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of the Regions**

**Commission for
Economic Policy**

ECON

Implementing a place-based approach to EU industrial policy strategy



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List of abbreviations

CF	Cohesion Fund
CoR	Committee of the Regions
CLLD	Community-Led Local Development
CPS	Cyber-physical system
EC	European Commission
ERDF	European Regional Development Fund
EFSI	European Fund for Strategic Investments
ESIF	European Structural and Investment Funds
EU	European Union
GPP	Green Public Procurement
IED	Industrial Emissions Directive
ITIs	Integrated Territorial Investments
KETs	Key Enabling Technologies
LRAs	Local Regional Authorities
Mt	Million tonnes
OECD	Organisation for Economic Co-operation and Development
PO	Political Objective
PP	Public Procurement
R&D	Research and Development
RIS3	Strategies for smart specialisation
SME	Small and medium-sized enterprise
SUD	Sustainable urban development
TO	Thematic Objective
WEEE	Waste electrical and electronic equipment

Executive summary

This report contributes to the current debate on how LRAs can adopt and implement a place-based or low carbon and circular economy approach to the industrial policy strategy, identifying key opportunities and challenges and potential policy options.

Chapter 1 presents an introduction on the report and elaboration of the research questions addressed.

Chapter 2 discusses the key theoretical concepts underpinning a place-based approach in the context of EU industrial policy. The term **industry** is defined applying three categorical groupings. **Fragmented Industry along value chains** are characterised by a very long division of labour along the value chain rooted on the regional and national level. **Traditional Industry large scope** is characterised by homogeneous products, large scale production and economies of scope and scale. The value chain is spread out over several countries and regions, with end users predominantly global. **Industry as economic activity – small scale, bordering services** is the residual of economic activity not grouped within the first two categories. The volume of production is comparably smaller and thus the markets served are mostly national and regional with policy steering and support determined on the same levels.

Many **place-based** concepts are embodied in EU industrial development strategy through **Smart Specialisation** - a vision of regional growth trajectories built around existing place-based capabilities. This vision has evolved from the well-known **Triple Helix** approach (universities, enterprises and public authorities) to a wider view including cooperation in innovation along with the spatial dimension (**Quintuple Helix**).

More recently, within the EU policy context, **circular economy has emerged** as a fundamental alternative to the linear take-make-consume-dispose economic model. Central to driving the process towards circularity in industry is to **involve different economic actors, such as businesses and consumers, and all policy levels**.

Chapter 3 describes the historical changes in the EU policy framework as it steadily evolves toward a **smart, innovative and sustainable** environment for industry incorporating the key features of a **place-based approach and circular economy**.

From 2015 the EC has put forward **several initiatives to support the circular economy** covering topics such as fertilisers¹ re-use and upcycling, eco-design², energy

1 European Commission (2016a).

2 European Commission (2016a).

from waste³, and restriction of hazardous substances in electrical and electronic equipment⁴. Following this, the **2017 EC Communication** presented a re-organisation of its strategy for European industry with the goal of achieving a **stronger and more competitive EU industry** as a holistic package, touching on the place-based approach. Elements are linked to national, regional and urban policies, with a focus both on **Key Enabling Technologies (KETs)** and **circular and low carbon economy**. In 2018, the EC adopted the **Circular Economy Package** containing revised legislation⁵ and setting new targets which also call for the contribution of LRAs. It should be noted that most of the **targets set remain unattained**. Most recently, a future perspective is observed in the context of the Commission proposal for the **Multiannual Financial Framework for 2021-2027** as demonstrated through the new **Policy Objectives (POs)** of the combined **European Regional Development Fund (ERDF)** and the **Cohesion Fund (CF)**, some of which can be applied to support circular and low carbon economy as well as place-based industry.

Chapter 4 presents six case studies. **Two discuss the place-based approach** (Mazovia, Poland and Bavaria, Germany), while **four cover low carbon and circular economy** initiatives (City of Maribor, Slovenia, City of Vienna, Austria, Skåne County/ City of Malmö, Sweden, and South Holland, the Netherlands).

Mazovia's approach to **place-based industrial strategy** relies on both the **diversification and specialisation** of the industrial activities and of the associated types of support. It is implemented by regional government. The Bavarian strategy (Cluster Offensive Bavaria initiative) includes **regional platforms in high-tech industries and traditional key branches** of the Bavarian economy. It is structured along **clusters inherently participatory and based on constant policy dialogue**.

The case studies covering the **low carbon and circular economy** approach are municipal (City of Maribor, Slovenia; City of Vienna, Austria) and provincial territorial experiences (Skåne County in Sweden with a focus on Malmö city and South Holland, The Netherlands). These territories have different sectoral specialisations as well as diverse environmental and social challenges, suggesting that **a low carbon and circular economy approach can be adopted in different territorial contexts**.

The territorial experiences covering the low carbon and circular economy approach show the **importance of public policy to push for the transition**, promoting development of **innovative infrastructure**, strategic use of **public procurement** to introduce low carbon practices, as well as **changes in regulations** reducing barriers to circularity and behavioural changes among citizens. On the other hand, **the economic viability of a circular economy remains an overarching issue**. It is easier for industries to commit to reusing high-value materials, but much more difficult to

3 European Commission (2017a).

4 European Commission (2017b).

5 See Directive (EU) 2018/851 and Directive (EU) 2018/852.

incentivise the re-use of low value material. Another challenging issue for LRAs is the **difficulty in monitoring the transition towards new industrial models**. This challenge is particularly evident for LRAs implementing a circular economy strategy.

Chapter 5 presents the **conclusions** and related **policy recommendations** based on the literature review and case studies conducted.

A **place based regional industrial policy** can best support two types of industry: the “**fragmented industry along value chains**” and the “**industry as economic activity – small scale, bordering services**”, as both are rooted in the regional and national level. For developing a place-based industry strategy, an existing industrial core, or at minimum location factors supporting the development of industries, are crucial.

Cluster platforms accordingly help to implement the place-based approach by connecting the relevant actors. They represent the geographic concentrations of highly specialised industrial actors and enable their strategic and structured collaboration. Their contribution is rooted in facilitating the **collaboration between big firms and SMEs, technology centres and universities**. Cluster managements and similar institutions are often established and co-financed by regional authorities. The case studies show the **important role of the regional government** in acting as a facilitator and promoter of place-based policy.

Successfully following a place-based industry strategy is a **long-term process** which spans well beyond election periods. Case study findings demonstrate the importance of **continuously pursuing a chosen place-based industry strategy**. Core characteristics of successful support approaches include **long-term investments** into industrial facilities, the **establishment of educational basis**, and the **establishment of networks**.

It is the role of authorities to enable the necessary stable and favourable environment for place-based industry. This can be achieved through assuming supportive roles such as: **the owner of the strategy; the “networker” for the strategy; the developer of the strategy**.

Low-carbon and circular economy contributes to the **sustainable management of natural resources, energy savings and a lower material footprint**. Case studies revealed that the implementation of **low carbon and circular economy** strategies, applied to the industrial sector, has a **large economic potential** (new business creations, business opportunities, greater efficiency and savings) and presents **substantial social and environmental benefits** (increased quality of life, reduce pollution). Nonetheless, as emphasised in the Maribor case study, and to some extent in South Holland, market conditions may not all incentivise private actors in adopting circular principles.

Case studies demonstrate that there is room for regional and local authorities to alleviate the prevalence of some of these issues through:

- The development of **regional circular economy strategies**.
- Public financed activities in **awareness raising**.
- The development of **circular economy approaches for public services**. Experience gained can trigger initiatives in the private sector.
- Supporting **private, non-governmental, bottom-up initiatives** in circular economy.
- Incorporating the principles of **circular economy into public procurement**.

Overall, EU recommendations cover several broad policy areas. Investing in **human capital**, ensuring **funding which is accessible**, appropriate and well designed (through loans, grants, and financial instruments), support for **financial service providers** and investors; emphasis on a **long-term planning** approach, support for entities with a particular focus on SMEs, **business support** organisations and representatives, and **adequate infrastructure**, are among the most relevant.

Recommendation for local and regional authorities include facilitating **contact and communication between start-ups, industry, entrepreneurs, and local bodies**. **Clusters** as well as the **facilitation of networking** have proven to be equally important elements of a favourable economic environment. Further, **supporting research as well as the role of educational institutions** that contribute to the development of innovation and to training a skilled workforce is recommended. Stimulating place-based policy on a regional level further includes: providing the required **infrastructure**; **cooperation** between public and private stakeholders and between regions; developing a **regional strategy for industry**; **promotion of the region**.

The **post-2020 cohesion policy** should place an emphasis on **efficient complementary use of its funds** without duplicating national measures. MS and regions should also be encouraged to identify funding gaps, make appropriate investments, and where necessary enhance quality standards by formulating ex ante conditionalities and enabling conditions.

Regarding **recommendations on low-carbon and circular economy**, the case studies have shown that the public sector has already established various initiatives, whereas **for industry the production costs are a determining factor**. When implementing the circular economy approach to industry, in many cases **the internalisation of external costs of production is required**. Meaning that coupled products of industry must be included in market prices. Mechanisms such as an EU wide CO₂ taxation, common standards and rules for material flows, and standards encouraging modular design are some examples of how this could be approached.

It is important to note, the transition to a low carbon and circular economy may incur **high transition costs** involving significant investment. In this regard, the ERDF could provide crucial **incentives or subsidies for LRAs as well as enterprises**, if planned for appropriately. In light of this, LRAs promoting a low carbon and circular economy approach should make **good use of the time before ERDF and CF programme drafting** to verify their capacity to bring in their needs for support of circular economy into the programming process.

1 Introduction

There is increasing awareness of the importance of a strategic vision for European industry. The Commission elaborated the Communication “Investing in a smart, innovative and sustainable Industry: A renewed EU Industrial Policy Strategy” COM(2017) 479, which underlines the importance of a strong and high-performing industry for the future of Europe’s economy. As most tools to stimulate industrial competitiveness are at national, regional or local level, a partnership between the Commission, Member States, regions, cities and the private sector is identified as being essential for strengthening European industry.

The CoR considers it as important that a European industrial policy strategy includes strong territorial and place-based dimensions. The report contributes to highlighting the role of regions and cities in the development and facilitation of such a strategy.

It identifies ways by which an EU industrial policy strategy could be implemented using a territory or place based approach focusing on the roles of regional and local authorities. Furthermore the study investigates how low carbon and circular economy can be a driver of innovation, and steer the creation of future-proofed business models and employment opportunities. A particular attention is drawn to the role local and regional governments can play in supporting the design and implementation of placed-based policies and setting up levers for a low-carbon and circular economy.

The study aims at answering the following research questions:

Questions concerning conclusions

Questions related to industry policy in general

- What is a European industry policy today?

Questions related to a place based economy

- How is place based defined? By geography, administrative units, political boundaries or by functional links?
 - Is it a question of government, governance or partnership?
 - Is place based mainly about ecosystems and territorial clusters?
 - How do place-based approaches cross incorporate border or trans-regional dimensions?
- Is there an appropriate level, at which place based approaches should be applied?

- How are policy competencies at regional and local level relevant to a place-based approach?
- Are there any territorial restrictions to implementing a place-based approach and are there essential requirements that need to be fulfilled?
- Which roles can LRAs play when relevant competences are not on regional but on member state level (e.g. education)?

Questions related to low carbon and circular economy

- How can a low carbon and circular economy be a driver of innovation and new business and employment opportunities in a regional and local context?
- How can regional and local government help support low carbon and circular economy businesses and facilitate the transition to a more sustainable economy in regions, cities and municipalities?

Questions concerning recommendations

Questions related to industry policy in general:

- What role can regions and cities play in strengthening Europe's industrial competitiveness?
- How can a renewed EU industrial strategy be operationalised for the roles of regional and local authorities?

Place based industrial strategy

- What are concrete proposals for implementing a place based industry approach?
- What does the place based approach mean in operational terms in the context of EU programmes and funding?
- How can programming instruments in the upcoming period 2021-2027 contribute to the implementation of a territorial or place based approach to industrial policy strategy?

Circular economy

- What types of policy support will be needed to create the right conditions for companies to develop and adapt their business models for a low carbon and circular economy at regional and local level?

All in all, the study explores the prospects for a territorially sound EU industrial policy strategy which capitalises on industrial paradigm shifts to embrace innovation and internalise sustainable development principles. Yet, the territorial component associated to the intricate nature of the issues to be analysed may lead to a multitude of potential policy pathways.

In this respect, the report follows a step by step approach which builds on a theoretical and conceptual analysis for the scoping of the study and on case studies findings illustrating how local and regional governments are implementing place-based policies and applying low-carbon and circularity principles in order to present the prerequisites, conditions and for the implementation of an EU industrial policy strategy. The results of the analyses form the basis for the formulation of conclusions and recommendations tailored to various stakeholders and types of industries.

2 Theoretical and conceptual frameworks

Setting the frame of this study requires a preliminary analysis and definition of the key words indicated in the study aim such as “industry”, “place-based policy” and “low carbon and circular economy”. This step is essential due to the ambiguous and multi-faceted nature of these concepts which could correspond to different policy approaches.

2.1 Industry

The starting point consists in defining and refining the understanding of the term “industry”. While numerous definitions have emerged and coexisted over time, the intension is to build on these definitions to pin point the meaning of “industry” in relation to the precise aims of this study.

The Commission’s Communication on Investing in a Smart, Innovative and Sustainable Industry: A renewed EU Industrial Policy Strategy⁶ defines industry along exclusion criteria rather than setting a clear demarcation from other economic sectors/activities. Indeed, the Commission’s statistical description of the industry sector includes “manufacturing, extractive industries and utilities industries”. Business services and construction are excluded, despite being closely linked to the industrial sector. This link is even closer against the backdrop of the growing role of value chains and of the ever increasing servitisation of products. In principle, this definition follows the classic definition of “industry” or secondary sector which distinguishes the industry sector from any other economic activities.

Nonetheless, as pointed out by the Commission, the differentiation between industry and services is becoming increasingly blurry due to the changes in production organisation and extended value chains, which increasingly include service components.

Along those lines, it appears necessary to define criteria indicating which specific economic activities can be qualified as industrial. Such criteria are not meant to be bound and determined but rather guiding images on which to orientate the analysis. The following criteria of industry are suggested:

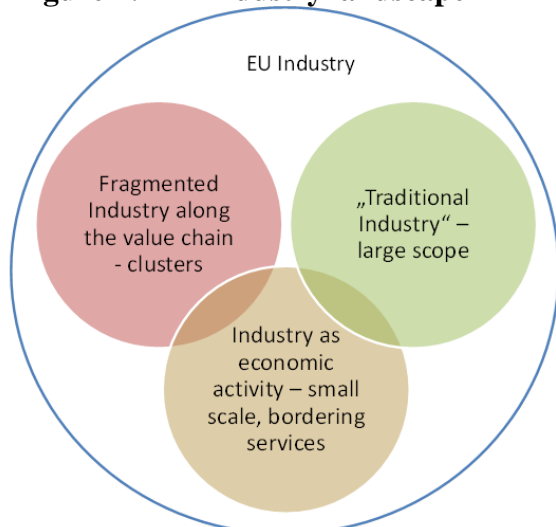
- Standardised/similar/identical products as output.

⁶ https://eur-lex.europa.eu/resource.html?uri=cellar:c8b9aac5-9861-11e7-b92d-01aa75ed71a1.0001.02/DOC_1&format=PDF

- A certain size of the single economic unit of production allowing for economies of scope and scale.
- Organisation of production: division of labour, a mix of production and services along the value chain.
- Ownership and disaggregation along the value chain: ownership is increasingly reduced to key competencies and key resources (e.g. final assembly, R&D), disaggregation is used for outsourcing and combining inputs in the value chain (e.g. clusters).
- Production functions and markets: the production function is prone to high fixed costs (capital) with a relatively low variable unit cost factor (determining the seeking of economies of scale and scope). The markets are – following the criteria above – national/transnational or even global rather than regional/local.

Although this attempt to narrow down the specifics of industry creates a more concrete picture, industry in Europe will still come in many faces and comprise various sectors and aspects of the economy. Consequently the “face” of industry will differ considerably and it is to be questioned whether a one size fits all policy approach will equally address and support all these facets. Correspondingly, a key starting point and underlying basis of this study is the acknowledgment that there is no such thing as “the industry”. It is indeed highly questionable that there will be a single policy approach able to comprehensively address all specificities (territorial and in terms sectoral subdivisions) of the industry, EU wide. Taking into account the variety of industry (as notably illustrated by the five criteria listed above), it is to be assumed that any policy support will differ considerably to pin-point the features of the different industries.

Figure 1: Industry landscape



Source: OIR, own elaboration, 2019.

Building on these first observations, the approach adopted therefore consists in splitting up the analysis of industry and industry policy along three rough classes of industrial production, which are basically derived from the aspects addressed in the Commission's Communication and from the narrower criteria defining industry listed above. They are therefore to be seen as "working definitions" for the purpose of this study to help to distinguish policy approaches and territorial specificities for industry.

Industry will be split up in the following three groups:

- "Fragmented Industry along value chains"

This group of industries is characterised by a very strong division of labour along the value chain. This implies that production steps are split up and single tasks in the production are distributed to economic sub-units or actors. The classical approach of this mode of industry is taken in clusters where different components of a coupled product are provided by different providers. Another specificity is that ownership of the different production units is not necessarily in one hand, but spread out over highly specialised economic units. However, for certain industrial sectors, notably producing products with a significant technological component, the key production steps and resources are bundled in one ownership hand. Moreover this type of industry shows a blurry border line with the tertiary sector. Some components of the value chain are not entirely produced but provided by services and the end products may also be provided in a service way rather than private ownership. Classical examples are sectors related to the bio-economy (bio-based products – ranging from energy to bio plastics etc.), industry applying circularity principles.

Territorially, this industry is very much rooted on the regional/national level and markets are thus territorially limited. Accordingly, the policy steering and supporting this type of industry is rather regionally/nationally determined with certain EU framework conditions set.

- "Large scope Industry – manufacturing oriented"

This group of industries is characterised by the traditional indications of "industry" – i.e. homogenous products, large scale production in order to tap on economies of scope and scale, a need to cover a comparably high stock of fixed costs in the production function. Such type of industries may be organised by a division of labour as well – with a clear dominance of ownership in the core technologies and key resources (mostly R&D). The final consumer product is dominantly destined to private ownership. Classical examples of this type of industry are automotive, aerospace, but also pharmaceutical industries.

Territorially, this type of industry definitely shows a supranational footprint. The value chain is spread over several countries and regions and the end consumers served are

predominantly global. The policy steering and supporting is therefore rather to be anchored on the national and super-national level which entails that this group will be best addressed by EU industry policy in the sense of a fair single market, but also in the sense of a competitive global economy.

- “Industry as economic activity – small scale, bordering services”

This last type of industries is rather a residual of any economic activity which cannot be grouped in the first two ones. The production function is not so much dominated by large stocks of fixed costs and therefore the variable costs play a much more dominant role. The ownership is embracing the whole economic unit and division of labour is not so much established along the value chain, but horizontally over synergies of the products (horizontal clusters). The volume of production is comparably smaller (dominance of SMEs as production source) and thus the markets served are rather national and regional. There is no dominance of sectors and practically all kinds of products may be found within this group. Still, the change of production modes is substantial due to the increasing influence of services in the value chain as well as in the horizontal linkages between the producers.

Territorially, this type of industry is basically of national and regional importance. – The location decisions are therefore very much driven by regional/local cost factors (e.g. local labour costs, regional tax/support system). This implies that policy steering and support will be very much determined on the regional and national levels. Likewise, needs possibly addressed by EU policy rather lie on the harmonisation and legal security side in order to prevent national/regional unfair competition and free riding.

2.2 Place based policy

The place-based approach is a regional development strategy, making best use of endogenous resources. It is characterised by coordinating efforts of different regional stakeholders including amongst others governmental institutions, private industries, educational institutions, citizens and diverse non-government organisations and all levels of government. It is a highly collaborative approach making different stakeholders in a region working together. Thus, it combines two fundamental aspects⁷:

- First, it assumes that **geographical context really matters** for its social, cultural, and institutional characteristics.
- Second, **it focuses on knowledge in policy intervention**, by promoting interactions of enterprises, local groups and policy decision makers.

⁷ Barca, McCann and Rodriguez-Pose (2012), p.139.

A place based policy is specifically tailored to developing existing advantages, specialities and capabilities and extending them into new growth trajectories within a region. These, in turn, are rooted in a location's history, culture and geography⁸. The emphasis is upon place – and knowledge – rather than particular sectors. Place-based policies are therefore geared towards using local characteristics, complexity and interconnectedness to spur local and more inclusive growth.

Place-based development policy recognises that most of the knowledge needed to fully exploit local growth potential and to design tailor-made institutions and investments is not readily available to the state, large corporations and local agents. It is developed through a participatory and deliberative process involving local and external stakeholders⁹.

2.2.1 Key theories

The place-based approach combines key theories that highlight the characteristics of a location, available resources and institutions, as well as additional elements such as collaboration, adaptability, resource management capability and the interaction of different local elements. It is a policy synthesis of three economic theories¹⁰ joining aspects such as human capital and innovation (endogenous growth theory), agglomeration and distance (new economic geography), and institutions (institutional economics):

a) The **Endogenous growth theory**¹¹ sees the economic growth as a direct result of internal processes and developing human resources contributes to economic growth through new technologies as well as efficient production and services. Supporters of this theory emphasise the need for government and private sector institutions to be creative, because knowledge determines economic growth. Policies of openness, collaboration, change and innovation can contribute to growth, while policies focused on constraints, such as protecting certain types of production or service, hamper growth in the long term.

The endogenous factors of regional growth are components in a region's socio-economic and cultural system¹², such as entrepreneurial ability, local production factors (labour and capital), as well as the relational skills of local actors generating cumulative knowledge and decision-making capacity. This enables local economic and social agents to guide the development process, support it during change and

⁸ Bailey, Pitelis, and Tomlinson (2018).

⁹ Barca, McCann and Rodriguez-Pose (2012), p.147.

¹⁰ Barca, McCann and Rodriguez-Pose (2012). For a review of the economic theories see also L. Baltiņa (2014).

¹¹ For a review see Romer (1994).

¹² See Capello (2007) and Mel'nikova (2015).

innovation, and enrich it with external information and knowledge to encourage growth.

- b) The **new economic geography theory** explains the link between location and economic development in nations and regions. It highlights a more flexible approach to using geographical space, emphasising the role of regions in creating a business-friendly environment¹³. It assumes that interactions between institutions and geography are critical for development, and development policy should encourage these interactions¹⁴. In a place-based approach, understanding the likely impacts of a policy requires interactions between institutions and geography to explicitly consider the local and wider regional context¹⁵.
- c) The **institutional economics theory**¹⁶ focuses on institutions as the main reason that areas with similar territorial resources have different societies and economies. This implies deep and co-ordinated engagement of regional and local governments in achieving national short and long-term development outcomes. It also entails nurturing specific institutional arrangements to sustain the dialogue between public and private sectors, academia and training institutions and community-based non-governmental organisations.

All three approaches are inextricably linked with a territory and determine the structure of social and economic relations unique to the territory¹⁷. As local conditions determine the competitiveness of a local production system and ensure its persistence over time, space becomes an active factor in development. So, **the specificity, complexity and interconnectedness of a territory are essential parts of an industrial development policy strategy**. In this sense, place-based strategies are different to “top-down” policies – often identified as place-neutral policies in the World Bank’s view¹⁸ – where central governments pursue a one-size-fits all solution to spur growth.

¹³ Baltiņa I. (2014), p.36.

¹⁴ Krugman's new Economic Geography is based on the idea of multiple equilibrium states in the development of economic spatial structure. To analyse more clearly the formation and evolution of economic spatial structure, Krugman puts forward four propositions: (1) Transportation Costs play a key role in international trade and inter-regional trade; (2) Spatial agglomeration of interrelated economic activity could save costs and increase benefits; (3) The cost-saving and benefit-increasing from economic spatial agglomeration could promote further concentration of economic development; (4) Early-development advantage could lead to long-term accumulation of economic activity.

¹⁵ Barca, McCann and Rodriguez-Pose (2012), p.139.

¹⁶ See Chang (2011).

¹⁷ Larisa Mel'nikova (2015).

¹⁸ See Larisa Mel'nikova (2015), p.6.

2.2.2 Key policy concepts for an industrial place-based approach

Barca defines a place-based development policy as: “*a long-term development strategy whose objective is to reduce persistent inefficiency (underutilisation of the full potential) and inequality (share of people below a given standard of well-being and/or extent of interpersonal disparities) in specific places, through the production of bundles of integrated, place-tailored public goods and services, designed and implemented by eliciting and aggregating local preferences and knowledge through participatory political institutions, and by establishing linkages with other places; and promoted from outside the place by a system of multilevel governance where grants subject to conditionalities on both objectives and institutions are transferred from higher to lower levels of government*”¹⁹.

Translated into industrial policy a place-based approach can be viewed as the answer to the following questions:

a) What are the local comparative advantages? Regional policy makers and businesses define their development paths based on the current (and possible new) comparative advantages of a region²⁰. According to the place-based approach each territory has different types of industrial inputs, quantitatively and qualitatively, which give the local economy different comparative advantages. Identifying the comparative advantages means identifying what inputs need to be enhanced to raise industrial productivity, foster competitiveness and encourage specialisation. Broadly, these are human and physical capital, which are strictly related to labour productivity, as well as raw materials and energy resources which affect production costs.

A place based industrial policy aims to improve the quality of local labour resources as well as investments in research, development and innovation. Without investing in local human capital and in research and development, investment in infrastructure may be useless, although such investments increase accessibility, especially for remote areas. This needs some time to show positive effects, but it represents a base to create conditions for long-term growth.

b) What pattern of industrial specialisation is needed? Due to a place based industrial strategy there is no one-size-fits-all approach. Local specificity is both inevitable and desirable to develop the strength of the industry within a region. What works in one place cannot be transferred context-free to another, no matter how similar²¹. A place based regional strategy for industries requires therefore the understanding of the specific sectoral constraints and capabilities in their area. An industrial regional strategy identifies the path for industrial policy is based on the existing comparative advantages. Place based regional industrial strategies can foster industrial

¹⁹ Barca (2009), p.5.

²⁰ Bailey, Pitelis, and Tomlinson (2018), p.2.

²¹ Committee of the Regions (2017).

specialisation by enhancing traditional sectors where local industry already has a comparative advantage and existing strengths on the one hand. On the other hand they strive for supporting enterprises to move towards current or future more dynamic and high-technology sectors²².

c) What governance setting is supporting industrial development within a region?

The place-based approach assumes that each territory has different resources, and institutional settings to develop. Thus, no single governance setting can be applied²³. Delivering governance change is highly context-specific and achieving this depends on institutional, administrative, legal and organisational conditions²⁴. Institutional weaknesses, both national and local, potentially act as barriers to successful realisation of the potential of different places²⁵.

2.2.3 The role of smart specialisation within the place-based approach

At the core of the current EU industrial development strategy is Smart Specialisation²⁶, a vision of regional growth trajectories built around existing place-based capabilities. The key goal is to leverage existing strengths, identify hidden opportunities, and generate new strategies that regions can build on for competitive advantage in high value-added activities²⁷.

According to this view Smart Specialisation is based on the place-based principle where regions across the EU have different economic and institutional structures, pre-conditions and challenges that determine and differentiate their economic and industrial development and their policy challenges for promoting innovation, competitiveness and growth. It is “*a process of priority-setting in national and regional research and innovation strategies in order to build ‘place-based’ competitive advantages and help regions and countries develop an innovation-driven economic transformation agenda*”²⁸.

²² Three main industrial paths can be exploited. *Path renewal*, which denotes the rejuvenation of existing clusters or industries and may imply extensive changes in products, processes and organisations, including using new technology in existing industries. Renewal is associated with incremental change in old industrial regions, modifying their development trajectory rather than altering it. *Path formation* of industries that are new for the region. This is based on diversification to renew old industrial regions, which involves more significant change than the regeneration of mature clusters. It opens new directions for development, broadening the regional economic base. Diversification is defined as the emergence of new clusters in established industries. *Path creation* implies a more radical change towards new high-tech and knowledge intensive industries with radical changes in the technology and knowledge base. This implies a major shift in development for these regions, relying less on incumbent firms and more on completely new enterprises. See Committee of the Regions (2017), pp- 46-47.

²³ See Stead (2013) and Bailey and Hildreth (2014).

²⁴ DG Internal Policies (2015).

²⁵ Bailey and Hildreth (2014), pp.10-11.

²⁶ European Commission (2012a).

²⁷ Balland, Boschma, Crespo and Rigby (2018), p.1.

²⁸ Landabaso (2014), p.378.

Under this view, countries and regions identify strategic sectors of existing and/or potential competitive advantage where they can innovate, specialise and create capabilities that differ from other countries and regions. This starts with entrepreneurial discovery, a process of “*deployment and variation of innovative ideas in a specialised area that generate knowledge about the future economic value of a possible change*”²⁹. Smart Specialisation promotes entrepreneurial discovery processes to identify the most promising emerging fields of economic activity and to restrain powerful players by emphasising a participatory approach³⁰. This approach usually requires combining different knowledge of technology and market opportunities with the management and organisational aspects required to introduce a new product or service. According to the EC guide³¹ such efforts are highly collaborative and should involve a variety of stakeholders including different ministries, regional administrations, universities, industry associations, businesses, and ideally civil society organisations.

This concept of Smart Specialisation relies on three key features:

- **Diversification based on knowledge flows** from a firm-level process where knowledge, core competences and resources from existing industries are used in new industries and where entrepreneurs combine their knowledge with knowledge from other industries or knowledge providers³².
- **Strengthening and exploiting the “connectivity” between related activities** within a region as well as between the region and other regions that can bring in new knowledge and resources related to existing activities in the region³³.
- Economic activities are **linked to place identity**, not only economically, **but also physically, socially, environmentally and culturally**, so interactions between these factors bind the economic activities to the specific place³⁴.

The first two aspects are captured by the well-known **triple helix approach** where cooperation between and within knowledge institutions and enterprises determines and enhances knowledge flows. In this process, public authorities favour using potential competitive advantages and strengthening stakeholder dialogue, their involvement in the planning process and the formation of public-private partnerships.

The **quadruple helix** approach³⁵ broadens this approach by emphasising the active role of citizens as consumers and innovation users. According to this view, an increase in user-orientated innovation can promote new types of entrepreneurial discovery, even

²⁹ Foray (2014), p.495.

³⁰ Grillitsch (2015), p.6.

³¹ European Commission (2012a).

³² Grillitsch and Asheim (2018), p.1641.

³³ Drejer and Holst Laursen (2017), p.5.

³⁴ Drejer and Holst Laursen (2017), p.6.

³⁵ See Arnkil, Järvensivu, Koski and Piirainen (2010).

involving SMEs without a strong science-base in smart specialisation activities. Including users and civil society enables more innovations in addition to science- or technology-based ones. Quadruple helix innovation models therefore concentrate more on cooperation in innovation.

Civil society not only uses and applies knowledge, or demands innovation in the form of goods and services, but also becomes an active part of the innovation system³⁶. The role of firms and universities is above all to support citizens in their innovation activities (e.g. provide tools, information, development forums and skills needed for user innovation activities). Governments provide the regulatory framework and financial support for defining and implementing innovation strategies and policies. Firms and public organisations also use innovations from citizens.

The quadruple helix allows for a variety of innovations beyond those strongly based on technology or science, with a wide concept of innovation underlying smart specialisation. But it requires significant flexibility, process adaptation, new skill acquisition and potential re-distribution of power among organisations.

The **quintuple helix perspective** adds to this approach the spatial dimension. It assumes that the identity of a territory is shaped by the physical place with its landscape, environment, physical infrastructure and buildings³⁷ (see Figure 2).

It emphasises all the distinct characteristics of a place, including the physical, people and place-based potential. These can range from the workforce, know-how, competences and preferences of people in the territory to the infrastructure, buildings, harbours, landscapes, natural resources and technical facilities. The main difference between the traditional triple helix model and the newer quintuple helix is therefore in the “innovation ecosystem”, which combines and integrates social systems and environments with diverse actors and organisations in a specific territory. These include universities, small and medium-sized enterprises, large corporations, government innovation networks and knowledge clusters³⁸. The natural environments of society and the economy become drivers for knowledge production and innovation, so defining potential opportunities for the knowledge economy³⁹ and industrial development.

