017-2020 strategy.
 Ministry of Agriculture and Fisheries, Food and Environment.
 Department: General Directorate of the Food Industry.
 2018-2020 Budget: €432,6M
- 19.1. Main lines of action: Consumption.
 Title: Development of a strategy for the Secretary of State of Tourism 2018-2020.
 Ministry of Energy, Tourism and Digital Agenda.

Department: Secretary of State of Tourism. 2018-2020 Budget: €15,448,616

- 19.2. Main lines of action: Consumption.
 Title: Development of an ecotourism promotion strategy.
 Ministry of Energy, Tourism and Digital Agenda.
 Department: Secretary of State of Tourism.
 2018-2020 Budget: €177.000
- 20. Main lines of action: Waste Management. Title: PEMAR and the Waste Prevention Programme. Ministry of Agriculture and Fisheries, Food and Environment.
 Department: General Directorate of Quality and Environmental Assessment and Natural Environment.
 2018-2020 Budget: €495,000
- 22. Main lines of action: Waste Management. Title: Computer tools for the control and monitoring of waste. Ministry of Agriculture and Fisheries, Food and Environment.
 Department: General Directorate for Quality and Environmental Assessment and Natural Environment.
 2018-2020 Budget: €1,182,336
- 24.1. Main lines of action: Waste Management. Title: Aid for Environmental Development plans. Ministry of Agriculture and Fisheries, Food and Environment. Department: General Directorate for Quality and Environmental Assessment and Natural Environment. 2018-2020 Budget: €12M
 24.2. Main lines of action: Waste Management. Title: Aid for Autonomous Communities for the implementation of the State Plan for Prevention of waste and the State Plan for waste framework. Ministry of Agriculture and Fisheries, Food and Environment.

Department: General Directorate for Quality and Environmental Assessment and Natural Environment.

2018-2020 Budget: €7,5M

• 28. Main lines of action: Waste Management.

Title: Protection and recovery of biodiversity and marine ecosystems. Waste collection.

Ministry of Agriculture and Fisheries, Food and Environment.

Department: General Directorate of Fisheries Management and Aquaculture.

2018-2020 Budget: €4,361,309

- 29. Main lines of action: Waste Management.
 Title: Creation of a coherent national scheme for trash fishing.
 Ministry of Agriculture and Fisheries, Food and Environment.
 Department: General Directorate for Sustainability of the Coast and Sea, General Secretary for Fisheries and the Biodiversity Foundation.
 2018-2020 Budget: €1,060,502
- 30.2. Main lines of action: Waste Management. Title: Management of construction and demolition waste in works of stations attached to the direction of passenger stations. Ministry of development. Department: Rail Infrastructure Manager.

2018-2020 Budget: €1,880,500

• 31. Main lines of action: Secondary raw materials.

Title: By-product declaration.

Ministry of Agriculture and Fisheries, Food and Environment and Autonomous Communities.

Department: General Directorate for Quality and Environmental and Natural Environment Assessment.

2018-2020 Budget: €217,494

• 32. Main lines of action: Secondary raw materials.

Title: Establishment of criteria for end of waste condition.

Ministry of Agriculture and Fisheries, Food and Environment and Autonomous Communities.

Department: General Directorate for Quality and Environmental and Natural Environment Assessment.

2018-2020 Budget: €179,868

• 34.3. Main lines of action: Secondary raw materials.

Title: Promoting the use of sustainable management materials and techniques in ADIF architecture projects.

Ministry of development.

Department: Rail Infrastructure Manager.

2018-2020 Budget: €600,000

 41. Main lines of action: Reuse of water. Title: Reuse actions included in the river basin management plans. Ministry of Agriculture and Fisheries, Food and Environment. Department: General Directorate of Water. 2018-2020 Budget: €478,2M

- 43.1. Main lines of action: Research, innovation and competitiveness. Title: Call for grants for the program to promote the offer of cloud computing solutions for small and medium-sized companies CO57/15ED. Ministry of Energy, Tourism and Digital Agenda. Department: Red.es 2018-2020 Budget: €18M
 43.2. Main lines of action: Research, innovation and competitiveness.
- Title: Call for the granting of aid for the Program to promote the demand for cloud computing solutions for small and medium-sized companies CO51/15ED.
 Ministry of Energy, Tourism and Digital Agenda.
 Department: General Directorate of Digital Economy.
 2018-2020 Budget: €25M
- 45. Main lines of action: Research, innovation and competitiveness.
 Title: R&D projects oriented to the challenges of society in public private collaboration.
 Ministry of Economy, Industry and Competitiveness.
 Department: Secretary of State for Research, Development and Innovation.
 2018-2020 Budget: €100M
- 46. Main lines of action: Research, innovation and competitiveness.

