"CircE - European regions toward Circular Economy"

INTERREG Europe Project

Action Plan

Project Partner 1 - Lead Partner

Lombardy Region

European Union
European Regional
Development Fund

Regione Lombardia

CircE
Interreg Europe

1. General information

Project

CircE – European Region towards Circular Economy

Partner organisation

Lombardy Region - Directorate-General Environment and Climate change

Country

Italy

NUTS2 region

Lombardy

Contact person

Alessandro Dacomo
e-mail address: alessandro_dacomo@regione.lombardia.it
phone number: 0039 0267652373

European Union
European Regional
Development Fund

2. ERDF ROP

2.1. ERDF ROP 2014-2021

2.1.1. General information

The ERDF ROP is based on the "Europe 2020 jobs and growth strategy", aimed to pursue a smart, sustainable and inclusive growth and reach social, economic and territorial cohesion.

The ERDF ROP was identified in our Application Form (AF) as the most suitable policy instrument for the implementation of the EU Action Plan's goals for the Circular economy [EU COM(2015) 614] because it:

- approaches the integration of regional policies, in order to improve their effects in:
  - restarting growth;
  - increasing the productivity of the regional private and public system;
  - increasing the competitiveness of enterprise and territorial system.
- considers innovation as a key tool to support these challenges;
- sees Public Demand to support innovation as a potential tool to start-up and scale-up new activities;
- states the need to increase occupation, considering green economy as an opportunity for that;
- supports complex investments projects;
- aims environmental protection and sustainability principals.

Although all these issues are strictly linked with the Circular Economy (CE) strategies, the ERDF ROP was approved before adoption of the EU Action Plan for CE; therefore, the instrument needs to be reoriented in order to help more significantly the change of the local productive system towards CE.

2.1.2. Policy context

The Action Plan aims to impact:	x	Investment for Growth and Jobs programme
	☐	European Territorial Cooperation programme
	x	Other regional development policy instrument
Name of the policy instrument addressed:		ERDF Regional Operational Programme

2.2. ERDF ROP 2021-2027

The Lombardy 2014-20 ERDF ROP, even when considering environmental issues, restricted the scope of regional intervention strategy to actions aiming at energy efficiency (for which the deputy policy instrument was the PEAR – Regional Environmental Energy Plan) and air pollution reduction (PRIA – Air quality Intervention Regional Plan). At that time, waste management was still broadly perceived as a service for citizens and enterprises that had already attained a satisfactory standard, rather than a circular economy opportunity.

In the new programming period (2021-27), although negotiations are ongoing and it is difficult to make reliable forecasts, the environmental issue is very likely to hold a relevant position. Environmental sustainability is foreseen to be a key concept, linking for example local resilience to natural hazards and climate change to the industrial transition towards more sustainable production and consumption patterns. In the latter perspective, the massive experience collected by CircE will support the design of a feasible and effective ROP to meet Circular Economy issues and to select the future interventions to be funded as priorities.

2.3. The CircE's Action plan actions

The actions described into the next chapters mainly address the ERDF ROP 2014-2020, but they can provide important information to steer the new programming period as well.

3. Common background of the action plan

3.1. Project results

During phase 1, the CircE Project identified Circular Economy good practices, actors, opportunities and barriers in the project sectors (biomass, built environment, food-waste, plastics, raw materials, textile, tourism, WEEE), through the Exchange of Experiences (EE in the following), where the Stakeholders' support was crucial.

A key role in supporting the EE was played by the CircE methodologies: the CircE tool, the cross-regional value chain analysis, the cross-sectorial analysis, the Prioritization procedure. The Opportunities Report, the Synoptic Report on opportunities and barriers, the Priority opportunities report, describe in-depth those methodologies (see the CircE website Library: https://www.interregeurope.eu/circe/library/).

The EE anyhow widened in its turn the regional view both in terms of methodology and in terms of knowledge.

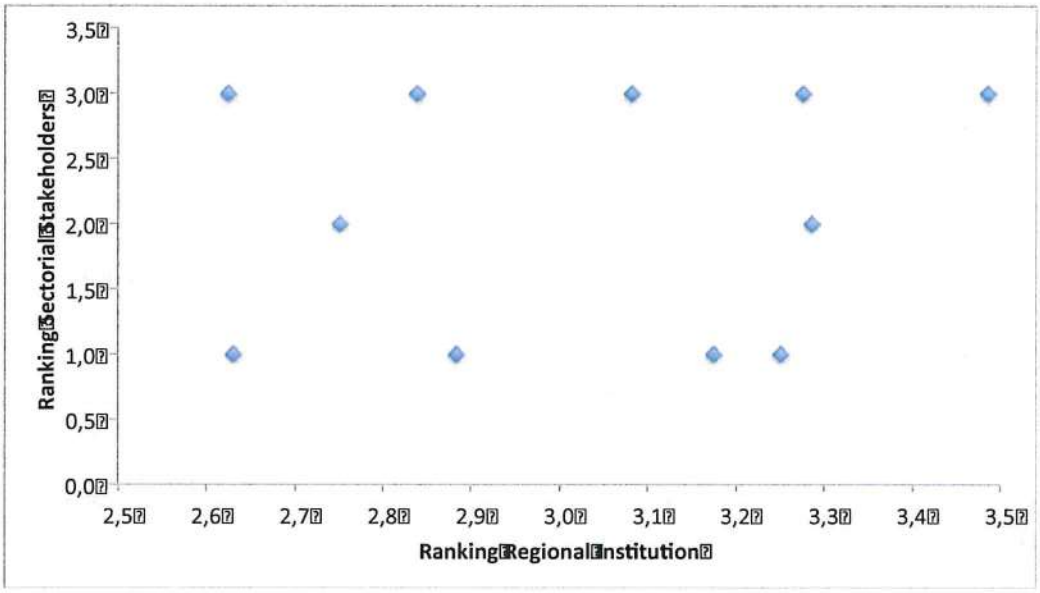
In particular, the Circe tool methodology (Annex 1) and the final identification of priority opportunities in the region (reported in Annex 3) represent a very valuable knowledge basis to be taken into consideration while designing new policies, defining objective and targets, understanding the right way to approach specific issues related to the development of Circular Economy.

The information and the results quoted above are the base of the actions presented in this Action plan.

In order to understand the actions envisaged, a short description of the methodology used in the prioritization process is provided below. For a complete overview the reference is the Priority opportunities report (see the CircE website Library: https://www.interregeurope.eu/circe/library/), and, more briefly, Annex 2.

The opportunities identified in the project were ranked through the AHP (Analytic Hierarchy Process) methodology. Both the regional institution and the sector-specific stakeholders applied this methodology, creating two different rankings.

In order to compare these two rankings, to get further information concerning how to support different opportunities and to set-up specific implementation actions, the opportunities ranked by the two different groups (Lombardy Region and sectorial stakeholders) were represented in a Chart, based on the score expressed by the regional institution, reported on the X axis, and by the sectorial stakeholders, reported on the Y axis . Based on the specific ranking, each opportunity is mapped in the graph. An example is provided below.

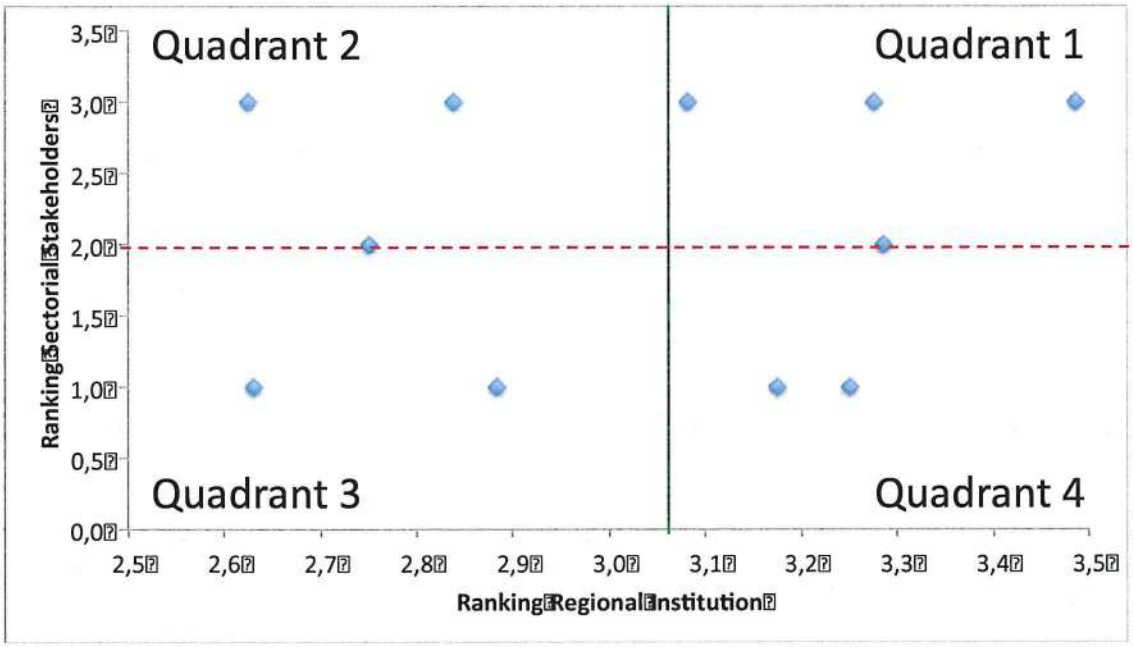


Then, the methodology foresees to find the median:

- of the set of ranking scores for each sector provided by the sectorial stakeholders;
- of the set of ranking scores for the entire set of sectors provided by the regional institution judges (provided, for all the sectors considered, by the same team).

Such an approach identifies 4 clusters in the 4 quadrants of the map, as shown below.

European Union
European Regional
Development Fund



Each quadrant has its peculiarities: standard types of actions and policy options that can be derived can be implemented on the related opportunities. Depending on the quadrant to which an opportunity belongs, it can be supported by different actions.

Action 1 is mainly designed to support Quadrant 1 opportunities; Action 2 supports Quadrant 4 and Quadrant 2 opportunities.

The four quadrants have the following meaning:

- **Quadrant 1:** the opportunity is perceived as a high-impact action both by the regional institution and the sectorial stakeholders.
- **Quadrant 2:** the opportunity is perceived as a high-impact action by the sectorial stakeholders and as low-impact action by the regional institution.
- **Quadrant 3:** the opportunity is perceived as a low-impact action both by the regional institution and the sectorial stakeholders.
- **Quadrant 4:** the opportunity is perceived as a high-impact action by the regional institution and as low-impact action by the sectorial stakeholders.