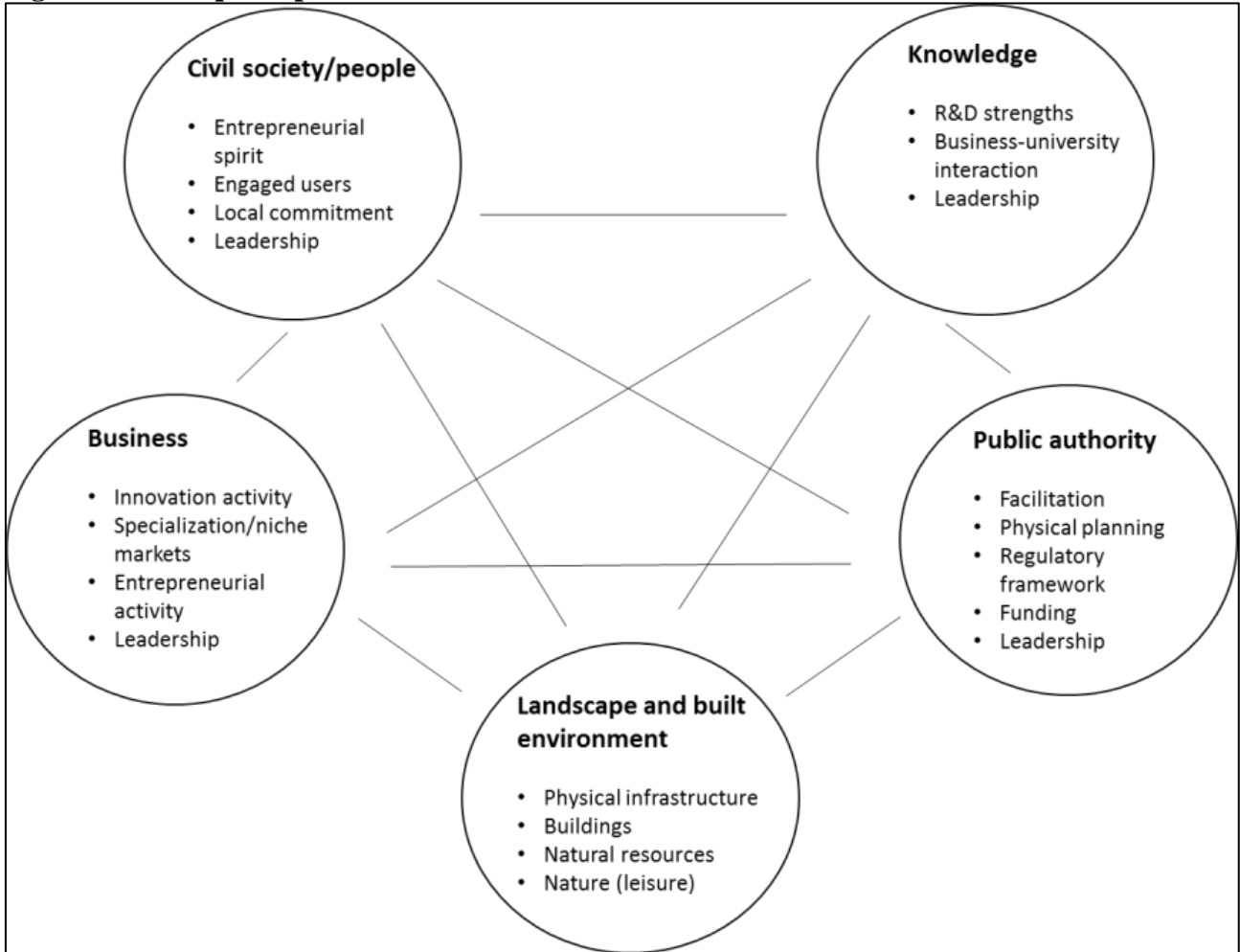
³⁶ Committee of the Regions (2016), p.7.

³⁷ Drejer and Holst Laursen (2017), p.7.

³⁸ Marçal *et al.* (2018).

³⁹ See Carayannis and Campbell (2010) and Carayannis, Barth and Campbell (2012).

Figure 2: The quintuple helix model



Source: reproduced from Drejer and Holst Laursen (2017), p.7.

So smart specialisation strongly contributes to a place based industry strategy by bringing in innovation as an important driver.

2.3 Low carbon and circular economy

2.3.1 General concept

The concept of a circular economy is a fundamental alternative to the linear take-make-consume-dispose economic model, based on the assumption that natural resources are available, abundant, easy to source and cheap to dispose of. But this is not sustainable, as the world is moving towards, and in some cases exceeds, planetary boundaries⁴⁰.

The linear model implies that natural resources are extracted and transformed into products. The products are bought and used by consumers who, when the products no longer fulfil their needs, throw them away. This model ignores the high economic,

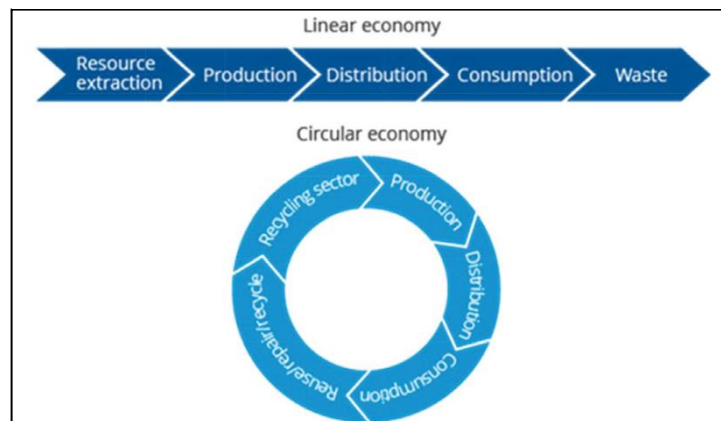
⁴⁰ European Environment Agency (2016), p.9.

environmental and social costs related to the extraction, transformation and disposal of resources, and is therefore unsustainable in the long term. Limitations of the linear model are becoming even more apparent as the availability of natural resources can no longer be taken for granted (e.g. due to water shortages, diminishing fossil fuel reserves, or environmental effects).

The key difference between the two models is in the initial and last phases of the production process⁴¹. Resource extraction and waste management in the linear economy are replaced with recycling and reuse/repair/recycle respectively in the circular economy.

In the EC's view⁴² the circular economy can boost EU competitiveness by protecting businesses against a scarcity of resources and volatile prices, help create new business opportunities and innovative, more efficient ways of producing and consuming, as well as creating local jobs at all skill levels and opportunities for social integration and cohesion.

Figure 3: The linear vs the circular economy



Source: Blunck E. and Werthmann H. (2017), p.655.

At the same time, a circular economy approach can save energy and help avoid damage to the climate and biodiversity, air, soil and water which exceeds the earth's capacity to renew these. A circular economy can provide a significant positive contribution to lower CO₂ emissions, pushing European industry towards a low carbon economy.

Furthermore a circular economy approach can reduce Europe's economic dependency on the import of resources. Europe's economy strongly relies on an uninterrupted flow of natural resources and materials, including water, crops, timber, metals, minerals and energy. Most of these inputs depend on imports which further raise pressure on the environment through transport activities. This dependence on imports can be a source of vulnerability, especially when global competition for natural resources contributes to increases in prices and volatility. Uncertain and unstable prices adversely affect the resource-dependent sectors, forcing enterprises to reduce staffing, defer investment or stop providing goods and services. At the same time, rapid increases in extraction and exploitation of natural resources are having a wide range of negative environmental impacts in Europe⁴³.

⁴¹ For a more detailed comparison between the circular economy and the linear model see also European Environment Agency (2017), pp. 14-15.

⁴² European Commission (2015a).


⁴³ See European Environment Agency (2015).

2.3.2 Characteristics of a circular economy

The circular economy approach is based on two key aims: **maintain the value of products, materials and resources** in the economy for as long as possible, and **minimise waste**.

To achieve these two aims various approaches have been developed based on the so-called R-lists⁴⁴ of actions which differ mainly in the number of circularity strategies they put forward. The most complete one⁴⁵ includes (see Figure 4): refuse; rethink; reduce; re-use; repair; refurbish; remanufacture; repurpose; recycle; recover.

Figure 4: The 9R framework

Circular economy		Strategies	
	Smarter product use and manufacture	R0 Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product
		R1 Rethink	Make product use more intensive (e.g. by sharing product)
		R2 Reduce	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials
	Extend lifespan of product and its parts	R3 Reuse	Reuse by another consumer of discarded product which is still in good condition and fulfils its original function
		R4 Repair	Repair and maintenance of defective product so it can be used with its original function
		R5 Refurbish	Restore an old product and bring it up to date
		R6 Remanufacture	Use parts of discarded product in a new product with the same function
	Useful application of materials	R7 Repurpose	Use discarded product or its parts in a new product with a different function
		R8 Recycle	Process materials to obtain the same (high grade) or lower (low grade) quality
R9 Recover		Incineration of material with energy recovery	
Linear economy			

Source: reproduced from Kirchherr, Reike and Hekkart (2017), p.224.

The transition to a circular economy in industry requires significant changes not only in the production chain (supply of goods) but also consumer behaviour (demand) and policy choices (governance)⁴⁶.

Creating a circular economy in industry requires fundamental modifications throughout the value chain, from product design and technology to new business models, new ways of preserving natural resources (extending product lifetimes),

⁴⁴ For a detailed review see Kirchherr, Reike and Hekkart (2017).

⁴⁵ See Potting, Hekkert, Woorrell and Hanemaaijer (2017).

⁴⁶ European Environment Agency (2016), p.15.

turning waste into a resource (recycling), new modes of consumer behaviour, new norms and practices, education and finance. New and innovative business models also require carefully designed policy interventions to become mature, competitive and economically viable, while avoiding market distortions.

The 9R principles highlight several ways to shift production towards a low carbon and circular economy approach:

A thinking of **waste as a resource** is required. This calls for promotion of cross-sector and cross-cycle links by creating markets for secondary raw materials, reducing energy and material use during production and also facilitating locally clustered activities to prevent by-products from becoming waste (industrial symbiosis). Thus, waste management plays a central role in the low carbon and circular economy, with a hierarchy for prevention, preparation for reuse, recycling and energy recovery through to disposal, such as landfill⁴⁷. Moreover, the **eco-design of products** should ensure they are more durable or easier to repair, upgrade or remanufacture. This can help recyclers disassemble products to recover materials and components, helping to save resources. **Reuse and repair** are not only ways to extend the lifetime of products, since they are labour-intensive activities and so they could contribute also to the EU jobs and social agenda.

A central issue for circularity is adopting service- and function-based business models. These look at **product function instead of physical ownership**⁴⁸. They can improve customer loyalty, increase market share through product differentiation, scale up the value of used products, reduce costs and bring new technologies to market. Competition is mainly based on creating added value through a service, not on a product's sale value. As providing a service is linked to the location of the customer, location of production and use will become closer. Local and service-based activities require a skilled and affordable workforce. The transition to a circular economy therefore requires a qualified workforce with specific and new skills, and opportunities for employment and social dialogue⁴⁹. Thus, the shift to a circular economy must be supported by education and training. Educational approaches in value management are necessary to change the prevailing perception of waste and uncover the potential of circular product systems and their competitive edge⁵⁰.

Moving towards a circular economy approach in industry also includes changes in consumer behaviours. For example, **collaborative consumption**, or the **shared use** of

⁴⁷ European Commission (2015a), p.8.

⁴⁸ These models can be classified as: product-oriented services, centred on product sales, with additional services such as maintenance and take-back agreements; user-oriented services, based on product leases, rentals, sharing and pooling; and result-oriented services, which provide specific outcomes, such as a pleasant climate in offices. See European Environment Agency (2016), p.15.

⁴⁹ European Commission (2015a), pp.19-20.

⁵⁰ Lider and Rashid (2015), p.48.

products by consumers, either peer-to-peer or mediated through a company, is an important aspect of circularity⁵¹. This involves sharing, swapping, bartering, trading or leasing products and other assets such as land or time. Such new forms of consumption are often developed by businesses or citizens, and promoted at national, regional and local levels.

A circular economy assumes that consumers deal with household recycling of materials and waste reduction. They change their behaviour regarding end-life of products by collecting their waste to return it to producer/retailers. Putting aside these materials and taking them back to their source requires an effort involving commitment and responsibility⁵². This is often more effective at national and local levels, where awareness campaigns and economic incentives have proven particularly effective.

2.3.3 Steps towards circular economy

The implementation of circular economy requires a change of the general attitude towards use of goods and waste management and consumer behaviours. A key point for changing consumer behaviour towards industrial products is **awareness raising**. The choices of multiple consumers can support or hamper the low carbon and circular economy. These choices are shaped by access to information, the range and prices of existing products, and regulations. For instance, a recent study by the EC⁵³ evidenced that consumers are generally willing to engage in circular economy practices, but actual engagement is low mainly due to a lack information regarding product durability and reparability as well as a lack of sufficiently developed markets (e.g. for second hand products, renting, leasing or sharing services etc.). A lack of knowledge about durability and reparability may hinder the purchase of more durable appliances. Moreover, another **barrier to consumer participation in repair services is cost**⁵⁴. When households need to repair an appliance, they balance the cost of repair with the price of replacing it.

The transition to a circular economy in industry is a systemic change⁵⁵. In addition to targeted actions affecting each phase of the value chain and key sectors, it is necessary to create conditions for a low carbon and circular economy to flourish, where resources can be mobilised. **Innovation plays a key part in this systemic change**. Rethinking ways of producing, consuming, and transforming waste into high value-added products requires new technologies, processes, services and business models. So, support for research and innovation is a major factor in encouraging the transition, contributing also to the competitiveness and modernisation of EU industry.

⁵¹ European Environment Agency (2017).

⁵² Borrello, Caracciolo, Lombardi, Pascucci and Cembalo (2017).

⁵³ European Commission (2018g).

⁵⁴ European Commission (2018g), p.70.

⁵⁵ European Commission (2015a), p.18.

A low carbon and circular economy will differ in each European city and region, depending on geographic, environmental, economic and social factors. The industrial profile of a city or region plays an important role, with service and resource-intensive sectors needing different types of support. For instance, implementing more resource-efficient transport, district heating systems or a sharing economy could be a greater challenge for less accessible areas (e.g. islands or peripheral regions) than for metropolitan areas with a higher critical mass. The diversity of territorial contexts translates into different needs and opportunities that circular economic approaches should address.

Central to driving the process towards circularity in industry is to **involve different economic actors, such as businesses and consumers, and all policy levels**. Local, regional and national authorities enable the transition, but the EU also has a fundamental role to play in supporting it. Integration between policy levels and policy domains, as well as within and across value chains, is also essential. Action is needed at all levels, from the European to the local, and by all stakeholders, including governments, businesses, researchers, civil society and citizens.

2.3.4 The concept of low carbon economy in relation to circular economy

There is a direct physical relationship between the quantity of raw materials used in industrial processes, the energy required and GHG emissions⁵⁶. The latter are emitted in all stages of the product lifecycle: extraction, production, consumption and waste management. Reducing global GHG emissions by at least 60% by 2050 compared to 2010 to limit global warming to “well below 2°C above pre-industrial levels” (as stipulated in Article 2 of the new Paris Agreement) will thus require more than a shift to low-carbon and renewable energy. Improved resource efficiency, greater recycling and re-use, as well as an absolute reduction of raw material use must become key elements of climate policy and a circular economy.

In this context, significant synergies between natural resource decoupling and achieving environmental objectives can be exploited. More efficient material management can be useful for meeting national climate commitments. Around 50% of industrial CO₂ emissions can be attributed to the production and processing of five basic materials – steel, cement, paper, plastic, and aluminium – most of which have secondary equivalents that are considerably less energy intensive to produce⁵⁷.

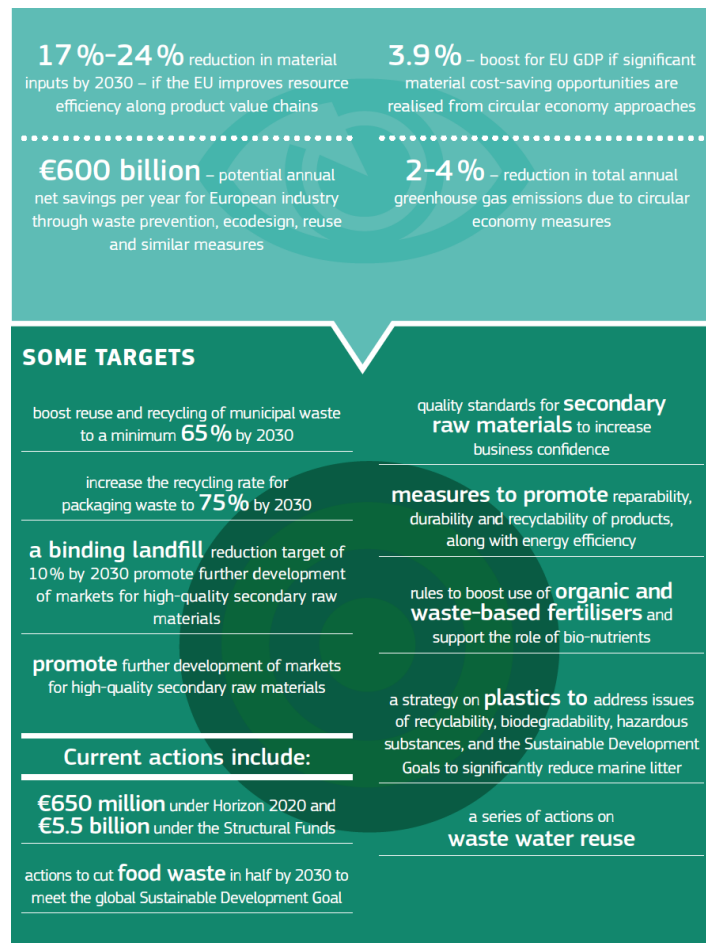
⁵⁶ Behrens (2016), pp.2-3.

⁵⁷ OECD (2018c), p.12, based on FMEAE, 2015.

Circular business models, by closing resource loops and by slowing and narrowing resource flows, can reduce the environmental footprint of economic production and consumption⁵⁸.

The transition towards a decarbonised and circular economy needs the same systemic shift. A more circular economy is indispensable for meeting global material needs without exceeding the carbon budget⁵⁹. Zero-carbon energy is a crucial part of the answer, but it is not enough⁶⁰. This is because so much carbon is either built into products themselves then released at their end of life (plastics), or is core to the process chemistry of production (steel, cement). The demand side – making more of materials already produced – will therefore be key to a materials sector in a low-carbon economy.

Figure 5: Synergies between circular economy and low carbon in Europe, key figures



Source: reproduced from European Commission (2017d), p.6.

Firmly embedding circular economy measures in the low-carbon agenda should become a priority. Circular economy measures can contribute from 2% to 4% in lower annual GHG emissions⁶¹.

Resource efficiency improvements all along the value chains could reduce material input needs by 17% to 24% by 2030 and a better use of resources could result in overall

⁵⁸ For instance: producing raw materials via recycling, rather than from non-renewable natural resources, can reduce GHG emissions by as much as 90%; remanufacturing products that have reached their end of life can reduce the extraction of natural resources and generation of waste by up to 80% relative to manufacturing new products; reduced extraction, processing, and transport of natural resources also translates into energy savings, often in excess of 50%. See OECD (2018a), p.6, based on Bureau of International Recycling (2008) and Turner, Williams and Kemp (2015).

⁵⁹ Material Economics (2018), p.7: 'It is estimated a remaining 'carbon budget' for this century of around 800 billion tonnes (Gt) CO₂. This is the amount of emissions that can be emitted until 2100 for a good chance of keeping warming below 2°C – with still less for the 'well below 2°C' target set by the Paris Agreement. On current trends, materials production alone would result in more than 900 Gt of emissions. Energy efficiency and low carbon energy will help, but do not resolve this dilemma: emissions add up to 650 Gt even with rapid adoption. This is because so much carbon is either built into the products themselves and then released at their end of life (plastics), or is inherent to the process chemistry of production (steel, cement). For context, note that 2°C scenarios typically 'allocate' about 300 Gt CO₂ to these sectors for the total world economy.'

⁶⁰ Material Economics (2018), p.10.

⁶¹ European Commission (2017d), p.6.

savings of EUR 630 billion per year for European industry. Business driven studies based on product-level modelling demonstrate significant material cost saving opportunities for EU industry from circular economy approaches and a potential to boost EU GDP by up to 3.9% by creating new markets and new products and creating value for business.

A circular and low carbon economy can bring four types of benefit⁶²:

- **Resources:** increasing the efficiency of resource consumption and conserving materials embodied in high-value products or returning waste to the economy as high-quality secondary raw materials, reduces demand for primary raw materials. This reduces Europe's need for imports, so procurement chains for many industrial sectors are less affected by price volatility in international commodity markets and supply uncertainty due to scarcity or geopolitics.
- **Environment:** reducing greenhouse gas emissions, improving resource security and decreasing import dependency lowers environmental impact (see section 2.2 for detail).
- **Economic:** reducing a dependence on imports can lower production costs. By offering a platform for innovative approaches, such as technologies and new business models, the approach can generate more economic value from fewer natural resources. Moreover, many positive economic effects are expected also for enterprises and new business opportunities (see section 2.3 for detail).
- **Social:** the circular economy approach also brings social innovation from sharing, eco-design, reuse, recycling and other developments, resulting in more sustainable consumer behaviour, while contributing to human health and safety. The circular economy can also contribute to create new jobs close to where materials are used, and some would make key services, such as transportation, more accessible and affordable. Thus, along with climate targets, a more circular economy would also make several Sustainable Development Goals more achievable.

While the expected environmental, resource-related and socio-economic benefits of a transition to a low carbon and circular economy are reasonably reliable, these may not be evenly distributed. Some industrial sectors, businesses, regions and social groups are likely to lose, while others will benefit. For example, jobs in industries producing virgin materials or low-quality consumer goods, often outside Europe, could be lost through such strategies. Realising the benefits will depend on the development and deployment of low carbon and circular economy skills.

⁶² European Environment Agency (2016), pp.12-14.

3 EU policy context

3.1 Towards a smart, innovative and sustainable industry

The EU internal market for goods and services has had a major impact on industrial performance in the EU over the past decades⁶³. By creating one of the world's biggest consumer markets through common standards and internal EU competition law, it has enhanced the development of intra-EU value chains and the economic efficiency of industrial production, introducing at the same time legislation and initiatives related to better environmental protection and sustainable, secure and affordable energy.

From the turn of the century the EU started to focus more on horizontal actions rather than sectoral initiatives. With the 2004 communication⁶⁴, stimulated by the increasing competition of emerging countries and growing delocalisation of industrial processes, an **integrated multi-policy approach on competitiveness was introduced**, with a stronger focus on research and innovation policies that are business driven and linked to innovation diffusion and systems, human capital and skills, deepening and widening the internal market, cohesion and industrial clusters, clean tech and access-to-markets outside the EU. In this communication, both the Member States and **LRAs were expected to play an active role, particularly by encouraging initiatives based on business clusters**. Moreover, the EC underlined the importance, in less developed regions, of supporting industry by improving conditions in which enterprises operated, as well as extending and improving transport, telecommunications and energy infrastructure.

With the communication in 2010⁶⁵, as a response to the financial and economic crisis, the EC aimed to further enhance an integrated industrial policy strategy encompassing competition, trade, innovation and energy. This strategy had a **stronger focus on an inter-sectoral tailor-made approach to industry and on the whole value and supply chain, from access to energy and raw materials to after-sale service and recycling materials**. Also in this communication, clusters and networks were central to improving industrial competitiveness and innovation by bringing together resources and expertise, and promoting cooperation among businesses, public authorities and universities. **Regional, national and EU cluster policies were called to overcome existing market failures and funding gaps**, especially to supply the bridge between companies and research institutions. At the same time the EC intended **to support regions in the diversification of existing industries, upgrading industrial capacity, as well as stimulating investment and innovation to re-develop and strengthen the resilience of local economies**.

⁶³ See Wyns (2017) for a review of EU industrial policy.

⁶⁴ European Commission (2004).

⁶⁵ European Commission (2010).

With the **Territorial Agenda of the European Union 2020**⁶⁶, adopted by the Commission in 2011, the **place-based approach became central for local development strategies to strengthen the territorial dimension of policies**. According to this document⁶⁷:

- A place-based approach to policy making contributes to territorial cohesion. Based on the principles of horizontal coordination, evidence-based policy making and integrated functional area development, it implements subsidiarity through a multilevel governance approach. It aims to unleash territorial potential through development strategies based on local and regional knowledge of needs, as well as build on specific assets and factors which contribute to the competitiveness of places. Places can use their territorial capital to realise optimal solutions for long-term development, so contributing to Europe 2020 Strategy objectives.
- The diversity of territories is seen as a development potential, for which the distinctive identities of local and regional communities are key. Territories with common potential or challenges can collaborate and share experiences to find common solutions. Territories with complementary potential, often neighbouring ones, can join forces and explore their comparative advantages together, creating additional development potential.
- Better use of territory can benefit economies, improve access to general services, infrastructure and public goods, as well as management of natural and cultural assets.

Despite a lack of specific focus on industry, the Territorial Agenda put more emphasis on the role of regions and cities. **Multi-level governance formats are required to manage different functional territories** and to ensure balanced and coordinated contributions of local, regional, national and European actors in compliance with the principle of subsidiarity. This needs **vertical and horizontal coordination between decision-making bodies at different levels and sector-related policies that ensure consistency and synergy**. Moreover, regions must **be supported to find their own paths of sustainable development**.

In May 2012 the EC published the guide **to research and innovation strategies for smart specialisation (RIS3)**⁶⁸, to help European regions focus on their specific strengths to increase local economic and cultural potential. The guide set out practical steps to design a national/regional RIS3, including how to analyse the regional context and identify the potential for innovation, how to set-up a sound and inclusive governance structure and how to produce of a shared vision about the future of the

⁶⁶ European Commission (2011a).

⁶⁷ European Commission (2011a), p.4.

⁶⁸ European Commission (2012a).

region. Under this framework, National/regional research and innovation strategies for smart specialisation (RIS3) are defined as “*integrated, place-based economic transformation agendas that do five important things:*

- *They focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development, including ICT-related measures;*
- *They build on each country’s/region’s strengths, competitive advantages and potential for excellence;*
- *They support technological as well as practice-based innovation and aim to stimulate private sector investment;*
- *They get stakeholders fully involved and encourage innovation and experimentation;*
- *They are evidence-based and include sound monitoring and evaluation systems”.*⁶⁹

The RIS3 framework embraces a broader concept of innovation (as discussed in Section 1.3), not only investment in research or the manufacturing sector, but also building competitiveness through design and creative industries, social and service innovation, new business models and practice-based innovation. All regions have a role to play in the knowledge economy, provided that they **can identify comparative advantages, potential and ambition for excellence in specific sectors or market niches**. Smart specialisation is not about creating technology monoculture and uniformity. On the contrary, **it is likely to promote greater diversity**. Indeed, **regions can sustain multiple lines of smart specialisations (priorities)**. With the RIS3 the EC recognises that the entrepreneurial process of discovery works differently in every region and identifying sectors that can achieve critical mass should take into account:

- The principle of **regional embeddedness**, refers to industries that are in tune with socio-economic conditions and can rely on a trained local labour force and a history of cooperative relations with other regional actors. Without these characteristics, industries are much more likely to be unsuccessful in the medium term.
- The principle of **regional relatedness**, which describes the diversification of firms into related areas based on new innovative techniques or processes. In other words, it is a strategy of diversifying within a specialisation. This allows

⁶⁹ European Commission (2012a), p.8.

firms to build on the skills, assets and capabilities within a region while adapting and improving on them through innovation.

Under this new view, in October 2012 the EC⁷⁰ introduced a more structured strategy for industrial development around four pillars: investments in innovation, better market conditions, access to finance and capital, human capital and skills. In this Communication **LRAs were invited to exploit research and innovation strategies for smart specialisation**, to support development research including pilot lines and demonstration projects and to promote co-operation along the value chain. **Close consultation with the private sector as well as research and innovation actors to identify strategic priority areas for knowledge-based investments was strongly recommended.** Moreover, **LRAs were asked to play a role in encouraging market uptake**, e.g. through infrastructure development, public procurement, and non-financial incentives such as priority access to city centres.

Key EC documents	Role of LRAs	Place-based approach principles addressed
EC (2004), <i>Fostering structural change: an industrial policy for an enlarged Europe</i>	<ul style="list-style-type: none"> • Focus on regional clusters; • Support for infrastructure in less developed regions. 	<ul style="list-style-type: none"> • Integrated multi-policy approach on competitiveness; key focus on cluster rather than on multi-sector policy.
EC (2010), <i>An Integrated Industrial Policy for the Globalisation Era</i>	<ul style="list-style-type: none"> • Regional cluster policies called to overcome existing market failures; • Support for diversifying existing industries and upgrading industrial capacity 	<ul style="list-style-type: none"> • Shift towards an inter-sectoral tailor-made approach to industry and on the whole value and supply chain; focus on clusters and on overcoming comparative disadvantages.
EC (2011), <i>Territorial Agenda of the European Union 2020 – Towards an Inclusive, Smart and Sustainable Europe of Diverse Regions</i>	<ul style="list-style-type: none"> • Support regions to find their own paths of sustainable development. 	<ul style="list-style-type: none"> • Place-based approach becomes central for local development strategies; • Diversity of territories is seen as a development potential; • Multi-level governance formats are required to manage different functional territories
EC (2012), <i>Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3)</i>	<ul style="list-style-type: none"> • All regions have a role to play in the knowledge economy; • Regions are called to identify comparative advantages, potential and ambition for excellence in specific sectors or market niches. 	<ul style="list-style-type: none"> • Importance of comparative advantages; • Importance of diversity in innovation specialisation patterns; • Multi-policy and multi-sectoral approach; • Regional embeddedness; • Regional relatedness; • Multi-level inclusive governance; • Long-term vision.

⁷⁰ European Commission (2012c).

Key EC documents	Role of LRAs	Place-based approach principles addressed
EC (2012), <i>A Stronger European Industry for Growth and Economic recovery</i>	<ul style="list-style-type: none"> • Regions invited to exploit research and innovation strategies for smart specialisation; • Regions are asked to play a role in encouraging market uptake 	<ul style="list-style-type: none"> • Multi-policy and multi-sectoral approach; • Close consultation with the private sector and research and innovation actors.
EC (2014), <i>For a European Industrial Renaissance</i>	<ul style="list-style-type: none"> • Regions have to concentrate investment on their comparative advantages and to encourage the creation of cross-European value chains. 	<ul style="list-style-type: none"> • Stronger focus of industrial strategy on regional comparative advantages
EC (2017), <i>Investing in a smart, innovative and sustainable Industry – A renewed EU Industrial Policy Strategy</i>	<ul style="list-style-type: none"> • Strong involvement of regions, together with Member States, cities, businesses and citizens in the five pillars for a sustainable industrial development. 	<ul style="list-style-type: none"> • Horizontal strategies; • Multi-policy and multi-sectoral approach; • Multi-sectoral approach

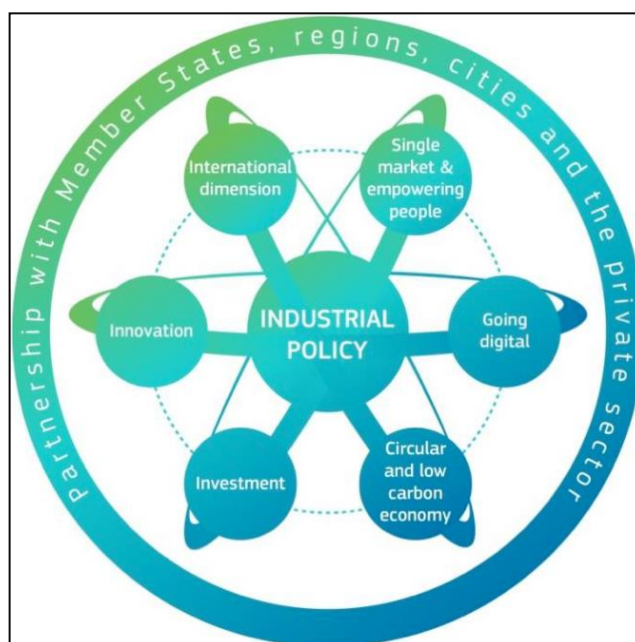
The 2012 policy vision for industry was further fine-tuned with the communication in 2014⁷¹. The focus on regional and local level was further improved especially by underlying importance of the “comparative advantage” for the industrial strategy. Here it was underlined that investments in innovation by ESIF would be guided by the concept of “Smart Specialisation”, to allow Member States and **regions to concentrate investment on their comparative advantages and to encourage the creation of cross-European value chains**. It was also recognised that “*since the impact of restructuring is most directly felt at regional level, managing and anticipating change requires regions to be actively involved. In the vein of successful ‘smart specialisation’ strategies, policy initiatives at that level (on infrastructure, training, research and innovation) should therefore take into account the effects of forthcoming restructuring. To help regions modernise the industrial base through the channelling of resources towards more productive sectors and to support efforts that minimise possible social impacts, the Commission will propose a comprehensive approach to anticipating and facilitating industrial change at regional level*”⁷².

⁷¹ European Commission (2014a).

⁷² European Commission (2014a), p.17.