Title: Encourage collaboration and communication with technological platforms and especially with the inter-platform group of Circular Economy and the Public Administrations responsible for sector policies and R & D policy.

Ministry of Economy, Industry and Competitiveness.

Department: Secretary of State for Research, Development and Innovation.

2018-2020 Budget: €100M

• 49. Main lines of action: Research, innovation and competitiveness.

Title: Energy efficiency as a factor of competitiveness of the sector in the plans and programs of the Secretary of State for Tourism.

Ministry of Energy, Tourism and Digital Agenda.

Department: Secretary of State for Tourism.

2018-2020 Budget: €80,000

• 52. Main lines of action: Awareness and participation.

Title: Transfer of knowledge and exchange of good practices.

Ministry of Agriculture and Fisheries, Food and Environment, Autonomous Communities and SFMP (Spanish Federation of Municipalities and Provinces).

Department: General Directorate for Quality and Environmental Assessment and Natural Environment.

2018-2020 Budget: €54,000

53.1. Main lines of action: Awareness and participation.
 Title: Dissemination campaign of the Spanish Circular Economy Strategy.
 Ministry of Agriculture and Fisheries, Food and Environment.
 Department: General Directorate for Quality and Environmental Assessment and Natural Environment.
 2018-2020: €300,000

 54. Main lines of action: Awareness and participation. Title: Support for sustainable tourist municipalities. Ministry of Energy, Tourism and Digital Agenda. Department: Secretary of State for Tourism. 2018-2020 Budget: €179,883

- 56.1. Main lines of action: Employment and training.
 Title: Comprehensive program for the social recovery of unused railway assets, generating value through entrepreneurship or public service projects.
 Ministry of Development.
 Department: Rail Infrastructure Manager.
 2018-2020 Budget: €1,5M
- 57. Main lines of action: Employment and training.
 Title: Empleaverde programme.
 Ministry of Agriculture and Fisheries, Food and Environment.
 Department: Biodiversity Foundation.
 2018-2020 Budget: €34,1M

3.1.2 Specific grants

• State grants for the renovation of touristic infrastructures (Turismo, 2010): in 2005 the State Financial Fund for Modernisation of Tourism Infrastructures was created in order to financially aid projects to reform and modernise touristic destinations along the Spanish coast. Various administrations and the private sector work together on this initiative.

In order for grants to be accepted, projects must apply environmental, social and economic sustainability criteria, as well as include measures that introduce new technologies and processes that contribute to improvement and integral efficiency, especially valuing those oriented to waste, energy, water and air management.

From 2005-2010, 204 credits were granted to a total of €492M.

• Home improvement grants (Miteco, 2020): in March 2018 the Spanish Government approved the Housing Plan 2018-2021. The Royal Decree includes, amongst other things, help with home improvements, offering grants for works that will improve energy

efficiency in the home including: insulation, new windows, electrical installations, heating & air conditioning, sound proofing, etc.

The grant amounts vary depending on the property and/or project. A house reformation may be granted up to $\notin 12,000$ or 40% of the cost; a low income household can receive 75% of the cost; for individual flats the limit is $\notin 8,000$ and for blocks of flats the amount is multiplied by the number of apartments, in either cases the grant will not be more than 40% of the costs. Another $\notin 1,000$ are available for improvements to houses or Buildings of Cultural Interest (due to age or architecture).

Amounts include: Andalusia nearly \notin 250M; Murcia \notin 63M; Valencian Community \notin 164M.

4. Implementing the circular economy vision

- ECOEMBES (ECOEMBES, 2020), is an environmental non-profit organization, which promotes sustainability through recovery and recycling of light packaging (yellow containers) and paper (blue containers), generated domestically (municipal collection) and outside of homes, (through complementary collection projects), with over 30,000 recycling points. For over 20 years, Ecoembes has managed the public-private collaboration of selective collection of packaging, covering over 47 million citizens, over 8,000 ayuntamientos, 400 collaborating organisations and over 12,000 companies. This collective system of extended responsibility of the producer (SCRAP), works to satisfy society's current and future demands, through an open dialogue between the different recycling agents and citizens who separate waste at home.
- Mercadona (Mercadona, 2020), a Spanish supermarket chain, is currently present in 50 provinces of 17 autonomous communities, with over 1,600 local supermarkets, implementing a new shop model having undertaken 125 reforms, since 2018. The new shop model reduces the environmental impact and incorporates new energy saving measures to an existing eco-efficient shop model. The reforms incorporated 20 measures to increase energy efficiency such as presence detectors, low consumption lighting and quick opening doors. The new model introduces additional improvements, to reduce up to 40% of energy consumption. Other improvements include:
 - Energy saving all illumination is LED technology. Automatic control mechanisms have been installed which regulate light intensity throughout the day, in line with the requirements.
 - Water saving installation of automatic washing equipment, to reduce manual cleaning tasks, water consumption and energy.