3.2. Policy instrument

Lombardy Region, through the CircE project, intends to influence the ERDF ROP, in particular its Axis 1.

The actions designed in the ERDF ROP Axis 1 are driven by Lombardy Region's Smart Specialization Strategy (RIS3 in the following), which identified specialization areas where the efforts for developing research and innovation in the region should be concentrated.

In order to support the effectiveness of Axis 1 actions and of RIS3, Lombardy Region draws up the "Programmi di Lavoro Ricerca e Innovazione" (Research and Innovation Work Programs; in the following RIWP). These Programs are revised and updated every 2-3 years.

Grounding on the specialization areas identified by the RIS3, these documents identify also macro themes and themes of development. Among these three entities a hierarchical relationship exists: a specialization area has several macro themes which have several themes of development.

The RIWP identify a set of priorities for innovation to be addressed by calls and projects of Axis 1. They can be considered as the principles to be addressed by the calls/projects and which the calls/projects have to take inspiration from.

4. ACTION 1 – Steering Research and Innovation Work Programs, calls and project

This action wants to steer the ROP 2014-2020 through steering the Research and Innovation Working Programs and influencing related calls and projects.

The contents related to the opportunities perceived as high-impact actions both by the regional institution and the sectorial stakeholders (falling within Quadrant 1 of the prioritization methodology) will be the knowledge base to use in this action.

4.1. Specific background

The Research and innovation work programs version in force is RIWP 2017-2018. The duration of the version in force (2017-2018) is extended to the end of 2019.

The revision and updating of this version are ongoing in 2019, in order to deliver within the end of the year the updated version RIWP. This version will influence Axis 1 - ROP calls and projects until 2023.

The revision of the RIWP is managed through a formal process and relying on a knowledge base, enhanced with respect to the previous version, where also relevant stakeholders can take part, at specific stages. In particular, the process entails public consultations and one-to-one meetings with related stakeholders.

The revision will consist, if necessary, in the rewording of macro themes and themes of development or adding new macro themes and themes of development, therefore modifying the set of priorities for innovation to be addressed by calls and projects of Axis 1.

The CircE findings are directly available as references to ground new calls (sectorial calls or general calls) and to inspire projects coherent with the CircE findings and with RIWP.

4.2. Action mechanism

The CircE project intend to steer the new version of the RIWP, new calls and projects.

In particular, the CircE project:

- will take part in the RIWP revision process lobbying for upgrading the RIWP on the basis of the project knowledge base, built during phase 1;
- will provide the knowledge base produced during the project to directly design new calls and inspire new projects coherent with the CircE opportunity and also with the RIWP.

4.2.1. Details on the RIWP

Concerning the RWIP in particular, the preparation of the new version will mainly entail: (i) an improvement of the macro themes and themes of development description, including the scope and the rationale of each macro themes and themes of development; (ii) the identification of new macro themes and themes of development, in order to support emerging circular economy-related themes.

Steering the macro themes and the themes of development (their rationale and support the creation of new ones) can steer calls and the projects presented in a specific call, since the presented calls and projects must be coherent with the identified macro themes and themes of development. Considering that the RIWP will be the reference document for calls and project from 2020 to 2023, the aforementioned activity will influence the calls and projects of the last years of the ROP programming period, in coherence with CircE and towards the boosting of Circular Economy within the Region.

4.2.2. Direct influence on calls and project

The direct influence on new calls can be achieved also through the analysis of the calls already done and the projects already presented: this can be considered as a kind of feedback on the coherence among the work done in CircE and the work done by the regional actors in presenting Projects for Axis 1 ROP calls.

Through this analysis, the CircE team and the policy makers can get important hints for improving their activities, directly enhancing new calls.

The steering activity can be produced through three main mechanisms:

- Lobbying the designing of new calls and providing the designer with technical contents, to better shape the wording and the rationale of the calls and increase the effectiveness of the calls;

- Putting the CircE results into the wording of the calls as a reference to support the evaluation of the projects presented and as a criterion for the assignment of evaluation scores;
- The Managing Authority will take the results of the project (as well as other relevant Interreg Europe projects on the subject) as an assessment tool for the call proposals that the Managing Authority itself must examine before the calls are put into force, if regarding pertinent subjects.

This concrete use of the CircE results will be guaranteed through the dialogue, already ongoing, with the Managing Authority and the Department responsible for ERDF-ROP Axis 1.

The effectiveness and the soundness of this approach is proved by the positive example of the recent call on Axis 1 "Fashiontech", in which evaluation criteria, generically aimed at environmental and social sustainability in the prior underlying act (*Deliberazione di Giunta Regionale* XI/1217 of February 4th, 2019) approved by the political level, where more analytically laid down, taking into account CircE policy options, during the drafting process of the call, which was subsequently banned with a decree undertaken by a regional manager at the Department for tourism, local marketing and fashion (*Decreto del Dirigente di Unità Organizzativa* n. 5044 of April 10th, 2019).

4.3. Action contents

The analysis run by the CircE project identified 4 main areas of action in order to support circular economy. In these areas the activities detailed by and through the CircE opportunities and the relevant barriers and information show the specific directions to follow.

All the opportunities and the related information can be attributed to these areas of action. Of course, this attribution is not strict, because opportunities can imply issues concerning other areas, but the attribution reflects and represents the main peculiarities of each opportunity.

The areas of action are:

- Network-Value chain improvement;
- Higher waste-material input;
- Lower and better material output;
- Metrics and protocols.

In the following the opportunities are presented divided into the different areas of actions.

The final wording describing the opportunities is a product of the whole work done in the partnership through the project methodology. For some opportunities a specific paragraph ("*Role of the exchange of experiences*") is proposed, in order to detail particular pertinent outstanding experiences emerged from the partnership. This further information emerged mainly in the cross-regional value chain analysis.

In order to have a complete overview of the opportunities the reference are Annex 3 and the project reports, namely the *Synoptic Report on Opportunities, Barriers and Value Chain Analysis* published on the CircE website (see the CircE website Library: https://www.interregeurope.eu/circe/library/).

4.3.1. Network-Value chain improvement

The analysis done and the exchange of experiences with partners show that this area of action is important. The experience and the results of other partners show that this area of action is a key aspect to play with to improve CE and that Lombardy Region has to take it into great consideration to produce effective circular actions.

In particular, the findings and the PP2's experience, which brought to the identification of a pilot action to strengthen the value chain of the textile sector, are the flagship references underpinning the need to work on this area of action. The PP4's experience on the Agreement on Sustainable Garment and textile (a PP4's good practice) support as well the idea of working on the networking to strengthen circular value chain. This importance emerges in the PP4's action plan as well, where Action 1 is aimed at this purpose.

The opportunities which represent the main line of action of the current action area are presented in the table below (where also the sector to which the opportunities are relevant is reported) and detailed in the following.

ID	Opportunity	Biomass	Built Environment	Food waste	Plastics	Textile	WEEE
VC03Other	Enhance the role of customers towards circular economy	1	1	1	1	1	1
PP01_S5_009	Implementation of a multi-user web platform for value-chain integration		1	1		1	
VC03Biomass	Developing multi-regional pilot innovation facilities	1					
VC04Biomass	New business models for bioeconomy start-ups	1					
VC02Biomass	Local production – consumption chains of biomass	1					
PP01_S5_005	Reverse logistics in built environment		1				
PP01_New_1	Integration of agro-food industry, biotechnological industry and green chemistry			1			
VC02 Textile	Support for new circular textile start-ups					1	
PP01_S5_014	Increase the recovery of waste clothes					1	
PP01_S5_038	Enhance the role of clusters in the regional eco-system					1	

European Union
European Regional Development Fund

Enhance the role of customers towards circular economy

Customers need to become more and more aware of their power to influence the way companies design, produce and distribute their products. Large public institutions can play an important role in this transition by becoming themselves conscious customers of green products and thus influencing the manufacturers' attitude towards circular economy.

Role of the exchange of experiences

The original need of Lombardy region, the gap to be addressed, was identified and inspired by the following experiences:

- From PP8's project: the project GREENCYCLE aims to introduce a circular economy system as a holistic approach to support the implementation of low-carbon strategies and provide an additional 2-4% greenhouse emission reduction in the participating cities. Cities as biggest producers of emissions and major consumers of energy and materials will play a pioneering role by developing circular economy implementation strategies where key target groups (utilities, SMEs, citizens, research organizations) will be actively involved in the process.
- From PP7's project: the BAS (Benefit as you save) Project aims – preparation and creation of joint strategies, action plans and tools to encourage citizens to participate in the recycling and re-use of materials.

Moreover, other partners showed to have similar gaps and needs concerning this theme, having identified themselves specific opportunities on this issue, namely:

- PP4: opportunity number 5 on communication and opportunity number 7 "Launching customer";
- PP7: need of Public campaigns.

Both the experiences already done and the opportunities identified by other partners can entail a useful collaboration among partners to identify solutions.

Implementation of a multi-user web platform for value-chain integration

Information sharing among different stakeholders of the value-chain is one of the most promising enablers for emerging circular economy business models. A cross-sectorial web platform should be implemented for the creation of a virtual market containing the description, the volumes and the geographical localization of the waste materials coming from different sectors (for example, from construction and to textile to other sectors). The platform should be multi-users, in the sense that multiple stakeholders should provide and retrieve information, in different stages of the value-chains. For example, plant managers may provide data related to processing capabilities, product designer may retrieve data about material characteristics, recyclers may retrieve data about products to be processed. In the Lombardy Region, ANCE Lombardia (construction sector), ANPAR (recycling sector) and Centrocot (textile sector) are independently setting up or already testing similar digital platforms.

Role of the exchange of experiences

In the understanding of the real key role played by this platform the following experiences were important:

European Union
European Regional
Development Fund

- PP5's opportunity 11: Create/work with existing online web platform for trading of recovered building materials.
- PP4's opportunity 12: Databank for using waste material.

The opportunities identified by other partners can entail a useful collaboration among partners to identify solutions.

Developing multi-regional pilot innovation facilities

Several initiatives have been launched at European level to support industry in the transition to more sustainable circular economy businesses. However, innovations and demonstrators developed within projects find significant barriers in achieving the market as companies see circular economy as a high-risk investment area. The major barrier is the lack of infrastructures or platforms that can incorporate these innovative technologies and services within integrated pilot plants to show-case to industry the developed technologies in real industrial environments and to boost their private exploitation and replication at industrial scale. Such infrastructures should act as "technology gateways" that any business sector can use. Enhanced support should be dedicated to the building and operation of multi-regional Pilot Facilities which will substantially improve sustainable innovation capacity of Europe. The development strategy should ground on the Smart Specialization Strategies of the Regions and regional best practices, thus exploiting the local eco-systems to achieve extended impact at European level. This concept is a crucial element in dealing with societal challenges as the development of a sustainable, innovative and knowledge-based economy in Europe, creating jobs and meeting climate change targets.