With the most recent communication for a smart, innovative and sustainable industry in 2017⁷³ the EC intends to re-organise its strategy for European industry with the goal of achieving a stronger and more competitive EU industry as a holistic package around five elements⁷⁴: investments (e.g. the European Fund for Strategic Investments (EFSI), innovation (e.g. Key Enabling Technologies (KETs) and Horizon 2020), circular and low carbon economy, completion of the single market (capital and digital markets) and skills, digitisation and the international (trade) dimension. All of these elements are in turn linked to national, regional and urban policies (see Figure 6) such as smart specialisation and cooperation and industrial transformation and modernisation.

Figure 6: The pillars of smart, innovative and sustainable industry



Source: European Commission (2017c), p.6.

Most of the activities and policies mentioned in the communication are “horizontal”, i.e. they cover multiple industrial sectors and wider sectors in the economy.

Box 1: Smart Specialisation at work

As underlined by the European Commission in the Proposal for the new Regulation on the ERDF and CF “*in most regions, including more developed ones, smart specialisation strategies represent a consistent strategic framework for investments and bring about high added value. These were triggered by the strategic programming requirement for ERDF support and the corresponding pre-condition. In fact, the benefits of such strategies tend to be highest in the most developed regions (and notably in the Nordic countries, Austria, Germany, Benelux and France)*”⁷⁵.

Mapping of formal and informal networks, positioning their capabilities within European and global value chains, mapping flows of goods and services, cooperation in R&I projects **have not been performed by all regions and Member States to the same extent to date**⁷⁶. For example, **some advanced regions already have a good knowledge of their regional actors as they have put in place a range of cooperative measures aiming to enhance productivity and quality output.** On the other hand, employing the entrepreneurial discovery process offered many regions a good opportunity to learn about their regional actors, explore their activities and markets. As a result, these regions got an important opportunity to interact with their regional stakeholders and to map their activities, opportunities, weaknesses and needs. However, **some less developed regions are at the earlier stages of the process.** The transformative agendas prepared by regional and national governments tend to be somewhat inward looking and **do not always employ an adequate strategic approach to enable and facilitate trans-regional collaboration.**

⁷³ European Commission (2017c).

⁷⁴ Wyns (2017), pp. 8-9.

⁷⁵ See European Commission (2018i), p.2.

⁷⁶ <http://s3platform.jrc.ec.europa.eu/value-chains>

Moreover, **there are several problems and challenges associated to the reality of the multi-level governance dimension of Smart Specialisation**⁷⁷, such as: ineffective coordination mechanisms; lack of trust among authorities and actors placed at different territorial scale; difficulties in developing common visions that combine the different needs, agendas and expectations of the different territorial levels; lack of clear political commitment for a more active engagement of sub-regional governments and stakeholders; and duplications of support measures and/or implementation of contradictory measures.

Multi-level governance requires clear and transparent coordination arrangements and mechanisms, where the different agendas and interests of all relevant stakeholders are brought to the fore. **There is a need for investing more time and resources to build collaborative networks and create opportunities for institutional learning.** Horizontal and vertical coordination needs to be carefully addressed since the initial design phases of policies and strategies to avoid the emergence of coordination failures in the implementation stage and poor delivery of public action. The national level should also be able to act as a competence centre on policy implementation issues and provide an adequate support function for lower level governments.

Finally, **the engagement of some stakeholders, namely SMEs and civil society groups, in the RIS3 exercise has proven to be particularly difficult to achieve.** Specific instruments and communication strategies are required to support their participation as well as capacity building measures to help stakeholders to develop the capacity needed to take part in RIS3. **Restructuring the debate around those societal challenges that are locally relevant and their possible solutions, rather than on science or technological developments and trajectories, may promote a greater participation of civil society groups, citizens and other public bodies** (other than the ones normally involved in science and innovation policies). **A better understanding of SMEs innovation seems also required to achieve their greater engagement in the process.** The organisation and coordination of RIS3 activities require an important role of the public sector as well as clear rules to ensure wide access, equal possibility to influence the process by all relevant stakeholders and transparency.

Source: reproduced from <http://s3platform.jrc.ec.europa.eu/value-chains>, European Commission (2018i) and European Commission (2018j).

In the current **Cohesion Policy (2014 – 2020)** the territorial dimension has therefore become much more important. The role of the regional level in mobilising development processes has been enhanced. In order to encourage a more integrated and “place-based” approach to regional, urban and local development that is more responsive to the needs of particular areas, regulatory obligations were introduced.

These require a greater focus on sustainable urban development (SUD) and new tools were made available in the form of Integrated Territorial Investments (ITIs) and Community-Led Local Development (CLLD). The use of Article 7 for the implementation of ERDF makes integrated urban development a compulsory feature of the ESIF regulation. One of the main goals is to empower cities⁷⁸. As such, a novel feature of the regulation was the requirement to delegate implementation tasks to cities for interventions that are programmed as part of the minimum 5% ERDF share to implement SUD. Furthermore, the regulation encourages innovation and experimentation (Urban Innovative Actions, Article 8 of Regulation 1301/2013) and

⁷⁷ See European Commission (2018j), p.30.

⁷⁸ Article 7 can be implemented using a number of different approaches and instruments. SUD can be implemented through so-called mainstream approaches (i.e. in a similar way to other ESI Funds) as either a separate Operational Programme (OP) or a separate mixed priority axis. SUD can also be implemented through an ITI strategy. This new tool provides a framework for thematic/sectoral integration.

the introduction of an Urban Development Network to deepen the discussion on implementation of the urban dimension (Article 9 of Regulation 1301/2013).

CLLD can also contribute to SUD strategies. CLLD provides a bottom-up participatory approach to ESIF implementation generally and can also be used in the urban context. However, ITI and CLLD have a broader application. ITI can also target functional areas, such as rural, rural-urban and cross-border areas, and territories with specific geographic features. CLLD can also contribute to implementation of these non-SUD ITI strategies. CLLD can be used as part of an urban or territorial strategy. Moreover, CLLD encourages local communities to develop integrated bottom-up approaches that can respond to territorial and local challenges. It also helps to build community capacity and stimulate innovation and entrepreneurship, promote community ownership by increasing participation, and facilitate the involvement of local communities in multi-level governance policy-making.

Box 2: The Structural Funds added value for urban and territorial strategies

A study by the European Commission (2017^e) provided an analysis and synthesis of integrated place-based strategies implemented as part of the Cohesion policy framework in the 2014-20 programme period. The focus was on implementation of integrated place-based strategies within SUD under Article 7 of the ERDF Regulation, ITIs and CLLD. Key results are:

- **Significant uptake of territorial strategies in 2014-2020**, mainly SUD, across most Member States. An estimated EUR 14.5 billion is being allocated to SUD in 2014-20;
- **Many Member States exceed the minimum threshold of 5% of their funding allocations for SUD.** Some allocations are 10-20% in Belgium, Bulgaria, Cyprus and Romania. The study identified over 1 000 territorial strategies, some 880 for sustainable urban development and a further 154 for other types of area.
- Although every country has at least one SUD strategy, **they are used most extensively in France, Portugal and Spain** which collectively account for almost half of all such EU strategies (see figure below). However, in terms of ESIF funding allocation, the strategies in Poland, Italy, Romania and Czech Republic account for nearly half the total funding allocated to SUD across the EU28.
- **Territorial strategies are being implemented in all types of regions** (More Developed Regions, Transition Regions, Less Developed Regions) and in many kinds of territory – regional, local, urban and rural. They are being applied at different scales – from city neighbourhoods and small towns with fewer than 10 000 inhabitants, to major metropolitan regions with more than 5 million people.
- The option of using **CLLD as part of an integrated sustainable urban strategy is much less popular.** Only 5% of SUD strategies use CLLD, and they tend to be only loosely integrated. CLLD is either not considered necessary, or the administrative requirements are regarded as too complex for capacity at local level.
- While the strategies contribute to all 11 Thematic Objectives, **there is a particular focus on supporting the shift towards a low-carbon economy (TO4), preserving and protecting the environment and promoting resource efficiency (TO6) and promoting social inclusion, combating poverty and any discrimination (TO9).**

- **A third of urban strategies cover a functional urban area or metropolitan region.** They are frequently associated with new governance structures – facilitated by the ITI tool – to support joint policymaking and implementation across administrative boundaries.
- Related to the integrated approach, **territorial provisions are promoting more collaborative models of governance.** Strategies are being implemented through governance arrangements that bring together different levels of government and both governmental and non-governmental actors.
- **One aspect of governance proving difficult is the involvement of citizens.** The development of strategies usually involves consultation with stakeholder groups and, less commonly, with citizens.

Source: reproduced from Bachtler J. and A. van der Zwet (2018) based on European Commission (2017e).

3.2 The low carbon and circular economy in EU industrial policy

With the EC communication in 2017⁷⁹, the circular economy became a pillar of EU policy for smart, innovative and sustainable industry.

The first mention of the circular economy was in 2014, when the EC started to design actions for a zero-waste programme⁸⁰. In this communication the EC recognised that transition to a low carbon and circular economy requires changes all along value chains. These include product design, new business and market models, new ways of turning waste into a resource, and different consumer behaviour.

This implies full systemic change and innovation not only in technologies, but also in organisation, society, finance methods and policies. **In this communication the role of LRAs was focused on waste management.** The EC called for a better management of municipal waste setting specific targets to boost reuse and recycling of municipal waste to at least 70% by 2030 and increase recycling for packaging waste to 80% by 2030, with interim targets of 60% by 2020 and 70% by 2025, including targets for specific materials⁸¹.

In 2015, the EC adopted an action plan “**Closing the loop – An action plan for the Circular Economy**”⁸² with a key objective to boost EU competitiveness given the problem of resource scarcity. The plan proposes measures to facilitate the transition towards a circular economy that covers all stages of product lifecycle, from production to waste management. It also identifies five priority sectors where the transition will

⁷⁹ European Commission (2017c).

⁸⁰ European Commission (2014b).

⁸¹ European Commission (2014b), p.9. Additional measures include: biodegradable waste by 2025, while Member States should endeavour to virtually eliminate landfill by 2030; further promote the development of markets for high quality secondary raw materials, including through evaluating the added value of end-of-waste criteria for specific materials; clarify the calculation method for recycled materials in order to ensure a high recycling quality level.

⁸² European Commission (2015a).

face particular challenges due to business characteristics including plastics, food waste, critical raw materials, construction and demolition, biomass and bio-based products. The 2015 action plan is clearly connected with the 2011 Roadmap to a Resource Efficient Europe⁸³. Both the 2015 communication and this roadmap are part of a history of European policy strategies that focus on better waste and resource management, including thematic strategies on waste prevention and recycling, and on the sustainable management of natural resources. In the roadmap the EC already indicated the necessity to turn waste into a resource: *“Recycling and re-use of waste are economically attractive options for public and private actors due to widespread separate collection and the development of functional markets for secondary raw materials”*⁸⁴.

From 2015 the European Commission put forward several initiatives to support the circular economy. For example, it proposed a regulation on fertilisers⁸⁵ so fertilisers can be made from secondary raw materials, turning a waste management problem into an opportunity. It also adopted the Ecodesign Working Plan 2016-2019⁸⁶ which recognises the key role of eco-design in the transition to a circular economy. In 2017, the EC adopted a communication regarding waste to energy, to highlight the importance of energy from waste in the circular economy⁸⁷. In the same year, the EC proposed a directive on restricting the use of hazardous substances in electrical and electronic equipment⁸⁸.

With the communication in 2017 **for a smart, innovative and sustainable industry**⁸⁹ the EC underlines the necessity to strengthen European industry’s ability to continuously adapt and innovate. This is through facilitating investment in new technologies and embracing changes from increased digitisation and the transition to a low-carbon and more circular economy. In this scenario companies are called to upgrade technology, future-proof business models, internalise sustainable development principles and embrace innovation. A deeper and fairer Single Market must facilitate the integration of companies in European and global value chains and act as an essential driver of industrial competitiveness. **At the same time, it must help industry, people and local communities to adapt to social, economic and environmental change.** Lifelong learning, equal opportunities and fair access to education, training and technological skills are at the heart of building such resilience.

Efforts to facilitate the transition to a low carbon and circular economy continued in 2018 when the EC adopted the so-called **Circular Economy Package**, to transform

⁸³ European Commission (2011*b*).

⁸⁴ European Commission (2011*b*), p.8.

⁸⁵ European Commission (2016*a*).

⁸⁶ European Commission (2016*b*).

⁸⁷ European Commission (2017*a*).

⁸⁸ European Commission (2017*b*).

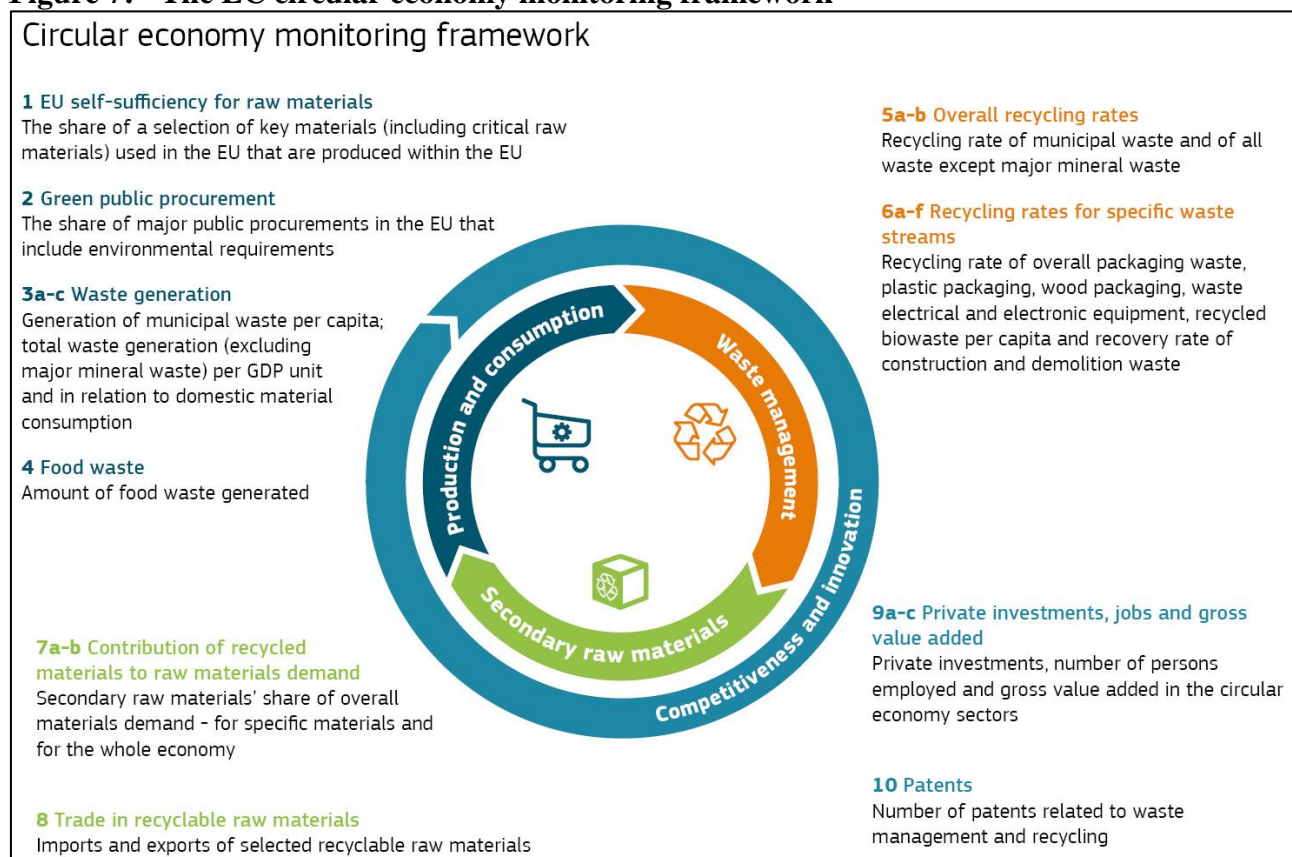
⁸⁹ European Commission (2017*c*).

Europe's economy into a more sustainable one and to implement the ambitious Circular Economy Action Plan. This included the EU strategy for plastic in the Circular Economy⁹⁰, where all plastics packaging should be recyclable by 2030 as well as measures to address the interface between chemical, product and waste legislation⁹¹.

A crucial aspect underlined by the new circular economy package is the importance of a **common monitoring framework**⁹² at EU and national level, with ten indicators referring to the circular economy.

In the transition to a low carbon and circular economy, **monitoring trends and patterns is key to understanding how the various elements are developing**, to help identify success factors and assess whether sufficient action has been taken. Monitoring should form the basis for new priorities towards the long-term objective of a circular economy. They are not just relevant to policy makers but should inspire and drive new actions. The monitoring framework consists of 10 indicators⁹³ split into four categories (see Figure 7): production and consumption; waste and management; secondary raw materials; competitiveness and innovation.

Figure 7: The EC circular economy monitoring framework



Source: reproduced from <https://ec.europa.eu/eurostat/web/circular-economy/indicators>.

⁹⁰ European Commission (2018a).

⁹¹ European Commission (2018b).

⁹² European Commission (2018d).

⁹³ See <https://ec.europa.eu/eurostat/web/circular-economy>

The Circular Economy Package also contained revised legislation⁹⁴ setting new targets which also call for LRAs to contribute:

- By 2025, set up separate collection for textiles.
- By 2020, prepare for the re-use and recycling of waste materials – at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households – to be increased to a minimum of 50% by weight.
- Increasing the level of preparation for the reuse and recycling of municipal waste by 2025 at 55%, by 2030 at 60% and by 2035 at 65%.
- Choose between four methods to monitor the recycling target according to Commission Decision 2011/753/EU. This indicator shows only data according to one method, which is the most ambitious one. Reliable and comparable data for the other methods do not currently exist.
- By 2025, set up separate collection for hazardous waste produced by households.
- No later than 31 December 2025 a minimum of 65% and no later than 31 December 2030 a minimum of 70% by weight of all packaging waste will be recycled.
- No later than 31 December 2025, the minimum recycling targets for materials contained in packaging waste⁹⁵.
- By 2030, all plastics packaging in the EU will be reusable or recyclable in a cost-effective manner.

However, as displayed in Box 3, **most of the above targets are still far from being reached**. Moreover, data on industrial waste in Europe⁹⁶ show that much more effort is needed, also at local level, to move towards a low carbon and circular economy in industry (see Box 4).

⁹⁴ See Directive (EU) 2018/851 and Directive (EU) 2018/852.

⁹⁵ (i) 50% of plastic; (ii) 25% of wood; (iii) 70% of ferrous metals; (iv) 50% of aluminium; (v) 70% of glass; (vi) 75% of paper and cardboard. No later than 31 December 2030 the following minimum recycling targets for materials contained in packaging waste will be attained: (i) 55% of plastic; (ii) 30% of wood; (iii) 80% of ferrous metals; (iv) 60% of aluminium; (v) 75% of glass; (vi) 85% of paper and cardboard.

⁹⁶ <https://www.eea.europa.eu/data-and-maps/indicators/industrial-waste-indicator/assessment-1>

Box 3: Key results on the implementation of EU waste legislation, including the early warning report for Member States at risk of missing the 2020 preparation for re-use/recycling target on municipal waste

- In 2016, Europeans generated on average 480 kg of municipal waste per person, 46% of which was recycled or composted, while a quarter was landfilled. Municipal waste represents only around 10% of the total waste generated in the EU, but it is one of the most complex streams to manage due to its diverse composition, its large amount of producers and fragmentation of responsibilities. 14 Member States have been identified as at risk of missing the 2020 target of 50%. These are: Bulgaria, Croatia, Cyprus, Estonia, Finland, Greece, Hungary, Latvia, Malta, Poland, Portugal, Romania, Slovakia and Spain. Scenario modelling performed for this exercise confirmed this and concluded that if no additional policy action is taken, some of the Member States concerned would probably not even meet the 50% target by 2025.
- Concerning preparation for re-use, recycling and other material recovery for waste stream, Member States' performances vary significantly, with over half reporting that they already met the 2020 target in the 2013-2015 period, and some even achieving over 90% recovery. However, Cyprus, Greece, Slovakia, and Sweden are still below 60%. There is still some uncertainty regarding the figures reported by some Member States.
- The analysis of hazardous waste management across the EU24, suggests that there are serious gaps in the implementation of key legal obligations. These include inadequate planning, data inconsistencies and statistical gaps between generation and treatment, and misclassification of waste.
- In 2015, 23 Member States met the minimum collection target of 4 kg of household waste electrical and electronic equipment (WEEE) per person, with Sweden and Denmark collecting as much as 12 kg while Cyprus, Latvia, Malta and Romania missed the target by a considerable margin.
- Since 2005, the average overall packaging recycling rate in the EU has steadily increased (to 65.8% in 2015). However, between 2013 and 2015 the amount of packaging waste generated grew by 6% across the EU, suggesting that more work on waste prevention is needed. Several Member States missed one or more material-specific targets: for paper and cardboard (Malta), wood (Croatia, Malta, Cyprus, and Finland), metal (Croatia and Malta), and glass (Greece, Malta, Cyprus, Hungary, Portugal, Poland, and Romania).
- 15 Member States were not fully meeting the obligation laid down in the Directive to treat waste before landfilling.
- Despite the closures of non-compliant landfills reported by the Member States, the number of facilities that are not in line with the requirements of the Directive remains a matter of concern.

Source: reproduced from European Commission (2018h).

Box 4: Current situation in waste generation and recovery in European industry

- The **extractive industry sector is one of the largest sources of waste in the EU** and waste generation figures can change substantially from year to year depending on activity levels in some of the larger sites in the sector. The data indicate a downward trend from 2012 to 2016 for extractive waste, with a reduction in waste generation of around 100 million tonnes over this period.
- **For the manufacturing industry, the total mass of waste generated each year has remained relatively constant over the period 2010-2016**, although its percentage contribution to total waste generation has decreased slightly over this period. Compared with the relative contribution of industry, the total waste generation from households in 2016 was approximately 214 million tonnes, slightly lower than waste generation from the manufacturing industry.
- **For the waste industry, the quantity of total waste generation rose steadily over the period 2010-2016.** This total waste figure includes both primary waste generation and secondary waste. Secondary wastes include residues from waste processing activities, for example, sorting residues, which are generated from the processing of municipal waste.
- The **chemical industry trend has increased relatively steadily from 42% to over 50% in 2016**, though this is still the sector with the lowest reported fraction of waste transferred for recovery.
- **The energy sector recovery trend has been consistently downwards since 2007, though it has levelled off in more recent years.** This is partly explained by an increase in reported quantities of waste being sent for disposal from this sector, which could be related to less on-site management of residues (e.g. less on-site landfilling, necessitating transfers of waste off-site).
- **The trend in the mineral industry, which reports one of the highest total transfers of waste, has been generally downwards since 2007**, falling from 80% recovery in 2007 to 72% in 2016.
- **The paper, wood and pulp sector shows a consistent but modest increase in recovery** from 81% to 87%, while transfers for recovery within the intensive agriculture and aquaculture sector have risen to 97%

Apart from the sectors mentioned above, **most other sectors do not show any discernible or consistent trend in recovery rates based on reported waste transfers.** Overall the trends towards increased recovery are considered to be weak and do not suggest any substantial move towards greater circularity in terms of waste recovery rates. However, these data may mask varying levels of performance between different countries, with countries such as Romania actually reporting a significant overall increase in recovery of industrial waste from 52% in 2011 to 73% in 2016.

A number of reporting countries provided additional thoughts on issues that could be influencing recovery within industry. These include:

- **A lack of specific measurable targets for recovery rates within individual industrial sectors**, including a lack of specific targets within the Best Available Techniques Conclusion documents for Industrial Emissions Directive (IED – 2010/75/EU) regulated activities. **The lack of specific waste minimisation and recovery targets within permits for industrial activities was also highlighted as an issue;**
- **Insufficient availability of detailed data on waste generation, recovery rates and recovery technology;**
- **The relative cost of recovery versus the cost of purchasing virgin materials for an industrial process.** This also includes **high waste shipment costs which can reduce the incentive to send waste for recovery at specialised installations outside the country of generation.** In parallel, there

is a need to **introduce financial instruments to encourage and facilitate the development of recovery initiatives;**

- On-site recovery activities are sometimes avoided due to the potential liability associated with holding and processing waste. **The transfer of responsibility to a third-party waste management company is sometimes considered as a lower-risk option;**
- In some countries, **the cost of landfilling is low, which is a disincentive for recovery activities;**
- The presence or potential **presence of hazardous materials within waste** (e.g. heavy metals) **is reducing the potential to develop resource efficient recovery options within some industrial sectors;**
- With regard to the influence of the BAT Conclusions and BREF documents⁹⁷ in general, **the decision not to review certain BREF documents related to the chemical industry was highlighted as a relevant issue**, which could impede progress in improving waste management within certain industrial sectors. The relevant BREF documents are the BREF documents for “manufacture of organic fine chemicals”, “production of speciality inorganic chemicals”, “production of polymers” and parts of the BREF documents related to “large volume inorganic chemicals”.

Source: reproduced from European Environment Agency (2019), Industrial waste in Europe, available at: <https://www.eea.europa.eu/data-and-maps/indicators/industrial-waste-indicator/assessment-1>

Finally, at the end of 2018, the **EC published a long-term vision (to 2050) for a prosperous, modern, competitive and climate neutral economy**⁹⁸ (see Box 3.6) in which a competitive EU industry and the circular economy are key enablers to reduce greenhouse gas emissions. The contribution of the circular economy towards a low carbon economy is recognised not only in the use of industrial inputs or in the production systems (i.e. reduced material input through re-use and recycling, recovery of raw materials, importance of new materials, digitalisation and automation), but also in favouring more climate conscious choices, such as customers increasingly asking for climate and environmentally friendly products and services. This requires more transparent information for consumers about carbon and environmental footprints of products and services so they can make informed choices.

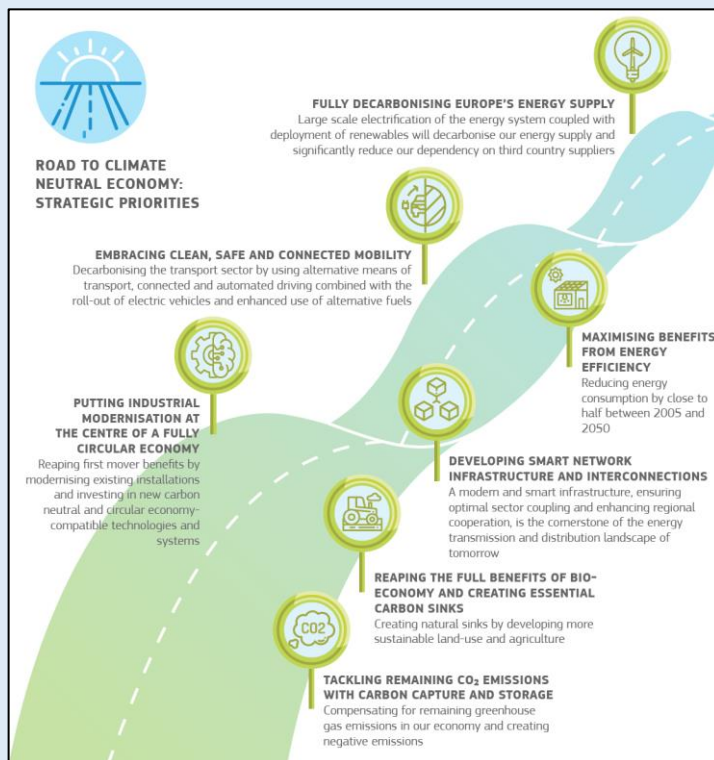
⁹⁷ The EU Best Available Techniques reference documents (BREFs) cover, as far as practicable, the industrial activities listed in Annex 1 to the EU’s IPPC Directive. They describe industrial processes and for example, their respective operating conditions and emission rates. Member States are required to take these documents into account when determining best available techniques generally or in specific cases under the Directive.

⁹⁸ European Commission (2018e).

Box 5: The European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy

The EU has been at the forefront of addressing the root causes of climate change and strengthening a concerted global response in the framework of the Paris Agreement. The Paris Agreement, ratified by 181 parties, requires strong and swift global action to reduce greenhouse gas emissions, with the objective to hold global temperature increase to well below 2°C and to pursue efforts to limit it to 1.5°C. It also has the goal to achieve a balance between emissions by sources and removals by sinks of greenhouse gases on a global scale in the second half of this century. All parties are to present long-term low greenhouse gas emission development strategies by 2020 that deliver on its objectives.

The EU, responsible for 10% of global greenhouse gas emissions, is a global leader in the transition towards a net-zero-greenhouse gas emissions economy. Already in 2009, the EU set its objective to reduce emissions by 80-95% in 2050. Europeans have managed to successfully decouple greenhouse gas emissions from economic growth in Europe for the past decades. Following the peak in EU greenhouse gas emissions in 1979, energy efficiency, fuel switch policies and the penetration of renewables reduced emissions significantly. In consequence, between 1990 and 2016, energy use was reduced by almost 2%, greenhouse gas emissions by 22% while GDP grew by 54%.



The road to a net-zero greenhouse gas economy could be based on joint action along a set of seven main strategic building blocks:

1. Maximise the benefits from Energy Efficiency including zero emission buildings;
2. Maximise the deployment of renewables and the use of electricity to fully decarbonise Europe's energy supply;
3. Embrace clean, safe and connected mobility;
4. A competitive EU industry and the circular economy as a key enabler to reduce greenhouse gas emissions;
5. Develop an adequate smart network infrastructure and inter-connections;
6. Reap the full benefits of bio-economy and create essential carbon sinks;
7. Tackle remaining CO₂ emissions with carbon capture and storage.

Source: reproduced from European Commission (2018e).

3.3 Place-based approach and circular economy in industry in the post-2020 programming period: an overview

In the context of the upcoming Multiannual Financial Framework for 2021-2027, the European Commission published a proposal for a regulation on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) on 29 May 2018.

The two key changes with respect to the current programming period are a new single regulation on the ERDF and CF, previously covered by two separate regulations and the previous 11 thematic objectives from 2014-2020 have been reduced to 5 “policy objectives” (POs):

- 1) a smarter Europe – innovative and smart industrial transformation;
- 2) a greener, low carbon Europe – clean and fair energy transition, green and blue investment, circular economy, climate adaptation and risk prevention;
- 3) a more connected Europe – mobility and regional ICT connectivity;
- 4) a more social Europe – implementing the European Pillar of Social Rights;
- 5) Europe closer to citizens – sustainable and integrated development of urban, rural and coastal areas through local initiatives.

The ERDF will support all these policy objectives⁹⁹. The majority of ERDF resources will be concentrated on PO1 and PO2 (i.e. smart and green economy). To increase flexibility, thematic concentration criteria should apply at national level with some possibility to adapt them for individual programmes. The Cohesion Fund will continue to provide financial support mainly for environmental and transport infrastructure projects in cohesion countries. Thus, it will support only PO2 (environment) and parts of PO3 (TEN-T and transport mobility)¹⁰⁰. The focus on environment and transport is the same as in the previous period, as is the inclusion of technical assistance.

The key novelty is the stronger focus on environmental issues. The majority of ERDF funding (65% to 85%) will focus on smart growth and the green economy, while the fund will also support activities such as connectivity, social issues and local development. The Cohesion Fund will continue to focus predominantly on environmental and transport infrastructure. Both funds are expected to contribute to the EU’s overall 25% commitment to the climate objective. Investments under the whole ERDF financial envelope are expected to contribute 30% to climate objectives, while this percentage rises to 37% under the Cohesion Fund.

⁹⁹ As regards the details of investments, the ERDF will support: a) investments in infrastructure; b) investments in access to services; c) productive investments in SMEs; d) equipment, software and intangible assets; e) information, communication, studies, networking, cooperation, exchange of experience and activities involving clusters; f) technical assistance.

¹⁰⁰ The detailed support will include: a) investments in the environment, including investments related to sustainable development and energy presenting environmental benefits; b) investments in TEN-T; c) technical assistance.

For the circular economy, one specific objective is introduced under PO2: Specific objective 2.6 “Promoting the transition to a circular economy”. Proposed indicators for this specific objective are:

- One output indicator:

RCO 34: Additional capacity for waste recycling, measuring the annual waste recycling capacity of recycling facilities commissioned or renovated via the programme;

- Four result indicators:

RCR46: Population served by waste recycling facilities and small waste management systems;

RCR47: Waste recycled according to Eurostat “recycling of waste is defined as any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes (it includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations)”¹⁰¹;

RCR48: Recycled waste used as raw materials;

RCR49: Waste recovered, where waste is used to replace other materials.