- Recyclable transport containers and shopping bags made from recycled materials.
 Plastic shopping bags, 50-70% of the material is recycled. Raffia bags are also available as a reusable option.
- A reusable container pool is provided by Logifruit, foldable boxes that are used to transport and store products, while providing savings. These containers save up to 80% space in inverse logistics. This is an important material and resource saving in comparison to the use of single use cardboard boxes. Reusable boxes, which avoid 100,000 tonnes of cardboard waste per year, also improve the process.
- Naturgy, renewable gas project in Edar de Bens (BENS, 2018), is a Spanish energy supplier (electricity and gas). One of the company's goals is to raise awareness on sustainability and circular economy. A particular Naturgy project focuses on the production and application processes of renewable gas created from waste sludge, obtained from residual water treatment plants (EDAR - Estaciones de depuración de aguas residuales). Renewable gas is a Circular Economy paradigm. It is produced from organic waste (EDAR, wastelands, agricultural and/or livestock waste). It is neutral in CO2 emissions and totally interchangeable for natural gas, so it could gradually be interchanged without any noticeable impact on users. It also generates a by-product that can be used as organic fertilizer, from a renewable source. It should be noted that renewable gas provides other important benefits to society. Being locally produced it enhances energy self-sufficiency, security, and development of new jobs. While helping to solve sustainable waste management - a clear example of the development of a Circular Economy. Its development does not require additional investment in new transport and distribution networks, but would allow the use of current networks, taking advantage of existing infrastructures and investments. The Mixed Renewable Gas Unit is a group of the Naturgy group and the Centro Tecnologico Energy Lab, which has the collaboration of EDAR de Bens SA, a supra-municipal public company that provides wastewater treatment service in the municipalities of A Coruña, Arteixo, Cambre, Culleredo and Oleiros. The project, framed in Naturgy's commitment to renewable gas, has as its ultimate purpose the assessment of the technical feasibility of new technologies, innovation in production processes, optimisation of costs and the alignment of innovation in the development of renewable gas. In the future this will cover a significant part of total gas demand with renewable gas without CO2 emissions. One of the priorities of the project is the analysis of the logistics of the incorporation of renewable gas into existing networks of domestic fuels and mobility, at present this is a rare practice in Spain. Renewable gas generated in pilot plants installed in EDAR Bens, will be used for both purposes. During the existing infrastructure for gas supplies, will be distribute gas supplies to a light fleet of vehicles belonging to the water treatment plant and inter/city

buses of the ayuntamiento of A Coruña. The intention is to close the circle towards a Circular Economy in which waste generated in the city, is later turned into renewable gas, becoming an alternative fuel resource that can be used in the metropolitan transport fleet.

Cerealto Siro Foods (SIRO, 2020), is a global company of Spanish origin in the agrifood sector that is dedicated to the development and production of cereal-based products, for retailers and food brand companies. Cerealto Siro Foods has incorporated a model based on efficiency of the use of resources, from primary production to recycling, valuation and the reuse of waste of all industrial processes, this way, the company's goal is to give a second life to by-products generated by activities at the same time as reducing waste. In 2018 Cerealto Siro Foods announced the construction of a biogas plant in Venta de Baños, Valencia to generate natural gas obtained from organic waste.

The same year, all their Spanish and Portuguese factories reached the targets of zero landfill waste and the ISO14001 certification of all Spanish factories was renewed. In Spain, 100% of their energy consumed is 100% renewably sourced. The environmental footprint of the plants is measured to manage and reduce polluting emissions generated by factory activity. Training on good environmental practices is provided to employees, as well as awareness of reducing energy and water consumption.

- Ecovidrio (Ecovidrio, 2019), is a Collective System of Extended Producer Responsibility (SCRAP) and a non-profit entity responsible for placing bins and managing the collection of glass packaging waste. Two different management systems are offered to local authorities for collecting glass packaging. One option is for the town hall to carry out the collection and for Ecovidrio to finance the total cost. The other is for Ecovidrio to carry out the tasks required to guarantee the selective collection of glass waste through the use of containers. Their goals are to encourage circular economy, minimize environmental impact and to promote the research and development of waste management.
- Endesa Endesa is a Spanish company responsible for the generation, distribution and sale of electricity and gas. One of Endesa's projects was the selective demolition of the old Foix power plant (Cubelles, 2019), in order to maximize the separation, segregation, reuse and recycling of demolished materials, resulting in savings of natural resources, energy, fuel and avoiding pollution emissions. The goal is to return the terrain to its original conditions, without any signs of 34 years of industrial activity. Over 11990,7 m3 of construction and demolition waste were recovered, of which 4795,38 m3 have already been reused as construction site filler materials and 7192,32 m3 are waiting to be reused in other building projects. 87% of the 27,000 tons of waste was revalued through its recovery. The project budget was over €4,7M.