New business models for bioeconomy start-ups

The bio-economy sector is populated by large companies that exploit economy of scale to reduce the impact of their high cost infrastructure and stay competitive on the market. However, several innovative business opportunities are emerging in small medium enterprises and local business stakeholders that could be enhanced through innovative business models in order to reach the market. This opportunity aims to develop new business models in biomass and, more in general in bioeconomy, to encourage and improve the creation of innovative start-ups in this field. Such business models should create the economic and financial preconditions for these business opportunities to emerge with sustainable and credible growth patterns.

Role of the exchange of experiences

In the understanding of the precise need of Lombardy region, the gap to be addressed, the following experiences were important:

- PP3's opportunity 14: Models of economic activities in bioeconomy.
- PP3's opportunity 19: Support start-up development which specialize in industrial biotechnology.
- PP4's good practices 6, named BERST, which aims to explore the bioeconomy potential of EU regions.

The experiences identified by other partners can entail a useful collaboration among partners to identify solutions.

Local production – consumption chains of biomass

Supporting the development of a local circular value-chain, from production to consumption, could reduce the logistics costs in the biomass sector and become a promising strategy, especially for biomass from forest resources and agricultural production waste. For example, in the wood sector, a smart use of forest resources

could enhance local economies by enabling use both in the industrial and manufacturing sectors as well as in energy production. However, enhanced knowledge of the specific production-consumption capabilities at local level, aiming at the establishment of a stable local value-chain, should be gained at regional level.

Role of the exchange of experiences

In the understanding of the precise need of Lombardy region, the gap to be addressed, the following experiences were important:

- PP3's opportunity 15: Increase of local biomass usage and increase of usage of biomass waste for power industry.
- PP3's opportunity 11: identification of potential of local biomass.
- PP3's opportunity 13: creating local biorefineries.
- PP6's opportunity 1: bio-sourced materials
- PP7's opportunity 7: construction of a pellet plant for utilization of wood waste generate from Municipal enterprise for waste treatment – Sofia and feeding the administrative buildings of Sofia Municipality.
- PP8's opportunity 2: the development and the importance of wood production chains.

The opportunities identified by other partners can entail a useful collaboration among partners to identify solutions.

Reverse logistics in built environment

This opportunity aims at establishing a network to support the return of homogeneous waste coming from the demolition to the producer through a selective process.

When a product normally moves through the forward supply chain network, the aim is to reach the distributor or the final customer. A reverse logistic should be designed to transfer post-use components and materials for the purpose of capturing value, or proper disposal. In the reverse logistic the manufacturing firm should then organize the shipping of the waste, testing, dismantling, repairing, recycling or disposing the product. In order to avoid the delivery of inert waste in landfill, a solution could be to set up a CLSC (Closed-Loop Supply Chain). Building materials would be extended after the end of life of the building itself by keeping them in the loop through systematical extraction, purification and repurposing. They will be reused in some parts of other buildings or they will be inserted in the secondary material markets. This procedure might include reusing the extracted items directly or after different levels of recovery processes.

Integration of agro-food industry, biotechnological industry and green chemistry

The food supply chains are large in volumes, significant in economic and environmental terms and central to the management of many biological materials. They currently generate significant amounts of waste and are associated to high environmental impacts. The waste streams are generated during harvesting, storage and transport prior to primary processing (primary stream), during primary processing within the agro-food industry (secondary stream) and during production or consumption by end users (tertiary stream). This is recognized as a priority sector where accelerating the circular economy would be beneficial and where EU policy has a particular role to play.

This include also the idea of valorising food and beverage industry wastewaters based on the outcomes of the EU H2020 Saltgae project involving partner Regions in CIRCE (e.g. Lombardy, Slovenia). To do so, novel

R&D and industrial collaborations will be identified within these Regions, starting from Saltgae partners, to ensure further scaling up and future potential industrial implementation of Saltgae outcomes.

Support for new circular textile start-ups

Through a careful and continue cross-regional value chain analysis, potential synergies among different sectors may arise, especially targeting start-ups. Indeed, start-ups are at the core of the innovation eco-system of a Region. Thanks to their light and dynamic structures and the less established brand vision, start-ups can experiment innovative circular business cases and expand them in line with the company growth strategy.

An opportunity comes from the extension of the Advance London program good practice (established by LWARB) to other Countries to support young start-ups. Lombardy region shows a real interest on this possibility.

Role of the exchange of experiences

In the understanding of the precise need of Lombardy region, the gap to be addressed, the following experiences were important:

- PP4's opportunity 2: Young start-ups. New young start-ups are aware of the need for working circular. They are the new economy and realize that a change is needed.
- PP5's opportunity 29: Offer support through Advance London program within LWARB. Advance London offers business support to textiles industry start-ups and existing SMEs to help them transition to more circular economy business models. Cooperation and knowledge sharing within region could be fruitful for both.

The opportunities identified by other partners can entail a useful collaboration among partners to identify solutions.

Increase the recovery of waste clothes

The Lombardy Region produces 13-15 kg per year per person of wasted clothes, but only 2-3 kg are actually recovered. If properly exploited, this material availability opportunity can be exploited to develop new concepts of sustainable clothes made of recycled textile. For example, textile materials can be reused and inserted into new clothes, thus reducing the amount of generated clothes waste and virgin material usage, at the same time.

Enhance the role of clusters in the regional eco-system

Every region should strongly promote the role of the regional clusters as intermediaries favouring an interaction among the Regional offices, the companies and the Universities operating in the same sector of the cluster, in order to create research and innovation projects and sustainable paths to scale-up innovative solutions and to promote the creation of networks in the area of circular economy.

4.3.2. Higher waste-material input

The opportunities which represent the main line of action of the current action area are presented in the table below (where also the sector to which the opportunities are relevant is reported) and detailed in the following.

ID	Opportunity	Biomass	Built Environment	Food waste	Plastics	Textile	WEEE
PP01_New_4	Increase the quality of recycled aggregates (and of all the materials used in building)		1				
PP01_S5_011	Increase the quantity of secondary raw materials use in the built environment		1				
PP01_S5_036	Increase the percentage of secondary raw materials used in the production of goods				1		
PP01_S5_016	Reuse of textiles in other sectors					1	
PP01_S5_018	Influencing fashion designer in the use of secondary raw materials (textiles)					1	
PP01_S5_036	Increase the percentage of secondary raw materials used in the production of EEE goods						1

Increase the quality of recycled aggregates (and of all the materials used in building)

A major challenge for unlocking the massive re-use of post-use materials in the built environment sector is the achievement of high-quality standards of the recovered recyclates. Actions targeted to increase the quality of the produced aggregates, in order to increase their use in different sectors, supporting the development of homogenous input flows in the recycling plants and the use of the best available technology for plant design and installation should be supported. This objective can be achieved by innovative material inspection and quality control methodologies, innovative identification and sorting technologies, more effective material separation practices and strategies to select high quality and re-usable materials in the construction industry.

Increase the quantity of secondary raw materials use in the built environment

The growth of secondary raw materials use in the built environment is an important opportunity that can be boosted in particular by increasing the percentage of recycled materials in the construction of new

infrastructure (e.g. binder, milled material, aggregates, concrete). In order to develop this opportunity an important policy option is to stimulate the regional authorities towards the development of new technical specifications and legislations targeted incentivizing material re-use in construction. More concretely, in this context the relevance acquired by the MEC (Minimum Environmental Criteria) in Green Public Procurement policies seems to be a real opportunity. The challenge is to increase the MEC relevance (currently compulsory, but no fees or penalties are foreseen in case these principles are not adopted) and the percentage of recycled materials through mandatory laws for the private sector.

Increase the percentage of secondary raw materials used in the production of goods

The objective of this opportunity is to enhance and increase the use of secondary raw materials in the production of plastic goods. A particular focus should be placed to the development of sustainable certification protocols applicable to the re-usable materials as well as to the final products. This would increase the customer acceptance towards product re-using plastics, thus extending the market attractiveness of this approach.

Reuse of textiles in other sectors

Material re-use is a promising circular economy alternative that could be more widely exploited for the waste materials coming from the textile sector. A relevant example is the reuse of wasted textiles as secondary raw materials in the built environment sector, becoming an insulator material to be used during the construction of buildings. Since the built environment sector is a high-volume sector, such an approach may significantly decrease the un-processed waste produced by the textile industry.

Role of the exchange of experiences

In the understanding of the precise need of Lombardy region, the gap to be addressed, the following experiences were important: PP4's good practice Denimtex, which is a circular wall and ceiling decoration, made of use clothes and/or bio-based textile fiber. These materials are produced to a decorative sound proofing and sustainable wall covering.

This experience, already alive, can entail a useful collaboration among partners to identify solutions.

Influencing fashion designer in the use of secondary raw materials (textiles)

Inducing fashion designers to make clothes including recovered textiles is an opportunity that could be better exploited. Although several fashion brands and fashion designers are becoming more sensitive to sustainability issues, the use of waste textiles into the design of new collections remains limited. Possible actions include the design of specific incentives, the promotion of sustainability-oriented marketing initiatives and awareness creation initiatives targeted to consumers, thus leading to a more sustainable sector and to a lower production of wasted textiles.

Increase the percentage of secondary raw materials used in the production of EEE goods

New electronic products are rarely designed considering the option of embedding recycled materials to reduce the environmental footprint of the product. However, this option would be technically applicable, especially to those structural and aesthetical components that are less subject to technological innovation cycles. With a proper re-design of the product, secondary materials such as plastics and aluminium could potentially be re-used in new electronic products. The objective of this opportunity, coming from a cross-sectorial analysis, is to enhance and increase the use of secondary raw materials in the production of electric

European Union
European Regional
Development Fund

and electronic equipment. A key tool in this opportunity is the ability to certify the secondary material and the final good properties and functional requirements.

4.3.3. Lower and better material output

The opportunities which represent the main line of action of the current action area are presented in the table below (where also the sector to which the opportunities are relevant is reported) and detailed in the following.

ID	Opportunity	Biomass	Built Environment	Food waste	Plastics	Textile	WEEE
PP01_S5_006	Waste recovery from renovation activities		1				
PP01_S5_015	Increase the percentage of recycled materials					1	
VC01Textile	Sustainable textile manufacturing					1	
VC03Textile	Reduction of waste due to structural degradation of textile materials during the production, use and maintenance phases (along the value chain).					1	
PP01_S5_029	Increase the percentage of materials (eg rare elements metals...) recovered from WEEE						1

Waste recovery from renovation activities

In Italy the building renovation-refurbishing activities are usually more frequent than the demolition activities. In particular, the main practice is the micro-renovation, defined as the renovation activities on small buildings or on small parts of them. The high number of these micro-demolition produces high amount of waste, with low quality. Thus, it is of paramount importance to focus on the improvement of these practices, boosting the development of a stable network for collecting, processing and re-using materials from renovation activities. Such activities are usually spread on the regional territory, more difficult to monitor than building demolition, and require specific protocols to be turned into valuable secondary material sources.