The territorial dimension has received greater visibility through the new dedicated PO5 “A Europe closer to citizens by fostering the sustainable and integrated development of urban, rural and coastal areas and local initiatives”. While greater visibility of the territorial dimension is likely to be welcomed by Member States and stakeholders, it could be argued that the territorial dimension should be a horizontal and crosscutting objective¹⁰². **The required ERDF funding for this objective will go up marginally from 5% to 6%, delivered through local development partnerships and existing tools** (SUD strategies, ITIs, CLLD) but with more flexibility in decision-making responsibilities for cities. A **European Urban Initiative** will provide a more streamlined and coherent approach to capacity building, innovative actions, knowledge and policy development and communication by combining the various urban tools (such as URBACT or the Urban Innovative Actions) in a single programme.

There are no specific indications to enhance a place-based approach in industry, however **under PO5 there are two specific objectives and related indicators that**

¹⁰¹ See http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Recycling_of_waste

¹⁰² See EPRC (2019).

LRAs could use in the 2021-2027 programming period to promote the development of local industry.

These are:

- **5.1 “Fostering the integrated social, economic and environmental development, cultural heritage and security in urban areas”** with the following:

- Output indicators:

RCO74: Population covered by strategies for integrated urban development, measuring the population living in areas covered by strategies for integrated urban development, according to Article 9 of COM(2018) 372 (draft);

RCO75: Integrated strategies for urban development;

RCO76: Collaborative projects. According to the EU Urban Agenda, projects can cover: Sustainable Land Use; Public Procurement; Energy Transition; Climate Adaptation; Urban Mobility; Digital Transition; Circular Economy; Jobs and Skills in the Local Economy; Urban Poverty; Inclusion of Migrants and Refugees; Housing; Air Quality;

RCO77: Capacity of cultural and tourism infrastructure supported.

- Result indicators:

RCR76: Stakeholders involved in the preparation and implementation of strategies of urban development;

RCR77: Tourists/visits to supported sites;

RCR78: Users benefiting from cultural infrastructure supported.

- **5.2 “Fostering the integrated social, economic and environmental local development, cultural heritage and security, including for rural and coastal areas also through community-led local development”** with the following:

- Output indicator:

RCO80: Community-led local development strategies for local development.

4 Policy approaches to place based, low carbon and circular economy: insights from case studies

This section analyses the six case studies conducted in selected EU regions and cities. Two cases examined the approach applied by regional authorities to ensure the development of an industrial place-based strategy. Four cases have respectively been conducted to explore the policy levers local and regional governments have designed and implemented to pursue the transition towards a low-carbon and circular economy. Details on the case study selection procedure are presented in Annex I. The following regions and cities were selected:

- Place-based approach:
 - Mazowieckie Voivodeship (Mazovia), Poland;
 - Bavaria, Germany;

- Low carbon and circular economy:
 - City of Maribor, Slovenia;
 - City of Vienna, Austria;
 - Skåne County/City of Malmö, Sweden;
 - South Holland, the Netherlands.

As a starting point, the specificities of the strategic approaches are reviewed. Second, the types of governance mechanisms and particularities of the local and regional governments' involvements in designing and implementing placed based policies and strategies contributing to the transition towards a low-carbon and circular economy are analysed. Finally, the identified hindering and facilitating factors are compared and described to provide a basis for identifying legal as well as operational shortcomings and development potentials.

4.1 Place-based case studies

The place-based regional development policies examined in the Polish region of Mazovia (Mazowieckie Voivodeship) and in the German region of Bavaria illustrate the various pathways followed by regional authorities to harvest the industrial potential, foster competitiveness and ensure the economic prosperity of the territory. The following boxes present short summaries of the case studies findings, which are further analysed in the subsequent sub-sections.

Box 6: Summary of the Mazovia case study

Mazowieckie Voivodeship is one of the most significant industrial centres in Poland with petrochemicals as one core sector. Additionally, the region covers many rural areas where agriculture and consequently food processing dominates. The region benefits from the dynamic capital city of Warsaw, an innovation centre providing good conditions for smart growth which attracts investments.

The Development Strategy of Mazowieckie Voivodeship 2030¹⁰³ sets up a place-based approach to industrial development. It aims at developing export-oriented production in the fields of medium and high technology and in the agri-food sector.

Especially the agri-food sector is seen as a source of endogenous potentials bringing added value through the improvement of the agri-food industry. Building on the existing core sectors, the strategy aims at enlarging the diversity of the industry sectors. The Regional Innovation Strategy for Mazowieckie Voivodeship (RIS Mazovia) is developed to support the place based strategy by preparing the field for innovation e.g. by promoting R&D activities, partnerships between the regional government, science and business and the development of business-related services.

Box 7: Summary of the Bavaria case study

Bavaria has a long standing tradition supporting and implementing regional development strategies and place based industrial strategies¹⁰⁴. Grounded in strong industry sectors such as automotive, electrical engineering and mechanical engineering, the development of Bavaria's industry relies on close public private partnerships. The Bavarian government supports industry development to improve the attractiveness of Bavaria towards other industrial players. Therefore, the economic centres are distributed throughout the state and not only concentrated in Munich. The enterprises rely on local labour power and support the economy also in more rural areas. This gives Bavaria a crucial locational factor to compete internationally. The public support currently focuses on the provision of digital infrastructure, the support for the creation of new enterprises, and improving networks between enterprises and research institutions through clusters. The close interlinkage between research institutions and the industry is a clear goal of the Bavarian policy. The ultimate purpose is to tap on research results to improve industrial production and ensure the provision of skilled workers to meet the needs of the industry.

4.1.1 Specificities of the place-based industrial strategies

To a certain extent, both regions share common economic features. For example, Munich and Warsaw are respectively seen as regional/national capitals, economic drivers and pole of attractiveness and competitiveness. Likewise, both regions have historically and traditionally dedicated significant efforts and investments to support the maintenance and development of the local industrial base.

The difference in size of the case study areas is however an important point to highlight, given the relevance of soft factors such as a common regional identity and vision as well as proximity of the relationship and exchanges between stakeholders. Moreover, the regions' territorial approach to industrial development differs with regards to the type of strategic framework implemented, the nature and focus of the support provided as well as the steering mechanisms involved. The two examined regions' strategic approaches to place-based policy also have different levels of maturity, which impacts on the possibility to observe their implementation. The Bavarian initiative was developed in 2006, when cluster platforms were set up and extended for significant

¹⁰³ Regional Government of the Mazowieckie Voivodeship, 2014.

¹⁰⁴ <https://www.stmwi.bayern.de/wirtschaft-standort/industrie/>

competence fields. Since 2006, the cluster platforms have established themselves as state-wide hubs for information, communication, coordination, knowledge transfer and innovation in their respective industry or field. The Development Strategy of Mazowieckie Voivodeship 2030 was established seven years later, in 2013.

The place-based approach adopted in Mazovia is enshrined within the regional development strategy of the region. Without being referred to as such, the regional development strategy encompasses and endorses the main underlying principles of a territorially aware industrial development. This is reflected in the strategy's vision of "Mazovia as a region with territorial cohesion, competitiveness, innovativeness, rapid economic growth and high quality of life" through two goals. The first covers industry and production, while the other focuses on the environment and energy. Moreover, the goals are formulated with regards to two policy dimensions; competitiveness and cohesion. They also encompass three territorial dimensions, the Warsaw metropolitan area, other urban areas, and rural areas.

All territorial dimensions are hence recognised and become part of a unique strategic plan. The key point accordingly lies in the alignment of the strategic economic support allocated to the development of the local industrial sector, including support for the establishment of favourable ecosystem (educational system, research institutions and other organisations) to the specificities and disparities within the region. The strategy thereby intends to reduce persistent inequality and inequality in specific places.

The socio-economic diagnosis conducted for the purpose of the strategy concretely identifies the strengths and weaknesses of the different functional economic areas of the region. This allows for a better targeted territorial approach. Accordingly, besides a focus on technologically advanced industrial activities with high development potential (principally located in the Warsaw metropolitan area), the strategy emphasises the need to support the industrial base of rural areas (which notably relies on agriculture).

All in all, Mazovia's approach to place-based industrial strategy relies on both the diversification and specialisation of the industrial activities and of the associated types of support. Focusing on the R&D and high-tech activities may contribute to generating high returns on investment which would be beneficial for urban areas and create a virtuous circle. Yet, unleashing the untapped economic potential in more peripheral locations is as important, in spite of the possibly lower yield.

In Bavaria, official documents related to the regional development and support to industries do not either expressly refer to a place-based approach but incorporate its main principles of territorially based development. The region's cluster strategy (Cluster Offensive Bavaria initiative) particularly dovetails the idea of a place-based approach. The initiative has the following objectives:

- to strengthen the entire value chain from research to final product;
- to promote competitiveness through cooperation;
- to implement research results into new products and services; and
- to increase innovation dynamics¹⁰⁵.

The initiative includes regional platforms in high-tech industries and traditional key branches of the Bavarian economy. The initiative is structured around 17 cluster platforms covering aerospace, automotive, railway technology, biotechnology, chemistry, energy technology, food, forest and wood, ICT, power electronics, carbon technology, mechatronics and automation, medical technology, nanotechnology, new materials, sensor technology, and environmental technology. In addition to the largest businesses and research institutions joining, engaging and implementing the cluster strategy, medium-sized enterprises and smaller research bodies, such as higher education institutes are also expected to play a key role in building region-wide networks.

Compared to Bavaria, Mazovia's development strategy encompasses a broader and more holistic range of issues. A clear emphasis is given to the improvement of a larger ecosystem, conducive to the development of industries implanted in the region and of which outputs are mostly destined to the regional and national market. In this sense, Mazovia's strategy also intends to protect the nascent and developing industries (e.g. agro-food industries), which may not yet necessarily meet the conditions to compete nationally and internationally.

Bavaria's cluster initiative gathers highly specialised players which have achieved a greater degree of cooperation and coordination. The initiative builds on and contributes to the maintenance of an indispensable business-friendly environment and entrepreneurship spirit.

4.1.2 Governance and stakeholder involvement

In Bavaria, the regional government set up the cluster strategy framework, promoting the clusters and monitoring implementation, but each cluster platform has a "cluster management team" which also coordinate cluster activities. These teams have voluntary "cluster spokespersons" and experts to identify value added fields, and thus joint R&D projects. The cluster management also decides on the involvement of stakeholders and their participation in the decision-making process, depending on their integration in cluster committees. Knowledge transfer within clusters also falls under the remit of cluster management. There are also advisory councils and working groups in each cluster.

¹⁰⁵ Source: Ibid, p.5.

The cluster teams bring companies of all sizes together along the respective value chain. The more lead companies, competent suppliers and well-versed service providers that participate, the better a cluster functions. Another advantage is that neutral cluster teams bring together companies who otherwise are in direct competition with each other. Bavarian universities and research institutes are also an existential component of the clusters. They join the clusters and with their knowledge and research laboratories, as well the know-how of their scientists, researchers and application-oriented problem solvers, they significantly enhance cluster capabilities. In sum, the cluster initiative relies on well-established and smooth-running mechanisms in which decision-making power and initiative are collegially taken without strong public interventions. Bavarian authorities however still play a pivotal role, notably in terms of promotion, i.e. fostering the organisation of fairs for industry players as well as investing in other forms of marketing activities. Place branding is an integral part of the regional economic development strategy and of the Cluster initiative as it contributes to the attractiveness of the region, in particular for industries but also start-ups with high development potential.

Conversely, the local and regional authorities may lead the strategy implementation. In Mazovia, the regional government implements the Development Strategy of Mazowieckie Voivodeship 2030. Multiple working groups deal with, update and monitor each strategy goal. In addition, the regional territorial forum and the territorial observatory (from the Mazovian Office for Regional Planning) contribute to implementing and monitoring the strategy. The regional administration is committed to a participatory approach, involving representatives of civil society and businesses in the implementation of the strategy, as well as vertical and horizontal cooperation. The authorities base the implementation on cooperation between different government levels, as well as interregional cooperation. In any case, the regional government initiates the cooperation.

All in all, despite of a varying influencing and steering power from public authorities, LRAs need to consider the interests of more varied stakeholders. Multiple stakeholder groups can contribute to increasing the complexity of governance, making it more difficult to coordinate and engage stakeholders. An open multi-level governance system, ensuring smooth implementation of a multi-sectoral and integrated approach to industrial development can limit these risks. For instance, the Bavarian Cluster Initiative is inherently participatory and based on a constant policy dialogue to avoid free riding, overlapping or fragmented actions.

4.1.3 Challenges and facilitating factors

Since formulating the strategy, Mazovia has achieved a leading role in the Polish economy and created an attractive innovation milieu. The region continues to use its innovation potential by concentrating large and increasing R&D activities and investment and high-tech manufacturing, as well as maintaining and attracting

entrepreneurship in different areas, including the creative sector. Achieving the strategy goals Support for innovation and entrepreneurship, including measures targeting incubators, accelerators, clusters and business environment institutions has contributed to achieving the strategy's objectives.

A substantial challenge can however be observed as the industrial policy should address regional disparities. Large regional disparities and lack of cohesion within the region, with different industrial specialisations affecting different areas, can pose additional challenges to LRAs in terms of policy effort. While urban economies can experience rapid growth with innovative industries and foreign investment, rural areas dominated by traditional agricultural can lag. This requires industrial policy to adopt an integrated approach to alleviate the urban-rural development gap, by stimulating the development and absorption potential of rural areas through a greater role for production and industry, in particular food processing, and reinforcing the inter-sectoral links between industry and agriculture. The Mazovian authorities identify three important challenges to industry and production:

- improved partnership between government, science and entrepreneurs;
- improved share of industry in the region;
- specialisation in export production.

Moreover, as mentioned by the Mazovian Office of Regional Planning, common identity facilitates cooperation and networking in industry and the economy. Yet, the lack of such identity calls for a stronger focus on strengthened measures for promoting the development of social capital.

In order to achieve the aims of the Cluster initiative, efforts have been invested in eliminating obstacles and bottlenecks which can impede full use of know-how, resources and capacities. Even if the initiative shows a good capacity to mobilise funds (EUR 253 million of national funding and EUR 41 million of EU funding), it is clear that its value is in its capacity to mobilise stakeholders and not in the opportunity to obtain grants. It is worth noting that in line with EU State Aid Regulations, clusters bear a minimum of 50% of their operating costs. This is a financial challenge for the initiative, but also prevents the clusters from becoming totally public-funded institutions which would risk changing their nature and losing the connection with private players.

The clear cut facilitating factors for the Bavarian industry policy is the open and proactive attitude of the political sphere (Regional Parliament, administration and regional legal framework) towards an active location policy. Industry was encouraged to stay in Bavaria and industrial sites were steered towards rural areas where the qualified workforce was to be found rather than luring it into the large urban centres. Sure enough, industry itself has been willing to cooperate and shown a rather specific regional patriotism overcoming possible location disadvantages (e.g. higher wage levels).

4.2 Low-carbon and circular economy case studies

The case studies covering the low carbon and circular economy approach are municipal (City of Maribor, Slovenia; City of Vienna, Austria) and provincial territorial experiences (Skåne County in Sweden with a focus on Malmö city and South Holland, The Netherlands). These territories have different sectoral specialisations as well as diverse environmental and social challenges, suggesting that a low carbon and circular economy approach can be adopted in different territorial contexts. The following boxes present short summaries of the low-carbon and circular economy case studies:

Box 8: Summary of the Maribor case study

In 2018, the city of Maribor developed a circular economy strategy for the city of Maribor and its environs. It concentrates on two main goals:

- 1) changing the business model of the city, toward a circular approach, and
- 2) controlling material going through the city and channel it for the benefit of the city and to foster competitiveness in the region

The strategy aims at transforming the five main sectors that are in the responsibility of municipal companies (i.e. waste, construction, energy, mobility and water). The strategy, which has been very recently adopted, is principally a public sector strategy targeting projects undertaken by publicly-owned companies. In turn, the approaches applied and experience gained in these companies shall trigger initiatives in the private sector. Additionally, the strategy intends to foster the interest and initiatives of a broader range of public actors towards circular economy. Public procurement following circularity principles forms an integral and significant part of this approach.

Two additional key pillars were selected to complement the approach to the five sectors addressed. First, spatial planning was added because it ensures that greenfield land is not used for new developments when brownfield sites can be recovered first. Second, cooperative economy initiatives were added to bring in existing private endeavours and NGOs as they could be key to involving the private sector.

Box 9: Summary of the Vienna case study

Vienna is the capital of Austria with a population of about 1.87 million inhabitants. There is no special circular economy strategy in Vienna, but various strategies taking the idea of a low carbon and circular economy into account. Vienna's Smart City Framework Strategy is the latest development strategy for the city of Vienna enacted in 2014. It aims at improving energy efficiency and climate protection in the long-term¹⁰⁶.

Based on the Viennese waste management act (Wiener Abfallwirtschaftsgesetz – Wr. AWG) Vienna has a quite long tradition in implementing circular economy aspects in the public economy run by municipal enterprises, especially in the field of waste collection and recycling. Additionally, several private initiatives supporting reuse and recycling of waste exist in Vienna. Even if the City of Vienna is clearly committed to industrial manufacturing, and even if there are several activities in line with the circular economy concept, there is no direct link between Vienna's industry policy with a circular economy approach.

¹⁰⁶ Vienna City Administration (2015): <https://www.wien.gv.at/wirtschaft/standort/pdf/wipo-leitlinien-englisch.pdf>

Box 10: Summary of the Skåne County/City of Malmö case study

Malmö, the third biggest city in Sweden is in Skåne (Scania) County, which is part of the South Sweden Region. This case study reviews Skåne strategies to develop a low-carbon and circular economy as well as approaches and initiatives at city level.

The strategy for developing a circular economy is enshrined in Skåne's 2016 Environmental Programme (2017-2020), which also sets specific goals and targets to foster the environmentally sustainable use of resources and efficient management of natural resources and energy for all of Skåne's administrations, majority-owned companies and activities that are financed wholly or in part by the County.

Proactive and preventive initiatives are undertaken to reduce waste and minimise the environmental impact of the Country's industrial activities, all along the value chain.

A comprehensive regional development strategy (Open Skåne 2030) covers low-carbon economy issues, in particular a strategy for turning the region into a sustainable growth engine. It sets up indicators for monitoring the progress. However, as the strategy was set in place just recently, no concrete figures monitoring its success are available.

Box 11: Summary of the South Holland case study

South Holland is one of the most important industrial provinces in the Netherlands with Rotterdam as its economic centre and with various universities and research centres. Despite of an existing high innovation potential, the industry is still based on fossil fuels and traditional linear business models.

The "Europe strategy Province of Zuid-Holland" aims at making the province smarter, cleaner and stronger in the next few years. Transition to a circular economy is one of its four priority themes. The strategy is based on the national strategy that aims for a fully circular economy by 2050, maximising product and raw material recycling as well as the re-use of biomass. In 2016, a roadmap for the Metropolitan region of The Hague and Rotterdam was set up to create a pathway towards the national 2050 goals with a list of relevant projects and interventions. It aims to build up or improve existing infrastructure and stimulate innovation to facilitate the transition to the next economy and to develop the required skills of the people for the transition. In the industrial sector, the transition shall be boosted by introducing innovations making the best use of local resources and materials.

The regional development company, InnovationQuarter, is now organising the implementation through several projects. Each project cooperates with all the supply organisations, the government, local authorities and educational institutions, which are fundamental for training workers for the transition. However, due to the very recent start of the implementation process in 2018 it is too early to assess first achievements.

4.2.1 Specificities of the low-carbon and circular economy approaches

Recently, in 2018, the city of Maribor adopted a strategy to 2030. At a time where economic hardship was hitting the city hard, adopting a circular economy approach reveals strong political leadership. The municipality does not see the circular economy in terms of environmental burdens adding costs to the local community. On the contrary, a circular economy is seen as an opportunity to unlock the economic potential of the city. This is why the strategy is hinged not only on an "environmental" goal, i.e. "controlling material going through the city and channel it for the benefit of the city", but also on an evolutionary economic goal such as "changing the business model of the city toward a circular approach".

Maribor shows that a circular economy is not only a matter of waste management. Although waste is the main problem and the first pillar of the strategy, six more pillars have been identified to make up a holistic strategy helping the city transition to a different business model. These are construction, energy, mobility, water, spatial planning and the cooperative economy. The first five pillars of the strategy cover material loops that the strategy plans to close. Interestingly, spatial planning was included as a sixth pillar to deal with the management of degraded areas, and the cooperative economy entered as seventh pillar to mobilise NGOs that are historically active in the city and could increase involvement of the private sector.

Unlike Maribor, the Austrian capital city of Vienna has a long tradition of a low carbon approach to industrial issues (i.e. since the early 1990s), with a historical and well-established proactive role for key stakeholders pushing for circularity. The circular economy has been an important topic in Vienna since the establishment of ARA (a leading Austrian recycling company) in 1993. In 2011, the City of Vienna announced the “Smart City Wien” initiative with an objective of “the best quality of life for all inhabitants of Vienna, while minimising the consumption of resources”. The scope of the strategy is broad and reflects the multifaceted socio-economic context of a capital city.

The main thematic areas for 2017 to 2019 are: (i) bioeconomy, (ii) plastics, and (iii) product policy (eco-innovation, eco-design, eco-labelling, repair, reuse and recycling). In particular, the third point reveals the ambition to impact not only on production routines but also on citizen behaviour, beyond encouraging more eco-friendly production processes.

In Skåne, discussions on a regional development strategy to address environmental challenges started in 2010. After four revisions, the strategy now looks forward to 2030 and is based on circularity principles. A major characteristic is a full understanding of how companies, research organisations and eco-innovation players can interact across multiple sectors. The development strategy “Open Skåne 2030”, published in 2014, is strongly multisectoral. On this basis, it aims to (i) offer optimism and quality of life, (ii) be a strong, sustainable growth engine, (iii) benefit from its polycentric urban structure, (iv) develop the welfare services of tomorrow, (v) be globally attractive. These five goals are linked to sub-goals with a strong focus on innovation as well as support for knowledge-based companies. The strategy intends to support and harvest advanced technology industries to ensure that development and growth in the region is economically, ecologically and socially sustainable, resource-efficient, climate-neutral, competitive and high quality.

In the Netherlands, the national strategy for a fully circular economy by 2050, maximises product and raw material recycling as well as the re-use of biomass. This offers a strong policy framework to the “Europe strategy Province of South Holland”, with special regard to the fourth priority theme “Transition to a circular economy”. The

province has not yet developed a specific roadmap for a circular economy, but many initiatives and local strategies have been designed. Among them is the Roadmap Next Economy established at the end of 2016 by the Metropolitan region of The Hague and Rotterdam. The strategy looks to transform 2050 ambitions into short-term actions, creating an agenda of projects and interventions.

Given this context, the roadmap covers three fields, the port of Rotterdam, the built environment and horticulture, focusing on five transition paths: (1) Smart Digital Delta, (2) Smart Energy Delta, (3) Circular Economy, (4) Entrepreneurial Region, and (5) Next Society. The roadmap is based on a context analysis which involved representatives of the government, knowledge institutions and around 140 other stakeholders. The strategy is designed to be effective at two levels. Firstly, it aims to build up or improve existing infrastructure and stimulate innovation to facilitate a transition to the next economy (paths 1, 2 and 3). Secondly, it stresses the importance of developing people and skills for the transition: “75% of the success of innovation is due to social innovation rather than technological innovation” (paths 4 and 5).

The strategic approach in South Holland is very ambitious. As seen in other cases, reducing CO₂ emissions for transport is currently challenging, particularly for the biggest port in Europe. Furthermore, logistics in a port implies regulatory barriers that could hamper the adoption of circular practices, especially in waste management. Finally, the Rotterdam area hosts oil refineries, as well as chemical and related industries, where sector barriers to circularity are high. Factors such as the strong political will, a long-term view (by 2050), consistency with a national strategy, effective involvement of stakeholders and a multisectoral approach in a territory with high potential, have allowed the local authority to design a strategy that opts for circularity, going beyond existing business models and vested interests. This is a forward looking and audacious attempt to make South Holland even more competitive in the European and global context, which shows the capacity of “old Europe” to be a first mover in experimenting for the transition.

4.2.2 Governance and stakeholder involvement

The territorial experiences covering the low carbon and circular economy approach show the importance of public policy to push for transition, promoting development of innovative infrastructure, strategic use of public procurement to introduce low carbon practices, as well as changes in regulations reducing barriers to circularity and behavioural changes among citizens.

The public sector is crucial in the strategy undertaken in Maribor and its vicinity. The first direct objective of the strategy is to close material loops in publicly owned enterprises. The second objective is to ensure that the public sector experience enables a transition to the circular economy concept and control of material flows for private businesses in two ways. Firstly, building a critical mass in circular economy processes

make them more attractive and economically feasible, which is why civil society organisations were instrumental in strategy development. Secondly, making strategic use of public procurement will motivate private suppliers to switch to circular production. The national law allows public procurement to demand that 40% of supplied materials are recycled. In construction, public authorities can demand that 40% of demolition material is reused. One objective is to further integrate these requirements in public procurement procedures in the area.

In Vienna, endeavours towards a low-carbon and circular economy are equally stemming from the public sector and from civil society. The implementation of circular economy is indeed characterized by both top-down and bottom-up processes. The city authorities undertake various measures to promote circular economy and sustainable use of resources. The different approaches to waste management including waste processing plants as well as the activities of the MA48, the department responsible for waste management, are examples of how the city authorities are implementing the Smart City Wien strategy. The Smart City strategy recognizes the need to coordinate the efforts with regional authorities of the neighbouring states of Lower Austria and Burgenland. The city of Vienna also profits from initiatives undertaken and supported by the national authorities, such as the Circular Economy Platform Austria. Last but not least, the strategy recognizes the crucial role of involving citizens into the strategy implementation process. The evidence of bottom-up involvement is already present. This opportunity can be used to further strengthen civic involvement not only in implementation but also in governance, based on the open government principle.

In Skåne, national stakeholders, such as Sweden's innovation agency (VINNOVA) as well as the Swedish Agency for Economic and Regional Growth take part in discussions to design regional strategies. Drawing up Skåne's development strategy also entailed broad consultation of collaborative partners (e.g. groups of citizens, regional state agencies, universities and colleges, business and trade organisations, idea-based organisations and networks). Those actors are continuously involved in implementation of the strategy. Skåne Council is in charge of implementing the development strategy within its areas of responsibility, such as budgets and operational plans, as well as communication. Approval and implementation of the Environmental Programme is similar. Skåne Council approved the programme and is starting with the most important environmental impacts. The programme has been revised four times since its inception in 2001. Open Skåne is very comprehensive and addresses the key challenges raised by stakeholders. The process requires significant resources and can be very time-consuming. Indeed, developing the Open Skåne strategy took over two years. The multiplicity of stakeholders and their respective involvement may be similarly challenging. Nonetheless, a tradition of participation and horizontal collaboration have smoothed the entire process.

A similar participatory approach led by the regional public authorities is applied in South Holland. The roadmap was designed by local authorities from the metropolitan

region Rotterdam / The Hague, according to the triple helix principle where public institutions cooperate with stakeholders from private organisations and knowledge institutions. After the design phase, implementation of the roadmap was transferred to InnovationQuarter, the regional development company that has strong experience and solid knowledge of strategy. Within InnovationQuarter there are experts from each of the five transition paths. For the implementation, each InnovationQuarter project cooperates with all the supply organisations but also government, local authorities and educational institutions that are fundamental especially to train workers for the transition. Also, the Economic Board of South Holland was involved in reviewing the strategy. This council brings together knowledge institutions, industry and governments.

4.2.3 Challenges and facilitating factors

The strategy being implemented in Maribor and its environs is very recent, and substantial achievements are yet to be seen. Yet, preliminary successes towards the achievement of the strategic goals include an increased cooperation among municipal companies and between municipal companies and local NGOs. This has enabled new projects and a network to catalyse new circular economy investment. NGOs contributed to co-development and were particularly effective in identifying sector niches within the strategy's five thematic pillars. However, the strategy is confronted with some major challenges. Firstly, legislative elements prevent full deployment of a circular economy. Several potential areas, such as the reuse of purified water, are currently impeded by legislation for materials which are not targeted by end-of-waste criteria. Although for materials such as iron there is currently a large scope for reuse, the same cannot be said for other materials, and only change will enable greater development of a circular economy.

Standard approaches to the circular economy are not yet in place, which causes some uncertainty. The strategy team is looking forward to common international circular economy indicators, such as the BS8001 standard. Moreover, the economic viability of a circular economy is an overarching issue. It is easy for industries to commit to reusing high-value materials, but the local community is left to deal with remaining low-value material waste. A transition to a circular approach is naturally hampered as lower-value material is less obviously economically viable.

In Vienna, for the purpose of improving resource and waste management, the city developed an important economic sector to collect and treat waste in an environmentally compatible way. Efficient waste management brings materials from the production process back into the economic cycle. However, further waste prevention measures need to be promoted. To foster a greener economy, environmentally counterproductive tax exemptions need to be abolished. In addition, revenue neutral eco tax reform is needed.

In South Holland, although the implementation is still at a preliminary phase, at this point, the main barriers are mainly related to market conditions. There are general barriers in the energy market, for example national incentives vary a lot between sectors with incentives for bio-based fuels but not for bio-based materials. It is not easy to use waste in new products especially because treatment costs are very high, making it hard for companies to compete with low value products.

In addition to cost barriers, the benefits of using recycled waste, clean energy, etc. would be in the long term and not immediate, which does not normally fit with optimising enterprise profits.

Moreover, the knowledge and research institutions, well-developed service sector and key industrial sectors that hold potential for the region in terms of innovation could on the other hand hinder transition. Well-developed assets in key sectors could make adapting to new business models more difficult and slow down the transition.

To overcome such challenges, InnovationQuarter is cooperating with stakeholders affected by the strategy, not only local authorities but also companies. At the same time education plays a key role in cultural transition and motivating companies to invest in projects whose effect is not immediate but long-term.

A final challenging issue for LRAs, which has been echoed in all case studies, concerns difficulties in monitoring the transition towards new industrial models. This challenge is particularly evident for LRAs implementing a circular economy strategy. Even if measuring how waste is managed (i.e. how much is collected) is easy, assessing how the recycled materials are then used as input in a production chain is more challenging. In addition, low carbon and circular economy indicators focus primarily on physical parameters, like kilograms, that are more technology-related. Indicators focussing on socio-institutional aspects (e.g. collection systems) are instead less well-defined and less frequently included in monitoring frameworks. The same applies for high-level circularity strategies. Very few indicators capture the effect of smarter product use and manufacturing or extending the life span of products.

5 Conclusions and policy recommendations

5.1 Findings and conclusions

The findings are based on literature research the analysis of existing policy documents and six case studies. Therefore, the methodological limitations associated with the justification of the findings and conclusions are fully acknowledged. Nonetheless, the results of the analyses conducted show some clear hints on the roles played by regional and local authorities when designing and implementing a place based industrial policy approach. These findings likewise allow drawing conclusions and recommendations on how regional authorities can support the development of low carbon and circular economy as a driver of innovation steering the creation of future-proofed business models and employment opportunities.

5.1.1 Conclusions related to industry policy in general

- **What is a European industry policy today?**

Official EU documents do not explicitly refer to a clear cut definition of “industry policy”. As a general approach, the classic definition of “industry” or secondary sector which distinguishes the industry sector from other economic activities is used in the context of this study. This has led to the consequence in this study that we may not assume that there will be “single” industry policy for the EU, but there will be the necessity to target different “types” of industries differently. The Commission Communication itself is rather unspecific in this respect with the consequence that some of the policy suggestions are actually contradicting each other when considered to be applied for every type of industry¹⁰⁷. Along these lines, we have therefore created a “working classification of industry”, which may help to disentangle the different policy responses for the different types. When looking at the multifaceted nature of industrial activities, the policy field of “industry” can be split up in the following three groups:

- The “fragmented Industry along value chains” is characterised by a very strong division of labour along the value chain. Ownership of the different production units is not necessarily in one hand. Territorially, this industry is very much rooted on the regional/national level and markets are thus territorially limited. Accordingly, the policy steering and supporting this type of industry is rather regionally/nationally determined with certain EU framework conditions set.

¹⁰⁷ Take for instance the strong emphasis on industrial excellence (“industry of the future”) which shall be built upon technological first mover advantages. However this situation of quasi monopolies (when a first mover advantage is harvested) clearly contradicts the idea of “partnership” on the regional and national scale with other economic actors or the civil society.

- The “large scope industry” is characterised by the traditional indications of “industry” – i.e. homogenous products, large scale production in order to tap on economies of scope and scale, a need to cover a comparably high stock of fixed costs in the production function. Territorially, this type of industry shows a supranational footprint. The value chain is spread over several countries and regions and the end consumers served are predominantly global. The policy steering and supporting is therefore rather to be anchored on the national and super-national level which entails that this group will be best addressed by EU industry policy in the sense of a fair single market.
- The “Industry as economic activity – small scale, bordering services” is rather a residual of any economic activity which cannot be grouped in the first two groups. The production function is not so much dominated by large stocks of fixed costs and therefore the variable costs play a much more dominant role. There is no dominance of sectors and practically all kinds of products may be found within this group. Territorially, this type of industry is basically of national and regional importance. This implies that policy steering and support will be very much determined on the regional and national levels.

