



European
Commission

EREK European
Resource Efficiency
Knowledge Centre

The implementation of the circular economy in Europe

Perspectives of EU industry cluster managers and regional policymakers

EREK – European Resource Efficiency Knowledge Centre



The implementation of the circular economy in Europe

Perspectives of EU industry cluster managers and regional policymakers

Based on the conclusions of the session 'Circular Europe' at the European Cluster Conference 2019 in Bucharest and interviews to EU industry cluster managers and regional policy makers

European Resource Efficiency Knowledge Centre – EREK (www.resourceefficient.eu) August 2019.

This work has been carried out under a service contract for the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. This document reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

More information on the European Union is available on the internet (<http://europa.eu>).

PRINTED	ISBN 978-92-9202-582-3	doi: 10.2826/191687	EA-08-19-641-EN-C
PDF	ISBN 978-92-9202-583-0	doi: 10.2826/81623	EA-02-19-641-EN-N

© European Union, 2019.

Reuse is authorised provided the source is acknowledged. The reuse policy of European Commission documents is regulated by Decision 2011/833/EU (OJ L 330, 14.12.2011, p. 39).

For any use or reproduction of photos or other material that is not under the EU copyright, permission must be sought directly from the copyright holders.

Cover Image sources from Fotolia ©igor-ovsyannykov 20

Table of Contents

TABLE OF CONTENTS	1
EXECUTIVE SUMMARY	2
1. INTRODUCTION	5
2. METHODOLOGY	6
3. CIRCULAR ECONOMY DEVELOPMENTS FROM THE PERSPECTIVE OF CLUSTERS AND REGIONS	8
THE EUROPEAN CLUSTER CONFERENCE 2019 – CIRCULAR EUROPE SESSION	8
IMPACTS ON DIFFERENT INDUSTRIAL SECTORS	9
SIZE AND MATTER IN BEING READY	10
DEVELOPMENTS IN DIFFERENT COUNTRIES	11
POLITICAL AND TECHNOLOGICAL DRIVERS	12
4. NEEDS AND BARRIERS NOTED BY CLUSTERS AND REGIONS	14
KNOWLEDGE AND AWARENESS	14
<i>Awareness</i>	14
<i>Knowledge</i>	14
FINANCING	15
POLICY	16
OTHER NEEDS	17
5. THE ROLE OF REGIONAL POLICYMAKERS	19
DESIGN POLICIES TO FACILITATE NEW INITIATIVES	19
PROVIDE ACCESS TO FINANCE	19
OTHER ROLES	20
6. THE ROLE OF CLUSTER ORGANISATIONS	21
INCREASE AWARENESS AND INSPIRE	21
BUILDING BRIDGES	22
PROVIDE TRAINING AND INFORMATION	23
OTHER ROLES	24
7. KEY CONCLUSIONS OF THE REPORT	25
ANNEX A: INTERVIEW QUESTIONS	26
ANNEX B: COMPLETE LIST OF INTERVIEWEES	27

Executive summary

In the EU Action Plan for the Circular Economy, the European Commission defines circular economy as follows: "In a circular economy the value of products and materials is maintained for as long as possible; waste and resource use are minimised, and resources are kept within the economy when a product has reached the end of its life, to be used again and again to create further value". Circular economy provides economic opportunities, but SMEs still face many obstacles.

Shifting to a circular economy requires the involvement of many actors across existing industrial value chains and regions in Europe. This report offers a first glimpse to the experience, perspectives and specific role of two of the key actors driving such shift:

- 1) **EU industry clusters: offer a nurturing environment to effectively promote circular economy business models among their members, given their direct contact to companies and SMEs** and their understanding of the core business processes and needs. Cluster managers, knowing the region and the sector, often consider themselves a 'spider in the web' who can connect different stakeholders and tailor their approach to the needs of companies in their cluster.
- 2) **Regional policymakers: having a more formal and facilitating role compared to cluster organisations.** They support the transition to circularity by introducing schemes and measures at local level, influencing national policies and by providing financial and other means of support.

This report synthesises the conclusions of the session "Circular Europe" that took place during the European Cluster Conference 2019 in Bucharest¹, followed by 41 interviews, 28 of which with cluster managers and 8 with regional policymakers, and 5 with other stakeholders.

According to the findings from the interviews and the European Cluster Conference 2019, circular economy impacts almost every type of cluster and industry. Despite though ongoing efforts to transform traditional economic and business models, many companies, notably small and medium-sized enterprises (SMEs), are not currently ready for this shift. Many are willing to act but do not know how. SMEs face disadvantages when embracing circularity, given their limited capacities, resources, time and available knowledge to invest and deal with the related administration and compliance with regulations and standards. More favourable policies are needed to boost the circular shift; also, legislation needs to be adapted to enable this shift rather than hinder it.

Key conclusions from the European Cluster Conference 2019's session on 'Circular Europe'

The European Cluster Conference 2019 organised on the 14-16 May 2019 in Bucharest discussed the future priorities for cluster policies in the context of circular economy with a focus on connecting ecosystems in one of its sessions.

Five key messages were abstracted from this discussion:

¹ European Cluster Conference, 14/16 May 2019, Romania (Bucharest). More information: <https://www.eucluster2019.eu/en>

- ❖ Clusters can convey the voice of companies as they are in the unique position to share the success stories of companies and inspire other organisations to venture in circularity. Clusters can act as agents of change in favour of the circular economy.
- ❖ There is a lot to do to turn our economies and industries fully sustainable, but there are solutions, and step by step, all companies can make a significant change.
- ❖ The local level plays a crucial role in promoting circular economy and circularity should be integrated into regional ecosystems.
- ❖ Policymakers should not be trapped in over-regulation but instead should create simply the right framework conditions for companies to jump on the circularity train.
- ❖ Circular economy will transform financial markets, industries and our society. Companies will have to embrace circular business models sooner or later, otherwise they will be out of business.

Key conclusions from the interviews

Circular production processes are based on closing the loops in the supply chain where any waste material becomes a resource for another stage of the product development. Clusters that span related industries and foster cross-sectoral cooperation can facilitate the shift towards such circular supply chain management practices whereby companies reduce their waste and optimise their resource consumption; even new businesses can be created to harness hidden opportunities.

Professionalising the more than 1000 European cluster organisations across Europe (also profiled on the European Cluster Collaboration Platform) and equipping them to offer support on circular economy to their members can bring tangible benefits to more than 120 000 SMEs and help them realise the circular vision:

- ❖ Cluster organisations can take action to increase awareness of the circular economy among companies and build links between stakeholders. Some already provide their members with training and information, trying to influence policies and helping companies to access finance. This saves considerable time for SMEs needing to discover how to implement resource-efficient solutions. Nevertheless, the organisations' role is not just in informing but also in inspiring: showing how things can be done differently.
- ❖ Cluster organisations can use their experience with innovation to boost circular economy. They are well positioned to translate technological developments in different fields into opportunities for companies within their clusters. Promoting digital transformation linked to the circular economy is an area that holds great potential. Digitalisation can support in waste collection and water management; artificial intelligence can be applied to manage production, processing and recycling. Cluster organisations are able to effectively foster such innovations within their clusters.
- ❖ Clusters have a good network, which they can use to connect the relevant stakeholders in their broader regional ecosystems. Cooperation between companies in a value chain and in different sectors becomes more necessary, building links, using and expanding existing networks is more important. They can embrace new players and involve them in the life of clusters, such as resource-efficiency support providers, cleantech centres, waste management organisations or circular economy foundations.
- ❖ Cross-cluster cooperation connects companies and organisations across sectors and geographies to find each other and mutually benefit from the shift to a circular economy. The waste of one company in a cluster can potentially be used as a resource by a firm in another cluster. Identifying such possibilities for crossovers and cooperation is an activity cluster organisations naturally pursue.