Increase the percentage of recycled materials

Legislation can have an important role in motivating manufacturers to design their product integrating higher fractions or recycled materials, without compromising in performance. The challenge is to design targeted and well-accepted laws aiming at increasing the percentage of recycled materials used in products, thus increasing circular economy opportunities. A potential opportunity, already well investigated, is to boost the

European Union
European Regional
Development Fund

Minimal Environmental Criteria principle in Green Public Procurement. Other opportunities come from eco-design directive, currently under development at EU level.

Sustainable textile manufacturing

The objective of this opportunity is to invest in textile SMEs implementing innovative circular economy solutions, both in terms of sustainable technologies for textile manufacture and processes for large scale re-use of fibers. This will increase recyclability rates of textile materials and, in turn, will create a market for recycled fibers, yarns and manufactured clothes.

Role of the exchange of experiences

In the understanding of the precise need of Lombardy region, the gap to be addressed, the following experiences were important:

Opportunities:

- PP2's opportunity 03: Increase recyclability and availability of recycled of fibers, yarns and manufactured clothes. Although it is technically viable to introduce regenerated fibres and recycled yarns into new fabrics, there is still room for growth in this area. 20 companies out of 350 focused on yarn preparation, spinning, and fabric manufacture (5,7%) in Catalonia, are using pre-consumer or post-consumer recycled materials, most commons are: Pre consumer Cotton or Polyester yarns, in some cases the recycled content reaches up to 100% for both of them; or post consumer polyester or linen, both up to 100% too. In the rest of cases the predominant formula is a mix of materials (Recycled Cotton, virgin polyester and linen; Cotton, virgin acrylic and polyester). This are not the total amount of companies that use recycled fibres but those which are certified under the GRS (Global Recycled Standard) – containing at least a 20% of recycled content. Finally, these yarns and fabrics must find space in the wholesale and retail markets and provide customers (both brands and consumers) a tool to make informed decisions.
- PP5's opportunity 30: Invest in circular economy textile SMEs and in technologies that allow for more sustainable textile manufacture. Advance London offer support through Advance London programme within LWARB.

Reduction of waste due to structural degradation of textile materials during the production, use and maintenance phases (along the value chain).

Innovative procedures and technologies should be designed and tested to enable a considerable reduction of waste caused by structural deterioration of textile products and materials during production, use and maintenance phases, along the value chain. This waste is segregated by the product throughout its life-time and it is irreversibly lost in the environment, posing serious challenges. A major objective should be, for example, the mitigation of microplastics impact caused by textile washing processes.

Role of the exchange of experiences

In the understanding of the precise need of Lombardy region, the gap to be addressed, the following experiences were important: PP2's opportunity 5 - Reduction of structural waste during production, use and maintenance (along the value chain).

The opportunity identify by PP2 can entail a useful collaboration among partners to identify solutions.

Increase the percentage of materials (eg rare elements metals...) recovered from WEEE

Waste from Electric and Electronic Equipment (WEEE) is the fastest growing waste stream in EU, with 5% increase per year. Electronic waste can represent a very important source of key- metals for advanced technological products. WEEE are complex products where a multitude of metallic and non-metallic materials are mixed to provide the required functionality to the product. For example, PCBs (Printed Circuit Boards) are called "urban mineral resources" since 25%-40% in weight of their composition is made of valuable metals such as copper, tin, nickel, gold and silver. Moreover, small quantities of critical metals such as indium, palladium, ruthenium, gallium, tantalum and platinum are present. However, such materials are found in small concentration within the overall electronic product but in high concertation within specific electronic components. This makes recycling extremely challenging thus calling for a new generation of highly selective and smart WEEE recycling technologies. This opportunity aims to support and improve current technologies and to develop new technologies and processes to increase the percentage of materials recovered from Waste from Electric and Electronic Equipment, with particular focus on precious metals and rare earths.

4.3.4. Metrics and protocols

The opportunities which represent the main line of action of the current action area are presented in the table below (where also the sector to which the opportunities are relevant is reported) and detailed in the following.

ID	Opportunity	Biomass	Built Environment	Food waste	Plastics	Textile	WEEE
VC01TOther	Inter-regional waste management protocols				1	1	
PP01_S5_013	Certification for sustainable buildings and infrastructures		1				
PP01_New_5	Environmental certification of products		1				

Inter-regional waste management protocols

Trans-regional transportation and exchange of waste could become a relevant circular economy enabler if properly regulated and managed. This opportunity aims to develop safe and conscious inter-regional waste management protocols. In particular, these protocols shall be focused on the enhancement, both in terms of quality and traceability, of the procedures of waste management, from collection to recycling in every sector. The development of IT waste management platforms in a Zero Waste perspective could support the transparent implementation of such protocols.

Role of the exchange of experiences

The original need of Lombardy region, the gap identified, was to enhance (the quality and traceability of) the procedure of waste management, from collection to recycling in every sector.

The current opportunity was inspired by the following experiences:

- ICT system Implemented in Sofia municipality integrated waste management system (PP7's good practice);
- Currently, Ljubljana is already the EU capital with best performance regarding waste separation and waste avoidance; it separately collects 60 % of municipal waste and generates less than 150kg of residual waste – what is not recycled or composted – per person yearly. With adopting their Zero waste plan they commit to increase separate collection to 78 % and decrease the amount of residual waste to 60 kg per person per year until 2025. With this commitment for zero waste, Ljubljana officially rules out building any incinerator in order to have the flexibility to continue reducing the non-recyclable waste and push for prevention and recycling.

Certification for sustainable buildings and infrastructures

Inspired by existing standards for the energy classification of buildings, this opportunity aims at promoting the use of standard and certification protocols for a new building classification based on sustainability. Different degrees of certifications can be reached depending on the environmental footprint of the building and infrastructures. A fundamental feature of building footprint should be related to the adopted materials. In this direction, the percentage of recycled materials used during their construction (e.g. containing recycled and manufactured aggregates, fly ashes) should reduce the value of the building environmental footprint. This certification could boost the use of recycled materials and aggregates in the construction sector.

Environmental certification of products

This opportunity aims at offering verified, transparent and comparable environmental information about a product sold to the market, both concerning technical aspects and the environmental sustainability. Such information shall be useful for enhancing the capability of properly treating or disposing these products at the end-of-life. Moreover, it should be integrated into proper eco-design legislation to motivate manufacturers to increase the environmental performance of their products.

4.4. From the CircE's EE activity

The heritage of the exchange of experiences run during the CircE project is both into the project methodology (which were developed thank to the experience of all the Partners) and into the opportunities described above.

4.5. Players involved

The results of CircE were achieved through the collaboration and the discussion with regional directorates and stakeholders.

Therefore, the players involved in this phase will be the CircE Stakeholders (member of the Stakeholder Group or organizations represented by member of the SH group), the regional Directorates and the CircE team.

Among the Directorates, the most interested and involved will be the Directorate-General Research, Innovation, University, Export and Internationalization (it is responsible for the Axis 1 of the ROP and for the revision of the RIWP; they will manage the formal revision process described above) and the Directorate-General Economic Development.

Concerning the Stakeholders, they will also stimulate the presentation of projects coherent with the project results and addressing the macro themes and themes of development.

4.6. Timeframe

The RIWP revision process described above will start and take place in the second semester 2019, during the first Semester of Phase 2 of the CircE Project.

The call and projects steering activity can take place during the whole phase 2.

This activity will steer calls that will be issued by the end of 2020; the corresponding projects need to be completed by the end of 2023.

The work done and the results achieved will be summarized in periodic reports, according to the Phase 2 guidelines. The results can be monitored checking: the usefulness of CircE in producing the updated version on the RWIP; the number of new calls and the number of new projects presented, which are coherent with CircE.

4.7. Budget

No dedicated budget is expected. The scheduled activities will be carried out with standard staff cost and internal resources.

Participation of Stakeholders will be at their own expenses.

5. ACTION 2 – Enhancing the maturity of emerging opportunities

5.1. Specific background

Referring to the general background, this action aims at steering the Policy instrument working on the opportunities and the pertinent barriers and information belonging to Quadrant 2 and 4 (Annex 2 provides details on the methodology).

Quadrant 2 identifies in particular those opportunities perceived as high-impact actions by the sectorial stakeholders and as low-impact actions by the regional institution; these opportunities are perceived as relevant by stakeholders, while according to the public administration the level of formalization of the expected impacts (especially environmental and social) seems improvable.

Quadrant 4 identifies, in particular, those opportunities perceived as high-impact actions by the regional institution and as low impact actions by the sectorial stakeholders; these opportunities can bring high benefits to the regional eco-system, therefore they should be supported; the activities related to Quadrant 4 opportunities are perceived as high-risk activities by the sectorial stakeholders. This is probably due to a lack of examples of successful business cases related to the Quadrant 4 opportunities. To support these activities high public support should be likely needed.

5.2. Action mechanism

Into different perspectives several pieces of information can be enclosed, useful to enhance the comprehension of the issues which are concerned by each opportunity and to set up specific and more effective actions towards the policy instrument.

Therefore, it's worth developing a dialogue with the stakeholders and the whole regional ecosystem. The results of this dialogue will provide further information to enhance the description and design of the concerned opportunities and to present better defined issues and topics.

This improved issues and topics will be useful to steer the current and future ERDF ROP, supporting the activities described in Action 1.

Lombardy region will work with the sectorial stakeholders and players, mainly through specific meetings and through the collaboration with the regional *Observatory for the circular economy and the energy transition* (the Observatory in the following).

The Observatory

Lombardy Region is aware about the importance to align its strategic plans (like for example on the circular economy) with the needs and trends of the Stakeholders. Therefore, Lombardy Region established some technical operative boards in the most strategical economic sectors concerning circular economy, setting up on October 24, 2018 the *Observatory for the circular economy and the energy transition*.

One of the main purposes of the Observatory and of the related subgroups is to manage proposals coming from the productive sectors.

5.3. Action content

The opportunities belonging to quadrant 2 and 4 have a description and specific information as the opportunities belonging to quadrant 1 and presented in Action 1. Therefore, there are also opportunities with significant links with the exchange of experiences had during the project.