- Red Eléctrica de España (REE, 2020) In 2019 the Electrical Network of Spain composed of a group of companies committed to becoming 100% circular by 2030. The present initiative has the objective to promote the implantation of a circular economy through the reintegration of obsolete power machines as new resources or raw materials. Since 2015, REE has auctioned non-hazardous materials as raw materials or waste. In 2017, they started looking into the possibility of expanding the process to other equipment and power machinery. As a result, they launched a project that consisted of the commercialisation, sale, dismantling and removal of 4 single use transformer units (200 MWp) and switchgear disposal. The auction took place in 2018. A 100% of the waste of this project was recycled or regenerated. This process which offers a second life to equipment materials resulted in the generation of €120,376 offering a better economic return with this method of the disposal of materials compared to conventional waste management.
- Nestlé España (L., 2019) Recovered coffee grounds from the production of soluble coffee have a high calorific value. As a result, it can be used as a biofuel to generate energy in the form of steam and used as a resource in a soluble coffee factory. Nestlé España aims to use 45,000 tons of coffee waste generated by the Girona factory, meaning the recovery of 80% of this by-product, to generate steam using a new boiler. This initiative will also contribute to minimizing the environmental impact. In the process, the coffee waste is introduced into the boiler, which has a capacity for 7,500 kg/h, creating 22 tons of steam per hour. As a final step, it's necessary to carry out a gas treatment to reduce the amount of sulphur and nitrogen oxides, plus other particles. Indicators:
 - Reduction of the carbon intensity (CO2/T) of the final manufactured product, that represents 18% of the factory's total emissions.
 - Increased circularity of the process: use of 7,500 kg/h of waste as a resource for the process.
 - Environmental management indicators: Reduction, at the factory level, in more than 31% the use of water per ton produced and in more than 33%, both the energy consumption such as CO2 emissions per ton produced, between 2010-2018.
 - Zero waste generation to landfill since.
- Nutripeople (NUTRIPEOPLE, 2020), is a small, socially responsible company in Murcia, committed to promoting Zero waste. The company takes advantage of the overproduction of fruit and vegetables to produce superfoods. The products are 100% natural fruit purees, without added colorants, preservatives or sugar. They're suitable for celiac, vegans and all ages. The brand has managed to reduce 70% of plastic in their packaging and for every kg of fruit used, 963 litres of water are recovered from the process. The start-up actively engages Spain's agri-food industry to sell its vegetable

surplus as a resource to produce superfood pouches, which are then distributed in areas affected by famine.

- ECOLIFE (ECOLIFE, 2020), by Belda Lloréns, is a Spanish company, the first in Europe to create innovative yarns a high-quality range of yarn the composition of which includes recycled fibres. The company has manufactured ecological threads for 65 years, with more than 509 references in stock. During the manufacturing process, all waste is collected and 80% reused in the same process or in the creation of thicker threads (normally destined for cleaning products). The products are recycled polyester, BCI cotton, recycled cotton, ECOVERO (viscose fiber, all trees used in the process are replaced) and recycled viscose. The factory does not use water or chemicals, the CO2 emissions are 0% and solar panels are installed over the 60,000m2 plant, these produce 3 megawatts of clean energy. 95% of the products of the brand follow sustainable criteria and are labelled GRS (Global Recycle Standard), that guarantee traceability and transparency to ECOLIFE threads.
- **Ecoalf** is a Spanish fashion company with a sustainable profile that makes swimwear from 100% recycled fabrics made from PET and recycled polyester.
- UAM (Universidad Auntónoma de Madrid) is among the 60 most sustainable universities in the world. It is also listed as the third most sustainable university in Spain, after the Universidad de Alcalá and Universidad Autónoma de Barcelona. The university office has an Ecocampus (UAM, 2019), that provides information on current environmental projects, such as Ola Solar. The Ola Solar (UAM, 2020) project's aim was to install 5,000 photovoltaic panels on campus, using a €5,5M investment resulting in an annual production of over a million-kWh, equivalent to 300 homes. This represents almost 5% of annual consumption and a reduction of 500 tons of CO2 emissions to the atmosphere.
- Navarra, Catalonia and the Basque Country were the first autonomous communities to introduce organic waste containers on a regional level. The city of Madrid has incorporated an organic waste collection system (CIRCLE, 2020). It began by introducing brown recycling containers in certain parts of the city in 2017, then slowly expanded to other areas.