Regional policymakers can support the implementation of a circular economy by using their ability to make local policies, influence national policies and provide financial support. For the regions, where transitions are very context-dependent, it is impossible to provide a blueprint. In some cases, bottom-up approaches are needed; others require more direct interventions.

Cluster policymakers can design their cluster programmes right from the start by involving circular economy actors in the development of cluster initiatives that foster circular supply chains: they can include circularity in the accreditation criteria or promote clusters with a clear approach to help businesses improve the way in which resources are used; they can facilitate the development of resource strategies and select the key industries that need to tackle the circular economy challenge. By using regulation strategically, another way of stimulating circular economy is to discipline business behaviour to use environmentally friendly practices, for instance by limiting the discharge of waste. To a lesser extent, they can also contribute to increase awareness.

With the upcoming European Green Deal, clusters and cluster organisations have a clear role to play in reshaping the business landscape and preparing SMEs for a new resource-scarce era. Their potential should be seen as part of the solution for decarbonisation and sustainable industrial transformation.

1. Introduction

In the EU Action Plan for the Circular Economy, the European Commission defines circular economy as follows: “In a circular economy the value of products and materials is maintained for as long as possible; waste and resource use are minimised, and resources are kept within the economy when a product has reached the end of its life, to be used again and again to create further value”².

The transition towards a circular economy is seen by the EU as “the opportunity to transform our economy and generate new and sustainable competitive advantages for Europe”³.

However, SMEs still often face several challenges in the shift to a circular economy. Access to suitable finance is key for SMEs in making this shift and it is often a barrier.

Another issue is the lack of knowledge on the benefits of the circular economy concept. Furthermore, a lack of government support and effective legislation, a lack of information, an extra administrative burden, a lack of technical skills, a missing environmental culture and a lack of support from the supply and demand network are all barriers for SMEs⁴.

Chapter 2 gives an overview of the methodology used in this research.

Chapter 3 describes the most recent developments in circular economy in Europe, as perceived by cluster managers and regional authorities. We report the possible impacts of the shift to a circular economy on different sectors and countries, and the signs of change that can already be observed. Finally, an overview of some important trends and technologies is provided.

In chapter 4, the needs of companies from different economic sectors and regions are described, illustrated with examples.

In chapters 5 and 6, the roles of regional authorities and cluster managers in the shift to a circular economy are described, based on the perception of the interviewees.

Finally, chapter 7 gives the key conclusions of the report.

² European Commission (2015), “Circular Economy Package: Questions & Answers”

³ COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Closing the loop - An EU action plan for the Circular Economy. COM/2015/0614 final

⁴ Rizos, Vasileios & Behrens, Arno & Kafyke, Terri & Hirschnitz-Garbers, Martin & Ioannou, Anastasia. (2015). The Circular Economy: Barriers and Opportunities for SMEs.

2. Methodology

The shift to a circular economy involves many actors across the European value chains and regions. This report offers a first glimpse to the experience and perspectives of two of the key actors driving such shift.

In this report, we will describe the perspectives of cluster managers and regional policymakers with respect to the shift to a circular economy in order to provide insight into their needs to boost the green transition. We will also present some of their methods and experiences in stimulating circular economy, this making mutual learning possible.

This report collects the conclusions of the session “Circular Europe” that took place during the European Cluster Conference 2019 in Bucharest⁵, followed by 41 interviews: 28 cluster managers, 8 regional policy makers, and 5 stakeholders from other organisations⁶.

The interviewees were asked what economic areas were most affected by the shift to a circular economy, what changes they already see, the needs and barriers of companies in their cluster and the role of cluster managers and regional policy makers. 22 interviewees received the questions by e-mail, to write down their answers and send them back. In addition, 19 interviewees were interviewed by phone. The interview questions can be found in the Annex A: Interview questions.

Figure 1: Country of the interviewees⁷



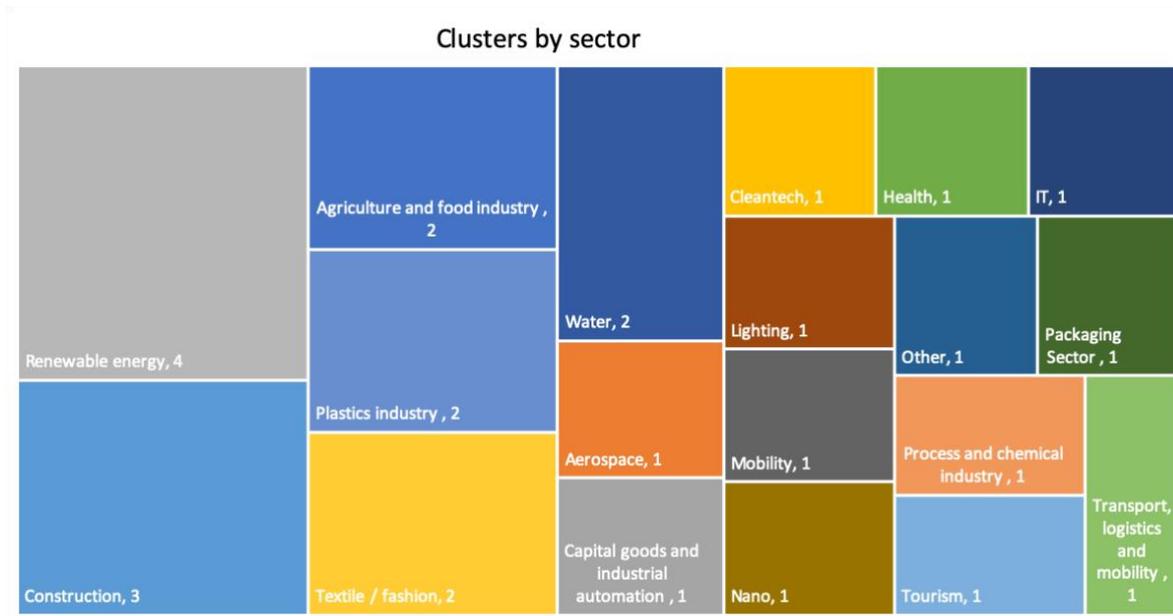
The 41 interviews were conducted with cluster managers, regional policy makers and other stakeholders working in different sectors across Europe (as can be seen in the graphs). This report presents available perspectives and approaches, but it does not necessarily present a comprehensive view on the needs and actions for a circular economy.

⁵ European Cluster Conference, 14/16 May 2019, Romania (Bucharest). More information: <https://www.eucluster2019.eu/en>

⁶ The other stakeholders are a Growth catalyst, a Co-creation of ecosystems, a Chamber of commerce, an Innovation region for advanced steel, steel products, industrial service and processing and Consultancy services.

⁷ One of the interviewees has a pan European presence.

Figure 2: Classification of the 28 clusters interviewed by sector



The methodology used had some limitations. First, we received a limited response from some industrial sectors and countries. Second, it was expected that cluster organisations involved in circular economy and which want to play a role in this research would be overrepresented, as they were more likely to respond to our request for an interview, but only 17 of the interviews attended the session. The complete list of the interviewees can be found on Annex B: Complete List of interviewees.

3. Circular economy developments from the perspective of clusters and regions

The European Cluster Conference 2019 – Circular Europe session

The European Cluster Conference 2019 provided information and discussions on future priorities for cluster policies, with a focus on connecting ecosystems. EREK, the European Resource Efficiency Knowledge Centre, organised and moderated one of the breakout sessions, “Circular Europe”.