5.1.2 Conclusions related to place based industry

- **How is place based defined? By geography, administrative units, political boundaries or by functional links?**
- **Is it a question of government, governance or partnership?**
- **Is place based mainly about ecosystems and territorial clusters?**
- **How do place-based approaches incorporate cross border or trans-regional dimensions?**

The place-based approach is a regional development policy approach. It aims at retaining the revenue within the region. A region or city must develop place specific strengths, resistant to offshoring. Externally, a successful place based approach – as for example, Bavaria – means to develop of a place brand, which is internationally recognised and benefits the local industrial players. This will be achieved by making the best use of endogenous resources and coordinating efforts of different regional stakeholders including, amongst others, governmental institutions, private industries, educational institutions, citizens and diverse non-government organisations and all levels of government.

Following a place based approach, a region or city will focus its development path on existing specific strengths. It recognises that most of the knowledge needed to fully exploit local growth potential and to design tailor-made institutions and investments is not readily available to the state, large corporations and local agents. Consequently, it

aims at developing the entrepreneurial ecosystem to support industry development within a region.

The concept of place based industry is defined more by functional interrelations than by administrative borders. It is less a single strategy developed by a single institution but rather a product of a common understanding and a common practice and cooperation of the network of relevant actors.

- **Is there an appropriate level at which place based approaches should be applied?**

A place based regional industrial policy can best support two types of industry: the “fragmented industry along value chains” and the “industry as economic activity – small scale, bordering services” since, territorially speaking, both types are very much rooted on the regional/national level and markets. For those types of industry, direct policy support can be provided to improve the adequacy of the milieu to the need of the industries. However, a place based policy approach can also support the “traditional industry large scope” by preparing the field around them. This task should be aligned with the needs of the industry players, e.g. adapting the educational system to provide a skilled labour force for the industrial sector, developing location factors such as transport infrastructure, supporting the use of spatial planning tools when new industrial sites are developed. The support of Bavaria for the German car production illustrates how the regional authorities have successfully addressed the needs of the local industries.

Along those lines, identifying the appropriate level has to take two aspects into account: on the one hand, it must be the level where relevant decisions are made. On the other hand, the territory should not be too large since an easy and direct communication between the stakeholders is a key success factor. Face to face contacts shall be possible. Thus, administrative boundaries matter, even when relations between industrial businesses, supporting services, research institutions and educational institutions do not perfectly fit within administrative borders. In such context, cross border or trans-regional dimensions are relevant.

Certainly the evidence shows as well that agglomeration effects do play an important role in supporting and developing industry in a place based setting. The concentration and critical mass of human resources are a decisive location factor. However what is also visible through the cases at hand is the willingness and potentials industry may show and tap on when deliberately moving into more remote and rural areas. This holds especially true for more bio-based industries.

- **How are policy competencies at regional and local level relevant to a place-based approach?**

A place based industry strategy combines all relevant policies, financing opportunities and supporting initiatives. It fosters vertical and horizontal cooperation involving different actors as a participatory bottom up approach. Enabling institutions are a core element of its application. Such enabling institutions can fulfil the following tasks:

- supporting dialogue and networking between stakeholders (e.g. via conferences and workshops);
- sharing information on market trends, research, technology and funding opportunities;
- coordinating support from national and international funds;
- marketing and promotion of industrial activities and the region's specificities along with the place brand, which is internationally recognised; and
- initiating and accompanying national and international R&D projects.

Cluster platforms accordingly help to implement the place based approach by connecting the relevant actors. They represent the geographic concentrations of highly specialised industrial actors and enable their strategic and structured collaboration. They contribute to support through the collaboration of big firms with SMEs, technology centres and universities.

Cluster managements and similar institutions are often established and co-financed by regional authorities. The regional administration of Mazovia set up the MSODI-project (Modelling the System of Service for Innovation) that simulates the quality and tailor-made nature of the service provided by business environment institutions to Mazovian SMEs. Bavaria co-financed around 17 cluster platforms for different sectors targeting businesses and research institutions to foster innovation and competitiveness.

The case studies show the important role of the regional government in acting as an enabler and a facilitator of a place-based policy. As the combined use of very different instruments and activities is a cornerstone of a place based industrial development, place based is less about policy competencies than it is about stimulating the right activities for the regional development.

- **Are there any territorial restrictions to implementing a place-based approach and are there essential requirements that need to be fulfilled?**

Place based industry strategies combine the relevant existing "hard" location factors for industrial production like an existing industrial core, access to resources and transport infrastructure as links to markets, with "soft" factors such as skilled labour force and educational institutions fitting the requirements of the industry in the regions,

administrative support for business and an overall positive climate towards industry. These “soft” factors can be also intrinsically rooted in the geography, history and culture of the area.

For instance, the case of Bavaria is a pertinent illustration of a long-lasting tradition of entrepreneurship and innovation across traditional sector boundaries which resulted from a specific model of development and territorial organisation of production. Historically, the allocation of production factors has spurred a local and inclusive economic development based on various growth trajectories.

Along those lines, to achieve the development of a place based industry strategy, the existence of an industrial core, or at least location factors supporting the development of industries, are essential. The implementation of place based industry approaches e.g. in very rural areas having very few industrial activities would be quite a challenge.

- **Which roles can LRAs play when relevant competences are not on regional but on member state level (e.g. education)?**

Both case studies show that it is essential to consistently pursue the chosen place-based industry strategy as a precondition for success. For instance, in Bavaria automotive as well as chemical industrial¹⁰⁸ production have been the basis for regional development policy for a long time. The petrochemical industrial core of Mazovia goes back to the last century. Successfully following a place-based industry strategy is a long-term process which goes beyond election periods. Some core characteristics of this approach are:

- Long-term investments into industrial facilities. Decisions about new manufacturing plants and industrial sites are binding capital investment for a long time.
- The establishment of an educational basis and a supporting industrial and innovative environment (e.g. clusters), requires time and cannot be achieved in a short time.
- Cooperation and participation requires the establishment of networks, common identity and trust between the relevant persons and institutions. A co-operative climate and trust can grow on the basis of long lasting contacts, positive experience and common success. These interpersonal relationships require time to be established.

The development of smart specialisation as a place-based approach tapping on a region’s existing resources and advantages can help boost innovation bringing together

¹⁰⁸ Both industries have evolved from military suppliers to consumer good oriented producers after World War II.

the existing location factors with new development opportunities. The case studies showed that a RIS3 strategy is often used to improve existing place based approaches. As a place-based industry strategy is not a top-down development process but mainly a cooperative process based on regional partnerships, it requires a long-term and continuous public support, strong leadership perspective and continuous implementation to ensure its successful implementation.

It is the role of authorities to enable this stable and favouring environment on the long-term. In order to do this, regional governments can assume the following roles:

- The owner of the strategy¹⁰⁹: first of all, a place-based industrial strategy is about regional development. Thus, regional and local authorities can act as owner and holder of the strategy. They take care of its development especially taking the required long-term perspective into account.
- The “networker” for the strategy: usually regional and local authorities know the regional resources and the regional stakeholders best. They are the key bodies to link the different participants and actors; for example, through setting up and supporting initiatives like e.g. clusters for networking.
- The developer of the strategy: industry policy is dependent on national, regional and global trends. Thus, despite the long-term characteristic of the place based industry strategy it requires a certain level of flexibility: regular updates and adaptation towards changing preconditions. Acting as owners of the strategy regional and local authorities can be the driving force for its ongoing development.

5.1.3 Conclusions related to low carbon and circular economy

- **How can a low carbon and circular economy be a driver of innovation and new business and employment opportunities in a regional and local context?**

Low carbon and circular economy strategies are derived from, and aligned with, the supranational, national and regional policy agenda for sustainable development. Transitioning towards a low-carbon and circular economy contributes to a sustainable management of natural resources, energy savings and a lower material footprint. Those two far-reaching concepts are concretely tailored by local and regional governments, the private sector and the civil society to the territorial specificities and needs. As initially indicated, several pathways can be followed for such transition.

¹⁰⁹ However, if a place-placed strategy truly engages triple or quadruple helix partners, there must be buy-in by all the key stakeholders, in which case it might be more appropriate to speak of a leadership role for regional (or local) governments instead of an ownership one.

However, circular economy is a very young concept. The case studies show that regional and local authorities have just recently developed strategies for circular economy. (Vienna's Smart City Framework Strategy was enacted 2015. The strategy for developing a circular economy is enshrined in Skåne's Environmental Programme (2017-2020). The roadmap for the Metropolitan region of The Hague and Rotterdam was set up in 2016. The city of Maribor developed a circular economy strategy for the city of Maribor and its environs in 2018.) So there is very limited experience in the effects of implementing it into regional policies.

In more developed cases the innovation capacity of the circular economy strategies are more visible¹¹⁰:

The Scottish Institute for Remanufacture - centre of excellence to increase innovation in remanufacturing
The Scottish Institute for Remanufacture (SIR) is funded by the Scottish Funding Council and Zero Waste Scotland. Hosted at the University of Strathclyde, SIR is a pan Scotland centre of excellence to increase innovation in remanufacturing.

They aim to do this by stimulating and co-funding collaborative projects that address industry challenges and enable companies to increase reuse, repair and remanufacture in their manufacturing operations.

If innovation or the latest technology could help a company's remanufacturing operations, SIR can match it with the right academic experts from Universities across Scotland and through a matched-funding model enable collaborative projects that apply knowledge, expertise and specialist equipment to operational improvements for Scottish businesses.

SIR funding of £5,000 to £50,000 per project is available.

SIR will pay for the cost of a researcher's time on the project.

Companies will match the SIR contribution through staff time, equipment or equivalent.

The partner university will contribute the indirect and estates costs (FTE costs) for the researchers on the project.

Alternative funding can be investigated for projects with partners outside of Scotland.

Source: <http://www.scot-reman.ac.uk/>

This shows that circular economy benefits are not always obvious to businesses, therefore the knowledge of research organisations can help to learn about opportunities and how to harness them. Special finding programmes for cooperative research and innovation are therefore of big value and can generate far reaching impact on businesses.

¹¹⁰ Example from ESPON CIRCTER project: ESPON (2019): CIRCTER – Circular Economy and Territorial Consequences; policy guide; <https://www.espon.eu/circular-economy>

Another example¹¹¹ of innovation induced by circular economy strategies on the regional level:

Paris programme of support to innovation incubators focusing on circular economy

Paris&Co is the agency for economic development and innovation of the city of Paris. It is a non-profit association founded by large private industrial groups (Ecofolio, E.Leclerc, Veolia, Vicat) and supported by ADEME and the city of Paris. The overall goal of Paris&Co is to foster collaboration between start-ups and well-established industrial companies by working through sector-specific innovation platforms. Through the Paris&Co programmes, start-ups benefit from coaching schemes, network and market exposure, access to expertise but no direct financial support. Partnerships with larger groups give more visibility and weight to the start-up's initial services. Two support programmes exist: one at incubation stage, the other for more advanced participants. Partnership with the city of Paris does however make "incubatees" eligible to the Paris Innovation Incubation funds.

Paris&Co's most recent innovation platform was launched in 2017 with a call for tenders targeting start-ups operating in ecodesign, sustainable supply, product-service systems, responsible consumption, product longevity and waste management (collection and treatment). This new platform is exclusively dedicated to solving circular economy challenges and it is a part of the wider Paris&Co "Sustainable City" programme.

Source: <https://candidatures.incubateurs.parisandco.com/fr/challenges/economie-circulaire?lang=fr>

This example shows that creating a focus on circular economy activities via special calls mobilises the business ideas that otherwise had limited perspective for realisation. In fostering start-ups regions and cities need to foster a wider ecosystem, where an incubator is just one element of the system.

- **How can regional and local government help support low carbon and circular economy businesses and facilitate the transition to a more sustainable economy in regions, cities and municipalities?**

The development of all forms of industry is strongly relying on market conditions. This holds for "traditional Industry large scope" as well as for the "fragmented Industry along value chains" and the "industry as economic activity – small scale, bordering services". Where the emplacement of circular economy is economically advantageous, industry is already implementing that concept due to the economic benefits at the markets. As industrial products are competing on the market the possibilities for further changes is related to the characteristics of the market.

However, the case studies revealed that in the future the implementation of low carbon and circular economy strategies, applied to the industrial sector, has a large economic potential (new business creations, business opportunities, greater efficiency and savings) and substantial social and environmental benefits (increased quality of life, reduce pollution). Nonetheless, as emphasised in the Maribor case study and to some extent in the South Holland one, the market conditions may not all be reunited to incentive private actors in adopting circular principles. Several reasons can be

¹¹¹ Ibid.

accounted for. The economic viability of the circular economy business model is for instance questioned in relation to sole economic reasons (high transition costs and gains only occurring on the long run) and/or legal barriers (reuse of waste and recycling of certain material). Moreover, the lack of standard and framework is also considered as a hindering/off-putting factor.

Local and regional governments are taking proactive stance, endorsing the circularity principles and applying changes within public administration by themselves. In Maribor the strategy is principally a public sector strategy targeting projects undertaken by publicly-owned companies in the five main sectors that are in the responsibility of municipal companies (i.e. waste, construction, energy, mobility and water). Public procurement following circularity principles forms an integral and significant part in Maribor. The city of Vienna established principles of circular economy in its waste collection system. In Skåne with its Capital Malmö environmentally sustainable use of resources and efficient management of natural resources and energy is required for all of Skåne's administrations, majority-owned companies and all activities that are financed wholly or in part by the County.

Publicly financed activities aim at increasing awareness towards a better understanding of the circular economy across multiple stakeholders like e.g. the bottom-up processes, "Circular Futures – Circular Economy Platform Austria" in Vienna.

In several regions non-governmental, bottom-up approaches exist contributing to circular private initiatives, for example, the "repair network", a network of repair professionals in Vienna that foster reuse of consumers products or the "dismantlement and recycling centre", a recycling, reuse and upcycling operation for waste electrical and electronic equipment in Vienna. These private initiatives are not fully competitive under market conditions as often the production of new goods in low-wage countries is often cheaper than repair in the consumers' countries. Accordingly, these initiatives are also often supported by public funding. Thus, the challenge is to roll out these principles to the complete production sector. Taking into account that a fundamental change of the industry production towards circular economy would require a complete change of the existing conditions of the world market, the options for local and regional authorities to boost circular economy are limited. However, the case studies showed that there is still room for action for regional and local authorities:

- The development of regional circular economy strategies can contribute to raise awareness and to prepare the field for further action. Public financed activities in raising awareness can prepare the field for further policy actions.
- Regional and local authorities can develop circular economy approaches for public services which are under their control as e.g. waste collection and recycling, water, sewage, the operating of public services (building yard, street cleaning etc.). These can act as laboratories for a further enrolment. The

approaches applied and experience gained in these companies will trigger initiatives in the private sector.

- Regional and local authorities can support private, non-governmental, bottom-up initiatives that contribute to circular economy approach.
- Public procurement of regional and local authorities can take principles of circular economy on board.

The ESPON CIRCTER¹¹² project has come up with an even more comprehensive overview of potential policy options for regional and local authorities:

Table 1: Policy measures to support circular economy

Categories of policy measures	Examples of policy measures
<i>Regulatory instruments</i>	<ul style="list-style-type: none"> • Directives and regulations (e.g. on waste recycling, producers responsibility, eco-design, take-back, transparency in material chain and responsibilities, etc.) • Quality and other mandatory targets (e.g. waste recycling, re-use) • Codes and standards e.g. for products, recycled material content, packaging, emissions, as well as the ones triggering innovation prior to setting new minimum performance limits
<i>Economic instruments</i>	<ul style="list-style-type: none"> • Fiscal instruments and incentives, e.g. charges and taxes for waste, incineration, landfill, tax reliefs for circular activities • Direct funding including, loans, subsidies, grants for projects, business, infrastructure • Demand pull instruments, including public procurement, eco-vouchers • Market based instruments, e.g. “cap and trade” etc.
<i>Research and Innovation support</i>	<ul style="list-style-type: none"> • Funding for R&D in CE related themes (e.g. direct or competitive grants) • Pre-commercial /R&D procurement • Providing R&D infrastructure • Innovation vouchers schemes for SME on CE related innovations • Support to innovation incubators focusing on CE related areas • Support programmes and incentives for R&D personnel
<i>Information, education and networking support</i>	<ul style="list-style-type: none"> • Advisory services & information provision (to companies, start-ups, customers, technology adopters, etc) • Professional training and qualification and skills enhancement courses, i.e. in material chain management • Support networking via matchmaking, technology platforms
<i>Voluntary measures</i>	<ul style="list-style-type: none"> • Performance label for products and services • Guarantee for product durability, repair, • Negotiated agreements (public-private sector) • Public or unilateral voluntary commitments (by private sector)

Source: CIRCTER project

In that sense, public authorities can be the ones who are walking the talk and showing how better cooperation and communication can provide effective and efficient solutions to waste treatment, for instance. This may contribute to the internalisation of

¹¹² ESPON (2019): CIRCTER – Circular Economy and Territorial Consequences; policy guide; <https://www.espon.eu/circular-economy>

market failures, temporarily dis-incentivising industrial players from moving beyond a “low-hanging fruits” strategy.

Innovative actors in the production sector such as start-ups could be triggers tightening the links between public sector and the industry.

5.2 Recommendations

When establishing recommendations for policies in the field of industry policy the question of “mind set” of industry policy has to be addressed first: The recommendations provided below are to be regarded with care as certain interventions may have counterproductive effects for either type or group of industries – see e.g. the protection of industrial standards as competitive advantage for large scale industries, which seek a global market dominance. At the same time, such a recommendation provides barriers to free and fair market access for small players and industrial actors. This is why the authors have split up the recommendations by type of industry and for the two policy regimes (place-based vs. circular economy related).

5.2.1 Overall recommendations for a European industrial policy

One recommendation which holds true across sectoral and territorial characteristics is investing in human capital. The basis for any successful industrial development is the human capital available in the region. The tapping on these resources is only possible, if the population is encouraged to lifelong learning and when industry is actually moving to the pool of the resources instead the other way round. This means that location decisions for industries should be taken with an eye on the local human capital stock – thus allowing for territorial cohesion and a more resilient economic structure in the territory. Sure enough this means that the other stakeholders as well have to actively contribute to this aim. – i.e. place-based approaches to skills development will be essential for regional and local authorities as well as national education and training authorities.

The lubricant of any industrial activity (regardless of type or scale) is funding. Access to finance is a key element of any economic environment. Not only virtual availability of funding is necessary; the funding also has to be accessible in appropriate ways through loans, grants, and financial instruments, which in turn have to be designed properly. This includes both financial instruments under the umbrella of EU co-financed funds and private venture capital. Thus, the support for financial service providers and investors is general recommendation.

Industries – like all economic activities – need legal certainty. Long term planning horizons are the backbone of any investment and business decision. Thus, policy

should seek to provide this certainty to the utmost extent. This includes ensuring long-term certainty around product standards, economic and trade instruments.

Last but not least the provision of industry support entities (with a specific SME relevance) plays an important role. Support entities are:

- Networking/clustering services which establish networks for innovation and knowledge transfer, supporting internationalisation as well as access to EU standards, regulations, and projects. Availability and support of exchange and cooperation networks and platforms is crucial for SME growth and development;
- Business representative associations representing private sectors;
- Financial institutions in conjunction with public authorities are responsible to offer access to finance for industry;
- Business support organisations which offer operational support for industry through knowledge and technology transfer.
- Good infrastructure, within the region as well as connections to (other) economic centres: This includes roads and railway connections, electric grids, telecommunications, and broadband infrastructure.

Continue to promote tailor-made solutions for Member States and regions in relation to industrial growth and development: The focus on tailor-made solutions should be present also in the post-2020 cohesion policy to understand and tap into the specific potentials of regions or countries. The keyword “tailor-made” is often used; however it can easily be construed as abstract or vague. It should be recognized that when choosing and developing tailor-made solutions, the valuable role of other actors such as research and educational institutions should be supported, but in an overall structured process¹¹³.

5.2.2 Recommendations on the role of regions in a European industrial policy

- What role can regions and cities play in strengthening Europe’s industrial competitiveness?

¹¹³ In this respect a rather holistic, but nonetheless participatory approach may be taken – i.e. establishing regional potentialities through foresight processes, ex-ante territorial impact assessments etc. shall lead to real regional SWOTs, which should then be translated into concrete objectives and action plans.

- How can a renewed EU industrial strategy be operationalised for the roles of regional and local authorities?

Creating a favourable economic environment within the region

In addition to the overall policy frame on the European and national level, regions are an important player to create a favourable economic environment. As a rule of thumb, a non-transparent government and an unfavourable business environment are connected. There are many aspects of a good industry ecosystem:

First and foremost, a healthy industry ecosystem involves high quality governance with transparency and stability, clear and possibly simple regulations based on a tailor-made, collaboratively elaborated industry and start-up growth strategy, as well as clear communication and pro-active approach from the authorities.

Often economic actors are not aware of existing support mechanisms. Local and regional authorities can facilitate contact and communication between start-ups, industry, entrepreneurs, and local bodies. Clear communication, which makes available tools visible and offers support from public authorities, is conducive to industrial growth.

Clusters as well as the facilitation of networking have proven to be equally important elements of a favourable economic environment. With support and incentives from regional authorities, clusters and networks can develop to be strong drivers of industry and can thereby effectively contribute to economic growth. Their presence may further contribute to the creation of hubs and incubators.

Supporting research as well as the role of educational institutions that contribute to the development of innovation and to training a skilled workforce is required. Universities can be a major facilitator for strategy elaboration and implementation, establishing a start-up ecosystem, and supporting new industries. This may take different forms and modalities: ranging from simple funding support of co-developed university-industry projects over active support of university graduates in the start-up phases of their own companies to the match-making function through public procurement initiatives (e.g. in large public infrastructure). This approach is more difficult and less clear-cut for a rural than an urban region. Nevertheless, this means that the marginal returns would be even higher for rural regions, due to their comparably lower industrial base. In particular, incentivising and facilitating the interaction between academia and business sector – especially the smallest firms – is crucial for many regions.

Indirect forms of support are an important complement to direct firm support. Indirect forms of support are e.g. consulting, provision of infrastructure, and information campaigns, as well as making the business support visible, e.g. as “one-stop shops”.

Indirect support helps to not only promote industrial policy but also to give guidelines on how to benefit from it, which is a necessary element of such policies.

All of the above should contribute to supporting the development of an entrepreneurial culture, which further reinforces and stimulates industrial growth. Entrepreneurial culture involves providing entrepreneurial education as well as support measures, raising awareness about various possibilities, promoting open-mindedness, risk-taking, and investments, mutual trust, support and cooperation (not only between private actors but also between private and public). The regional governance structures can contribute through the provision of both structures and institutions for industrial development.

Cultural factors are deemed to be very significant in industrial development. While these have to be considered in developing a strategy, local and regional authorities are in the best position to adapt these to cultural specificities of the region. Given the importance of ecosystems for economic growth, tailor-made solutions are best developed by actors who know the specific context of firms functioning in the region and, thus, can harness the potentials.

Providing the required infrastructure

All economic activities are dependent on good infrastructure, e.g. in terms of accessibility as well as in terms of telecommunications and broadband. While cities have an advantage in terms of clustering, infrastructure and environmental issues become an increasing bottleneck. Also, infrastructure plans need to be developed in close cooperation with the surrounding regions. In cities, the focus should be therefore on intra-regional networks and connections to the hinterlands. In more rural areas, good connections to other European economic centres are important. Regional governments and municipalities play important roles to develop the required infrastructure and bring it to the clients.

Cooperation between public and private stakeholders and between regions

Cooperation between public and private stakeholders is very relevant. This calls for a common and shared vision, which enhances the cooperation between different kinds of stakeholders and encourages action. Regions and cities have to engage in an interactive strategy elaboration process. Cooperation involves good communication and support to create trust between public and private actors. An important element of this is also a clear definition of competences and sharing of tasks. For example, an advisory board with local stakeholders can be created to support local businesses.

Cooperation with other regions and cities can strengthen industrial performance. On one hand cities are particularly dependent on their surrounding regions in terms of infrastructure and also workforce. Regions, on the other hand, can benefit from a city nearby. This implies that an interregional coordination process between neighbouring

regions/cities concerning governance is highly relevant. Interregional coordination processes are particularly challenging for regions, which are not in the same Member State. Cross-border cooperation can alleviate this gap. Generally, they are fruitful and have already proven to increase the potential of participating regions.

However, regions and cities which are not geographically close, but experience similar challenges can also be valuable partners. Rural areas in particular can benefit from such cooperation – the smart specialisation strategy (S3) platform is a useful tool to find regions which apply fitting S3.

Developing a regional strategy for industry

Having a regional strategy for industrial growth and development is important. LRAs can design a strategy to support economic activities held back by market failures and help them realise their full potential. They should therefore identify the path for industrial policy. However such strategies should be carefully chosen. The transferability and adaptability of other models should have already been considered upon specifying the overall strategy. It is important for authorities not to simply choose and replicate models from other regions, but to consider the specific context of their region as well as to consult different relevant actors and stakeholders. Tools such as foresight or horizon scanning tools may be useful in relation to future developments.

It is important to consider the links between research and innovation as well as growth and development. For that matter, national or regional strategies for smart specialisation should be tailored to the specificities of that region as well. A focus on internationalisation and diversification will often be considered.

The regional industry strategy needs to find the balance between specialisation and diversity. Whereas industrial diversity can be a major success factor for the development of the economy, an industrial strategy needs to focus as well at the existing industrial base. New industrial paths can be highly challenging in regions with low system of industrial sophistication, lacking a critical mass of strong actors and without strong systemic support for innovation and entrepreneurship. Regional industry strategies can focus on technology and competence fields which can be flexibly applied in many different industries. Any specialisation strategy should avoid creating potential dependencies.

Promoting of the region

Good visibility and marketing can help to attract investments to the region, thereby strengthening the industrial environment. Through the implementation of an S3 strategy, regional assets can be further strengthened which allows for the development of a “regional brand” in accordance with these strengths. Regional and local authorities can engage themselves in location marketing to improve the visibility of the region.

5.2.3 Recommendation on place-based policy approach

What are concrete proposals for implementing a place based industry approach?

Establishment and support of regional networks and clusters

Especially a regional place-based policy strategy requires close cooperation between local and regional stakeholders. This is relevant for all types of industry. Multiple stakeholder groups in industrially diversified regions increase the complexity of governance. This makes it more difficult and costly to coordinate and engage stakeholders, enable entrepreneurial discovery and facilitate collective action. A cluster system can be very effective answer to such difficulties.

Local and regional authorities are not only part of these networks, they can initiate and support them by the establishment of professional “network managers” as e.g. cluster managements. A network of (potential) supporting institutions is central for a place based regional industry development.

When establishing such networks and network supports clear and understandable structures are required. Parallel institutions can lead to confusion and inefficient use of funds. Low information levels and confusion of entrepreneurs about support offers are severe obstacles for enterprises to get financial support for e.g. innovative measures. Clarity of the whole portfolio of support offered at different administrative levels is required.

Cooperation between the industry and the educational system

Close cooperation between the industry and the educational system is an important cornerstone to provide the required human capital. The industry needs to define the skills that are required and can absorb, whereas the educational institutions (secondary schools, colleges, universities) educate the workforce. This is not limited to a matching between regionally defined need and supply on the labour market, but also on co-operation in research. As such, higher level cooperation may be necessary to harmonise outputs of the education sector to industrial requirements.

European industry competing on the world market

When European industries are competing on the world market (“large scope industry”) it is essential to support or develop European industries at a world market size. However this might be contradictory to a place based strategy and to the idea of market surveillance for safeguarding fair competition. In those cases where negotiated standards create a de-facto monopoly and thus a competitive advantage on the global scale – especially in sectors where the EU may become a world industrial leader – e.g. bio-based large scale industry, hydrogen power, train technology, machine-to-machine

communication standards – protection against outside EU competitors could be needed. Strategies may contradict the idea of an inner-European competition between regions and enterprises.

- What does the place based approach mean in operational terms in the context of EU programmes and funding?
- How can programming instruments in the upcoming period 2021-2027 contribute to the implementation of a territorial or place based approach to industrial policy strategy?

It is important to coordinate measures on various levels and make sure that different funds have different but complementary aims and tasks. The post-2020 cohesion policy should place an emphasis on efficient complementary use of its funds without duplicating national measures. The aim is to fill gaps to form a cohesive innovation and/or start-up ecosystem in the region, with support at the national level and the European level.

A sound approach includes such measures that support local and regional authorities in strengthening the place based approach. This includes:

- Support for the establishment and strengthening of networks between industry, educational institutions and public authorities (e.g. cluster management etc.).
- Support for innovation bringing together industry and research institutions to develop concrete innovative products that are in line with the strategic development options.
- Support of the promotion and marketing of a region and its specific advantages by public institutions or chambers, etc.
- Support of initiatives for a diversification of the industrial portfolio that is based on existing strengths.

Cohesion Policy funding should complement national or regional strategies. Member States and regions should also be encouraged to identify funding gaps and make appropriate investments, and/or should sometimes also be forced to enhance quality standards by formulating ex ante conditionalities/enabling conditions.

5.2.4 Recommendation on low-carbon and circular economy

What types of policy support will be needed to create the right conditions for companies to develop and adapt their business models for a low carbon and circular economy at regional and local level?

General framework for circular economy at the EU level

Regarding circular economy in industry, the case studies have shown that the public sector has already established various initiatives, whereas for the industry the production costs are the determining factor. When the European Union wants to implement the circular economy approach to the industrial production, the internalisation of external costs to production is required. This means that coupled products of industry have to be included in the market prices to make circularity economically feasible.

Many examples of circular economy work on the “end-of-pipe” side and often only with the support of public funding, which internalises these externalities (e.g. waste, emissions etc.). One solution would be an EU wide CO₂ taxation, which would diminish national competitive advantages and lower the entry barrier of private economic actors to the circular economy.

Standards and rules for material flows, as e.g. rules determining the economic metabolism (e.g. from “cradle-to-cradle”) could limit economic coupled products. One example is the “waste hierarchy” in Vienna: preventing before re-using before recycling before thermally using.

The definition of product standards aiming at minimising material throughput would also nudge the industry to walk the circular economy path. Examples are modular product designs, which allow for a replacement of components (see – furniture, mobile phones etc.) or the prohibition of obsolescence.

Circular economy at the regional level

The low-carbon economy shows comparatively high investment costs for start-ups and therefore relies to a certain extent on the public sector as a client and by framing the demand from the private sector through setting standards. Thus, there is an imperative for strong public support for developing the low-carbon economy. Regional and local authorities could also use their own competencies for strengthening circular economy approaches:

- As the existing circular economy strategies mainly concentrate on the public sector and the consumers, it would be advantageous to develop circular economy strategies for the production sector with a strong involvement of stakeholders

from the industry. A first step could be the focus on sectors where the public sector plays an important role as e.g. construction, energy, mobility and water.

- Softer aspects such as spatial planning (for sound management of degraded areas, rules for the development of sites) could be further developed according to the goals of circular and low carbon economy.
- Circular economy strongly requires the close of production chains. Networking and bringing together different potential partners could be an approach for local and regional authorities to close existing gaps.

Players that act to strengthen the re-use of consumer goods as repair professionals, reusing and upcycling waste electrical and electronic equipment, organisations taking over discarded IT hardware from large companies/public institutions and preparing them for resale are crucial to ensuring efficient circularity at local and regional levels. LRA can help them to bridge the gap between market prices and the repair-costs.

Public procurement can be used strategically to support circular economy. LRAs could use qualitative rather than lowest cost criteria more systematically taking on board criteria that are relevant for a low carbon and circular economy implementation. In construction, a share of demolition material that is reused can be fixed. Reduced CO₂ emissions and lower electricity consumption could be taken into account.

LRA can use their own taxation competencies for nudging circular economy. For example they can favour higher and penalise lower waste hierarchy options stimulating reuse. Regions and cities can play an important role in increasing awareness. Amongst others, they could help promote remanufacturing to financial institutions as well as create financial incentives for businesses wishing to take up remanufacturing so that businesses have facilitated access to capital.

Rural areas could be drivers and first movers to close material loops and create sustainable industrial ecosystems based on the food sector and others that are linked to agriculture. Regional authorities can support initiatives that link different aspects along the value chain.

Industrial regions losing importance deserve particular attention. In the spirit of the circular economy, abandoned industrial installations could be dismantled and either sold for reuse or recycled and industrial sites could be re-cultivated. Vacant buildings could also be adapted to new circular industrial uses (waste treatment and separation, composting etc.) and non-industrial uses (in the long-term commercial or residential), or be transformed into public spaces (art galleries, co-working spaces, community-centres, repair markets, etc.), thereby contributing to regenerative spatial and urban planning.

Circular Economy and EU funding

The transition to a low carbon and circular economy may incur high transition costs involving significant investment. Costs to businesses include management, planning, research and development, as well as physical and digital infrastructure.