However, these opportunities are not proposed in detail here, because through the dialogue described in the previous paragraph their precise definitions and the whole pertinent information will be developed during phase 2 and the final information to use to steer the policy instrument will emerge after this dialogue.

All the information to describe these opportunities is available in Annex 3 and in the *Synoptic Report on Opportunities, Barriers and Value Chain Analysis* published on the CircE website (see CircE Library: https://www.interregeurope.eu/circe/library/).

5.4. Role of the exchange of experiences

The ideas to hold a discussion and to identify a formal pathway and room for it on specific circular economy issues (the opportunities with different level of priority for regional institution and stakeholders/players) is an approach that took inspiration also from other partners' experiences. This evidence emerges also from the analysis of the action plans.

In particular, we would like to quote here:

- the approach followed by PP2'in the Pilot Action and in Action 5 actually allows to identify a specific room for dialogue and for working on the clarification of issues and the identification of issues to be addressed to support circular economy through the chosen policy instrument;
- the approach followed by PP5 in Action 1, 2 and 3.

5.5. Players involved

The Directorate-General Environment and Climate change of Lombardy region will further discuss these opportunities with sectorial Stakeholders and players, through the CircE Stakeholder Group and through the Observatory.

Namely, the dialogue with RIS3 Clusters, trade/professional associations and umbrella organizations (the CircE SH group already includes many of them) will make this work easier and more effective. Moreover, the Lombardy Region team participation to their meetings will furtherly support this activity.

Then the Environmental department will share with the Directorate-General Research, Innovation, University, Export and Internationalization the opportunities that have to be taken into account in order to influence the ERDF ROP.

5.6. Timeframe

This action has the same timeframe of Action 1.

Room for calls and projects presentation until 2020; room for project completion and financial accounting until 2023.

5.7. Budget

No dedicated budget is expected. The scheduled activities will be carried out with standard staff cost and internal resources.

Participation of Stakeholders will be at their own expenses.

6. ACTION 3 – Further shaping the future

6.1. Specific background

As already written in the common background section, the CircE project designed methodologies to identify and prioritise CE opportunities, through value-chain analysis and cross-regional and cross-sectorial analysis. The methodology was tested by the partners and enhanced also through the partners' contributions.

The results coming from the exchange of experiences, steered by the quoted methodologies, represent the knowledge available to support the actions of this Action plan.

Nevertheless, both this methodological and technical contributions can be conceived as a decision support system, which can support several other policies, in particular the innovation policies.

The action wants to boost the use of this package (methodology + results) in this direction.

6.2. Action mechanism

The action wants to boost the use of the CircE methodology and results as a decision support system.

The action wants to start from one specific activity, widen its influence on other coming activities.

The first activity identified in order to address the aim of the current action is the support to the definition of the Lombardy region Inter-cluster Roadmap on Circular Economy.

For the sake of clarity, the technological clusters are organization promoted by Lombardy Region in the contest of the *Smart Specialization Strategy* (RIS3), conceived as a fundamental tool to boost and support the innovation ecosystem, with the belief that the collaboration among the different players of the ecosystem is the key factor to trigger innovation. They are aggregations between the various subjects active in the field of Research and Innovation (companies, universities, research centers, public and private Institutions and financial subjects), focused on specific thematic areas.

This kind of action will be proposed and replicated also for other policy developments.

6.2.1. The Lombardy's Circular Economy Roadmap

Lombardy region is designing an Inter-cluster research and innovation Roadmap to identify a concrete common circular economy strategy to support the RIS 3 and Axis 1 policies and projects, involving all the cluster set up with the RIS3. The idea and the need of a Circular Economy roadmap emerged from the Clusters and their companies, in particular from the Cluster AFIL (the advanced manufacturing cluster), who promoted the first inter-cluster meeting.

In particular, the idea is to define a Lombardy's Circular Economy Roadmap, with the objective to formalize a regional vision in this thematic area, outline the lines of development and the specific priority actions and to transfer the regional perspective at different levels, from to National to the European one.

The action wants to support the Roadmap activity, providing the CircE tool, methodology and results to trigger stakeholders mapping and priority gathering, with a bottom up approach.

To this aim, the CircE team will:

- propose the CircE methodology as the reference also for the Roadmap development activity;
- bring the CircE findings into the process of Roadmap designing.

6.3. Role of the exchange of experiences

During the exchange of experience, the CircE team met other partners examples, where the design of a road map was a key tool for boosting the development of Circular Economy and to promote the project finding.

In particular the experience of the following partner was important to acquire awareness of the key role of such a tool:

- PP2's policy instruments:
    - the strategy "Boosting Circular Economy in Catalonia" (2015);

European Union
European Regional
Development Fund

  - "Strategy for the prevention and management of textile waste in Catalonia" (currently under development);
- Knowledge acquired through PP4 of the Dutch Circular Textile Roadmap;
- PP5's successful participation in the updating and steering of the London Circular Economy Route Map;

Those experience focused our attention on the key role played in the local contest by such a policy tool, proved that that room was the right place where address project results and push us to take part in and support the process of development of the quoted road map.

6.4. Players involved

In the Roadmap design the interested Lombard technological clusters are involved:

- Mobility Cluster;
- Aerospace Cluster;
- Smart Cities and Communities Cluster;
- AFIL (Lombardy intelligent factory association) – Roadmapping leading cluster;
- Agrofood Cluster;
- Green Chemistry Cluster;
- Energy Cluster.

Many of the clusters involved are members of the CircE Stakeholder Group. They have been collaborating with the CircE activities during the project lifetime and used the CircE methodology.

These Stakeholders can therefore easily use the CircE methodologies to build the base of knowledge on which the new road map can be designed.

The CircE team will bring the lesson learnt in the project and the increased capacities into the road map development process.

6.5. Timeframe

This action will be proposed in all the initiatives involving steering actions towards Policy instruments carried out within the phase 2 duration.

6.6. Budget

No dedicated budget is expected. The scheduled activities will be carried out with standard staff cost and internal resources.

Participation of Stakeholders will be at their own expenses.

7. ACTION 4 – Common Action *Awareness raising and capacity-building*

7.1. Background shared with the project partners

The Circular Economy opportunities identified in the CircE project – through Cross-regional, cross-sectorial and value chain analysis – can be considered as gaps in the circularity of the region involved. In order to boost CE it is necessary to work on these gaps. These opportunities are hampered by barriers. Therefore, the project also performed a barrier analysis, analyzing the general barriers and the opportunity-specific barriers hampering their implementation (the project formal reports are the reference for a detailed overview).

The project activity showed that awareness raising and knowledge sharing are key aspects and priorities in order to develop circular economy, from a business to business point of view (inside the companies: business awareness), from a business to customer point of view (enhance the role of customers) and, more generally speaking, from a social point of view, where also the citizen education is crucial.

In particular, this was pointed out by the opportunities analysis and the barriers analysis. This evidence emerges from all the project partners' analysis.

Therefore, actions to steer the policy instrument towards the increasing of awareness and knowledge in all the players of the value chain are of strategic important. The activity supported and boosted by this action can be developed with different nuances in the different Policy instruments. However, the common point is to support awareness, knowledge and capacity building in all the policy instruments.

Moreover, the CircE project has identified a wide range of circular economy opportunities, connected to different economic sectors.

For this reason, actions regarding capacity-building are very suitable as common actions for all partners since they can be implemented in all regions regardless their differences in the identified opportunities and the addressed sectors.

7.2. Specific background

With respect to Lombardy region the specific project results and findings coherent with the above described common background are reported in the following.

The project identified the following opportunities related to awareness issues:

- Enhance the role of customers towards circular economy (id: VC03Other, present in all the sectors);
- Developing multi-regional pilot innovation facilities (id: VC03Biomass, just for the Biomass sector);

- Influencing fashion designer in the use of secondary raw materials (PP01_S5_018 – just for the Textile sector);
- Citizen education on textile recovery through the introduction of separate collection (VC05Textile just for the Textile sector);
- Greater involvement of fashion companies (PP01_S5_019 – just for the Textile sector).

Moreover, from the barrier analysis, social factors emerged as important to affect the growth of a CE. Business attitude, managers awareness, consumers information and awareness were identified as important barriers, pointing out the importance of communication and educational initiatives to raise awareness and understanding.

7.3. Action

Considering that awareness and education are not activities fundable by the ERDF-ROP 2014-2020, we need to watch towards other Policy instruments to support this opportunity through real policy options.

Yet, we think that we can set up as objectives of this action 2 main activities:

1. the promotion in all the activities run in the other actions the importance of awareness raising and capacity building. The objective is to work in order that all the calls and the projects presented have to contain references and stimulation to take into consideration also awareness, knowledge and capacity building as an added value and as fundamental tools, crucial for the success of the initiative proposed.

   In the evaluation process awareness rising and capacity building should be taken into consideration as well: to evaluate correctly the real potential of success of a project presented, it is necessary to watch it also from the awareness rising and capacity building perspective; some potentially valuable projects could meet bad results, if, in order to get those results, awareness and capacity building action should be likely needed and they are not foreseen by the project.

   Promote the importance of awareness and capacity building is crucial also in the new ROP and in the Regional waste management program.

   The action can be monitored collecting all the situations where the role of awareness-capacity building in the policy was successfully boosted and supported.

2. the design of a template or of a reference document, defining how to produce sound and effective dissemination, awareness and communication plans to support CE projects; each project presented should have an awareness/dissemination/capacity building plan, the expenses of which will not be borne by ERDF funds, but clearly connected and supported by other financial sources; this document could be a key support also for those who evaluate the projects.

European Union
European Regional
Development Fund

7.4. Players involved

The Environmental department of Lombardy region will take into consideration this action in the development of its policies.

The Directorate-General Research, Innovation, University, Export and Internationalization will take into consideration this action in the activity on ERDF ROP 2014-2021.

Stakeholders who can take into considerations this priority in developing their activity. The CircE project will make them aware of the crucial value of awareness and capacity building.

7.5. Timeframe

This action will be proposed in all the activities carried out to support other CircE's actions and in the initiatives involving steering actions towards Policy instruments carried out within the phase 2 duration.

7.6. Budget

No dedicated budget is expected. The activities will be carried out with standard staff cost and internal resources.

The Stakeholders' activities in this direction will be at their own expenses.

8. Regional waste management program (RWMP)

Although Circular Economy is not restricted to an effective waste management, the recovery of new materials from properly managed waste streams represents a fundamental step towards Circular Economy.

Many of the sectors considered by CircE find an obvious correspondence in waste streams.

The waste management legislation (namely, art. 28 of Directive 2008/98/EC and art. 199 of Legislative Decree 152/2006) provides that the Regions approve regional waste management programs.