The session started by two presentations. The first by Luca Donelli, President of the Lombardy Energy Cleantech Cluster, touched upon the complexity of the world that we live in: a world where change is partially driven by buzzwords and hashtags. But whether you talk about Circular Economy or Resource Efficiency or Industry 4.0, the underlying message remains the same. As our value chains are very much interconnected, a change in one country can also positively affect other countries. It is important to keep in mind that companies can't change the way they produce in one day, but by taking one step at the time a lot can be achieved. Especially if Circular Economy is not viewed as a specific group of content but applied wider, for example by taking the perspective of environmental cost of production.

Kristiina Jokelainen, representative of the Arctic Industry and Circular Economy Cluster, gave the second presentation on how Arctic could be sustainably developed. In the northern part of Europe, there is a wealth of resources in the forms of copper, lithium and other minerals that are key components for electronics. Kristiina explained how Finland develops this industry in a sustainable way. The idea is to develop a zero-loop system: with no waste. It requires every actor from education to SMEs to be involved.

The presentations were followed by a panel discussion involving Christiane Egger, Francesc Ribera, Aida Szilagyi and Carlo Cuijpers. Christiane Egger is the deputy manager of the O.Ö. Energiesparverband, the energy agency of Upper Austria, and the manager of the Ökoenergie-Cluster, a network of 150 companies active in renewable energy and energy efficiency; Francesc Ribera is cluster manager of the cluster de l'energia eficient de Catalunya; Aida Szilagyi is the president of the Romanian National Center for Sustainable Production and Consumption and Carlo Cuijpers is a sustainability adviser with KPMG. There were several key messages that came out of this discussion. The first message is that clusters can serve as the voice of companies as they are in the unique position where they can learn about the success stories and share these stories to inspire other organisations. And inspiring is important, because this gives organisations a sense of purpose. In extended ecosystems, clusters thus can act as agents of change in favour of Circular Economy.

Five key messages were abstracted from this session:

- ❖ Clusters can convey the voice of companies as they are in the unique position to share the success stories of companies and inspire other organisations to venture in circularity. Clusters can act as agents of change in favour of circular economy.
- ❖ There is a lot to do to turn our economies and industries fully sustainable, but there are solutions, and step by step, all companies can make a significant change.
- ❖ The local level plays a crucial role in promoting circular economy and circularity should be integrated into regional ecosystems.
- ❖ Policymakers should not be trapped in over-regulation but instead should create simply the right framework conditions for companies to jump on the circularity train.

- ❖ Circular economy will transform financial markets, industries and our society. Companies will have to embrace circular business models sooner or later, otherwise they will be out of business.

Impacts on different industrial sectors

According to the cluster managers and policymakers interviewed, the shift towards a circular economy will affect almost all industries and will have a large impact on the companies located within their cluster. It is expected that it will influence the production, processing and packaging of materials and products, needing more and closer cooperation within the value chain. The only exceptions are healthcare industries and aerospace manufacturing (although the impact is significant in the operation of aircrafts)⁸.

*"The circular economy is a cross-sectoral issue. This means that almost all industrial sectors are going to be affected by this phenomenon."
Bianca Dragomir, CEO, Avaesen*

Figure 3 presents the sectors and economic areas that are seen to be the most influenced by the shift towards a circular economy. Some were mentioned more frequently than others, especially agriculture, food, energy and construction. Two interviewees also pointed out the large impact on education, as the education system will need to adapt its curriculum and prepare the next generation of business leaders to think in a sustainable and resource-efficient business manner. These changes to education will have an indirect impact on the other sectors.

Figure 3: Answers to the question: What (other) economic areas do you think are most affected by the shift towards more resource efficiency and a low-carbon circular economy?



Although interviewees agree that the shift to a circular economy would impact almost all sectors, they have different perspectives on the (type of) sectors that will be impacted the most. Naturally, the amount of resources required by a sector determines the relevance of resource efficiency, such

⁸ There could be more sectors on which the circular economy does not have a large impact, as people working in those sectors could be less likely to have answered our request to participate in this research.

as the energy or construction sector and manufacturing industries where it plays a significant role. In these sectors many stakeholders seem to be aware of the shift towards a circular economy and sometimes even see it as a market opportunity, e.g. the solar industry. One interviewee from a construction cluster mentions that because the construction industry is responsible for 40% of the resource consumption and 35% of the waste production in their country, the impact on the construction sector would be significant. Also, the plastic industry sees a large impact, as global pollution through plastic littering is a serious issue.

There are differences between sectors as to what extent materials can be reused or efficiency gains can still be found. Sectors that require a large amount of resources and sectors that use resources that are easy to recycle have, in many cases, already improved the efficiency of their processes and optimised recycling or reusing the materials because this is an easy way for them to save money (and contribute to protecting the environment). Therefore, in the coming years, sectors where efficiency gains are harder to achieve and where materials cannot easily be reduced will be impacted to a greater extent by societal demands for more circular products.

In addition, sectors whose products have a significant impact on the resources needed in the use phases can make a big difference. An example is the steel sector, which can contribute to sustainability during the use phase, e.g. by developing stronger types of steel so that the automotive industry can reduce the weight of vehicles (resulting in reduced fuel consumption) and make longer lasting constructions (resulting in less replacements and therefore less materials needed over the lifetime of the average vehicle).

Thus, it is expected that the move towards a circular economy will have the largest impact both on companies that use a lot of resources and on companies that do not yet optimally reduce, reuse, recycle or recover (known as the four Rs) the resources they use. Take for example energy use: Energy-intensive industries (e.g. steel or chemicals), in many cases, have already significantly reduced their energy use because energy is a large expense. However, having done all the quick wins, there are still some big challenges left for which it is more difficult to find a solution. Less energy-intensive industries have probably not done as much to reduce energy use because it is only a small cost for them. Therefore, there is more potential here to reduce energy use, but at the same time, the absolute energy reduction will be smaller. This same logic applies to the use of water, materials and other resources.

Size and matter in being ready

Larger companies, in general, seem to be more ready for the shift to a more circular economy than smaller companies, with most of them having a strategy to address it. In SMEs, strategic capacities are often less well developed and there is more limited capacity for systemic analysis of future trends and for developing actions in product and technology development outside the present core business. Those SMEs that do see the shift coming do not always have the resources, time, knowledge and ideas to act on it. However, they will react if regulation forces them or if somebody shows them the direct benefits.

Many SMEs don't pay enough attention to green supply chains. Large industrial companies are usually more aware of the potential in circular supply chain management. They try to reduce resources and waste along the supply chain and close all possible loops by cooperating more closely with service providers and recirculating materials at different stages, as pointed out by one interviewee from a logistics cluster.

*"Circular supply chain management has a lot of potential, but several industrial sectors and especially SMEs need to work and be supported to get prepared for the shift."
Luca Donelli, President, Lombardy Energy Cleantech Cluster*

In terms of sectors, it is energy and clean tech companies that seem to be more ready for implementing circular economy and actually actively push the shift forward. Cluster managers from tourism, lighting and chemistry sectors are also confident that the companies in their cluster are ready to implement changes towards a circular economy.

Climate protection and the attention on renewable energy sources have a positive effect on resource efficiency. However, Europe's leading position may change, as China and other parts of the world are investing a great deal in clean energy technology. The IT sector is another important driving force for the circular economy as digitalisation can help many companies make their processes more efficient through the use of fewer resources.