According to the current proposal for a regulation on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF), LRAs managing ESI funds in the 2021-2027 period may use specific indicators capturing information on circularity under Policy Objective 2 “A greener, low carbon Europe – clean and fair energy transition, green and blue investment, circular economy, climate adaptation and risk prevention”. So the ERDF could provide incentives or subsidies for LRAs as well as enterprises. This includes:

- Support of enterprises and research institutions for developing circularity along the production chain.
- Support enterprises in investments to change the product cycle from a linear production to circularity.
- Support of public institutions and NGOs to raise awareness for production needs as well as consumer patterns according to circular economy.

LRAs promoting a low carbon and circular economy approach should make good use of the time before ERDF and CF programme drafting to verify their capacity to bring in their needs for support of circular economy into the programming process.

Annex I – case study methodology

The role of case studies is to explore the concrete ways in which EU industrial strategy could be implemented with a territorial or place-based approach. The project examines how the different features of the EU industrial strategy, which involves a place-based approach as well as an emphasis on low carbon and circular economy, can be operationalised in European regions and cities. It is accordingly necessary to examine the local and regional strategies as well as their achievements and challenges in order to provide sound conclusions and forward-looking recommendations.

Case study selection

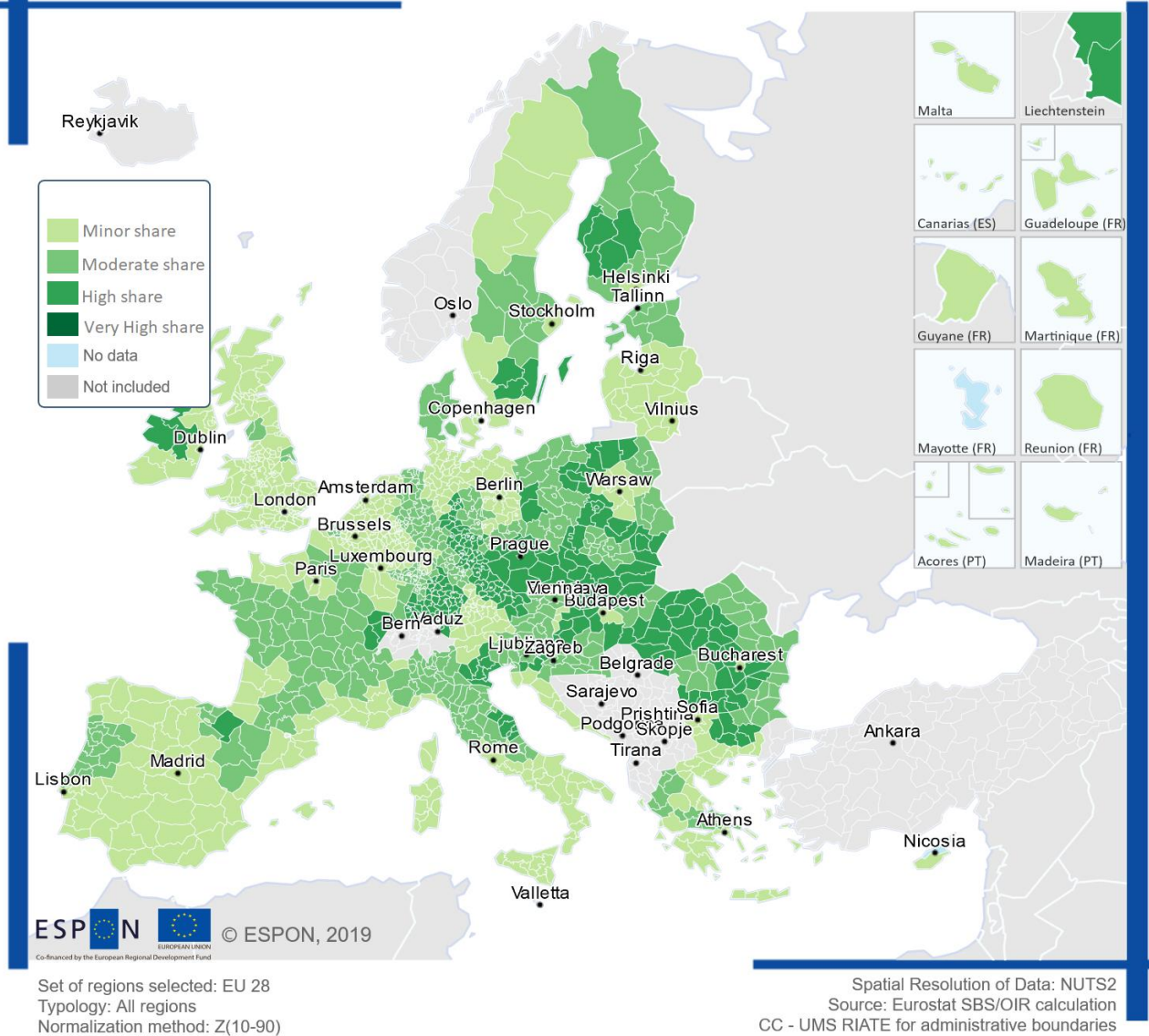
For case studies to provide the needed inputs, it is first necessary to safeguard an appropriate selection of cases which should be based on a number of criteria. An underlying principle in examining the implementation of the strategy in the EU is the selection of a balanced range of case studies which should ensure the coverage of a diverse range of situations, in different European cities and regions. The balance is to be understood in terms of:

- Performance in industry; based on, for example, industry employment and Gross Value Added (GVA) (see map below);
- Performance in circular economy which is an important aspect of the EU industrial policy and can be measured by employment in Circular Economy Business Models (CBM) (ESPON CIRCTER, 2019) (see map below);
- Inclusion of both cities and regions;
- “Older” and “newer” Member States (MS) with “newer” MS defined as those who joined the EU from 2004 onwards;
- Geographical balance;
- Case study focus; either on place-based industrial policy or circular/low carbon economy which are important features of the EU industrial strategy

The two maps below were produced in the ESPON TIA Tool and show the share of employment in industry as well as the share of industry share of GVA in European regions on NUTS 3 level. The third map originates from ESPON CIRCTER (2019) and shows employment in Circular Economy Business Models. The maps serve as basis for identifying the case studies in regards to the first three criteria.

Map 1: Share of employment in industry (secondary sector)

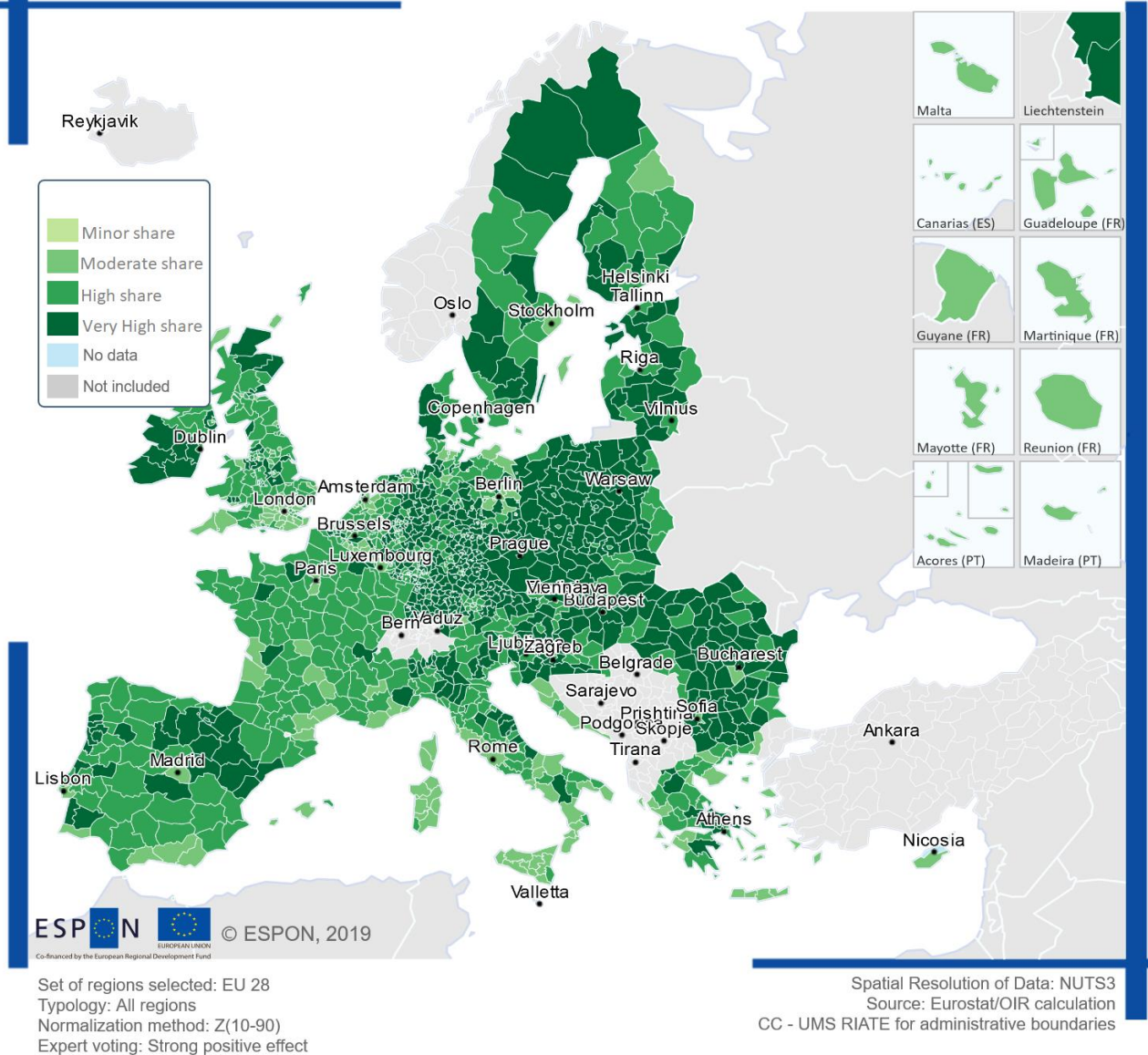
Employment in industry (secondary sector)



Source: ÖIR; ESPON TIA Tool, 2019.

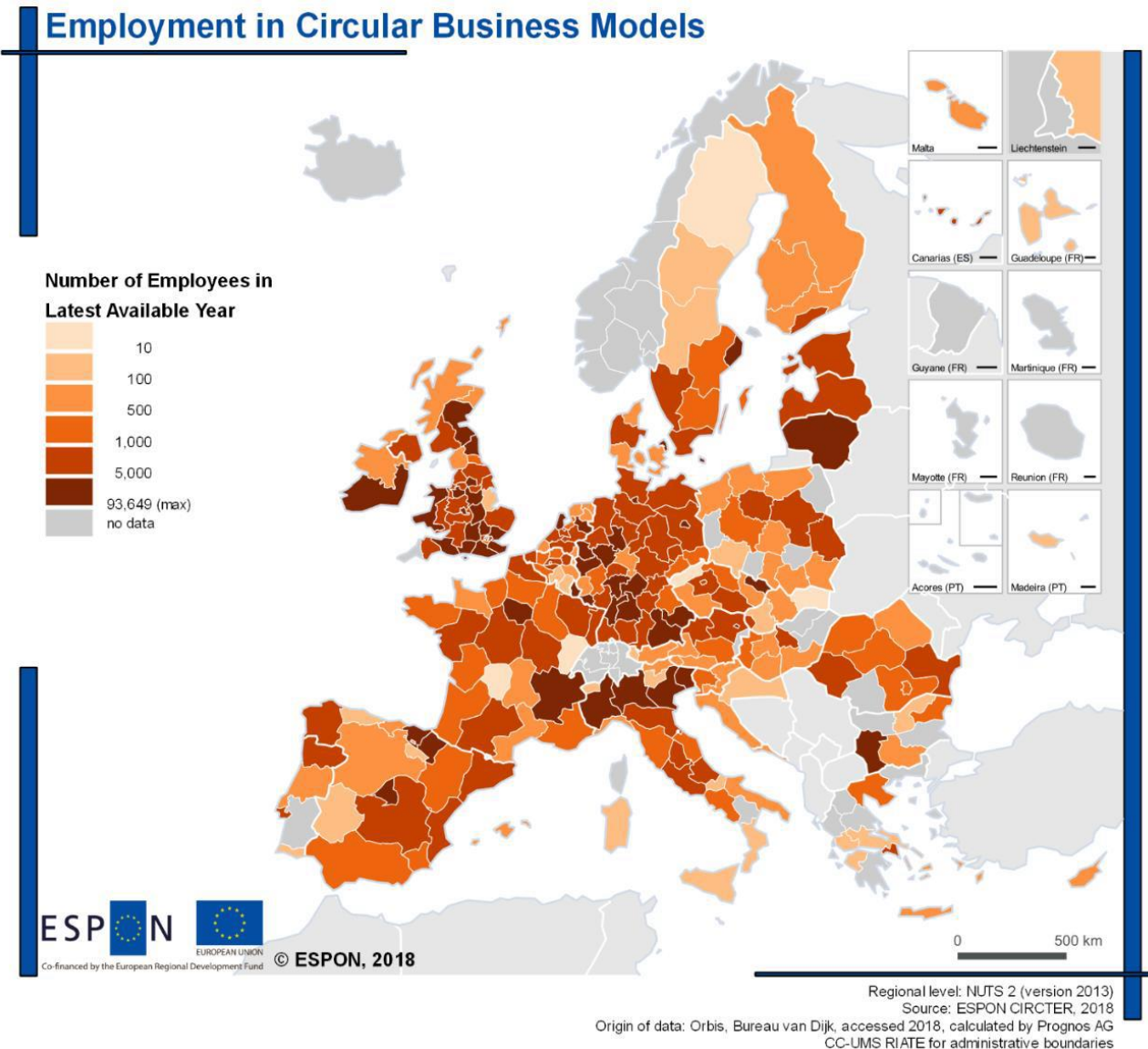
Map 2: Share of GVA in industry (secondary sector)

GVA in industry (secondary sector)



Source: ÖIR, ESPON TIA Tool, 2019.

Map 3: Number of persons employed in companies associated with Circular Economy Business Models



Source: ESPON CIRCTER, 2019.

The table below justifies the selection of case studies, based on the balanced approach to the above criteria.

Table 1: Presentation of selected case studies according to the criteria

	Mazowieckie Voivodenship (PL)	Bavaria (DE)	Maribor (SI)	Vienna (AT)	Skåne/Malmö (SE)	South Holland (NL)
Share of GVA industry	Very high	High to very high	Moderate	High	High	Moderate to high
Share of employment in industry	Minor	Moderate to high	Moderate	Minor	Minor	Minor
Performance in circular economy (employees in CBM)	5000	1000-Max	500	Max	5000	1000-5000
City/region	Region	Region	City	City	Region	Region
“Older”/“Newer” MS	Newer MS	Older MS	Newer MS	Older MS	Older MS	Older MS

	Mazowieckie Voivodenship (PL)	Bavaria (DE)	Maribor (SI)	Vienna (AT)	Skåne/Malmö (SE)	South Holland (NL)
Geographical location	East Europe	Central/West Europe	South-East Europe	Central/East Europe	North Europe	North-West Europe
Case study focus	Place-based industrial	Place-based industrial	Low carbon and circular	Low carbon and circular	Low carbon and circular	Low carbon and circular

Source: consortium, 2019.

The table above shows a satisfactory balance of selected case studies in regards to the above criteria. Looking at the first three criteria, case studies are generally diverse and within most ranges of performance in industry and circular economy, according to the maps. There are two cities and four regions being investigated; however the slightly lower number of cities is compensated by the fact that regional case studies also consider cities. In terms of geographical balance, only Southern Europe seems underrepresented; however, Maribor represents South-East Europe Importantly, however, overall balance is safeguarded in both types of case studies: place based industrial policy as well as low carbon and circular economy.

Case study methodology

In order to understand how place based as well as low carbon and circular economy industrial policies are applied, it is necessary to appropriately guide the case study data collection in a standardized manner. For this purpose, not only a case study template was provided but also guidance for national experts for conducting the case studies.

The case study structure was designed in order to streamline data collection for purposes of the project. It was divided into the following elements:

- **Context** provides background information about the region/city investigated, including its socio-economic context, presence of industry; this information about the initial situation of the area complements the understanding of the rationale behind the selection and performance of the industrial strategy.
- **Development of the strategy and objectives** is concerned with presenting the strategy and its objectives relevant to understanding the place-based approach to industry or the focus on low carbon and circular economy; whenever available, data on financing sources of the strategy is provided.
- **Implementation and governance** exposes the means of practical implementation of the relevant industrial strategies, including the practices and measures which are undertaken as well as the actors involved; the section helps

identify good practices in regards to measures and different forms of governance as important inputs for purposes of the project.

- **Achievements and challenges** aims to draw on the successes and challenges of the strategy and its implementation in order to provide statements on how and why the place-based industrial approaches of investigated European cities and regions prove successful and what are the issues that authorities face; this should provide lessons learnt for future purposes of implementing industrial strategies.
- **Main conclusions** draw on the findings of the case study with respect to the aim of the project: based on how industrial policies are currently implemented and what are their successes and challenges, understand how industrial policies, with focus on place-based approach and low carbon and circular economy, can be more effectively implemented in the future.

The methods employed in conducting case studies require mainly desk research and review of relevant literature. The work is conducted by national experts who have the needed language skills to access all relevant literature and documents. Whenever needed, consultations and interviews with relevant actors, mainly local/regional authorities, are conducted.

Annex II – Case studies: a place-based approach

Mazowieckie Voivodeship, Poland

1. Overview

Location	Mazowieckie Voivodeship/Poland
Key economic/ industrial indicators	<ul style="list-style-type: none"> • Unemployment rate at 4.8%; • 40% of national R&D investment and 31% of people employed in R&D; • 15% of agri-food enterprises of Poland; • Key sectors: agri-food, financial-insurance services, telecommunications, IT, pharmaceuticals and electronics.
Timeline	2014
LRA(s) involved	Regional Government of the Mazowieckie Voivodeship
Stakeholders	Public, private
Type and amount financing (if any)	Own revenue, grants from the state and the EU
Web links	https://www.mbpr.pl/user_uploads/image/PRAWE_MENU/STRATEGIA%20ROZWOJU%20WOJEWODZTWA%20MAZOWIECKIEGO%20DO%20ROKU%202030/SRWM%20SKR%20ANG.pdf https://www.funduszedlamazowska.eu/wp-content/uploads/2017/12/prezentacja-doradztwo-3-06-2015.pdf https://ec.europa.eu/regional_policy/en/atlas/programmes/2014-2020/poland/2014pl16m2op007

2. Summary

Mazowieckie Voivodeship is one of the most significant industrial centres in Poland with petrochemicals as one core sector. Additionally, the region covers many rural areas where agriculture and consequently food processing dominates. The region benefits from the dynamic capital city of Warsaw, an innovation centre providing good conditions for smart growth which attracts investments.

The Development Strategy of Mazowieckie Voivodeship 2030¹¹⁴ sets up a place-based approach to industrial development. It aims at developing export-oriented production in the fields of medium and high technology and in the agri-food sector.

¹¹⁴ Regional Government of the Mazowieckie Voivodeship, 2014.

Especially the agri-food sector is seen as a source of endogenous potentials bringing added value through the improvement of the agri food industry. Building on the existing core sectors, the strategy aims at enlarging the diversity of the industry sectors. The Regional Innovation Strategy for Mazowieckie Voivodeship (RIS Mazovia) is developed to support the place based strategy by preparing the field for innovation e.g. by promoting R&D activities, partnerships between the regional government, science and business and the development of business-related services.

3. Context

The Mazowieckie Voivodeship, otherwise known as Mazovia, is the largest Polish voivodeship, with 5.2 million people, 33% of them in Warsaw. The population is relatively young and well-educated¹¹⁵, also regional unemployment is 4.8% which is below the national average of 5.7%¹¹⁶.

Mazovia is a leader for economic transformation and development and is one of the fastest growing regions in Poland. Agri-food and petrochemicals are established and significant industries. Indeed, the largest oil refinery in Poland is in Płock. The region has also seen fast development of innovative sectors such as financial-insurance services, telecommunications, IT, pharmaceuticals and electronics. The region contributes most to national GDP and regional value added is 160% of the national average. It is the only Polish region which outperforms the EU average GDP per capita¹¹⁷. These achievements are predominantly due to the capital city, Warsaw.

The region includes 15% of agri-food enterprises and has the most enterprises in the country (almost all micro and small enterprises) and produces almost 25% of national marketed production¹¹⁸. Although decreasing, agriculture still employs a quarter of the region's population. The region has developed specialist production of fruits, milk, vegetables and eggs which are reflected in the share of national production.

Mazovia also has the most foreign investment in Poland as well as the most enterprises and R&D units. In 2011, the region claimed over 40% of R&D investment and 31% of people employed in R&D in Poland. Developments and activities in Warsaw mean Mazovia is the leading Polish region for innovative industries.

However, as with elsewhere in the country, Mazovia also has large regional disparities. Despite the relatively strong regional economy, some areas perform below the national average. Lack of cohesion within the region is linked to different industrial specialisations. While urban economies see rapid growth from innovative industries

¹¹⁵ Marshal's Office of the Mazowieckie Voivodeship.

¹¹⁶ Statistical Office in Warszawa, 2019.

¹¹⁷ Ministry of Investment and Economic Development, 2017.

¹¹⁸ Regional Government of the Mazowieckie Voivodeship, 2014.

and foreign investment, rural areas dominated by agricultural activities must find ways to use their strengths to achieve economic growth.

4. Development of the strategy and objectives

The Development Strategy of Mazowieckie Voivodeship 2030¹¹⁹ sets out development goals as well as actions, based on a diagnosis of the region. Formulating the strategy focused on analysing the economic situation, including industry and production, space and transport, society, environment and energy, culture and heritage as well as the development potential of the region. While the strategy addresses many components of development, there is a place-based approach to industrial development, as industry and production are a priority.

The development strategy pursues the vision of “Mazovia as a region with territorial cohesion, competitiveness, innovativeness, rapid economic growth and high quality of life” through two goals. The first covers industry and production, while the other focuses on the environment and energy. The industry and production goal focuses on the “development of export-oriented production in the fields of medium and high technology and the agri-food sector”, two significant (but not exclusive) specialisations in the region’s urban and rural areas.

The regional strategy also intends to “reduce socio-economic disparities within the Mazovian region, increasing the role of the Warsaw metropolitan area in Europe”. Besides the primary strategic goals targeting industry and production, and environment and energy, additional strategic goals for the economy, space and transportation, society and culture and heritage are included. All goals are formulated with regards to two policy dimensions; competitiveness and cohesion. They also encompass three territorial dimensions, the Warsaw metropolitan area, other urban areas, and rural areas.

To enhance competitiveness there are four targets:

- create favourable conditions to generate and absorb innovations;
- develop production: create business-friendly environment for investors and enterprises;
- internationalisation of the economy;
- create conditions encouraging non-agricultural investments, primarily in the agri-food sector.

The specific goal of regional policy is “supporting the creation and development of industrial companies”. Actions in this area include promoting R&D activities, increasing business innovation, improved partnerships between the government,

¹¹⁹ Regional Government of the Mazowieckie Voivodeship, 2014.

science and business, development of business-related services such as credit guarantees and loans, production and investment zones, supporting industrial companies to invest in new jobs (including R&D), support for R&D&I institutions, helping increase export potential and meeting EU quality and safety at work standards, as well as developing regional agri-food specialisations.

A further industry-relevant goal of the strategy, “regional economy”, is “Increasing the region’s competitiveness via development of economic activity and transfer and implementation of new technologies¹²⁰”. Two specific goals within the policy of competitiveness refer to all three territorial dimensions. The goals are strengthening and making use of regional specialisations as well as supporting the development of new technologies.

For the Warsaw metropolitan region, a competitiveness-related goal is to develop metropolitan functions. In the policy of cohesion, a goal related to urban areas outside Warsaw addresses support for developing regional and sub-regional centres. For rural areas, the goal is to enhance and develop absorption potential. Another cohesion-related goal for all urban areas is to restructure cities to strengthen their socio-economic functions. Finally, the last goal for all territories is to increase access to broadband internet and e-services. Industry-related actions in this area are to promote local economic specialisations, develop clusters and networks, more interregional and international cooperation as well as cooperation and technology transfer between scientific institutions and enterprises, infrastructure and support for business incubators and industrial/technology parks, support patenting and innovations and increasing attractiveness for investors.

Interesting actions address the goal of increasing the development and absorption potential of rural areas. These include building rural cooperation networks and clusters serving to develop specialisations, increasing the productivity of agriculture and marketability of farm products, restoring the number of bee colonies, increasing economic efficiency and innovativeness for agriculture, as well as investment in infrastructure facilitating development of economic activity.

Due to the “smart” nature of innovative industries, much attention is given to the potential for innovation and R&D activities, medium and high-tech, as well as biotechnology. The Regional Innovation Strategy for Mazowieckie Voivodeship (RIS Mazovia) is a vision for the region to become a strategic European R&D, as well as business service centre, with high levels of innovation as well as good social innovation. The RIS strategy foresees to obtain financing necessary for its implementation from the following sources: own funds of the Mazowieckie Voivodeship, ESIF, funds of other units of territorial self-government, private funds, others (including national budget). The specific ESIF programmes which can be used

¹²⁰ Regional Government of the Mazowieckie Voivodeship, 2014.

for financing the RIS strategy are: Regional OP of Mazowieckie Voivodeship, OP Smart Growth, OP Digital Poland, OP Knowledge Education Development, RDP for Poland, Horizon 2020, Interreg Baltic Sea Region, Interreg Central Europe¹²¹.

Both strategies focus on supporting entrepreneurs and scientists as well as facilitating the transfer of knowledge and technologies. In addition, both strategies are based on Smart Specialisation for Mazovia.

The sources of financing of the strategy stem from own revenues of the Voivodeship and its territorial units, as well as from different types of subsidies from the national budget, ESIF and other sources. The total amount of financial resources of the Voivodeship for the period of the implementation of the strategy (2014-2020) is estimated PLN 53,2 billion. A total of 45% of funds is estimated to come from own funds of the units of territorial self-government (municipalities, "powiats" and cities, city of Warsaw as well as the Voivodeship), while 55% of financing is foreseen to be provided by external sources.

6. Implementation and governance

The regional government of Mazovia leads the implementation of the Development Strategy of the Mazowieckie Voivodeship 2030. Multiple working groups deal with, update and monitor each strategy goal. In addition, the regional territorial forum and the territorial observatory (from the Mazovian Office for Regional Planning¹²²) contribute to implementing and monitoring the strategy.

Regional administration also commits to a participatory approach, involving representatives of civil society and businesses in implementation of the strategy, as well as vertical and horizontal cooperation. The authorities base implementation on cooperation between different government levels, as well as interregional cooperation, so the regional government initiates the cooperation.

Similarly, regional bodies are responsible for implementing RIS Mazovia. The Managing Authority consists of three teams responsible for different elements which cooperate primarily with two regional bodies, the Mazowieckie Voivodeship Board and Mazovia Innovation Council. Implementation of the RIS strategy is especially concerned with cooperation with business representatives.

Vertical and horizontal cooperation as well as a participatory approach and involvement of different actors are important principles for regional authorities implementing the strategy. However, effective implementation remains challenging.

¹²¹ Mazowieckie Voivodeship, 2015, Regional Innovation Strategy for Mazovia.

¹²² <https://www.mbpr.pl/about.html>

7. Achievements and challenges

Each strategic goal has indicators which define the baseline, target, trend, data source and responsible entity.

Since formulating the strategy, Mazovia has retained its leading role in the Polish economy and innovation milieu. The region continues to use its innovation potential by concentrating large and increasing R&D activities and investment and high-tech manufacturing, as well as maintaining and attracting entrepreneurship in different areas, including the creative sector. The region continues to develop other innovative sectors such as photonics¹²³ while its dominance in biotechnology is rapidly growing¹²⁴.

Mazovia has also significantly improved the quality and quantity of support for the business environment and innovativeness for SMEs. Achievements in strengthening Mazovian businesses are also confirmed by industrial exports increasing by almost 20% between 2011 and 2014.

Support for innovation and entrepreneurship includes measures targeting incubators, accelerators, clusters and business environment institutions. One interesting project is MSODI¹²⁵ which aims at simulating the quality and tailor-made nature of the service provided by business environment institutions to Mazovian SMEs.

Achievements can also be noted in the agri-food sector. The number of agri-food processing businesses increased by 10.6% from 2011 to 2014. The share of agri-food processing businesses active in industrial processing increased from 9.3% to 9.7% in the same timeframe.

An example of a project supporting the agri-food sector is Agri Renaissance¹²⁶ under Interreg Europe where Mazovia participates as one of five European regions. The project focuses on providing a tailored combination of policy and funding instruments for the region.

Despite of those achievements, there are several weaknesses, problems and challenges to be addressed by the region and the development strategy with regard to industrial development. Significant weaknesses are the low absorption of scientific findings and technologies to increase innovativeness in enterprises, weak partnership between regional government, entrepreneurs and science, as well as the low level of employment in industry.

¹²³ Marshal's Office of the Mazowieckie Voivodeship, 2018.

¹²⁴ Mazovian Office of Regional Planning in Warsaw, 2014.

¹²⁵ MSODI- Modelowanie Systemu Ofert Dla Innowacji (Modelling the System of Service for Innovation) https://innowacyjni.mazovia.pl/dzialania/projekt_msodi.html

¹²⁶ <https://www.interregeurope.eu/agrirenaissance/>

There is a lack of financial stability in enterprises to implement investment activities, fewer workplaces in production, decreased foreign investments and the movement of production to other countries. The authorities identify three important challenges to industry and production:

- improved partnership between government, science and entrepreneurs;
- improved share of industry in the region; and
- specialisation in export production.

While Warsaw contributes to a good overall performance for the region, significant issues still face other areas. Local and regional authorities beyond Warsaw struggle with high unemployment and labour market issues as well as with providing equal education and job opportunities. Governance at local, regional and national levels also needs to become more cooperative and effective in counteracting regional polarisation. Vertical and horizontal exchange, as well as exchange between public and private actors, needs to be strengthened. There is a need for stronger initiatives by development leaders and integrated organisations that act as exchange forums.

Another issue, which is often overlooked, yet which negatively impacts industrial and economic development, is the lack of regional identity in Mazovia. Regional identity contributes to economic cooperation between entities and can strengthen industrial and economic development.

9. Main conclusions

Mazovia is an example of a place-based industrial policy that addresses different territorial dimensions and attempts to counteract regional polarisation, especially between urban and rural areas.

Moreover, it stresses the importance of vertical, horizontal and public-private cooperation. Through cooperation, authorities can improve their policies while public-private exchange is especially important for industrial development where actions of public actors need to be aligned with the needs of the private sector.

Another interesting point is the importance of developing and strengthening the regional identity. As mentioned by the Mazovian Office of Regional Planning, common identity facilitates cooperation and networking in industry and the economy. The lack of such identity calls for stronger focus on the issue by the authorities.

Bavaria, Germany

1. Overview

Location	Bavaria, Germany
Key economic/ industrial indicators	<ul style="list-style-type: none"> • Bavarian GDP: EUR 570 billion (2016), manufacturing industry accounts for 27% of gross added value (2017); • Unemployment: 2.3% (2017); • 620 000 businesses (99.6% SMEs); • Key industrial sectors: automotive, electrical engineering, mechanical engineering, automation and robotics, as well as ICT, life sciences and tourism.
Timeline	2016-2019
LRA involved	Bavarian State Ministry for Economy, Regional Development and Energy
Stakeholders	Small, medium and large-sized businesses and research institutions along the entire value chain.
Type and amount financing	<ul style="list-style-type: none"> • For the cluster strategy: regional funding and cluster own-financing • For projects implemented by the cluster stakeholders: <ul style="list-style-type: none"> • National funding: EUR 253 million • European funding: EUR 41 million
Web relevant links	www.cluster-bayern.de

2. Summary

Bavaria (*Bayern* in German) has a long standing tradition supporting and implementing regional development strategies and place based industrial strategies¹²⁷. Grounded in strong industry sectors such as automotive, electrical engineering and mechanical engineering, the development of Bavaria's industry relies on close public private partnerships. The Bavarian government supports industry development to improve the attractiveness of Bavaria towards other industrial players. Therefore, the locations of the economy are distributed throughout the state and not only concentrated in Munich. The enterprises rely on local labour power and support the economy also in more rural areas, such as in Dingolfing (BMW¹²⁸) or Ruhdorf an der Rott (Siemens¹²⁹). This gives Bavaria a crucial locational factor to persist internationally in a place-based economy. The public support currently focuses on the provision of digital infrastructure, the support for the creation of new enterprises, and improving networks between

¹²⁷ <https://www.stmwi.bayern.de/wirtschaft-standort/industrie/>

¹²⁸ Source: BMW: <https://www.bmwgroup.jobs/de/de/standorte.html>

¹²⁹ Source: Siemens: <https://new.siemens.com/de/de/unternehmen/standorte.html#129>

enterprises and research institutions through clusters. The close interlinkage between research institutions and the industry is a clear goal of the Bavarian policy. The ultimate purpose is to tap on research results to improve industrial production and ensure the provision of skilled workers to meet the needs of the industry.