5. Knowledge dissemination vehicles

- COTEC, ACCIONA and ECOVIDRIO have created videos about circular economy in order to inform and raise awareness on this topic. The 3 short videos have different visual approaches on the same subject and can be found on YouTube:
 - **COTEC -** Circular Economy: discover what it is before the planet explodes Economía Circular: descubre lo que es antes de que reviente el Planeta (COTEC, 2017). COTEC

is a foundation that promotes innovation as an engine of economic and social development. This video on the Circular Economy was launched in 2017 on COTECs YouTube channel and has over 2,3M visualisations. It was created in collaboration with #WHYMAPS, to explain the circular economy in a simple and creative way.

- ACCIONA What does the circular economy consist of? ¿En qué consiste la economía circular? (ACCIONA, 2018). Acciona is a global company with a business model based on sustainability. The video was launched 2018 and has over 60,700 visualisations on YouTube.
- ECOVIDRIO What is the Circular Economy ¿Qué es la Economía Circular? (ECOVIDRIO, 2017). Ecovidrio is a non-profit entity responsible for the recycling management for glass packaging waste in Spain. The video was published in 2017 and has over 192,000 visualisations on YouTube.
- On the 9th & 19th of June 2021, Madrid will welcome the 2nd edition of Organic Food Iberia and Eco Living Iberia (Iberia, 2020) - the first event took place in Madrid, in 2019. The event is organised by Diversified Communications and IFEMA-Feria de Madrid, sponsored by Ecovalia. It will bring together national & international experts and professionals from the ecological - natural sector. Over 600 ecological producers will be there. The fair's goal is to promote the organic food industry to buyers around the world. Spain has a total of 2 million hectares devoted to organic farming. Making the country the biggest organic producer in Europe and the fourth in the world with a total of 40,000 operators.
- Smartincircles (SMARTINCIRCLES, 2020), is a social enterprise formed by a multidisciplinary team of professionals aiming to act as catalysts towards a circular and regenerative society. In order to achieve this, Smartincircles organizes and coordinates conferences, temporary expositions, ephemeral installations stimulating awareness, provide information and generally support the progression to a circular economy.
- The Circular Economy Foundation (Circular, 2020), FEC is a private, Iberian (Spain, Portugal and Andorra) foundation working in areas related to circular economy, sustainability, resource use and the environment. The FEC received a Golden Butler award in 2014 and will be co-organising the International Congress on Environmental Sustainability on 14th & 15th of October (2020), in Madrid. The FEC has also launched a multi-participant Iberian platform, aimed at encouraging participants to discuss possible orientations and co-build innovative economic initiatives. The goal is to promote Circular Economy and its potential advantages such as sustainable development, eco-competitiveness of companies, new proximity employment, reduction of dependence on raw materials, energy and material efficiency, reduction of the ecological footprint,

promotion of local and quality production, prevention and reduction of waste, protection of natural capital, increased ecological resilience and the reduction of carbon emissions. The work of the Foundation emphasizes improving the life quality of individuals, optimizing the use of resources and promoting the sustainable development of society using the new approach represented by the circular economy. The Foundation collaborates with personalities and world experts, governments, private entities and social agents in areas of interest.

- Education, professional training, as well as non-formal learning have a fundamental role to play in providing and updating the necessary skills required for the transition to a circular economy, together with the creation and design of new capacities, competencies and models. The CYCLE project (CYCLE, 2020), aims to create a set of tools and resources to develop skills for the circular economy in adult trainers, by introducing this approach into their training activities. The inclusion of these competencies and skills in adult education reinforces active and more responsible citizenship and a commitment to a more sustainable community, positively impacting current and future social, economic and environmental challenges. The Cycle Competence Centre (CYCLE CC) is a platform where educators can find training and guidance tools with resources available in 6 languages to help them introduce the circular economy within different learning environments.
- Ecoembes promotes open and collaborative innovation, with the development of projects in the area of circular economy and help to ensure that a recycling culture continues to advance in our society. As a result, Ecoembes created 'The Circular Lab' (TCL) center, in 2017 in Logroño, a pioneer in Europe in innovation aimed at the prevention and recycling of waste to influence all phases of a product's life cycle. The project will receive an investment of 10 million euros over 4 years.

6. Knowledge and education

There are a number of universities that now include the Circular Economy in their courses and programmes and/or collaborate on related projects.

6.1. Teaching

- Industrial Engineering Master's degree in Seville University includes the subject Sustainability and Circular Economy (Sevilla, 2018).
- The university of Oviedo has created a lecture on circular economy (Oviedo, 2020), to raise awareness and train and encourage Research & Development in waste management.
- Campus Iberus offers a Master's Degree in Circular Economy and Bioeconomy (Iberus, 2012), at the universities of Zaragoza, Lleida, La Rioja and Pública de Navarra.