However, not all sectors are ready for the shift. An interviewee from the agri-food sector states that companies are not yet ready, as did interviewees from the aerospace and health sectors. In the packaging sector, they are not ready in financial terms, as solutions like biodegradable materials are more expensive. But small changes have been observed in many industrial sectors. One interviewee in the construction area states that companies in his cluster are interested in the circular economy, but not prepared for it yet. The textile industry claims that they will be ready once the market is ready, but many logistics companies are willing to change but do not know how.

Developments in different countries

In most regions, the shift to a circular economy is still in an early phase but speed and advancement differ per sector and per region. In a survey among Danish cluster organisations, 75% of them stated that they are working towards a circular economy. This amount of attention is, to a large extent, driven by the public sector, which also made funding available to make the required changes in this area⁹.

Many other countries, such as Hungary, France, Austria, and Italy (starting with larger companies), have witnessed signs of growth in this sector as well. In Slovenia, the government is supporting the movement to green, sustainable paths, e.g. by supporting green energy, car sharing, smart buildings and local food. Improvement is also being seen in the Czech Republic:

"Companies are open to talk about changes in terms of the circular economy, which is a significant improvement on past years."

Petr Tomasek, International Relations Manager, Moravian Aerospace Cluster

However, several interviewees also mention that companies in their country are not yet ready for the shift or do not know how to start. For example, in Romania, the topic of circular economy is still very new and, according to cluster managers, companies are not ready for the shift. The interest is high, and companies are motivated by the hope to be more competitive by reducing costs and avoiding waste. However, there is still a great deal to be done as many resources are not yet completely used or re-used. Furthermore, in Belgium many companies are willing to change but most of them do not know how. This is already an improvement from a few years ago though when many companies did not even realise there was an issue with resources.

"They are more and more touched by this subject, but a lot of work still needs to be done to make the companies feel more concerned."

Hydreos

The extent to which different countries have adapted their policies to the needs of a circular economy also varies, as does their approach. In Romania, for example, there is no bottom-up movement in the

⁹ Conducted by Cluster Excellence Denmark in June 2019 among 35 clusters. Preliminary results based on 17 answers.

circular economy (yet), and a top-down approach prevails, whereas in a Dutch region, a bottom-up movement is observed where companies started initiatives and the regional authority joined their partnership and facilitated the changes they need.

More specifically, regions use different methods to decide on which sectors they focus their efforts to achieve circularity. For example, some regions set up a programme, focusing on sectors that use the most resources and developing resource strategies for these sectors. Catalonia provides an interesting example of choosing strategic sectors for the circular economy, for which they used an elaborate process: the potential for circularity on different aspects was scored, such as the intensity of materials, the environmental profile, the scope for improvement and the feasibility of reusing or recycling materials. The sectors were then scored on these topics (using around 50 indicators), as well as on the importance of the sector to the local economy. These two factors were combined to determine the main strategic sectors for boosting circular economy in Catalonia¹⁰.

One interviewee points out a large discrepancy between regions in their vision on a circular economy. According to him, many regions in southern Europe have a material perspective, focusing on recycling and waste management, whilst in northern Europe regions tend to have a broader perspective of a circular economy where they look not only at optimising residual flows, but also aim to improve sustainable energy, biodiversity and the social component.

Political and technological drivers

Political initiatives are a strong driver in moving circular economy forward. This relates to the EU Action Plan for a circular economy¹¹, as well as national and regional policies. These policies sketch future challenges and play an important role in paving the way towards a climate-neutral circular economy.

Changing consumer habits and behaviours are another important driver: end-users, especially younger people, are more and more careful about the environmental impact of products. This has large effects on, for example, the cleantech sector. However, in some other sectors the demand for circular projects is still very small.

New technologies are a third driver, facilitating the shift to a circular economy. Digitalisation was acknowledged by almost half of the cluster managers we interviewed as an important trend in support of circular economy. Artificial intelligence, robotics, automation, Internet of Things, sensory systems, big data and other ICT solutions support new solutions for the circular economy.

*"Digitalisation will have a big influence in general."
Marianne Meyer Jakobsen, Network Manager, InnoBYG*

One example is the use of digitalisation in waste collection. Trucks can detect when a bin is full so there is no need to drive past all the bins, thus saving fuel and resulting in lower operational costs. Another example is using artificial intelligence to manage production, processing and recycling.

¹⁰ Based on the study 'Anàlisi potencial de l'economia circular en els diferents sectors productis de Catalunya' (2016). Departament de Territori i Sostenibilitat i ACCIÓ by the department of territories and sustainability, 2016. The study can be found at: http://mediambient.gencat.cat/web/.content/home/ambits_dactuacio/empresa_i_produccio_sostenible/economia_verda/Sectors_economicos/Potencialitat-i-impacte-de-leconomia-circular-a-Catalunya-2016.pdf

¹¹ EU Action Plan for a circular economy. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52015DC0614>

Products can also be tagged with information about the materials used. Digital solutions are also used for a more efficient water management; blockchain ensures a circular value chain and paperless workplaces. Finally, digitalisation has a big role in enabling more energy-efficient processes and is often mentioned in relation to 'Industry 4.0'.

"With blockchain, it could become transparent how material moves throughout the value chain."

Sander Bos, Program Manager, Province of Friesland

There are also many sector-specific trends and technological developments that contribute to the growth of circular economy.

- ❖ The cleantech sector is growing and recycling technologies are improving;
- ❖ There are developments in technologies applied to agriculture, which reduce fuel consumption and increase productivity;
- ❖ In the water sector, solutions for water efficiency and the reuse of wastewater are important trends;
- ❖ Several developments in bio-based materials and eco design have been observed.
- ❖ Three principles of a circular model were specified in the textile industry: design with no waste, keep products and materials in use, and regenerate natural systems.

Another upcoming trend is the 'safe by design' concept. It means that products are designed in such a way that they can be easily reused or composted to the environment, avoiding harmful substances or additives that would make this impossible. New business models, like 'light as a service' are also seen as upcoming trends.

Despite these promising advances, there are still many barriers to overcome in order to ensure that more companies are ready and willing to make a shift towards a circular economy. As mentioned, interviewees state that many companies are not ready yet, partly as a consequence of a (too) low demand for circular economy products and services, or lack of means or knowledge to change.

4. Needs and barriers noted by clusters and regions

The differences in company needs across sectors and regions can be quite extensive, but three needs are relatively generic:

- ❖ Knowledge and awareness,
- ❖ Policy,
- ❖ Financing.

These three needs are discussed in the following sections. At the end of the chapter, we will focus on some needs that were mentioned by only a few people, but which might nevertheless be relevant for specific regions or economic areas.

Knowledge and awareness

Awareness

More than half of the interviewees indicate a lack of information, knowledge and awareness as one of the biggest barriers towards a circular economy. Many companies are still not conscious of the circular economy and how it may affect their business. Hence, there is a need for more awareness-raising about the opportunities and role models to demonstrate how circular business models can work in practice, e.g. saving money and saving the environment.

*"The main barrier is not funding or expertise, but awareness."
Ola Skalska, Manager of C-Voucher project*

In increasing this awareness, 'good practices' could play a large role, such as companies that have been experimenting and carrying out projects contributing to the circularity. These projects should be described and shown to help other companies, enabling them to see not only the advantages and the potential profit of the change but also the actual modalities and way forward so that they will invest their time and effort in creating new business (models) around circularity.

*"Role models need to be promoted, favouring positive spill-overs in the rest of the value chain."
Luca Donelli, President, Lombardy Energy Cleantech Cluster*

Often smaller companies, especially, do not know where and how to start, and may need support in introducing the theme within their companies.