The same article 199 details which elements the regional waste management program must include.

The regional program (RWMP) is structured in two main sections:

- urban (municipal) solid waste;
- special waste.

European Union
European Regional
Development Fund

In Lombardy, the waste management program in force was approved in 2014 (d.g.r. 1990, 20/06/2014); according to national and regional legislation (law 26/2003), regional planning must be updated every 6 years: consequently, the next update of the program must be issued by 2020.

Therefore, it is the suitable time to start developing the updating of the program: policy recommendations emerged by the CircE Project fall properly.

In particular the CircE findings (opportunities, barriers, priorities and policy options) can provide detailed information, useful to produce more effective, pertinent and concrete actions.

Annex 4 proposes details concerning which parts of the RWMP could be steered by the CircE findings.

An expected outcome for the monitoring activities of Phase 2 of the CircE Project is the level of inclusion of CircE findings in the new PRGR actions.

European Union
European Regional
Development Fund

9. Managing authorities' signatures and endorsements

9.1. ERDF-ROP

Date: 30/1/2020

Signature:

REGIONE LOMBARDIA
DIREZIONE GENERALE Ricerca, Innovazione, Università, Export e Internazionalizzazione

REGIONE LOMBARDIA GIUNTA REGIONALE

Stamp of the organisation (if available): Il dirigente (Dr. Dario Sciunnach)

9.2. Regional waste management program (RWMP)

Date: 29/1/2020

Signature:

Stamp of the organisation (if available): La Dirigente della Unità Organizzativa Economia circolare, usi della materia e bonifiche
Dr.ssa Elisabetta Confalonieri

9.3. Stakeholders Endorsement

See the following table.

European Union
European Regional Development Fund

CircE Action Plan – Annex 1

CircE tool: a tool for mapping circular economy

European Union
European Regional
Development Fund

1. Executive summary

In order to support the identification of Circular Economy (CE) opportunities and their barriers the CircE project designed a specific common methodology, called the CircE mapping tool (CircE tool). This document provides an overview of it.

The CircE tool main objective is to define the current baseline CE situation in the Regions involved by clarifying the strategies and mapping existing capabilities in terms of technology, industry, research, development and innovation, education and policy, as well as emerging CE good practices and opportunities, grounded on a value-chain oriented approach.
The CircE tool makes it possible to gather information and map existing stakeholders, good practices, projects, CE opportunities and barriers that hinder their development, for each economic sector of interest. At the same time, it supports the collection of a series of attributes for each category, useful for describing its positioning in the target value chain.

The CircE tool is the hearth of the exchange of experiences of the project: one good practice of a Partner can point out a gap of another partner and therefore an opportunity for this partner. Good practices, projects and actors can suggest potential solution in order to close CE gaps and develop CE opportunities.
More technically, the good practices, projects, stakeholders (actors) mapped allowed to carry out "cross-regional" analyses (comparing the different partner regions relative to the same economic sector) and "cross-sectorial" analyses (evaluating the interrelations between the different economic sectors) involving all the partners.

2. CircE Tool

The CircE tool is inspired by the approach proposed by the Vanguard Initiative “New Growth through Smart Specialisation,” within the Efficient and Sustainable Manufacturing – ESM pilot. The reference value-chain framework to which the CircE tool adheres is reported in Figure 1. It also shares common ground with a companion project, Screen (http://www.screen-lab.eu/), funded by the Horizon 2020 Programme and also conforms with the approach suggested in the “Policymakers toolkit” proposed by the Ellen Mac Arthur foundation (***https://www.ellenmacarthurfoundation.org/programmes/government/toolkit-for-policymakers***).

The CircE tool was designed and preliminarily tested by Lead partner in cooperation with researchers from the “De-and remanufacturing technologies and systems” group at STIIMA-CNR.
The overall structure and the specific areas are reported in Figure 2.
The following paragraphs describe the different parts of the tool.

European Union
European Regional
Development Fund

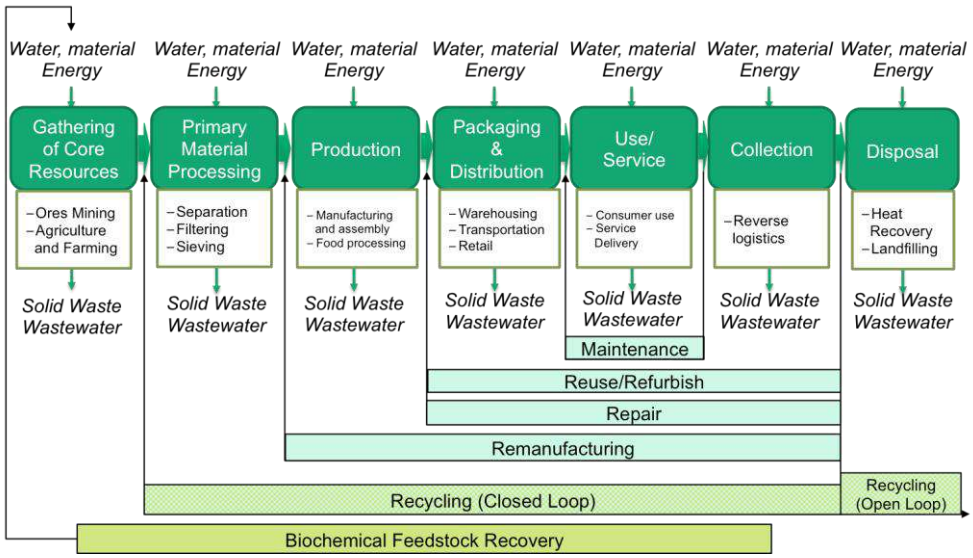


Figure 1: The reference value-chain framework.

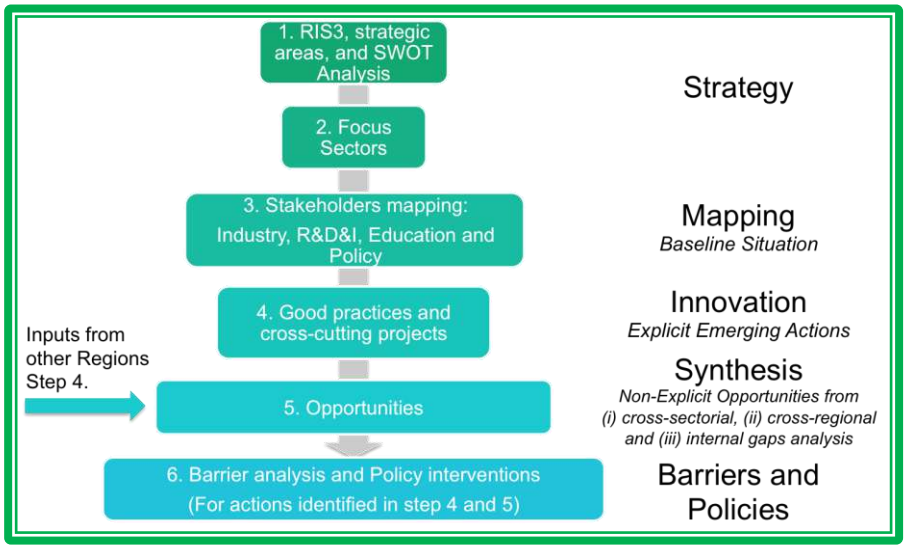


Figure 2: The CircE reference framework and mapping tool.

Define the regional scenario with respect to the CE

The first step or section of the tool is dedicated to the analysis of the strategic positioning of the region within a given area of the CE. This analysis is firstly addressed through the identification of the areas of Smart Specialisation (RIS3) of the region dealing with CE aspects, also so as to ensure the approach complies with the macro-objectives of the region.

Then, sectorial statistics are collected in order to define the *Role in the regional economy* of the sector. Moreover, in order to represent the circularity potential for each sector, a set of *Circularity indicators/fields* are identified. A further set of attributes are required which will be used *to identify CE-related potential links*

European Union
European Regional Development Fund

with other sectors and Regions, with the objective of supporting the value chain, cross-sectorial and cross-regional analyses.

Identify the Existing Regional Actors/Stakeholders and Their Capabilities

Once the strategic positioning of the region has been defined, the tool maps existing stakeholders in the region, with CE-related capabilities, including Industry, Research, Development and Innovation (R&D&I), Education and Policy-making entities. As a consequence, it triggers an analysis of the regional capabilities and expertise to address CE opportunities, thus combining the top-down approach of the strategic analysis with a bottom-up approach of the operational analysis.

For example, specific data is requested in order to define the sectors of potential interest for the actors, the position in the circular value-chain, the technical capabilities related to the mapped role in the value-chain and the input and output materials/components transformed. All of which is useful for identifying potential cross-sectorial value chain links.

The ability to identify the position within the value chain is a powerful tool, which helps spot links and stimulate cooperation between stakeholders who are active in the same target sector but work on a different position in the circular value chain.

Identify Good Practices and Projects in the Region

Subsequently, the CircE tool analysis moves on to describe closed and on-going CE projects and emerging good practices related to the Sectors and Stakeholders previously identified.
In the analysis of projects and good practices, particular attention is devoted to (i) the potential stakeholders who could form partnerships with the Stakeholder producing the Good Practice for the further exploitation and replication of the described good practice, (ii) the Target sectors, (iii) the phase of the value-chain affected by the good practice, and (iv) the Technology Readiness Level (TRL) of the good practice, in order to understand its level of maturity.

Emerging Opportunities, Barriers and Policy Options

One of the most innovative aspects of the tool is the one dedicated to the collection of emerging opportunities, that synthetises latent and non-explicit Circular Economy opportunities derived by a cross-sectorial, cross-regional or internal gap identification analysis, and by exploiting the information on sectors, actors, good practices and project, collected in the previous stages of the methodology.
For each opportunity more detailed information about the type of opportunity (e.g. industrial, R&D, innovation, policy making, education and training, social awareness) and the expected impact at economic, social and environmental level is required. These data will be useful for the future prioritisation of the opportunities in view of their implementation across the participating regions.

Connected to each opportunity, the tool also triggers a qualitative identification and analysis of the potential barriers hampering the defined opportunities. Different types of barriers are taken into consideration, belonging to the following main categories: economics, market failures, regulatory failures, social factors.
A set of policy options are proposed to identify the best ways to overcome barriers, belonging to the following categories: information & awareness, collaboration platforms, business support schemes, public procurement & infrastructure, regulatory framework, fiscal frameworks.