- The NGO Ecoembes manages training at all levels, from young children to older groups, encouraging learning beyond recycling, through the NATURALIZA project. This project trains teachers, offering learning experiences outside the classroom and curriculum greening. To date they have impacted on over 135,000 citizens and 800 schools. It's TCL (The Circular Lab), studies, designs, tests and applies in/directly to help the best practices in all phases of the packaging cycle, from its conception to its reintroduction in the consumer cycle as new products, in collaboration with companies, public administrations and citizens.
- 6.2. Science and research
 - CIDEC, Centre for Innovation and Development of Circular Economy (CIDEC, 2019), founded by the collaboration of three universities (Politécnica, Autónoma y Complutense de la Comunidad de Madrid) will reach the private sector while developing innovative projects and awareness related activities. The council and academic institutions have committed to plan a strategy on sustainable policies for Madrid with an impact on municipal actions, decisions together with research and development. The commitment is already firm on circular economy framework for waste prevention and management 2018-2022.
 - COTEC Foundation has published a number of reports (Mataró J., 2019), on the Status Quo of circular economy in Spain, first in 2017 and again in 2019. These reports detail priorities and strategies with available indicators and include their analysis of the situation of the circular economy in Spain.
 - Forética and the Task Force on Circular Economy, which coordinates with 11 major Spanish companies, presented the report Measuring the circular economy Frameworks, Indicators and Impact Management (Ruiz E., 2019), on 11 July 2019. The document analyses business opportunities by measuring circular economy in business management and contains a plan to support companies on this topic. This report identifies how to measure circularity in businesses using three parameters: measurement of physical flows, positive impacts for companies from resource efficiency and the impact on Sustainable Development Goals. The report stresses the importance of carrying out a specific analysis of the "circularity" of each sector to accelerate in this transition. This is estimated to create 2 million jobs in Europe by 2030 according to estimates by the European Commission. This document includes a series of practical examples that illustrate how this group's companies measure their approach to the circular economy.

Appendixes

1. Appendix I: List of mapped fields related to circular economy (Estonia)

EU laws and legislations

Estonia is dependent on EU laws.

- <u>GPP (green public procurement) criteria</u>: developed to facilitate the inclusion of green requirements in public tender documents.
- Environmental criteria examples that can easily be used
- Ecolabel

<u>State</u>

Ministry of Environment:

- Have a specialist working on circular economy
- Creating an action plan for a circular economy. In 2019 did research on indicators. Now
 putting together a tender for doing the research on the circular economy.
- Organised in 2018 and 2019 circular economy conference
- Website <u>https://ringmajandus.envir.ee/</u>
- Funding on circular economy (KIK)
- Keskkonnaamet
- Circular Economy Estonia NGO, developing into the circular economy hub. Intention to be the central place for CE matters.

Good examples:

• Bottles recycling: here, the most important example is the reusable bottle scheme where bottles are sorted at Estonian Deposit Packaging, sent on for washing and then refilled with the product.

Awards

- <u>Environmentally friendly company of the year</u>
- Environmentally friendly deed of the year

Third sector

Organisations (civil society):

- EKJA (Estonian Association for Environmental Management) -
 - Circular Economy Forum
 - green office
- Stockholm Environmental Institute Tallinn (Harri Moora)

- Cleantech ForEst umbrella organization for cleantech companies
- Teeme Ära / Let's do it world! (Anneli Ohvril, Kadri Kalle)
 - Rohetiiger (Eva Truuverk)
- VEF
- SEV
- Sustinere
- ERL: Ecologists without Borders Estonia (Estonian Green Movement)
- Mondo: educational materials, fairtrade
- ELF
- Kompostiljon
- Toidupank (food bank)

Education (tudengid, eksperdid, mentorid)

- TKTK circular economy department
- EKA circular and eco design
- Estonian School of Life Sciences:
 - Ecolchange Centre of Excellence
 - Centre of bioeconomy
 - developing a zero waste programme: analysis of food waste, cosmetics fertilizers
 - POLLI: plants
 - <u>Toidulabor</u>:animals products
 - Other projects: financing from the university's development fund upcycling of oil shale ash; bandaids from fish waste; fertilizers
- Opportunities to develop your idea: Tehnopol, Mektory, Ideelabor, University of Tartu science-based company logo (Tartu Ülikoolist võrsunud teadusmahukas ettevõte)

Community initiatives

- Community gardens: LasnaIdee, Tartu Maheidee, Põhjala tehase linnaaed
- Repairing events: Paranduskelder tartus (repair basement)
- Eco villages: Väike jalajälg, Lilleoru (<u>MTÜ Eesti ökokogukondade ühendus</u>)

Events

- Roheväljakutse
- Plastivaba nädal
- Keskkonnanädal

Spokespeople and mentors

Ann Runnel, Reverse Resources, textile waste tracking software

- Kadri Kaarna, Cleantech ForEst, first Zero waste blogger, great overview of cleantech companies in Estonia
- Kadri Kalle, zero waster, World Cleanup Day Programme Manager
- Anneli Ohvril, CEO of World Cleanup Day
- Harri Moora, SEI Tallinn
- Kadi Kenk, Let's Do It World, member of the management board, teaches waste management and prevention as far as I know
- Reet Aus: textile waste mapping and upcycling