*"SMEs lack information and there is a greater need for large-scale promotion. Even if CEOs are familiar with this concept, this is not the case at the level of the employees."
Bianca Muntean, Project Manager, iTech Transylvania Cluster by ARIES T*

Although the recommendations focus on changing company behaviour, it is indicated that awareness raising among other stakeholders, such as citizens and local governments, is also important to make circular models work (e.g. in waste separation) and/or create demand for circular products and services.

Knowledge

Besides awareness, practical knowledge is also a need for many companies as the topic is still new to many, at the level of both managers and employees. They need information on the technological possibilities, which needs to be up to date (technologies in this field are improving every year), but

also on the process and financing possibilities of circular business models, as they often differ from what they are used to.

"Companies within our cluster need support in the form of professional mentoring, consultation on the topics of resource-efficiency and low-carbon circular economy in order to implement state-of-the-art solutions within their organisation."

Zsolt Keresztúri, Managing Director, Omnipack First Hungarian Packaging Technology Cluster

According to an interviewee in Sweden the 'why' is already known by most companies, but the 'how' is not. Therefore, the need for information is mainly focused on how to make a shift to a circular business model.

Furthermore, the way in which information is distributed is important, as it is now difficult to find. A one-stop-shop where companies that have a good idea (regarding circular economy) can go and find information would help them.

Financing

Access to finance for circular business models appears to still be an obstacle in many areas: almost 70 % of the interviewees mention it as a deterrent. Circular business models often require higher investment costs (e.g. new machines), which will result in lower operational costs, but this means that a higher starting capital is needed with profits only being achieved after several years. Finding the money for making those investments is difficult.

SMEs especially face this problem. They cannot make large investments themselves and banks are often reluctant to finance circular initiatives with a long payback period.

A Dutch start-up cooperate with a manufacturer producing sustainable washing machines with soap dish on top. Thanks to this cooperation, despite using much less water, energy and soap, the start-up could benefit from good maintenance and repair service provided on the long run. Machine components could be reused as well. But, such an investment was challenging to make for thousands of washing machines with a payback time of more than 10 years as it was difficult for banks to deal with these requests with other (often more complicated) structures than traditional loans.

Larger companies do not face this problem to the same extent as they are considered very creditworthy, thus making it easier for them to borrow money.

"The challenges we face are gigantic, such as 50 % fewer resources by 2030. If you want to realise this, you have to start major investments now."

Willem Huntink, Program Manager, Province of Gelderland

There also appear to be differences in access to finance between countries. Some countries have more financial resources to provide additional support to companies in this shift. For example, in Romania, sufficient national funds are not available. Furthermore, an interviewee from Eastern Europe feels that their company relies to a large extent on partners from Western Europe. And as the economy is unpredictable and changes happen fast, plans cannot be made for 5 years.

Horizon 2020 (H2020) is used as a funding opportunity, but as it is based on research instead of company development, it does not provide enough support in the practical implementation of circular economy. Also, H2020 funding is found to be hard to manage, difficult and academic. Therefore, there is a preference for financing practical solutions.

The exact financial needs differ by sector due to the size of the investments. It matters if financing research and development (R&D) is still important or if the focus should shift to the implementation

of technologies. For example, financial incentives for pilot projects and long-term commitment participations promoting new business models are dearly missed. In the textile and fashion area the costs for recycling are considered as relatively high and, apart from a few niche-products, the final price of sustainable products is too high for many consumers. The logistics sector, together with many other sectors, is very competitive and cost sensitive, and will therefore only adopt innovations if they create added value and have a good business case in the short term.

Policy

Existing legislations as barriers to the circular shift

Half of the interviewees mention policy and regulation as important barriers. In several different countries and regions regulations make it difficult for companies to reuse materials. Legislation is still based on linear business models and should be replaced by legislation that is suitable for circular models.

For example, in Spain, companies have to monitor their waste and follow its route, what it is and how it is processed. Reusing waste in the system is very difficult because it has to be precisely documented exactly where every amount is going, or some waste will 'disappear' on paper, which is not allowed by the regulations.

A Spanish company wanted to use powdered concrete blocks (from other construction sites) to make new cement. However, they did not succeed, as this method for making concrete was not a certified one. The process of certification could have been envisaged, but it was long and costly.

Also, in Belgium, in some cases, standards state that a product must be made of primary resources, even though recycled resources could technically fulfil the purpose.

*"The end-of waste criteria must be adjusted to close the loop."
Ola Skalska, Manager of C – Voucher Project*

Certification processes can also be tough in some clusters, especially clusters with high safety risks like aerospace. An interviewee from the packaging industry remarked that certification organisations do not provide certification for new biodegradable materials. For clusters where certification is important and difficult to achieve you have to take into account that changes will take a long time and require several review cycles. Also, the costs of getting certification for a new process or project are considered an obstacle. An interviewee from Romania noted that obtaining building licences could also be difficult for parties not familiar with finding their way around the web of bureaucracy.

A further obstacle is the perceived lack of cross-European harmonisation with respect to legislation and standardisation, making it difficult to create an economy of scale. However, it is also noted that it would be difficult to set the same standards for every country, as they do not have the same development rates.

A need for policies to boost the circular shift

More policies should facilitate the shift to a circular economy, such as the carbon tax does. In the energy sector, energy prices do not encourage clean energy. In the plastic sector, stronger end-of-life/waste regulations could stimulate the use of sustainable (e.g. biodegradable) alternatives. Taxing virgin materials could stimulate a more circular economy and lowering taxes on labour costs would make it more advantageous to repair products.

Also, public procurement encouraging circular and low-carbon solutions contributes the boost circular economy. In Italy, a national action plan on green public procurement (GPP NAP) sets rules

and requirements for public procurement. But according to an interviewee, an enlargement of the green public procurement is needed because the effect so far is lower than expected.

Some changes can already be seen in policies facilitating a circular economy. For example, in Slovenia it used to be impossible to return wastewater from wastewater facilities to nature, even though this water is a huge resource with the potential to positively impact dry areas. In recent years the regulation has been adapted, making it possible to return (adequately treated) wastewater to nature.

Other needs

A limited number of interviewees mention other needs and barriers, which may be country or sector specific, or just less urgent than the ones provided above.

Technological development

About 20 % of the interviewees noted that more technological development is lacking for their sectors to become circular. This is the main need mentioned by the interviewees. Thus, more research and innovation, especially in the energy and cleantech industries, is also important but also in several other economic areas, e.g. water, agriculture, construction and plastic. For example, in the plastic sector, solutions to replace fossil-based materials and new ways of recycling need to be developed.

Human capital

One obstacle in the rapidly growing solar industry is the challenge to recruit enough people. This could also be (or become) an obstacle in other sectors with rapid growth, or with changes in the skills required (which should be anticipated with the increasing circularity). In some cases, circular skills and competences might be available in the market but only at high costs. Examples of skills needed are resource, material and eco-design skills, systems thinking and collaboration. Finally, there is a need for resources to allow people to develop new and additional skills at all phases of their career.

*"Lifelong learning will become more important."
Government of Flanders*

Organisational changes

Large organisational changes are sometimes required from companies in order to become more resource-efficient. It is difficult for companies to pursue, even if there is a decent business case. For example, for a company transporting most of its goods by road, even though they are located next to a train station, they still need to make some adaptations to deliver by train, although the calculations showed that rail transport would be cheaper

Higher prices of resources

The low price of some resources makes the urgency for resource efficiency low. In the water sector, this is a serious obstacle. A cluster specialized in water management had created a working group for the industrial sector, helping them to save water. However, as water is very cheap it only represents a small part of the production costs of the companies and their interest in saving water is low. The working group is therefore on stand-by. Higher-priced resources would indeed help to incentivise greater resource efficiency.