European Union
European Regional
Development Fund

How the Tool Helps Identify Opportunities

The key area of the entire CircE tool methodology is the one dedicated to opportunities identification and mapping. In this part, a multi-regional and multi-sectorial analysis is run by CircE partners, using the combined analysis of all the regional data collected on sectors, actors, projects, good practices and opportunities. The opportunities are identified through different mechanisms:

- Through an internal gap analysis, to a given region. In particular, these gaps can be identified in the analysis of sectors and good practices or during the exchange of experiences with other Project partners.
- Through a cross-sectorial or a cross-regional value chain analysis the opportunities emerge by linking opportunities, good practices, projects and stakeholders in different sectors or regions; in these cases, the value of interregional cooperation among stakeholders is crucial for implementing opportunities.

In order to support this analysis, the positioning in the value chain (Figure1 – Circular Value Chain Framework) of all the data concerning actors, good practices, projects and opportunities is useful. This can be seen in Figure3, where an example is provided concerning Project Partners' good practices in a specific CircE sector (Built environment).

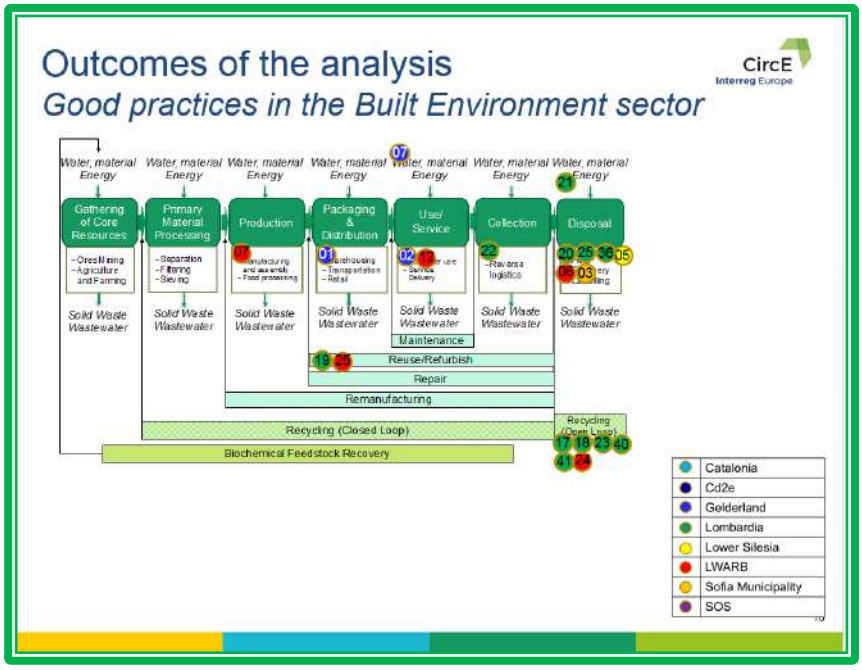


Figure 3: Mapping stakeholders and good practices in the circular value-chain helps identify emerging CE opportunities.

Results

The tool has made it possible to map 600 European stakeholders, 120 cross-cutting projects, 140 good practices, and identify 191 new regional opportunities and 40 cross-regional opportunities.

European Union
European Regional
Development Fund

CircE Action Plan – Annex 2

Prioritization methodology

European Union
European Regional
Development Fund

1. Executive summary

In order to support the prioritisation of the opportunities identified through the CircE project a specific common methodology was designed. This document provides an overview of it.

2. The common CircE's prioritization methodology

The common prioritization methodology was developed by the partnership through the discussion and the Lead Partner's (LP in the following) technical support. The aim of using a common methodology was to ensure a common, objective and reproducible analysis of the prioritization process.
The Partnership decided to use the Analytic Hierarchy Process methodology (AHP in the following), introduced by Thomas Saaty in the early 1970's, as tool for prioritizing the CircE opportunities.
Based on multiple-criteria analysis, the AHP looked like the most suitable methodology to allow the CircE partners to take legitimate decision and enabled them to consider both quantitative and qualitative criteria.
The main steps of the process were:

- The Partnership produced a Criteria tree, identifying shared criteria to score the opportunities with respect to their impact on those criteria.
- After having defined the final and shared version of the criteria tree, coherently with the AHP methodology, the weights of each criteria were calculated by each Partner. The final result of the weights identified by Lombardy region is shown in *Annex A: AHP Criteria tree.*
- Once having obtained the values of the weights, all the opportunities identified were assessed under those criteria.
- The total ranking of the opportunities was split into different rankings for each of the sector considered.
- The final ranking of opportunities was then presented to Stakeholders, in order to validate the final ranking.
- Even though in many cases Stakeholders confirm the order of the opportunities, in some cases Stakeholders thought that the ranking should be significantly different.
- Therefore, we decide to keep as final result two separate rankings in order to save the different information which these differences implied as explained below (chapter 3).

3. Opportunities rankings

As described above, in the end two rankings per sector were obtained: one ranking produced by the Lombardy Region team scores; one ranking deriving from the discussion with Stakeholders of the Lombardy Regions team's ranking (the Stakeholders had in some cases different opinions with respect to the position of specific opportunities in the ranking).

European Union
European Regional Development Fund

Assuming that different positions in the ranking imply different perceptions of the impact of opportunities, we argued that into these differences useful information could be embedded and that it would be worthwhile to explore them.

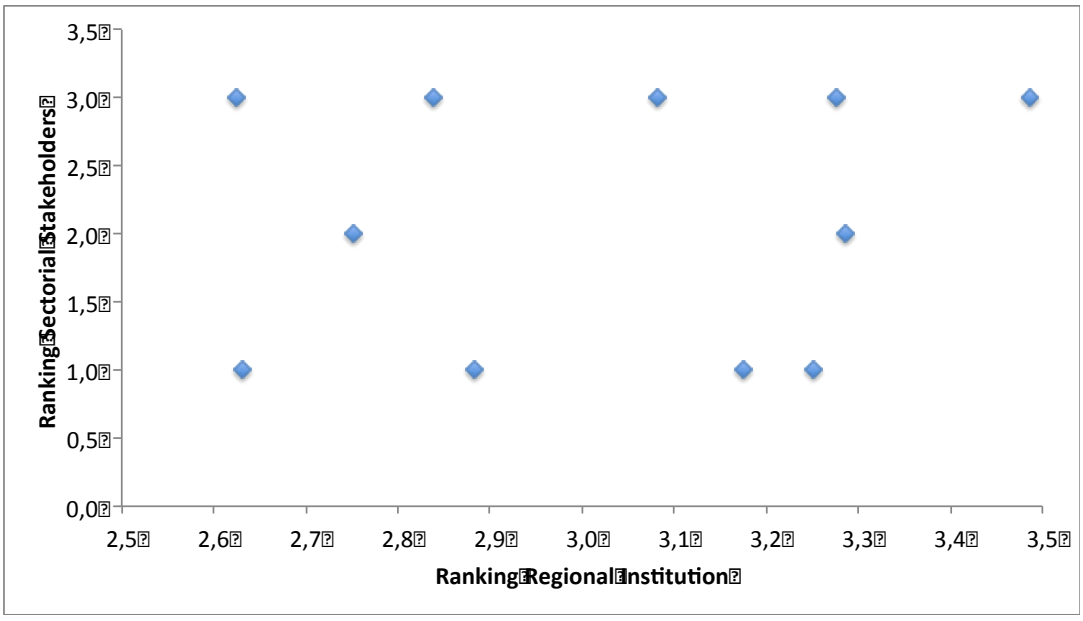
Therefore, with the support of STIIMA-CNR, we designed a specific tool to support this analysis.

The priority ranking map

The priority ranking map is a tool to:

- cluster the ranked initiatives in the different sectors with respect to the perception of their relevance by sector-specific stakeholders and the regional institution;
- support the identification of specific implementation actions with reference to the position of the initiatives within the map.

The image below shows the distribution of different opportunities in the Chart, depending on the score expressed by the regional institution (X) and the stakeholders (Y).



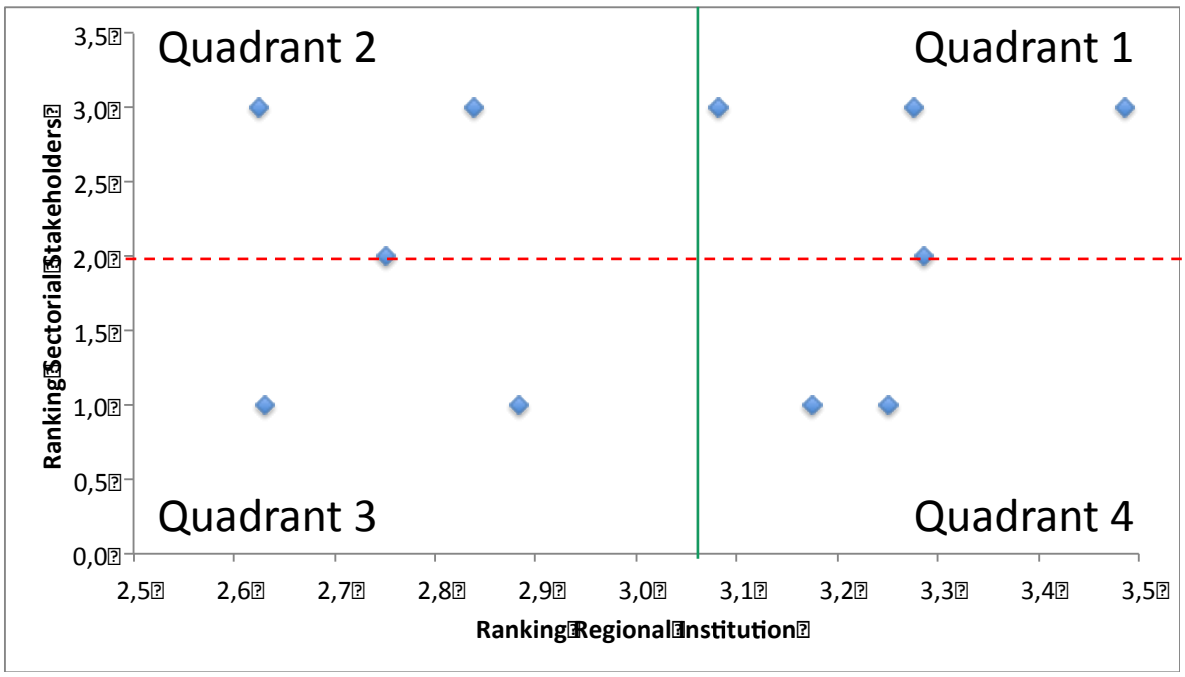
Therefore, the method foresees to locate the initiatives on the map by considering the ranking score of the regional institution and the sectorial stakeholders.

Then, the methodology foresees to find the median:

- of the set of ranking scores for each sector provided by the sectorial stakeholders;
- of the set of ranking scores for the entire set of sectors provided by the regional institution judges (provided, for all the sectors considered, by the same team).