3. Context

Bavaria is the largest federal state (Bundesland) in Germany in terms of area (70,550 km²) and second-largest in terms of population with nearly 13 million inhabitants in 2017 (i.e. close to 16% of the German population and 2.5% of the total EU population).

This region registered a record GDP of EUR 570 billion in 2016 (only surpassed by North-Rhine Westphalia in Germany). It has been a leading European region in terms of GDP/capita for more than a decade, reaching EUR 44,200 in 2016 (152% of the EU average)¹³⁰. Its unemployment rate was 2.3% in 2017, the lowest since 2000, and this has been systematically lower than the EU average for the past two decades¹³¹. Likewise, long-term unemployment in Bavaria was only 0.7% of the active population in 2017, while the EU and euro area averages were 3.4% and 4.4% respectively¹³². This high economic performance mirrors the attractiveness of the region in terms of skilled labour force. While the number of students enrolling in vocational training has remained high over the past two decades (above 90,000 students since 2000), the number of students starting a University degree steadily increased between 1995 and 2015, reaching some 73,000 students in 2016¹³³ and a relatively high share of the Bavarian population had tertiary education in 2016-2017, especially in Southern Bavaria.

Industry (including manufacturing but excluding construction) employed 1.58 million people in 2015 (the most since 2000), or 22% of regional employment (7.27 million people). Manufacturing accounted for the overwhelming majority (95%) of industrial employment. In comparison, public administration, defence, education, health and social work employed 1.63 million people, while wholesale and retail trade, transport, accommodation and food service activities employed 1.61 million¹³⁴. Around two thirds of employees work in services and 31.5% of them in industry and construction (4.1% above the national average), with only 1.6% in agriculture¹³⁵.

¹³⁰ Source: Eurostat, GDP/capita at current market prices.

¹³¹ Source: Ibid.

¹³² Source: Ibid.

¹³³ Source: IHK (Bavarian Chambers of Commerce and Industry), *Berufliche Bildung auf einen Blick, Daten und Fakten der bayerischen IHKs 2016*, based on the Bavarian Institute for Statistics (Bayerische Landesamt für Statistik).

¹³⁴ Source: Ibid.

¹³⁵ Source: European Commission, DG for Internal Market, Industry, Entrepreneurship and SMEs, and Eurostat, www.ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/bavaria

Manufacturing accounts for the largest part of Bavarian gross value added (27.2% in 2017), followed by financial, leasing and business services (25.7%), trade, transport, hospitality and ICT (20.2%), public and other services (18.9%), construction (5.2%), and agriculture and forestry (0.8%)¹³⁶. The price-adjusted gross value added of manufacturing increased faster in Bavaria than in Germany overall between 2013 and 2017, as has the total Bavarian economy¹³⁷.

Bavaria is now portrayed as “one of Europe’s most competitive industrial regions with a pronounced specialisation on the automotive industries, electrical engineering, mechanical engineering automation and robotics”¹³⁸. ICT, life sciences and tourism also feature prominently in the Bavarian economy, while the services sector is generally growing rapidly. Bavaria is home to almost 620,000 companies, 99.6% of which are SMEs. There are also major multinational enterprises such as Audi, BMW and Siemens¹³⁹. The European Commission¹⁴⁰ also points out “large regional economic disparities within Bavaria”, with Munich being the economic centre of the region. However, these disparities are not as substantial as in other EU regions. The major companies still rely on locations spread throughout Bavaria, also in rural regions or smaller cities than the capital Munich.

These multinational enterprises also have an interesting history. At the time of the first and Second World War, they mostly produced war material (e.g. tanks, chlorine gas...etc.). In the post-war period, they successfully managed a transition to consumer goods, which led to the birth of today’s automotive or electronics industries. Throughout this transition, the Bavarian government ensured that the companies do not close-down the locations in more rural areas, which is nowadays a benefit of the place-based economy and provides employment possibilities for the local population.

4. Development of the strategy and objectives

Building on a very strong industrial base, Bavaria has engaged in a cluster strategy to create networks among businesses, as well as between businesses and research institutions. The *Cluster Offensive Bavaria* initiative (the “initiative”) includes regional platforms in high-tech industries and traditional key branches of the Bavarian economy¹⁴¹.

¹³⁶ Source: Industry Report Bavaria 2018 (Industriebericht Bayern 2018), Bavarian Ministry for Economy, Energy and Technology, p.14.

¹³⁷ Source: Ibid., p.15.

¹³⁸ Source: European Commission, DG for Internal Market, Industry, Entrepreneurship and SMEs.

¹³⁹ Source: Ibid.

¹⁴⁰ Source: Ibid.

¹⁴¹ Source: Bavarian State Ministry for Economy, Energy and Technology, *Cluster Offensive Bayern, Im Netzwerk zum Erfolg*, May 2018, p.5.

Cluster Offensive Bavaria has the following objectives:

- to strengthen the entire value chain from research to final product;
- to promote competitiveness through cooperation;
- to implement research results into new products and services; and
- to increase innovation dynamics¹⁴².

The initiative is structured around 17 cluster platforms covering: aerospace, automotive, railway technology, biotechnology, chemistry, energy technology, food, forest and wood, ICT, power electronics, carbon technology, mechatronics and automation, medical technology, nanotechnology, new materials, sensor technology, and environmental technology¹⁴³. In addition to the largest businesses and research institutions joining, engaging and implementing the cluster strategy, medium-sized enterprises and smaller research bodies, such as higher education institutes should also play a key role in building region-wide networks.

This forward-looking place-based industry strategy draws on economic strengths in the region, gathering industry and research players along the whole value chain, including those closest to citizens, to spur innovation and competitiveness.

The initiative is implemented through¹⁴⁴:

- supporting dialogue and networking between cluster stakeholders (e.g. via conferences and workshops);
- sharing information on market trends, research, technology and funding opportunities;
- coordinating support from national and international funds; and
- initiating and accompanying national and international R&D projects.

The cluster strategy is financed by decreasing support from the Bavarian State Ministry for Economy, Regional Development and Energy. In line with EU Regulations on State aid, clusters bear a minimum of 50% of their operating costs.

In addition, the clusters have benefitted from EUR 253 million of national funding and EUR 41 million of EU funding for their projects.

5. Implementation and governance

While the regional government is responsible for setting the cluster strategy framework, promoting the clusters and monitoring implementation, each cluster

¹⁴² Source: Ibid, p.5.

¹⁴³ Originally the initiative included two other cluster platforms; logistics as well as financial services and media.

¹⁴⁴ Source: Ibid, p.8.

platform has a professional “cluster management team” to coordinate activities and the strategic orientation of further cluster development. These teams also foster networking and are supported by voluntary expert “cluster spokespersons” as well as working groups and advisory boards to facilitate the identification of value-added fields, and thus joint R&D projects.

The cluster management also decides on the involvement of stakeholders and their participation in the decision-making process, depending on their integration in cluster committees. Knowledge transfer within clusters also falls under the remit of cluster management. There are also advisory councils and working groups in each cluster.

6. Achievements and challenges

Key results of the cluster strategy include stakeholder networking through various events, branch-specific services, acquiring grants and starting collaborative projects. The Bavarian State Ministry for Economy, Regional Development and Energy undertakes qualitative and quantitative monitoring, while external experts carry out evaluations on a regular basis, though the results are not publicly available.

Achievements are tracked through output indicators. As of December 2017, the clusters had enabled more than 11 000 events (ranging from a large congress to thematic, highly specialised task force meeting), therefore reaching 606 000 participants. Stakeholders also engaged in more than 1 600 R&D-oriented projects with more than 10 700 participants benefitting from increased capacity and know-how through industry-research cooperation¹⁴⁵. However, neither short-term impacts nor longer-term outcomes (e.g. competitiveness, innovation dynamics) are being assessed, so the economic effects of networking and collaboration are not monitored or quantified.

Aligning financing (through regional funds) with the provisions of EU State aid regulation has proven challenging.

7. Main conclusions

Key lessons learnt and recommendations include:

- focusing on industry- and technology-oriented sectors;
- relying on economic centres outside of urban agglomerations to ensure the employment labour force in more rural areas;
- embedding transversal themes into existing clusters to develop cross-cutting technologies;

¹⁴⁵ Source: Ibid, p.9.

- reviewing cluster viability depending on the number of members (“critical dimensions” of the clusters);
- encouraging multi-year financing to increase funding and planning reliability for stakeholders, especially cluster management stakeholders; and
- granting cluster managers sufficient leeway and steering power to take strategic decisions tailored to the potential and needs of each single cluster.

Monitoring and evaluating the achievements of *Cluster Offensive Bavaria* require robust indicators depicting not only outputs, but also impacts and outcomes of the initiative. Collecting and analysing qualitative and quantitative evidence on a regular basis and making performance results available to the wider public would help cluster participants and management understand the multiple benefits of the cluster platforms and identify areas for improvement.

The Bavarian cluster strategy is part of the nationwide government “go-Cluster” programme and uses the bronze-silver-gold labelling of the European Cluster Excellence Initiative. Encouraging the Bavarian cluster strategy to network and collaborate beyond national borders (e.g. with Austrian and Czech stakeholders) could further stimulate industrial innovation and competitiveness.

Annex III – Case studies: low carbon and circular economy

City of Maribor, Slovenia

1. Overview

Location	City of Maribor, Slovenia
Key economic/ industrial indicators	<ul style="list-style-type: none"> • 96 000 inhabitants • 16% unemployment • 35.8% of employment in industry • Key industrial sectors: automotive, machinery, chemical
Timeline	Strategy to 2030 approved in July 2018.
LRA(s) involved	The Municipality of Maribor is the main political promoter of this strategy, which was developed by Wcycle Institute.
Stakeholders involved	Civil society; NGOs
Type and amount financing (if any)	No specific allocation for the strategy. The Wcycle Institute was capitalised by five municipal service companies and is financed with ERDF-ETC funding.
Web relevant links	<p>Wcycle website: https://wcycle.com</p> <p>Strategy: http://www.circularchange.com/wp-content/uploads/2018/10/The-Strategy-for-the-transition-of-the-City-of-Maribor-to-the-circular-economy.pdf</p> <p>Overview of Maribor industrial profile: https://www.investinmaribor.eu/datoteke/invest_ang_version.pdf</p> <p>Alpine Space project Greencycle promoting the strategy: https://www.alpine-space.eu/projects/greencycle/en/about</p> <p>Best practice project Urban Soil 4 Food: https://www.uia-initiative.eu/en/uia-cities/maribor</p> <p>H2020 Project Cinderella: https://cordis.europa.eu/project/rcn/214412/factsheet/en</p>

2. Summary

In 2018, the city of Maribor developed a circular economy strategy for the city of Maribor and its environs. It concentrates on two main goals:

- 1) changing the business model of the city, toward a circular approach, and
- 2) controlling material going through the city and channel it for the benefit of the city and to foster competitiveness in the region

The strategy aims at transforming the five main sectors that are in the responsibility of municipal companies (i.e. waste, construction, energy, mobility and water). The strategy, which has been very recently adopted, is principally a public sector strategy targeting projects undertaken by publicly-owned companies. In turn, the approaches applied and experience gained in these companies shall trigger initiatives in the private sector. Additionally, the strategy intends to foster the interest and initiatives of a broader range of public actors towards circular economy. Public procurement following circularity principles form an integral and significant part of this approach.

Two additional key pillars were selected to complement the approach to the five sectors addressed. First, spatial planning was added because it ensures that greenfield land is not used for new developments when brownfield sites can be recovered first. Second, cooperative economy initiatives were added to bring in existing private endeavours and NGOs as they could be key to involving the private sector.

3. Context

The municipality of Maribor is the second largest city in Slovenia, covers 147 km² and is home to 96 000 people. The city is in the eastern part of the country and the area has an industrial heritage dating back to being an industrial powerhouse of Yugoslavia. After the dissolution of Yugoslavia, its industrial backbone based on the automotive sector entered a crisis. The territory's fragile economy was also significantly hit by the 2008 financial crisis, which triggered a crash in the construction sector.

The distance from the country's capital city, both geographically and in terms of political priorities, is an additional challenge. The city is depopulating and deindustrialising and has relatively high unemployment and cross-sector competitiveness issues. 52% of working age people are employed, and unemployment is 16%, above the national average of 11.2%. The population is decreasing annually by 6.8 per 1 000 inhabitants (2.4 natural decrease, plus 4.4 net migration). Average wages are 3% lower than the national average¹⁴⁶. Data for the region of Drava, in which the municipality of Maribor is located, indicate that the industrial sector makes up 35.8% of employment.

The region is a net importer of goods. The automotive, machinery and chemical sectors remain industrial specialisation areas, while tourism, a strong sector in the overall Slovenian economy, is underdeveloped in the region, making up just 3% of Slovenian tourism. Most of these figures have been stable or worsening in recent years.

¹⁴⁶ Data 2016 National statistics office of Slovenia <https://www.stat.si/obcine/en/2016/Municip/Index/94>

The area faces a number of environmental challenges. Industrial heritage in the town of Celje, 50 km south of Maribor, which used to produce zinc, has caused significant land pollution. The area also faces growing water pollution from agricultural activity.

Work by the Municipality of Maribor on the city's Integrated Urban Development Strategy found that approximately 9% of land in the city is brownfield degraded areas, requiring soil remediation before it can be developed.

Maribor's waste management system is also struggling with capacity. The local landfill site covers 26 hectares, and the local political will is to stop its growth and avoid new landfill sites or incineration plants. Municipal waste of 441 kg per capita for the city is higher than the national average of 350kg. For these reasons, waste reduction from circular economy principles is a key goal of the administration.

4. Development of the strategy and objectives

The development of the strategy for the transition to circular economy in the Municipality of Maribor was triggered by the need to overcome difficult economic conditions and various other social and environmental challenges. The strategy's starting point relied on the strengthening the cooperation between municipal service companies which provide services in Maribor and in the neighbouring municipalities. To do so, the Municipality of Maribor launched an innovative project for the transition of the city into a circular economy – the Wcycle project. Alongside, an umbrella organisation, namely the Wcycle Institute Maribor (WIM), founded by five main municipal service companies (partly owned or owned by the Municipality of Maribor) was created to oversee the transition and develop Maribor's circular economy strategy.

The strategy was developed around two goals:

- 1) changing the business model of the city, toward a circular approach; and
- 2) controlling material going through the city and channel it for the benefit of the city and to foster competitiveness in the region;

Combining these two goals should contribute to improving the town's environmental and competitive performance and help foster employment and growth. The strategy focuses on initiatives involving the public sector but also plans to use the experience gained by these public companies to trigger the involvement of the private sector. Likewise, building a critical mass in circular economy processes shall make circular approaches more attractive and economically feasible. The strategy is thus to be achieved both by involving the private sector in circular economy projects promoted by public actors, and by direct involvement of private actors through circular economy public procurement. Demanding circularity in public procurement indeed shall motivate private suppliers to switch to circular production. The national law allows

public procurement to demand that 40% of supplied materials are recycled. In construction, public authorities can demand that 40% of demolition material is reused.

The choice to start with the public sector rather than private companies is also political. A commitment to greater circularity would be burdensome for private actors. The strategy team reckoned it would be difficult to take private contributors on board given the prevailing economic difficulties and their tax burdens.

Encouraging material use moves toward greater circularity should encourage new business models in the city. The strategy should not be limited to the municipal area but cover the whole surrounding functional area. Tightening circular loops will boost functional interdependencies between these territories. Moreover, this should foster greater cooperation between stakeholders in and outside the city's administrative borders.

The strategy is integrated in the national circular economy strategy of Slovenia as both strategies were developed in parallel following the same concepts. The strategy was developed under the Interreg Alpine Space project Greencycle, which promotes urban circular economy strategies in Alpine Space towns. The strategy is also linked to the city's integrated sustainable urban development strategy.

The strategy focuses on seven "pillars of resource management"; waste, construction, energy, mobility, water, spatial planning, and the cooperative economy. The first five pillars cover material loops that the strategy plans to close. These pillars also refer to each sector of the five municipal companies involved in developing the strategy. Under each pillar, territorially-specific actions are proposed to close material loops, and for broader development of the circular economy approach.

Two additional pillars were added to the initial five; spatial planning and the cooperative economy. Spatial planning was added because the analysis while drafting the Integrated Sustainable Urban Development Strategy for Maribor showed that the location of industrial facilities and infrastructure is strategic when considering the management of degraded areas. Given the relevance and problems of degraded lots, spatial planning enables monitoring and ensures that greenfield land is not used for new developments when brownfield sites can be recovered first.

The inclusion of the seventh priority on the cooperative economy was triggered primarily because such economic actors are historically active in the city. NGOs in Maribor are considered to be key for the involvement of the private sector, especially through start-ups. Their contribution could also take the form of research and knowledge, as well as new tools and approaches for private partners which do not have the capacity to produce such innovation on their own.

Cooperation between the five municipal companies is a peculiar aspect of the strategy. The five companies had not cooperated in a coordinated manner before, and the strategy has offered an opportunity for them. While these companies are the main beneficiaries, other beneficiaries include the general public involved in open debate workshops. Three workshops were organised during the development of the strategy, one involved citizens, the second gathered stakeholders from the chamber of commerce, and the third employees of the Municipality of Maribor. A first draft of the strategy was revised by the workshop participants.

Four actions are ongoing under the strategy:

1. The Urban Food 4 Soil project is a UIA¹⁴⁷-backed project in an advanced implementation status. The project is developing a system to turn the city's biological and mineral waste, mostly from demolition and land redevelopment, into a useful product (fertile soil). This should meet different needs of the city, such as food production, new parks and construction. The project is developing safe and certified soil with by-products of energy (through fermentation and pyrolysis). Positive results from preliminary tests at the National Institute of Materials in Ljubljana certify the viability of the concept and the safety and appropriateness of the soil. A specific type of soil is under development for use in vertical gardens, which will also be established in Maribor as part of the strategy.
2. The Horizon 2020-backed project Cinderella, to develop a Circular Economy Business Model for using secondary raw materials in urban areas, industry, construction and municipal services.
3. The repurposing of a wastewater treatment plant with a capacity of 7 million m³, which is already active. However, the treated water cannot be used for other purposes in the city but has to be discharged for regulatory reasons. Advocacy for innovation is ongoing to unlock additional uses for the resource.
4. An automated waste sorting facility to improve the quality of recycling opened in June 2018, contributing to an improved quality of recycling.

Financial resources for the projects come from European Programmes, including ERDF (ETC and UIA) and H2020, as well as from private investment. The Municipality of Maribor has not yet committed financially to the initiative.

¹⁴⁷ Urban Innovative Actions (<https://www.uia-initiative.eu/en>)

5. Implementation and governance

The Wcycle Institute, made up of the five municipal service companies Energetika Maribor, Marprom, Mariborski Vodovod, Snaga, and Nigrad, coordinates the strategy's activities. The founding members are also involved in implementing projects. The organisation also relies on partners providing external contributions. The liaising role between the five founding members could change if an initiative to merge the companies into a single multi-utility conglomerate is successful. The Municipality of Maribor plays an external role. Due to its internal organisation, the municipality is not directly involved in activities related to implementation. Such form of governance based on a single coordinating institution has several advantages:

- the Institute can externally and impartially coordinate cooperation between public and semi-public institutions;
- it is a reference point for following up and monitoring and enables continued work on the strategy, including updates;
- a specially-designated organisation helps safeguard the initiative from changing local political or business orientations.

6. Achievements and challenges

Initially, the main challenge associated with the development of the strategy related to the involvement of different kinds of partners. A difficulty encountered was that public service companies and NGOs, were not used to cooperating together and had some initial mutual trust issues. A significant effort was needed to bring them together and cooperation has improved over time. There were also challenges in liaising between the Municipality of Maribor and neighbouring municipalities. The strategy development team had to overcome competing interests and different organisational cultures.

At the beginning of 2019 the strategy had been in place for six months, and substantial achievements were yet to be seen. Nonetheless, the increased cooperation among municipal companies and between municipal companies and local NGOs is considered as a critical step towards the achievement of the strategy's goals. This has enabled new projects and a network to catalyse new circular economy investments.

The implementation of the strategy is followed up by Wcycle Institute, which continuously monitors progress. Tools for assessment, knowledge production and for monitoring industrial loops have been developed through the OPTcycle initiative. The OPTcycle is an organisation established under the strategy as a spin-off from the municipal waste management company. OPTcycle develops IT solutions to support the implementation of circular processes, drawing on existing technologies and tailoring

and integrating them to monitor material flows in industrial processes. Such tools are also essential to move towards a sound adoption of the circularity principles.

In spite of the efforts and progresses made, several other hindering factors still compromise the success of the circular economy strategy. A main drawback is that the Wcycle Institute, responsible for the implementation of the strategy, currently relies on external financing from the ERDF fund, which may prove challenging in the longer run. Ensuring the financial sustainability of the organisations involved in the implementation of the strategy is critical to support the transition to a circular economy.

Likewise, the economic viability of a circular economy per se is a substantial overarching issue. It is easy for industries to commit to reusing high-value materials, but the local community is left to deal with remainder low-value material waste. Transferring circular approaches is naturally hampered as lower-value material is less obviously economically viable.

Another key challenge relates to the legislative elements that prevent the full deployment of a circular economy. Several potential causes, such as the reuse of purified water, are currently impeded by legislation for materials which are not targeted by end-of-waste criteria. While for materials such as iron there is currently a large scope for reuse, the same cannot be said for other types of materials, and only changes will allow for greater development of a circular economy.

Furthermore, standard approaches to the circular economy are not yet in place, which causes some uncertainty. The strategy team is looking forward to common international circular economy indicators, such as the BS8001 standard¹⁴⁸.

All in all, constant follow-up, political support, support from the EU and early results are levers to overcome these above mentioned challenges, both in the current settings and as a future prospect. Future developments will include an updated strategy, with stronger links to Sustainable Development Goals and a new pillar focusing on the food sector. The update will also draw on a new partnership with UIA.

7. Main conclusions

An important take-away message is that cooperation between different stakeholders is an essential aspect of strategy development, and the commitment of different actors is more certain when each can obtain advantages from the cooperation.

Another lesson is the importance of continuity. Establishing an organisation in charge of strategy development, follow up and updating, is key to building and maintaining momentum for change.

¹⁴⁸ <https://www.bsigroup.com/en-GB/standards/benefits-of-using-standards/becoming-more-sustainable-with-standards/BS8001-Circular-Economy/>

A third lesson is the importance of aligning local, national, European and supranational efforts. Different levels are relevant when discussing legislation and implementation tools, as well as for communication and theoretical framing.

The contribution of the strategy to a new industrial vision in the territory will materialise first and foremost in a cultural and behavioural change with respect to resource use. Secondly, it will trigger a shift of prevailing business models in the city, enabling increased productivity in material use, with better prospects for employment and wages. Greater liveability of the city with a well-preserved natural environment will go hand in hand with greater prosperity. An increase in inter-municipal cooperation will allow for more widespread exploitation of the benefits from the model. Together these circumstances will unlock potential for opening the local economy to new sectors such as tourism, which is already well developed in other parts of Slovenia.

Some of the experience in Maribor could be applied to other territories. Establishing an ad-hoc institution to follow up on strategy implementation, monitoring and updates is the most valuable component of the Maribor model and shows that this approach is feasible even without direct financial support from local authorities. The complex issues of bringing together different actors with different economic and political motives and different organisational cultures are a fundamental challenge to implementing a circular economy model in a regional or local context, and the experience from Maribor offers a possible solution.

At national and European levels, attention should be paid to the needs of local contexts, as legislation is often needed to unlock the full potential of a local circular economy.

City of Vienna, Austria

1. Overview

Location	Vienna, Austria
Key economic/ industrial indicators	<ul style="list-style-type: none"> • Industrial output: 14.5% of GDP • Employment in industry: 11.4% • Key industrial sectors (in Vienna region): life sciences, information and communication technologies, renewable energy, environmental and urban technology, green building, sustainable construction, mechanical engineering and metal processing, chemicals and plastics, mobility and e-mobility, logistics, tourism, creative industries, and food .
Timeline	The circular economy has been an important topic since the establishment of ARA in 1993 (a leading Austrian recycling company) in Vienna
LRA(s) involved	Austrian Ministry of Sustainability and Tourism (BMNT), Vienna Waste Management, Street Cleaning and Fleet Department (MA 48), Vienna Environmental Protection Department (MA 22), Vienna Labour Market Service (AMS).
Stakeholders	Austrian Environment Agency, (Umweltdachverband), the Reuse and Repair Network Austria (RepaNet), Verband Abfallberatung Österreich (VABÖ – Municipal environmental Waste Consultants Association).
Type and amount financing	Circular Futures – Circular Economy Platform Austria is supported by the Austrian Ministry of Sustainability and Tourism, the European Union and the Austrian Rural Development Programme for the 2014 to 2020 period (LE 14-20).
Web relevant links	https://www.circularfutures.at/ueber-uns/english-language-summary/

2. Summary

Vienna is the capital of Austria with a population of about 1.87 million inhabitants. There is no special “circular economy strategy in Vienna, but various strategies taking the idea of a low carbon and circular economy into account. Vienna’s Smart City Framework Strategy is the latest development strategy for the city of Vienna enacted in 2014. It aims at improving energy efficiency and climate protection in the long-term¹⁴⁹.

¹⁴⁹ Vienna City Administration (2015): <https://www.wien.gv.at/wirtschaft/standort/pdf/wipo-leitlinien-englisch.pdf>

Based on the Viennese waste management act (Wiener Abfallwirtschaftsgesetz – Wr. AWG) Vienna has a quite long tradition in implementing circular economy aspects in the public economy run by municipal enterprises, especially in the field of waste collection and recycling. Additionally, there exist several private initiatives supporting reuse and recycling of waste. Even if The City of Vienna is clearly committed to industrial manufacturing, and even if there are several activities in line with the circular economy concept, there is no direct link of Vienna's industry policy to a circular economy approach.

3. Context

Vienna is the capital of Austria with a population of about 1.87 million inhabitants. In 2017, Vienna GDP was EUR 93.9 bn or EUR 50,000 per capita¹⁵⁰, which is the highest in Austria. As in many other highly developed cities, Vienna's economy has a strong services sector and the industrial sector makes up only 14.5% of economic output; significantly lower in comparison with Austria (28.3%) and the EU average (24.6%)¹⁵¹. Although many headquarters are in Vienna, production facilities are often based in other Austrian regions¹⁵². Despite the fact that industry is relatively less significant, its presence in the city is a challenge with respect to waste management.

Together with Lower Austria and Burgenland, Vienna is part of the Eastern Austrian Region (also known as Vienna region). Key sectors in the region are: (i) life sciences, (ii) information and communication technologies, (iii) renewable energy, environmental and urban technology, green building, sustainable construction, (iv) mechanical engineering and metal processing, (v) chemicals and plastics, (vi) mobility and e-mobility, (vii) logistics, (viii) tourism, (ix) creative industries, and (x) food.¹⁵³

In 2016, Vienna's share of the total Austrian GHG emissions was 10% (8.4 million tonnes CO₂ equivalents). Vienna's per capita emissions of 4.5 tonnes in 2016 were well below the Austrian average of 9.1 tonnes (EU-28 average: 8.4 tonnes). The main drivers of emissions were transport (39%), energy (24%) and buildings (18%). Waste management was responsible for 7.8% and industry just for 6.5%¹⁵⁴.

4. Development of the strategy and objectives

In Vienna, there does not exist one core circular economy of low carbon strategies, but a bundle of different strategies touching the ideas of low carbon and circular economy.

¹⁵⁰ Statistik Austria, 2017:

https://www.statistik.at/web_de/statistiken/wirtschaft/volkswirtschaftliche_gesamtrechnungen/index.html

¹⁵¹ Vienna Region, 2017: https://www.viennaregion.at/media/file_en/3_VR_Businessatlas_17_fin_72dpi.pdf

¹⁵² EC, 2019: <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/vienna>

¹⁵³ Data.gv.at: https://www.data.gv.at/katalog/dataset/stadt-wien_endenergieverbrauchinwiennachsektoren

¹⁵⁴ Environmental Agency Austria, 2018: <http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0665.pdf>

In 2011, the City of Vienna announced the “Smart City Wien” initiative, followed by a Smart City Wien strategy, with an objective of “the best quality of life for all inhabitants of Vienna, while minimising the consumption of resources”¹⁵⁵. This objective is based on a “radical protection of resources, a holistic perspective, a high, socially fair quality of life and productive use of innovations and new technologies”. Additionally, there are 38 specific objectives to be reached by 2050.

The circular economy fits perfectly into the Smart City Framework set Strategy, as it aims to reuse and recycle raw materials within a closed cycle, leaving little waste; however, it is not explicitly explored in the strategic documents. In 2019 the Smart City Framework set Strategy was adapted taking on board the UN SDGs.¹⁵⁶

The circular economy is also part of the United Nations Sustainable Development Goals addressing particularly Goal 12 “Ensure sustainable consumption and production patterns”¹⁵⁷.

The circular economy objectives in Vienna focus on longer life, easier repair, re-use and easier recycling for products, saving valuable resources. In order to achieve these goals, the following measures have been defined:

- Promotion of reparability and recyclability in product regulations,
- Transparent presentation of planned and unplanned obsolescence,
- Creating economic incentives to make products easier to reuse or recycle.

The Viennese waste management act (Wiener Abfallwirtschaftsgesetz – Wr. AWG) dated in 1996 is based on the precautionary principle and the goals of sustainability. It sets up a hierarchy of how to treat things that are out of use: (1) waste prevention, (2) reuse, (3) recycling, (4) other forms of utilisation like energy production and (5) disposal.¹⁵⁸

5. Implementation and governance

Based on the Viennese waste management act Vienna has a quite long tradition in implementing circular economy aspects in the public waste management operated by the Vienna Waste Management, Street Cleaning and Fleet Department (MA 48).

MA 48 established facilities to save resources and recycle waste on many levels. There are waste collection places throughout the city. They act as collection points for waste that is not collected by refuse collectors from the houses as well as information centres and centres for reuse. (For instance compost produced from the collection of organic

¹⁵⁵ Vienna City Administration, 2018: <https://smartcity.wien.gv.at/site/en/>

¹⁵⁶ Magistrat der Stadt Wien (2019): Smart City Wien Rahmenstrategie. Vienna.

¹⁵⁷ United Nations: <https://sustainabledevelopment.un.org/?menu=1300>

¹⁵⁸ Viennese waste management act, § 1 LGBl 53/1996.

waste can be bought there.) Some recyclable fractions as glass, metal and paper are collected through separate collection systems. In 2013 MA 48 built a waste logistics centre in Pfaffenu, and sorts out all kinds of waste to make sure, that every kind of waste is recycled the right way.

The City of Vienna opened a sustainable biogas plant already in 2007, supplying 900 households with biogas¹⁵⁹. It is fed by the 22,000 tonnes of biogenic kitchen waste that is annually collected. In the sense of a closed bio circular economy, the output of annually one million cubic meter bio gas is feed-in the Viennese natural gas network.¹⁶⁰ The thermal utilisation is the last step for residual waste.¹⁶¹

The MA 48 runs several smaller initiatives to recycle special products. For example, the city provides own collection points for Christmas trees throughout the city, which are used for district heating. The energy produced is climate-neutral and sufficient to supply more than 1°000 households with electricity and around 2°300 households with district heating for one month.¹⁶²

Another municipal initiative is called “48er Tandler”, who sells intact second-hand items collected at the waste disposal sites in Vienna and items not picked up from the lost and found service to the public. Every year, about 130,000 reusable items are being.¹⁶³ MA48 also offers their services to businesses, thereby contributing to greener and more circular waste management of businesses.

Additionally to the activities of the municipality of Vienna, there are various non-governmental, bottom-up initiatives that contribute to circular economy are:

- “Reparaturnetzwerk Wien” is a network of repair professionals in Vienna, who protect consumers and the environment. The main focus of the network is repairing products¹⁶⁴.
- “Demontage- und Recycling Zentrum” is a recycling, reuse and upcycling operation for waste electrical and electronic equipment in Vienna. This handles around 1 500 tonnes of electrical equipment each year¹⁶⁵.