Collaboration

Companies need to cooperate with different partners to become circular, as the waste products of one company can be resources for another. However, finding the right (new) partners and building a strong cooperation with them is difficult. Getting industry and academia (triple helix) interested is also mentioned as a barrier. Furthermore, improved cooperation within value chains is still needed.

There is a need for platforms that facilitate collaboration at a company-to-company level. An example from Finland is the One sea ecosystem, where stakeholders in the field of autonomous shipping collaborate¹².

Transparency

One interviewee also mentions a need for more transparency/ traceability in the composition and origin of materials. This could be achieved if other needs mentioned above are met (e.g. a policy requiring this, a technology making this easier to do).

Uniformity among European Member States

Demands are different across Europe, as is regulation, making it more difficult for technically advanced companies to work in an international market. The construction sector provides the example of indoor climate standards, which vary across Europe.

Balance out the establishment lobby

Lobbying from established businesses, in some cases, hinders the implementation of EU goals and policies. An interviewee indicates that, in his country, the traditional energy industry (oil, gas, coal) fight against and postpone the implementation of policies for clean and renewable energies, thus harming new industries like solar power.

Time

As companies need to change their processes and often to cooperate in a different (more intensive) way with other companies, it takes a long time to become circular.

Consumer acceptance

Consumers are not always ready for the circular economy and they do not want to pay extra for circular products. Improved marketing strategies are therefore needed to bring the circular products to consumers.

¹² One Sea – Autonomus Maritime Ecosyste. Available at: <https://www.oneseaecosystem.net/>

5. The role of regional policymakers

According to the interviewees, regional policymakers have a more formal and facilitating role compared to cluster organisations. They support transition to a more circular economy by using their ability to shape local policies, influence national policies and provide financial support. In general, they do not have much direct contact with companies in the region, but they know about the culture and the context of the region well. Every situation asks for a (slightly) different approach so no single method for shifting to a circular economy exists. Knowledge of the region is therefore an important asset for regional policymakers.

"For the regions, transitions are very context-dependent, so it is impossible to provide a blueprint. In our region it has grown very organically, coming from the bottom up with a government that provides a supporting and facilitating role. But I can imagine that there are provinces that need more top-down action."
Sander Bos, Program Manager, Province of Friesland

Design policies to facilitate new initiatives

Twelve interviewees mention that their role is to use regulation to stimulate circular economy.

In many regions and countries, companies face regulatory obstacles, as mentioned in the previous chapter. Regional policymakers can potentially remove these barriers or lobby at a national level. In this case, it pays to be specific about the changes needed, although this is sometimes difficult to define.

"In the framework of public affairs, we have learned the lesson that the more concrete we make a need or demand for (policy) changes, the more successful we are."
Sander Bos, Program Manager, Province of Friesland

Also, they can actively stimulate the circular economy using regulation. For example, in Lombardy, very nutrient-rich water (from flooded fields) would often be discharged directly into the rivers, while it would be better to extract the proteins from it first. One way of boosting circular economy is to prohibit companies from discharging this water before any useful extractions are made. Another example is in the energy sector, where regional governments decided to forbid new buildings being heated by oil.

Several regional governments are already using public procurement as a tool to stimulate circular economy. Asking for circular solutions in Danish tenders has created a demand for products that work with circular economy, for example requesting that second-hand school furniture is used. Another example comes from Belgium, where a platform for circular procurement was created to share knowledge on a topic.

"Public procurement can help to shift the economic activities."
Igor Kos, Advisor, Municipality of Maribor/ W-Cycle Institute Maribor, Slovenia

Provide access to finance

Regional authorities can provide access to finance in a variety of ways. Some can set up subsidies and innovation programmes (although for some regions this is not possible as funds are concentrated at national level). It could then be useful to track down the gaps in existing subsidy programmes and focus on filling them. It is important that funding systems are not set up in a linear way but allow

circular projects to be easily included. It might be necessary to change the way some funding systems are set up.

Regional governments can also sponsor cluster organisations and support their own eco-innovation programmes (although this does not seem to happen often) or organise events and hire experts (which does happen more frequently). For example, a region in Belgium currently runs a programme for experimental circular economy projects. They received 300 proposals and supported 135 projects. As its aim was to promote circularity in value chains, all types of stakeholders were able to cooperate and apply for subsidies.

Finally, regional governments can inform SMEs on where they can find financial support. For example, C-Voucher supports European SMEs in their transition to circular models and has open calls.¹³

Other roles

Increase awareness

Although increasing awareness does not seem to be the most important role of regional policymakers, they can contribute towards this. They can share good examples with other regions and within their own region. An example is cooperation between different cities in Europe to develop circular cities and share good practices from their pilots.

The Gelderland region in the east of the Netherlands shows how local good practices can accelerate circular economy. In this case, a regional bank offered an acceleration programme for construction companies with green and circular projects. At the first call, only one company applied and could implement its ideas into proposals – winning then multiple tenders in a row. For the second call of the acceleration programme, around 20 construction companies from the region applied, as they had heard about the success of the first applicant.

Strategy documents

When deciding on new priorities for the region and writing strategic documents, policymakers can lay the foundation for other tools and roles to support circular economy. These documents therefore indirectly contribute to circular economy. Cluster organisations often provide input to make the policy more concrete and in line with companies' needs.

¹³ C-Voucher. Available at: <https://c-voucher.com/opencalls/>

6. The role of cluster organisations

Cluster organisations can play an important role in the implementation of circular economy in Europe. In general, many cluster managers see their role as a ‘spider in the web’ and as an ‘accelerator’. Indeed, they have

- ❖ a perspective that is close enough to know the needs of companies and broad enough to see the possibilities for crossovers and cooperation;
- ❖ direct contact with companies and a good knowledge of the industrial sector(s) and region(s) they are operating in;
- ❖ experience with innovation.

Therefore, they can have a huge impact, speeding up the shift to a circular economy. If Europe were to put this topic as a primary role of clusters, this would allow them to truly optimise their potential as accelerators.

"The cluster manager is a director of an orchestra; the cluster manager must integrate multiple means to get things done faster, with focus and impact."

Bianca Dragomir, CEO, Avaesen

Increase awareness and inspire

Increasing awareness and inspiring companies is the most mentioned role for cluster managers, as it is mentioned by more than half of the interviewees. This ideally needs to be done on a regional or local level in order to reach SMEs, which is something clusters can do.

A good way to create awareness and to inspire is to show good practices and successful examples. Several cluster managers indicated that they have chosen this approach or intend to do it. For example, a cluster in the textile industry is involved in the Design4circle project (an innovative learning curriculum for the textile circular sector)¹⁴, where all project partners collect and share best practices from companies.

"You don't just have to inform; you have to inspire. Information is also on the news. They see enough information but that does not encourage action. You have to show how things can be done differently."

Carlo Cuijpers, Advisor, KPMG

Another way in which cluster companies are creating awareness is by organising events where they provide information and discuss circular economy with their members.

One cluster organisation in Spain organises two major public events (Strategic Immersion Event) every year, focusing on new technological solutions and new governance models. Another cluster in Austria organises events at the regional level on specific topics, such as photovoltaics on buildings. They use examples from so-called ‘innovators’, to inspire the ‘early majority’. These clusters also reach out to stakeholders at local level, providing information for small towns and local business owners on the possibilities and funding opportunities to save energy. Other clusters try to come up with different ways to reach stakeholders, such as a cluster in Hungary, which on one occasion exhibited a composting plant for biodegradable materials at the Sziget music festival to raise awareness.