Youth work

- Eesti Noorteühenduste Liit (Estonian Association of Youth Foundations): researched that the <u>environment</u> is important to the youth
- <u>Säästva arengu komisjon</u>

Voluntary

Blogs

- Suletudring.ee
- Nullkulu.ee
- Getxel.com
- Kolmkordaise.blogspot.com
- Laura Hates Plastic

Facebook Groups

- Package-free shoppers
- Vegans (Jah! See on vegan)
- Environment savers (Keskkonnasäästjad)
- Sub-groups for zero wasters (Zero waste Estonia, Zero waste Tartu, Zero waste Tallinn)
- Trash to treasure groups (Prügi aardeks taaskasutus)
- Foodsharing Tartu, Foodsharing Tartu: sharing leftover food
- Tarbime targalt: "Lets consume smart" (by Rimi); discussions on reducing waste
- Russian groups: <u>бережём природу мать нашу</u>

Youth organizations

- Fridays for Future movement, Exctinction rebellion, Nähtmatud Loomad: protesting against climate inaction, animal cruelty, extinction
- Seiklejate vennaskond: offers many international opportunities for youth workers to learn (including to learn about sustainability among many other topics)
- Different competitions for youth: <u>Mini Negavatt</u> (1.-6. Grade, videos on how to reduce textile waste), Negavatt (18-30 year-olds)

- Eesti Noorte Keskkonnanõukogu
- Bioteaduste Üliõpilaste Seltsi <u>keskkonnagrupp</u> (Society of Biology Student's environmental group)
- Eesti Maaülikooli Keskkonnakaitse Üliõpilaste Selts (Estonian University of Life Sciences Environmental Protection Students Society): plastic free week, green movies etc
- <u>Eesti Arstiteadusüliõpilaste Selts</u> (Estonian Medicine Students Society): temporary environmental health group
- The Estonian Scout Association and the Estonian Guides' Association, whose organizational structure is based on various skills that go hand in hand with knowing and valuing the environment.
- EÕL: Eesti Õpilasesinduste Liit
- Eesti Üliõpilaskondade Liit
- MTÜ Eesti Üliõpilaste Keskkonnakaitse Ühing "Sorex"
- Tartu Üliõpilaste Looduskaitsering MTÜ
- Noored Rohelised
- 4h Eesti deals with rural life
- Eesti Metsaüliõpilaste selts forest issues and development, forest management
- MTÜ auh dealing with homeless animals.
- AIESEC work with sustainable development goals in their activities
- AEGEE work with sustainable development goals in their activities
- Through universities, of course, student councils, etc. are involved in the development of a green university. For examplethe University of Tartu.
- Some youth councils in local governments are also involved in developing environmental awareness.

Private sector

Textile and Fashion

- Uuskasutuskeskus; Sõbralt Sõbrale (reuse center) etc
- Upmade
- Gelatex
- Lindström
- Stella Soomlais
- Toom Tekstiil
- <u>Mari Upcycle Studio</u>: furniture industry leftovers turned into backpacks
- <u>Märss</u>: vegan textile bags that use some industry leftovers
- <u>KIRA</u> zero waste shoes

- <u>Kärr ja Surr</u> decorations out of recycled textile (might not be an officially registered business)
- <u>Lentsius design</u>: telescopic coats from recycled tents
- <u>New Rustic</u>: backpacks from recycled materials
- <u>All estonian second-hand clothing shops</u>
- <u>Kalamaja printsess</u>: children's clothing from recycled fabrics and fabric waste
- Dryopteris: hair clips and decor
- Reverse resources: textile waste tracking software
- <u>Trendsetter Europe</u>: bedlinen, blankets, pillows

Waste management

- Puidukäitlus OÜ taking wood waste for free, upcycling wood, making wood chips, selling pallets, burning wood waste for heating apartments
- Ragn Sells talks about it
- Solve et Coagula OÜ
- <u>Estonian Cell: biogas out of wastewater</u>
- Association of Estonian Circular Economy companies: waste management companies

Biowaste

- Wastefox: composts biowaste fast (Startup)
- <u>Nutriloop</u>: composting (Startup)
- OÜ Saare peekon: warmth from pig leftovers

Waste prevention

- Circup: washing machine for reusable cups (Startup)
- Topsiring: circular model for cups
- <u>PoKo</u> out of PET; <u>Hüüp</u> from organic cotton; <u>Mari Upcycle Studio</u> from recycled fabric; <u>SISU kott</u>: reusable veggie bags
- Many reusable bags sellers
- Zero waste online shops: ItsBio, Elamise Kergus, zerowaste.ee, rohepakend
- <u>Power Algae</u>: turning CO2 into algae food and algae into other things like food (Startup)
- <u>Suckõrs</u>: reed straws (Startup)
- <u>3cular</u>: 3D-printing with sawdust (Startup)
- Eco-shops: biomarket, mahemarket, ItsBio (zero waste purchase opportunities)
- Nõukoda (dish lending), contact Anneli Ohvril
- BEPCO: reusable boxes with a washing system to deliver products
- Replace OÜ: upcycling of old computer

Student companies: changes every year. Junior Achievement organizes events that make students think about creating a more sustainable product.