¹⁵⁹WKU: <https://www.wku.at/en/Our-facilities/Biogas-Vienna>

¹⁶⁰WKU: <https://www.wku.at/en/Our-facilities/Biogas-Vienna>

¹⁶¹ Stadt Wien: <https://www.wien.gv.at/umwelt/ma48/entsorgung/abfallbehandlungsanlagen/alz-pfaffenu.html>

¹⁶² Stadt Wien: <https://www.wien.gv.at/umwelt/ma48/sauberestadt/christbaumsammlung/>

¹⁶³ Stadt Wien: <https://48ertandler.wien.gv.at/site/der-48er-tandler/>

¹⁶⁴ Reparaturnetzwerk Wien: <https://www.reparaturnetzwerk.at/reparieren-leicht-gemacht>

¹⁶⁵ DRZ: <https://www.drz-wien.at/>

- “Carla Vienna” is part of Caritas Vienna, which organises fundraising and prepares items for re-use. This supports socially disadvantaged people as well as jobseekers to re-enter the labour market¹⁶⁶.
- “Die Fairmittlerei” donates brand-new products which are unsalable for various reasons (like incorrect labelling) to non-profit organisations in Austria¹⁶⁷.
- “FB Social & Green-IT” takes over discarded IT hardware from large companies and public institutions and prepares them for resale¹⁶⁸.
- “Unverschwendet” collects surplus fruit and vegetables and produces sustainable delicacies¹⁶⁹.
- “BauKarussell” separates recyclable building materials and prepares them for reuse in new buildings¹⁷⁰.

The city of Vienna undertakes strong awareness-raising measures in regards to waste and recycling targeting the residents of the city. Furthermore, the, “Circular Futures – Circular Economy Platform Austria” was established as a cooperation between several NGOs, as the Umweltdachverband and the European Environmental Bureau (EEB), Reuse and Repair Network Austria (RepaNet), and the Verband Abfallberatung Österreich (VABÖ). It aims at creating a better understanding of the circular economy across multiple stakeholders through events, workshops and a website throughout Austria.

As the examples above show, the implementation of circular economy is characterized by both top-down and bottom-up processes in Vienna. The city authorities undertake various measures to promote circular economy and sustainable use of resources. The different approaches to waste management including waste processing plants as well as the activities of the MA48, the department responsible for waste management, are examples of how the city authorities are implementing the Smart City Wien strategy. However, the activities focus mainly on the waste collection and treatment operated by municipal enterprises of private NGO-initiatives. A clear link to industry policy is missing in Vienna.

¹⁶⁶ Caritas Vienna: <https://www.carla-wien.at/>

¹⁶⁷ Die Fairmittlerei, 2017: <http://www.diefairmittlerei.at/>

¹⁶⁸ AfB social & green IT, 2019: <https://www.afb-group.at/home/>

¹⁶⁹ Unverschwendet, 2019: <https://www.unverschwendet.at/kontakt-impresum/>

¹⁷⁰ RepaNet, 2018: <http://www.repanet.at/baukarussell/>

6. Achievements and challenges

For purposes of improving resource and waste management, Vienna developed an important economic sector to collect and treat waste in an environmentally compatible way. Efficient waste management brings materials from the production process back into the economic cycle. Through Vienna's waste management annually 550.000 t CO₂-equivalents can be saved. This is achieved especially through the final phase of the waste treatment process, the refuse incineration, the biogas plant, the reuse and the composting of organic waste.¹⁷¹

Annually, 120 000 tons of waste paper are collected, which is used for producing recycled paper, folding boxboard, corrugated board, packaging, newspaper and hygiene paper. 27 000 tons of waste glass are used to produce new bottles.¹⁷²

However, further waste prevention measures need to be promoted. To foster a greener economy, environmentally counterproductive tax exemptions need to be abolished. In addition, revenue neutral eco tax reform is needed¹⁷³.

The Smart City Framework Strategy objectives are reviewed on a regular basis. Indicators were developed for each objective. In 2017 results of the first monitoring show that two-thirds of the objectives are well on track. According to calculations, Vienna has already achieved the medium-term goal of reducing CO₂ for 2030.

Despite these achievements, energy and other resource consumption, CO₂ emissions which contribute to climate change, environmental problems as well as health and quality of living of citizens remain a crucial challenge for Vienna. While this is an issue in any type of territory, the impact which unsustainable consumption has on environment and people is especially evident in cities, which are densely populated and generate large numbers of wastes and emissions. Next to safeguarding city's waste management and circular economy, further restructuring of energy systems, organisation and financing of building rehabilitation and better fine-tuning of processes between the city and surrounding regions as well as securing funds for tackling these issues are some of the challenges identified.

There does not exist a circular economy strategy nor for the city of Vienna, neither for Austria. The challenge in Austria's industrial sector is to implement the EU strategy for the reindustrialisation of Europe in a resource and energy efficient way with low carbon and low emissions, but also to keep employment and value added. Meeting this challenge requires state-of-the-art technology as well as adequate strategic planning across different fields, incorporating the benefits originating from circular economy.

¹⁷¹ Magistrat der Stadt Wien (2019): Smart City Wien Rahmenstrategie. Vienna.

¹⁷² Wien Energie Vertrieb GmbH & Co KG: <https://www.energieleben.at/>

¹⁷³ Environmental Agency Austria, 2016: <https://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0600.pdf>

7. Main conclusions

The transition from a linear to a circular economy requires comprehensive changes and support to the economy, city planning as well as lifestyles of residents. Authorities can provide tools to enable different actors, such as businesses and residents, to integrate circular economy, as the examples of the measures of MA48 show. In order to counteract the negative tendencies of higher consumption levels, authorities can raise awareness by informing and educating all actors, especially consumers.

In Vienna, next to the involvement of authorities, there is a strong evidence of different bottom-up initiatives which show that the crucial involvement of civil society is possible. This situation, in case of Vienna, is a significant opportunity for strengthening multi-dimensional and participative governance, as well as commitment of all actors.

To pave the way for a low carbon future and a circular economy, clear goals and binding measures have to be defined and monitored. Negative impacts of consumption have to be counteracted and raw materials need to be used for as long as possible. While the activities of the city of Vienna are greatly concerned with resource preservation, the concept of circular economy is not prominent in the strategic documents. The authorities, thus, may still need to fully explore its potential. There is strong evidence on the potential of circular economy for economy; however, it also needs support and commitment from the government.

Finally, a shift to circular economy clearly goes beyond recycling and waste management. In order to identify other relevant sectors (e.g. the construction sector), stakeholders have to be brought together at one table. To pave the way for a low carbon future and a circular economy, clear goals and binding measures have to be defined. To meet the Paris 2015 goals, abandoning fossil fuels and a massive transformation of the social and economic system are necessary. Consumption needs to be reduced significantly immediately and raw materials need to be used for as long as possible. For many of these challenges, economic instruments such as environmental taxes and the prevention of environmentally harmful subsidies offer important additional options for action are needed, which goes beyond the competencies of a municipality like Vienna.

Skåne County/City of Malmö, Sweden

1. Overview

Location	Skåne County/Malmö, Sweden
Key economic/ industrial indicators	<ul style="list-style-type: none"> • Regional unemployment: 5.1% (2018); • Agricultural and fishing employed 12.9% of the active population, manufacturing 12.6%, and the service sector 74.5% • Key economic sectors: cleantech, digital media, life sciences, logistics and tourism
Timeline	Discussions around the regional development strategy started in 2010; after four revisions, the strategy now looks forward to 2030.
LRAs involved	Skåne County, Regional Council, national state agencies, national government.
Stakeholders	Citizens, regional state agencies, universities and colleges, business and trade organisations, idea-based organisations and networks.
Type and amount financing	No information mentioned.
Web relevant links	https://eureka.eu.com/innovation/circular-economy-malmo/ https://www.hutskane.nu/blog/2018/02/15/circular-economy-mapping-malmo/ https://www.skane.se/siteassets/organisation_politik/publikationer_dokument/miljoprogram-2017-2020-engelska.pdf https://malmo.se/download/18.1256e63814a61a1b34c1b34/1491298772439/OP_english_summary_hemsida.pdf

2. Summary

Malmö, the third biggest city in Sweden is in Skåne (Scania) County, which is part of the South Sweden Region. This case study reviews Skåne strategies to develop a low-carbon and circular economy as well as approaches and initiatives at city level.

The strategy for developing a circular economy is enshrined in Skåne's 2016 Environmental Programme (2017-2020), which also sets specific goals and targets to foster environmentally sustainable use of resources and efficient management of natural resources and energy for all of Skåne's administrations, majority-owned companies and activities that are financed wholly or in part by the County.

Proactive and preventive initiatives are undertaken to reduce waste and minimise environmental impact of the Country's industrial activities, all along the value chain.

A comprehensive regional development strategy (Open Skåne 2030) covers low-carbon economy issues, in particular a strategy for turning the region into a sustainable growth engine. It sets up indicators for monitoring the progress. However, as the strategy was set in place just recently, no concrete figures monitoring its success are available.

3. Context

Skåne, is the southernmost county in Sweden and has 33 municipalities and 1.3 million inhabitants. The largest city, Malmö (319 000 inhabitants, 2017), is a young city and growing fast. The population density of the County is relatively high with 121 inhabitants per km². The County is part of the broader Öresund area, which covers parts of Denmark and is the most densely populated metropolitan area in the Nordic countries. Regional cooperation is an important driver for growth and prosperity¹⁷⁴.

In Skåne, unemployment was relatively low at 5.1% in 2018. Agriculture and fishing employed 12.9% of the active population, manufacturing 12.6%, and the service sector 74.5%¹⁷⁵. In Malmö itself, knowledge-intensive service industries dominate as only 6% of the active population works in manufacturing. Law, economics, science and technology employ the most inhabitants in Malmö¹⁷⁶.

In Sweden and particularly in Skåne, industries are multifaceted, varying in size, core business and distribution. Over recent decades, industrial activities have evolved substantially in Malmö and by extension in the whole region. Malmö has transitioned from an industrial city based on shipyards and other heavy industries to a modern and dynamic area driven by innovation, also moving towards sustainable development. Today, industrial activities are mainly driven by sustained R&D investments and an increasing digitalisation of processes at various production levels. Vibrant corporate activity benefits from a large network of universities and research institutes in key sectors, especially cleantech, digital media, life sciences, logistics and tourism. The economic fabric of the region around Malmö is dominated by dynamic small and medium sized enterprises (Malmobusiness, 2018).

While Sweden is considered a prime mover for environmental sustainability, there is much room for improvement. Skåne evaluates environmental quality objectives and concluded that, based on existing management and control measures, no national environmental objectives will be achieved by 2020.

Several positive trends and persistent challenges are highlighted. Greenhouse gas emissions have fallen by 32% (between 1990 and 2014) due to a reduction in energy supply of more than 50%. Moreover, biofuels are increasingly replacing oil for heating.

¹⁷⁴ See Malmobusiness, 2018 and Malmö Stad, 2018.

¹⁷⁵ Regionfakta, 2018.

¹⁷⁶ See Malmobusiness, 2018.

Renewable energy supplies 50% of the energy in the region but the total capacity remains underexploited (solar energy in particular).

4. Development of the strategy and objectives

The concepts of a circular and low-carbon economy are not sector specific but cross-cutting concepts which include companies, research organisations and eco-innovation activities across multiple sectors. The development of a circular and low-carbon economy is reflected in various official steering documents at regional and local level. Instead of designing a sole strategy for low carbon and circular economy, the approach adopted by Skåne and the city of Malmö is to embed the low carbon and circularity principles within a holistic strategic framework addressing the economic, social and environmental sustainability of the area.

The Skåne development plan (2009-2016) defines challenges, priorities and activities for future development. Sector programmes further complement this development plan (e.g. Regional Transportation Plan 2010-2021, Environmental Programme 2017-2020, Enterprise Plan 2009-2016 and International Innovation Strategy 2012-2020 which directly deals with the cleantech sector).

The development and thematic strategies have been designed and developed in line with national development strategies and also reflect the future development directions set out in the Europe 2020 strategy.

Skåne's Environmental Programme (2017-2020) expressly refers to development of a circular economy. Moreover, the Programme includes clear quantitative targets as well as milestones. It covers all of Skåne's administrations, majority-owned companies and activities that are financed wholly or in part by the County.

In 2014, Skåne published a new development strategy, "Open Skåne 2030" after extensive dialogue with citizens, civil society, the private and public sectors. The strategy is developed around five goals:

- Skåne shall offer optimism and quality of life,
- Skåne shall be a strong, sustainable growth engine,
- Skåne shall benefit from its polycentric urban structure,
- Skåne shall develop the welfare services of tomorrow,
- Skåne shall be globally attractive.

These five goals are linked to sub-goals and target indicators¹⁷⁷. A strong focus is on innovation as well as support for knowledge-based companies. The strategy intends to

¹⁷⁷ For example, the target indicators associated with the 2nd goal are:

support and harvest the potential of advanced technology industries, to ensure that development and growth in the region is economically, ecologically and socially sustainable, resource-efficient, climate-neutral, competitive and of high quality.

Likewise, Open Skåne emphasises its advantageous location for creating a sustainable growth engine. Implementation of Open Skåne is meant to be a collaborative and continuous process led by strategic collaborative groups (including a large array of stakeholders).

The City of Malmö also has an Environmental Plan with four targets for 2009-2020: (i) Malmö will be the “climate-smartest” city in Sweden (more renewable energy, changing transport and travel habits, etc.), (ii) the city will lead the way in sustainable urban development, (iii) it will ensure sustainable use of natural resources, and (iv) it should be easy to do the right thing (public procurement of Malmö City will have high environmental standards, etc.). In 2014, Malmö adopted a Comprehensive Plan, looking two decades ahead. The aim is to promote a strong and long-term sustainable urban structure (in the light of positive demographic trends), green growth and a more attractive city. The plan intends to turn the city into a “neighbourly, compact and mixed-use city – a green city with a transport system that puts people in focus” (Malmö Stad, 2014). Notably, no budget information associated with these objectives has been publicly disclosed.

5. Implementation and governance

Sweden is a unitary and decentralised State in which governance is at three levels, central, county and municipal. Counties are responsible for setting up and implementing growth and development strategies. The highest regional decision-making organ is the Regional Assembly whereas the highest political body is the directly elected Regional Council which implements and coordinates administration.

National stakeholders, such as Sweden’s innovation agency (VINNOVA) as well as the Swedish Agency for Economic and Regional Growth take part in discussions to design regional strategies. Drawing up Skåne’s development strategy also entailed broad consultation of collaborative partners (e.g. groups of citizens, regional state agencies, universities and colleges, business and trade organisations, idea-based organisations and networks). Those actors are continuously involved in implementation of the strategy. Skåne Council is in charge of implementing the development strategy within its areas of responsibility, such as budgets and operational plans, as well as communication. Approval and implementation of the Environmental

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- Unemployment in Skåne is lower than the national average.
 - The gross regional product (GRP) is higher than the national average.
 - At least 85% of 20-year-olds in Skåne have completed upper secondary education.
 - Skåne is one of the two main regions in Sweden for start-ups per 1,000 inhabitants.
 - Skåne is one of the world’s ten most innovative regions.
 - The employment rate in Skåne is higher than the national average and reflects the composition of the Skåne population.

Programme is similar. Skåne Council approved the programme and is starting with the most important environmental impacts. The programme has been revised four times since its inception in 2001.

Open Skåne is very comprehensive and addresses the key challenges raised by stakeholders. The process requires significant resources and can be very time-consuming. Indeed, developing the Open Skåne strategy took over two years. The multiplicity of stakeholders and their respective involvement may be similarly challenging. Nonetheless, a tradition for participation and horizontal collaboration have smoothed the entire process.

6. Achievements and challenges

Monitoring goals and indicators (identified for each of the five objectives) is a pivotal pillar of the Open Skåne strategy as well as for the Environmental Programme. Annual follow up reports are conducted and published for each strategy. Yet, the key challenge relates to difficulties in monitoring the strategy's implementation. Innovation is difficult to measure, which is partly due to the lack of data at regional level. A key issue is that Eurostat does not provide data at NUTS 3 level to distinguish Skåne. Yet, it is reported that Skåne accounts for more than 90% of the NUTS 2 region's total R&D expenses. Overall, while the development and environmental strategies have very ambitious objectives, the means to achieve those targets and how to measure achievements remains limited. Data availability is thus a key issue.

Moreover, with regards to environmental issues, no improvements or developments have been reported on environmental targets and it is reported that "it is not possible to reach the environmental quality target by 2020 with the currently decided or planned instruments". One major environmental challenge is to reduce transport emissions, which have remained relatively constant due to the high commuting rate. As a result, a key issue is the relatively low air quality, especially in Malmö, where nitrogen dioxide in the air exceeds environmental quality standards.

A lack of green spaces is reportedly a key issue in Malmö, where 16% of the population have no green space nearby. Furthermore, water quality and quantity may become an issue in the near future due to the increasing effects of climate change on agricultural activities in the region¹⁷⁸. Furthermore, achieving a socially balanced city with a good quality of life for all is a decisive challenge for Malmö (Malmö Stad, 2014).

To address those challenges, Skåne and particularly the city of Malmö are advancing towards a circular and low carbon economy, placing those principles at the forefront of development projects. The city strives to engrave the circularity principles within large scale initiatives in an innovative, holistic and forwards-thinking way rather than

¹⁷⁸ Skåne Facts and Key Trends, 2017).

focusing on individual sparse projects. Moreover, regional and local authorities intend to capitalise on and create synergies between other types of the sharing, collaborative economies and the low carbon and circular economy in order to move towards sustainable development.

A flagship pilot project is the construction of a “circular neighbourhood” which applies the principles of a circular economy. The Sege Park¹⁷⁹ is one of Malmö’s most recent urban redevelopment projects which turned a former hospital and its surroundings into a sustainable district including renewable energy, urban farming spaces, and dedicated sharing hubs to increasing the sharing economy. The circular learning centre has also been created to raise the neighbourhoods’ inhabitants awareness about the circularity principles and their application in daily life, as well as to oversee the construction of new circular neighbourhoods.

The city has developed public-private partnerships to develop innovative, sustainable solutions. Malmö is also fertile ground for developing innovative technologies due to the closeness of universities, research institutes and corporate activities. The city is also actively committed to becoming a smart sustainable city, turning low-carbon principles into practice and Skåne County also pledged to make its entire vehicle fleet fossil-free by 2020.

Together with Copenhagen, Malmö organised the Nordic Clean Energy Week from 21- 25 May 2018, which covers: (i) the role of cities & regions in energy transition, (ii) smart grids, (iii) sustainable heating and cooling, and (iv) smart industries. Along with a favourable political will to shift towards a low-carbon economy, a wide array of stakeholders actively supports the development of a healthy environment for all.

Many new businesses are based on circular economy principles, in Malmö itself and across the county. A workshop in early 2018 led to the mapping of 90 circular initiatives, ranging from recycling services, local renewable energy schemes and transportation, to waste management¹⁸⁰.

7. Main conclusions

Skåne’s transition towards a knowledge-service based economy, with notably lower energy intensity, has been fostered by innovative and advanced technology industries. Such a move towards a post carbon society has likewise received support from civil society and is backed by political ambitions to place the city of Malmö and Skåne at the forefront of the fight against climate change.

¹⁷⁹ <http://circularpp.eu/circular-pp-study-tours-reveal-malmos-circular-economy/>

¹⁸⁰ Hutskanie, 2018.

Cross border regional cooperation with eastern Denmark also significantly contributes to reinforcing Malmö and Skåne's position as a leading innovative industrial power, especially in the cleantech sector. Nonetheless, CO₂ emissions from transport, linked to the economic dynamism of the area (a key transit region) as well as the associated low air quality remain key environmental and health challenges which have not yet been tackled. Efforts are therefore focussing on more eco-friendly means of transportation, innovative solutions throughout entire value chains and smart materials to unlock the region's global growth potential.

Energy production is another key challenge as the region consumes more electricity than is produced locally, despite having unused energy generation potential. Further development and investment in renewable energies is high on the agenda. Reducing energy consumption through energy efficiency measures is also important.

An emphasis on the regional circular economy and local production will require a strategic urban development plan which keeps urban sprawl under control. Urban gardens, agricultural spaces as well as opportunities for circular businesses will be needed. Furthermore, the support of local circular businesses, such as material reuse, repair, refurbishment and remanufacturing companies should be aligned with local and regional policies on trade, industries, innovation and the environment.

The holistic strategic approach applied by County and the city of Malmö relies on a strong participation culture, which has facilitated the development and implementation of development and environmental strategies. The impulse to move towards a low carbon and circular economy equally stems from the public authorities (which provide financial and operational support and strive to be sustainability front runners), the private sector (which intends to harness the potential of the circular economy to revive and transform local industrial activities, designing the world of tomorrow with today's waste and creating new circular business models) and the civil society (which aspires for a better and more sustainable living environment).

The County' industrial landscape has transformed into a future-oriented net of connected industry leaders and SMEs which has retained and enhanced the existing cultural urban heritage.

South Holland, the Netherlands

1. Overview

Location	Province of Zuid-Holland (South Holland), the metropolitan region of Rotterdam and The Hague
Key economic/ industrial indicators	<ul style="list-style-type: none"> • GDP per capita (PPS): EUR 37 400 • Employment 72.6% in 2016. 12% of employment in industry. • The Smart Specialisation Strategy identifies nine key sectors for the region: i) agri-food, ii) chemicals, iii) creative industry, iv) energy, v) high tech, vi) life science and health, vii) logistics, viii) horticulture, ix) water
Timeline	The Roadmap Next Economy started in November 2015 and was finalised at the end of 2016. From February 2018 implementation was transferred to InnovationQuarter, the regional development company. The plan looks forward 2050.
LRAs involved	The Province of South Holland, the metropolitan region Rotterdam-The Hague; the municipality of Rotterdam and the municipality of The Hague and other municipalities in the metropolitan region.
Stakeholders	In addition to LRA stakeholders are the port of Rotterdam Authority, private companies and three universities in the province (Delft University, Leiden University and Erasmus University Rotterdam).
Type and amount financing (if any)	n. a.
Web links	<p>Europe strategy Province of South Holland: http://www.zuid-holland.eu/</p> <p>Roadmap Next Economy: https://mrdh.nl/sites/mrdh.nl/files/files/Roadmap%20Next%20Economy%20EN%20version.pdf</p> <p>A circular economy in the Netherlands by 2050: https://www.government.nl/documents/policy-notes/2016/09/14/a-circular-economy-in-the-netherlands-by-2050</p> <p>InnovationQuarter: https://www.innovationquarter.nl/en/</p> <p>Economic Board South Holland: https://www.economicboardzuidholland.nl/english/</p>

2. Summary

South Holland is one of the most important industrial provinces in the Netherlands with Rotterdam as its economic centre and various universities and research centres. Despite of an existing high innovation potential, the industry is still based on fossil fuels and traditional linear business models.

The “Europe strategy Province of Zuid-Holland” aims at making the province smarter, cleaner and stronger in the next few years. Transition to a circular economy is one of its four priority themes. The strategy is based on the national strategy that aims for a fully circular economy by 2050, maximising product and raw material recycling as well as the re-use of biomass. In 2016, a roadmap for the Metropolitan region of The Hague and Rotterdam was set up to create a pathway towards the national 2050 goals with a list of relevant projects and interventions. It aims to build up or improve existing infrastructure and stimulate innovation to facilitate the transition to the next economy and to develop the required skills of the people for the transition. In the industrial sector, the transition shall be boosted by introducing innovations making the best use of local resources and materials.

The regional development company, InnovationQuarter, is now organising the implementation through several projects. Each project cooperates with all the supply organisations, the government, local authorities and educational institutions, which are fundamental for training workers for the transition. However, due to the very recent start of the implementation process in 2018 it is too early to assess first achievements.

3. Context

The province of South Holland is part of the Western Netherlands region. The province covers 2,508 km² (8.3% of the Netherlands) and with 3.7 million inhabitants is the most populous in the country. South Holland includes several municipalities, most notably The Hague and Rotterdam. The first is the political centre of the Netherlands and Rotterdam is one of the most important industrial centres in the EU, thanks to its port, which is the biggest in Europe.

The GDP of South Holland was around EUR 150.7 billion in 2016, approximately 21% of national GDP. Growth was positive from 2015 to 2016 but decreased slightly from 2014-2015.

As with many EU developed regions, the most important sectors in South Holland are services and industry. Employment in the province is concentrated on trade, transport, accommodation and food services (24%), business services (13%) and industry (12% of the total, including construction). Despite economic development, unemployment in the province is one of the highest in the country at 5.1% in 2017, down from 2015 but still higher than the national average (4.4%).

South Holland is one of the most important provinces in the Netherlands for industry, services and agriculture. One reason for the strong economic development is Rotterdam with its port. This is a strategic connection for shipping goods (around 461.2 million tons per year) since it combines water, road, railways and waterways. Moreover, the Rotterdam area also has a strong industrial concentration, especially oil refineries, as well as chemical and related industries. The Hague area is more

specialised in agriculture and horticulture, especially vegetables and flowers, which make up a big share of national exports. The Smart Specialisation Strategy identifies nine key sectors for the region: i) agri-food, ii) chemicals, iii) creative industry, iv) energy, v) high tech, vi) life science and health, vii) logistics, viii) horticulture, ix) water¹⁸¹.

The province of South Holland also has a high concentration of knowledge. Universities and research centres in the province include three of the most important in the Netherlands, Delft University, Leiden University and Erasmus University Rotterdam. High business activity and the concentration of knowledge and human capital mean South Holland is one of the highest innovation potential regions in the EU.

According to Regional Innovation Scoreboard¹⁸², in 2017, the province was an innovation leader while in 2014 it was an innovation follower.

In recent years, CO₂ emissions have decreased, but the province faces environmental challenges. The area around Rotterdam is strongly dependent on fossil fuel businesses and the agriculture and horticulture sectors are responsible for high emissions.

4. Development of the strategy and objectives

The economic and innovation potential of South Holland is evident because its well-developed business activity and knowledge centres facilitate the transition from a classic harbour to a knowledge intensive province. Despite the high innovation potential, South Holland industry is still based on fossil fuels and traditional linear business models.

The ambitions of the province are clearly expressed in “*Europe strategy Province of Zuid-Holland*”¹⁸³, the strategy which intends to make the province smarter, cleaner and stronger in the next few years. The strategy is based on four priority themes: Innovative metropolitan delta, Innovative and sustainable food supply, Mobility and sustainable transport and Transition to a circular economy.

The strategy is based on the national strategy that aims for a fully circular economy by 2050, maximising product and raw material recycling as well as the re-use of biomass. The province wants to substantially contribute to the national objective of producing 14% renewable energy by 2020 and 16% by 2023. The province has not yet developed a roadmap for a circular economy, but many initiatives and local strategies have been designed in South Holland.

¹⁸¹ Smart specialisation strategy of Western Netherlands

http://s3platform.jrc.ec.europa.eu/documents/20182/225903/NL_Western_Netherlands_RIS3_201014_Final.pdf/434df449-3143-4ce1-838f-b6663fbb1d1a

¹⁸² https://ec.europa.eu/growth/industry/innovation/facts-figures/regional_en

¹⁸³ <http://www.zuid-holland.eu/>

Among them is the Roadmap Next Economy (RNE) established at the end of 2016 by the Metropolitan region of The Hague and Rotterdam (MRDH)¹⁸⁴ and presented to the Vice-President and Commissioner for Energy Union, Maroš Šefčovič, in 2017. The strategy is to stimulate transition to a new economy by 2050. The roadmap was designed on the basis of a context analysis which involved representatives of the government, knowledge institutions and around 140 other stakeholders. The strategy looks to transform 2050 ambitions into the short-term, creating an agenda of projects and interventions. The RNE considers the effects of global trends on the metropolitan economy especially for innovation, energy, employment and education.

For this reason, the roadmap focuses on five transition paths:

1. Smart Digital Delta,
2. Smart Energy Delta,
3. Circular Economy,
4. Entrepreneurial Region,
5. Next Society.

The strategy is designed to be effective on two levels. Firstly, it aims to build up or improve existing infrastructure and stimulate innovation to facilitate the transition to the next economy (paths 1, 2 and 3). Secondly it stresses the importance of developing people and skills for the transition: *“75% of the success of innovation is due to social innovation rather than technological innovation”* (paths 4 and 5). The strategy will intervene in three fields: the port of Rotterdam, the built environment and horticulture.

The port of Rotterdam is the largest port in Europe which has the most extensive petro-chemical industrial complex in Western Europe. The port area is still highly dependent on fossil fuels so a transition toward a zero-carbon economy is strongly needed. The energy transition of Rotterdam port area focuses on decarbonisation of intensive industry, such as chemicals, combined with pilot projects for energy efficiency and carbon capture and storage. For industry decarbonisation the main project is “Core to the core business”. This looks to implement a new business model based on companies in the same clusters sharing infrastructure and logistics and exchanging raw materials. The new business model should create several benefits for companies, such as cost reduction, supply reliability and sustainability.

Another key economic activity for the region is horticulture, in which the demand for CO₂ is very intense and which is a complex factor for the transition. In the Greenport area energy demand needs to be decreased and CO₂ free energy sources need to be increased. The energy transition also regards the urban built environment that is responsible for 30% of Rotterdam-The Hague energy demand. The interventions focus on renovating gas infrastructure in brownfield and zero-emissions in greenfield sites.

¹⁸⁴ The Rotterdam The Hague metropolitan region is a metropolitan situated in the province of Zuid-Holland, It includes 23 municipalities, the most important are Rotterdam and The Hague.

With regards to the transition from a linear to a circular economic model, the long-term target is to be one of the first fully circular regions in the world, by 2050. The main objective is to introduce an intelligent system to map resources, materials and waste within the region to show opportunities for a circular economy.

In the built environment, the transition to a circular paradigm will be at a micro-level, making the currently fragmented waste collection more efficient (closer to houses).

In terms of industrial activities, the transition will be boosted by introducing innovations such as Intelligent Assets Value Driver, to acknowledge companies for local availability of resources and materials. An example is “Waste to Chemicals”, a pilot project started by companies in the chemical cluster. The project involves recycling around 250 000 tons of waste and transforming them into 90 000 tons of syngas and methanol used for several chemical projects.

For both pathways Energy and Circular Economy, social innovation will play a key role in the transition since there will be the need to train workers to adapt to new business models.

5. Implementation and governance

The roadmap was designed by local authorities from the metropolitan region Rotterdam The Hague according to the triple helix principle where public institutions cooperate with stakeholders from private organisations and knowledge institutions. After the design phase, implementation of RNE was transferred to InnovationQuarter, the regional development company that has strong experience and solid knowledge of RNE. Within InnovationQuarter there are experts from each of the five transition paths. Transition teams have also been set up in some MRDH municipalities, working in parallel with InnovationQuarter. For implementation, each InnovationQuarter project cooperates with all the supply organisations but also government, local authorities and educational institutions, which are fundamental especially to train workers for the transition.

Also, the Economic Board of South Holland was involved in reviewing the strategy. This council brings together knowledge institutions, industry and governments.

6. Achievements and challenges

The implementation of the strategy started only in February 2018, so it is too early to assess achievements especially because for the first year InnovationQuarter focused on setting a proper and coherent project agenda. Some small pilot projects have been started in several fields such as households, chemicals and plastics, to build new supply chains and at the same the company is creating a group called Circular Cities to exchange experiences and ideas on different approaches for the transition.

According to the long-term targets and project agenda, the metropolitan region expects to have a double impact from the strategy. The circular impact implies less waste and CO₂ with at the same time new supply chains in several areas. Project implementation helps in selecting new business models that fit with regional characteristics and also increase employment for less educated people.

Although the implementation is still at a preliminary phase, at this point the main barriers are mainly related to market conditions. There are general barriers in the energy market, for example national incentives vary a lot between sectors with incentives for bio-based fuels but not for bio-based materials. It is not easy to use waste in new products especially because treatment costs are very high, making it hard for companies to compete with low value products.

In addition to cost barriers, using recycled waste, clean energy, etc. would be in the long term and not immediate, which does not normally fit with optimising enterprise profits.

Moreover, the knowledge and research institutions, well-developed service sector and key industrial sectors that hold potential for the region in terms of innovation could on the other hand hinder transition. Well-developed assets in key sectors could make adapting to new business models more difficult and slow down the transition.

To overcome such challenges, InnovationQuarter is cooperating with stakeholders affected by the strategy, not only local authorities but also companies. At the same time education plays a key role in cultural transition and motivating companies to invest in projects whose effect is not immediate but long-term.

7. Main conclusions

Overall, the strategy is consistent with the national strategy and targets but has been adapted to better fit regional needs and characteristics.

The roadmap works systematically on digital, energy and circular economies to create innovation and improve or build the infrastructure needed for transition. At the same time, it focuses on creating social innovation, which is essential for achieving the targets.

These ambitions are also reflected in the governance, where from the design phase there was a strong interaction of public, private and knowledge sectors. In that phase, stakeholder cooperation was essential to identify needs and define coherent projects. During the implementation, InnovationQuarter continues to cooperate with local authorities, private organisations, research institutions and universities both to define the project agenda and for pilot project implementation.

The roadmap, with all the transition paths, aims to create new business models that can be adopted in supply chains that in the long-term will benefit the region. These include lower environmental impact, more employment, lower costs and higher productivity.

The experience of South Holland could be replicated in other regions. Customising to regional characteristics, inefficiencies and needs, as well as involving stakeholders (public, private and knowledge sectors) in designing and implementing is a solid basis for an effective strategy.

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