¹⁴ "The project Design4Circle – Innovative design practices for achieving a new textile circular sector – is developed to create an innovative learning curriculum in line with the needs of designers of the textile and fashion industry." More information at <https://design4circle.eu/>

Besides disseminating knowledge and creating awareness, events can also be used to link stakeholders to each other and to collect input from the stakeholders for the cluster managers.

A cluster in Austria mentioned that they recently launched an event on circular economy where they gave attendees information and organised discussion sessions, receiving input on the audience's needs. Based on this input, they will develop a programme focused on circular economy.

An Italian cleantech cluster published and promoted the booklet *Circular economy: 5 examples of business models and business cases*. In this booklet, it provides a simple explanation of what circular economy is by showing different circular economy business models and illustrating concrete cases of five enterprises that apply these models. This way, stakeholders in its cluster can find examples and inspiration on the approach, and the principles and practices regarding the transition to a circular economy.

The role of increasing awareness and inspiring stakeholders seems more suited for cluster organisations than for regional authorities, most probably because cluster organisations are closer to the stakeholders and use the same manner of speaking. However, to a lesser extent, regional authorities can play a role here as well.

"The cluster managers are the most appropriate tool to use in disseminating information – they can speak different 'languages'. You have to involve companies, universities, etc. We know the type of language of each stakeholder group is different."

Bianca Muntean, Project Manager, iTech Transylvania Cluster by ARIES T

It is important to keep the communication down to earth and practical. This means, according to an interviewee, that you should not use terms like 'circular economy' and 'cross-sectoral cooperation' but explain how companies can make money by using their waste and how waste from one sector can be used in another sector.

Building bridges

A very natural role for cluster organisations in the circular economy is in networking, matchmaking or bringing together different parties for cooperation. This is their core business and it should be possible to extend that role with the circular economy in mind. Cluster organisations could build bridges by bringing people from different fields to the same table. After a while, they start to speak the same language.

In Denmark, the support organisation for Danish clusters (Cluster Excellence Denmark) carried out a survey among cluster organisations. In this survey they asked for the role of cluster organisations in the circular economy. Almost all the clusters indicated that their role was in building bridges between knowledge institutions and companies.

A cluster from Hungary bases its model on the quadruple helix, where the cluster brings together academia, business, government and the civil society in order to facilitate positive shifts.

"Clusters are really good at building bridges and the partnerships needed to accelerate the circular transition of SMEs"

Kaspar Nielsen, Project Manager, Cluster Excellence Denmark

Other bridges are built between clusters and between different economic areas. For example, in Denmark there is a Danish hub for the circular economy, which is a cooperation between several Danish clusters (e.g. home material, lifestyle and design, and biomass). The hub realised that circular economy is a cross-sectoral challenge where cooperation in the value chain is very important. For

example, the waste from apples used to make apple juice can be used in the production of clothes. Cluster organisations in this hub for the circular economy organise events together in which they facilitate cross-sectoral cooperation.

*"We bring solutions together and bring these to our regions."
Bianca Dragomir, CEO, Avaesen*

Furthermore, clusters also build bridges with other regions. They spot opportunities elsewhere and using their good market intelligence can connect solution providers with SMEs in their region. As SMEs are still at a disadvantage with not enough information on the solutions and different business models available, cluster managers can help to connect them with other stakeholders.

Organising business-to-business meetings, business-to-consumer meetings, peer-to-peer meetings, and students and workers' competitions are also mentioned as examples of building bridges, as well as being a mediator between policymakers and companies.

One interviewee from Serbia gives an example of how their partnerships with other clusters and regions directly help their members. They have partners in Hungary, Romania, Poland and Germany, all with some testing facilities. These facilities are shared between them, so they do not need to have everything within one country. An interviewee from Italy has a similar example, stating that their cluster members can take advantage of their network with other clusters and R&D centres in Europe. They can use the network for internationalisation and to exploit cutting-edge technologies developed in other countries.

However, not everything cluster organisations do is successful. They have to regularly check if their actions (still) match the needs of the companies. An example is a cluster that set up trips abroad, but discovered that the companies were not that interested, as it was too far away or not perceived as important for their international strategy. Collaborations with other clusters can work to everyone's advantage but this is not always the case.

By attending events and networking, cluster managers are also able to find consortium partners and communicate knowledge to their members.

Building bridges does not seem to be an important role of regional authorities, although connecting EU initiatives and policies to the region is mentioned by one of them. They provide the EU with input (as part of the ACR+, circular economy club of regions and cities), as well as the European Circular Economy Stakeholder Platform.

Provide training and information

In some cases, cluster organisations help SMEs with training and expert advice: 12 interviewees mentioned this as a role they see for themselves. They pay experts to share their knowledge. This especially helps SMEs, which do not have to pay for this, or they only pay a small fee, more to ensure commitment than to cover the costs. Funding for this often comes from public projects.

Examples of experts hired are technical experts, engineers and experts in production methods or process designers. For example, a cluster in Austria set up an SME advice programme. SMEs in this cluster can reach out and receive training from a trained adviser that is 75 % subsidised. The advisers guide the SMEs towards measures, other support programmes and specialised suppliers.

Another example is the C-voucher, a H2020 project. The aim of the C-voucher is to "...develop new circular (cradle to cradle) value chains, disrupting traditional linear (cradle to waste) business models

by means of cross-fertilization with Design Thinking experts and Circular Disruptors¹⁵. Under this project, 24 SMEs from different industries were selected. They will follow an innovative circularity programme to develop circular economy solutions¹⁶.

Furthermore, a cluster in Spain trains its associates through workshops, where it explains how companies can integrate regulations to implement circular economy and try to generate changes to their production processes.

When providing members with training and information a few things should be kept in mind. First, it is important to consider if the training is scalable. If you help a few companies with a lot of coaching and training, this will give you some good case studies to show to other companies and inspire them. However, they too would probably also like the coaching and training, so you have to make sure you are able to provide it to more companies. Second, you must prove that the training will be useful for them, as they are very busy and may have other priorities. Finally, training in person is often more appreciated and more beneficial than communicating with trainers via email.

Other roles

Involvement in policy discussions

Although this role better fits local policymakers, cluster organisations can have an indirect role in designing policies. They can list regulatory barriers experienced by their member companies and decide if these barriers need to be addressed at the regional, national or European level, and if policymakers need to be lobbied to get these policies changed. They can also create a bridge between their members and regional policymakers, bringing them into contact with each other and moderating between them. Furthermore, they can be involved in policymakers' working groups.

"As a cluster we are a better voice for negotiations. We combine the voice of more than 80 companies."

Felix Arion, General Director, AgroTrasilvania Cluster

Provide access to finance

Clusters can help companies find finance by informing them on where they can find financial support (they can also help companies find private investors) and maybe even give them advice in applying for subsidies. For example, the C-Voucher supports European SMEs in the transition to circular models and has open calls¹⁷. Clusters can also lobby with public authorities to improve access to finance.

"Lobby with public authorities for investing in supporting a circular business model."

Enrico Venturini, Cluster Manager, OTIR2020 Tuscany Fashion Cluster

Support programme

Cluster organisations can also set up a programme to support companies in the innovation process. They can guide them by informing, sharing knowledge and creating partnerships. A support programme can give more attention to specific situations and provide tailored help to companies or partnerships. As cluster organisations understand what SMEs need, it makes sense for them to set up such support programmes, rather than policymakers who might offer something more generalised and less targeted.

¹⁵ See <https://www.clustercollaboration.eu/eu-project-profile/c-voucher>

¹⁶ Information obtained in June 2019 from the above website.