- Earlier: Festera (now WasteFox)
- 2018/2019: Pööre (reusing textile for hoodies, pencil cases, scrunchie), Tahpoon (solid shampoo), Imelõõr (reed straws), Nuhe (homemade deodorant)
- 2019/2020: ÕF Idüll and MF Tablaste (reusable makeup pads), Münt and Tablasta (dental tablets, 2Brush (bamboo toothbrushes), Amper (lamps out of reused bottles), many companies for reusable bags (Beliss, Fannypack, tormikotid), Botella (reusable bottles), Bresh (bamboo toothbrushes, BumbleBee (natural cosmetics), foldable straws (mapm), tablasta (dental tablets, wooden clutch (taleio)

Construction

- Werrowool AS
- Tool rentals

Food and agriculture

- Fotografiska Tallinn zero waste restaurant
- Otse tootjalt tarbijale (OTT) (Directly from producer to consumer)
- Nomilk! Tallinn. Almond milk home delivery in returnable glass bottles
- Rimi: campaign #TarbimeTargalt and facebook group to tackle food waste and general waste; uses an app called Semafor to prevent food waste
- Bugbox Ltd: hygienic solutions for producing mass bug food oils, flour (Startup)
- <u>Laavatech</u>: cost-effective solution for indoor-farming that reduces light-consumption (Startup)

Other

- Tech pledge
- Startup examples
- Advanced Sports Installations Europe AS

Transport

- Bolt: green plan of carbon offsetting (Startup)
- Elmo rent: electric car rental
- Public transport
- Elron
- Bike renting and repairing
- Starship Technologies: delivery with robots on wheels

Energy efficiency

- Kibu.energy: home solar panel energy solution (energy independence solution)
- <u>Powerup technologies</u>: hydrogen fuel cell based energy generators
- <u>Sympower</u> and <u>Fusebox</u>: Real-time balancing the supply and demand of electricity

Clean energy and storage

- <u>Roofit Solar: solar metal roofs</u>
- <u>E-pavement</u>: produces solar energy
- <u>SmartVent</u>: reduces energy expenses on indoor climate

Cosmetics

- Returnable, reusable and refilled packaging: Tilk!, Oma.Care, Hoia Homespa
- <u>Oma.care</u>: Refill station

Initiatives

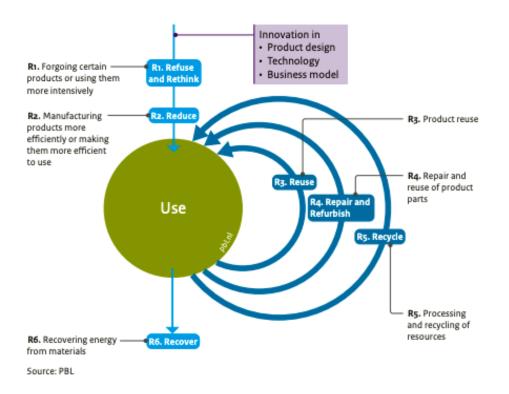
- <u>Tech green pledge: Estonian tech companies promise to become climate neutral by</u> 2030
 - Founders: Autlo, Bolt, Cachet, Cash On Go, Corle, Cybernetica, Cybexer Technologies, E-Governance Academy, eAgronom, Empower, Evocon, Fundwise, GoSwift, Guardtime, Icefire, Lift99, Pactum, Proud Engineers, RaulWalter, Reverse Resources, SK ID Solutions, Skeleton Technologies, Stigo, Telia, The Exit Academy, Thorgate Management, Topia, TransferWise, Veriff, Weekdone, WePower, Xolo, Yaga
 - Signatories: ADM, AlphaBlues, Autlo, FiscalAdmin, Future Technologies, Katalista UAB, Katalista Ventures, Laisvalaikio dovanos, Natufia Labs, pilw.io, Pipedrive, Science Addiction, Scoro, Tara International Consulting, Testlio, Tilde Eesti

Event

• I Land Sound: a sustainable music festival

2. Appendix II (The Netherlands)

R-ladder of circular strategies (PBL, 2019)



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Co-funded by the Erasmus+ Programme of the European Union