¹⁷ C-Voucher open calls. More information: <https://c-voucher.com/opencalls/>

7. Key conclusions of the report

Although changes are already happening, there is still a lot to do in the implementation of a circular economy in Europe. It is recommended to strengthen the role of cluster organisation in boosting circular economy as cluster organisations are well positioned to play a significant role:

- ❖ Clusters can offer a perfect nurturing environment to effectively promote CE business models among their members given their direct contact to companies and their fair understanding of the core processes and needs of companies. As the core processes will often be affected when moving to a circular model and the specific needs of companies differ, having this knowledge is important in giving the companies the right support to move to a circular model.
- ❖ Clusters can use their experience with innovation to boost circular economy. As innovation is needed when moving to a circular economy, understanding innovation and paying attention to innovation is also important. Clusters have this knowledge and focus. They can also monitor technological developments (e.g. developments in digitalisation) and translate it to opportunities for companies in their clusters.
- ❖ Clusters often have a good network, which they can use to connect stakeholders. As in the circular economy, cooperation between companies in a value chain and between companies in different sectors becomes more necessary, building bridges and using and expanding existing networks also becomes more important. Cluster organisations can also embrace new players in their regional ecosystems and involve them in the cluster, like resource-efficiency support providers, waste management organisations and circular economy foundations. They can also notice opportunities for using the waste of one type of company as a resource for another and build strategic cluster partnerships to help these parties cooperate.
- ❖ Clusters can think from a broad, shared perspective, without disregarding the individual perspectives of companies. Knowing the needs of companies and seeing possibilities for crossovers and cooperation, they can connect to other clusters and help companies that can benefit from each other in the shift to a circular economy to find each other. Clusters can solve a problem at a larger scale by making a joint approach for a group of SMEs.

Annex A: Interview questions

The EU is shifting towards more resource efficiency and a low-carbon circular economy. We would like to hear your view on this, by answering the questions below (5 main questions, with three sub questions each).

1. Sectors/Economic areas
 - a) In which sector(s)/ economic area(s) is your cluster operating?
 - b) How large is the impact of the shift towards resource efficiency and a low-carbon circular economy for this/these sectors?
 - c) What (other) economic areas do you think are most affected by this shift?
2. Change
 - a) How ready are companies in your cluster for this shift?
 - b) What changes do you already see in this cluster? (In general, and/or specific examples)
 - c) What are trends/ technologies that offer the best solutions for this shift to happen?
3. Needs & barriers
 - a) What do you think companies in your cluster need to get ready for this shift?
 - b) Which barriers do you see in the development of a low-carbon circular economy in Europe?
 - c) Can you explain these barriers/ give examples?
4. Role of clusters/ policy makers
 - a) What role could the cluster manager play to facilitate this shift?
 - b) What are you already doing/ can you give examples of how you fulfil this role (and if possible, the effect)?
 - c) Do you have experience with actions that did not work? (Why not? Others can learn from this).
5. Other
 - a) Do you have any other remarks?
 - b) In the interview list of the report, can we refer to your organization, or your name + organization?
 - c) Is it okay if we quote you in our report?

Annex B: Complete List of interviewees

Table 1: List of cluster managers

#	Organisation	Interviewee	Cluster thematic/ type	Function	Country
1	Standort Tirol, Cluster Erneuerbare Energien	Birgit Weihs-Dopfer	Renewable energy	Cluster Manager	Austria
2	Groen Licht Vlaanderen (Green Light Flanders)	Peter Bracke	Lighting	Manager	Belgium
3	Logistics in Wallonia	Bernard Piette	Transport, logistics and mobility	General Manager	Belgium
4	Moravian Aerospace Cluster	Petr Tomasek	Aerospace	International Relations Manager	Czech Republic
5	Nanoprogress z.s.	Anonymous	Nano	Anonymous	Czech Republic
6	Cluster Excellence Denmark	Kaspar Nielsen	Support organisation for Danish clusters	Project Manager	Denmark
7	Hydreos	Anonymous	Water	Anonymous	France
8	Omnipack First Hungarian Packaging Technology Cluster	Zsolt Keresztúri	Packaging Sector	Managing Director	Hungary
9	Zone cluster	Tamás Koltai	Mobility	Project Manager	Hungary
10	Lombardy Energy Cleantech Cluster	Luca Donelli	Energy cleantech	President	Italy
11	OTIR2020 Tuscany Fashion Cluster	Enrico Venturini	Textile – fashion	Cluster Manager	Italy
12	Proplast	Marco Monti	Plastics industry	R&D Project Manager	Italy
13	Wellness Cluster iVita	Anonymous	Health	Anonymous	Lithuania
14	TTA Textile Cluster Macedonia	Natasha Sivevska	Textile & clothing industry sector	Executive Director	Macedonia
15	Eyde Cluster	Helene Fladmark	Process and chemical industry	Manager	Norway
16	Norwegian Solar Energy Cluster	Anonymous	Solar energy	Anonymous	Norway
17	AgroTransilvania Cluster	Felix Arion	Agriculture and food industry	General Director	Romania
18	Cluster for Promoting Nearly Zero Energy Buildings (pRO-nZEB)	Anonymous	Construction	Anonymous	Romania
19	IND-AGRO-POL Cluster	Anonymous	Agro industry	Anonymous	Romania
20	iTech Transylvania Cluster by ARIES T, Romania	Bianca Muntean	IT	Project Manager	Romania
21	Cluster for ecological culture and ecological energy – EcoPanonia	Mirjana Kranjac	Renewable energy	Assistant Manager	Serbia
22	Construction cluster Dundjer	Biljana Avramovic	Construction	General Manager	Serbia
23	Fonund tourism micro-regional cluster – Subotica-Palić	Anonymous	Tourism	Anonymous	Serbia
24	Avaesen, Valencian Cluster of Energy Industries	Bianca Dragomir	Cleantech	Director	Spain
25	Cluster de Bienes de Equipo de Catilla y Leon	Ruth Escolar	Capital goods and industrial automation	Technician	Spain
26	ZINNAE – Cluster for the efficient use of water	Marisa Fernández Soler	Water	Cluster Manager	Spain

27	Swiss Plastics Cluster	Aruélie Auffret	Plastics	Cluster Manager	Switzerland
28	InnoBYG	Marianne Meyer Jakobsen	Construction	Network Manager	Denmark

Table 2: List of regional authorities

#	Organisation	Interviewee	Function	Country
1	OÖ Energiesparverband	N/A	N/A	Austria
2	Government of Flanders	Anonymous	Anonymous	Belgium
3	Province of Gelderland	Willem Huntink	Program Manager	Netherlands
4	The Province of Friesland	Sander Bos	Project Leader	Netherlands
5	Marshal's Office of Lower Silesia Voivodeship, economic division	Anonymous	Anonymous	Poland
6	Municipality of Maribor/ W-Cycle Institute Maribor	Igor Kos	Advisor	Slovenia
7	ACCIÓ	Anonymous	Anonymous	Spain
8	The Swedish Agency for Economic and Regional Growth	Ewa Andersson	Program Manager	Sweden

Table 3: List of other organisations

#	Organisation	Interviewee	Type of organisation	Function	Country
1	Funding Box	Ola Skalska	Growth catalyst and C-voucher programme managers	Programme Manager	EU
2	DIMECC Oy	Harri Kulmala	Co-creation of ecosystems	Chief Executive Officer	Finland
3	Tourism and Hospitality Chamber of Slovenia (TGZS)	Anonymous	Chamber of commerce	Anonymous	Slovenia
4	Triple Steelix	Larz Ignberg	Innovation region for advanced steel, steel products, industrial service and processing.	Director	Sweden
5	KPMG	Carlo Cuijpers	Consultancy services	Sustainability Advisor	The Netherlands