European Union
European Regional
Development Fund

Such an approach identifies 4 clusters in the 4 quadrant of the map, as shown below.



Meaning of the different Quadrants

The fact that an opportunity belongs to a Quadrant implies specific peculiarities of that opportunity, in terms of status, strategy and policy options or actions feasible.

Quadrant 1

Status: The opportunity is perceived as a high-impact action both by the regional institution and the sectorial stakeholders.

Strategy: It is of high priority and should be supported since it is of interest for the eco-system.

Action 1: Medium-level public support should be provided to these opportunities, as they are already perceived as relevant by the private sector.

Action 2: Effort shall be spent to remove the implementation barriers.

Quadrant 2

Status: The opportunity is perceived as a high-impact action by the sectorial stakeholders and as low impact action by the regional institution.

Strategy: The level of formalization of the expected impacts (especially environmental and social) of the opportunity seems improvable, as the benefits at eco-system level are not clear to the public institution.

European Union
European Regional
Development Fund

Action 1: Effort should be spent in supporting technical consulting services to improve the level of maturity of the opportunity and the appreciation of its potential by authorities and decision-makers.

Quadrant 3

Status: The opportunity is perceived as a low-impact action both by the regional institution and the sectorial stakeholders.

Strategy: It is not of high priority and should be supported only if surplus resources are available.

Action 1: Leave the action behind.

Quadrant 4

Status: The opportunity is perceived as a high-impact action by the regional institution and as low impact action by the sectorial stakeholders.

Strategy: The opportunity can bring high benefits to the regional eco-system, therefore it should be supported, after it is accepted by the stakeholders, and included in the regional strategic development actions.

Action 1: Effort should be spent in supporting awareness increase activity focused on the benefits of the initiative.

Action 2: Effort should be spent in supporting networking with other stakeholders that could support the implementation of the opportunity.

Action 3: opportunity for new incentives and legislations that can boost the implementation of the activity should be investigated.

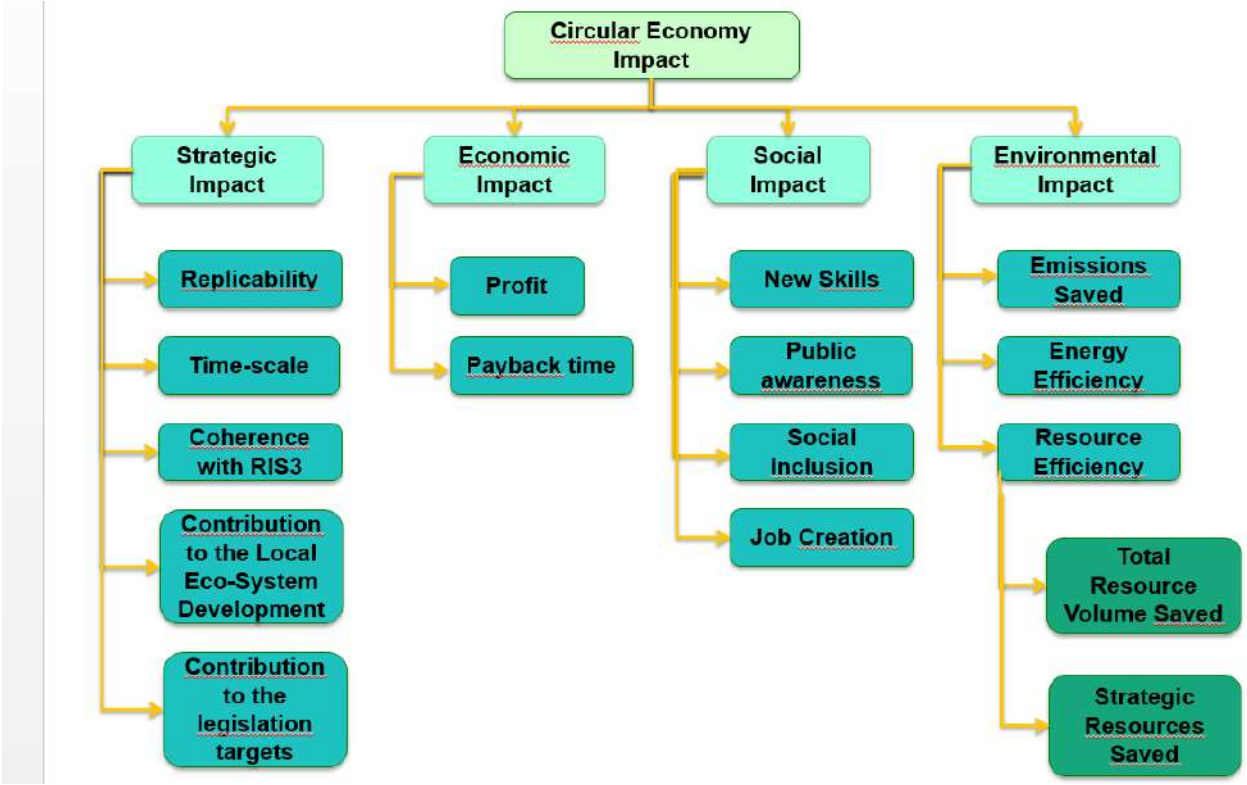
Action 4: In general, as this is perceived as a high risk activity by the sectorial stakeholders, high public support should be invested.

Further Analysis

The considerations above suit a general analysis of all the sectors. They can be enhanced, further developed and customised once applied to specific sectors.

European Union
European Regional Development Fund

Annex A: AHP Criteria Tree



European Union
European Regional Development Fund

Annex B: Weights

Level	Kind of impact			Weight	
				Local weight	Global weights
Level 1	Strategic			0,1683	0,1683
	Economic			0,2883	0,2883
	Social			0,2134	0,2134
	Environmental			0,3299	0,3299
Level 2	Strategic		Replicability	0,3	0,05049
			Time-scale	0,2728	0,04591224
			Coherence with RIS3	0,1153	0,01940499
			Contribution to the Local Eco-System Development	0,1959	0,03296997
			Contribution to the legislation targets	0,1159	0,01950597
	Economic		Profit	0,6667	0,19220961
			Payback Time	0,3333	0,09609039
	Social		New Skills	0,2927	0,06246218
			Public awareness	0,2125	0,0453475
			Social Inclusion	0,1903	0,04061002
			Job Creation	0,3045	0,0649803
	Environmental		Emissions Saved	0,5119	0,16887581
			Energy Efficiency	0,1222	0,04031378
			Resource Efficiency	0,3659	0,12071041
Level 3	Environmental	Resource Efficiency	Total Resource Volume Saved	0,734	0,088601441
			Strategic Resources Saved	0,266	0,032108969

European Union
European Regional Development Fund

CircE Action Plan – Annex 3

Results

European Union
European Regional
Development Fund

Biomass

ID	Name	Description	AHP ranking	SH ranking (3 max, 1 min)	Quadrant
VC03Biomass	**Developing multi-regional pilot innovation facilities**	Several initiatives have been launched at European level to support industry in the transition to more sustainable circular economy businesses. However, innovations and demonstrators developed within projects find significant barriers in achieving the market as companies see circular economy as a high risk investment area. The major barrier is the lack of infrastructures or platforms that can incorporate these innovative technologies and services within integrated pilot plants to show-case to industry the developed technologies in real industrial environments and to boost their private exploitation and replication at industrial scale. Such infrastructures should act as “technology gateways" that any business sector can use. Enhanced support should be dedicated to the building and operation of multi-regional Pilot Facilities which will substantially improve sustainable innovation capacity of Europe. The development strategy should ground on the Smart Specialization Strategies of the Regions and regional best practices, thus exploiting the local eco-systems to achieve extended impact at European level This concept is a crucial element in dealing with societal challenges as the development of a sustainable, innovative and knowledge-based economy in Europe, creating jobs and meeting climate change targets.	**3,5**	**3,0**	**1**
VC04Biomass	**New business models for bioeconomy start-ups**	The bio-economy sector is populated by large companies that exploit economy of scale to reduce the impact of their high cost infrastructure and stay competitive on the market. However, several innovative business opportunities are emerging in small medium enterprises and local business stakeholders that could be enhanced through innovative business models in order to reach the market. This opportunity aims to	**3,3**	**3,0**	**1**

European Union
European Regional Development Fund

		develop new business models in biomass and, more in general in bioeconomy, to encourage and improve the creation of innovative start-ups in this field. Such business models should create the economic and financial preconditions for these business opportunities to emerge with sustainable and credible growth patterns.			
VC02Biomass	**Local production – consumption chains of biomass**	Supporting the development of a local circular value-chain, from production to consumption, could reduce the logistics costs in the biomass sector and become a promising strategy, especially for biomass from forest resources and agricultural production waste. For example, in the wood sector, a smart use of forest resources could enhance local economies by enabling use both in the industrial and manufacturing sectors as well as in energy production. However, enhanced knowledge of the specific production-consumption capabilities at local level, aiming at the establishment of a stable local value-chain, should be gained at regional level.	**3,1**	**3,0**	**1**
VC03Other	**Enhance the role of customers towards circular economy**	Customers need to become more and more aware of their power to influence the way companies design, produce and distribute their products. Large public institutions can play an important role in this transition by becoming themselves conscious customers of green products and thus influencing the manufacturers' attitude towards circular economy.	**3,3**	**2,0**	**1**
PP01_S5_020	**Increase the networking of Small and Medium entities**	An existing barrier towards the creation of a stable circular bio-economy sector in the region is the high fragmentation of competences and technical capabilities and the lack of interaction between the local SMEs. For example, focusing on agri-biomass, SMEs need to understand the importance of creating networks, in order to grasp large-scale business opportunities together and become competitive in the global market. The objective of this action is to gather the attention of SMEs through communication and active involvement campaigns and to demonstrate the benefits and the sustainability of a collaborative networked business approach, on the medium-long term. At a regional level, this could lead to the creation of a stable SMEs regional network, able to align the activities and strategic objectives towards the target goal of becoming a circular bio-economy Region.	**2,8**	**3,0**	**2**

European Union
European Regional Development Fund

PP01_S5_021	**Enhance the role of clusters in the regional eco-system**	Every region should strongly promote the role of the regional clusters as intermediaries favouring an interaction among the Regional offices, the companies and the Universities operating in the same sector of the cluster, in order to create research and innovation projects and sustainable paths to scale-up innovative solutions and to promote the creation of networks in the area of circular economy.	**2,6**	**3,0**	**2**
VC02Other	**Developement of circular economy metrics**	Circular economy is recent a paradigm that has not been properly formalized yet both at scientific and industrial levels. With the goal to state baseline industrial situations with respect to circular economy, to fix target objectives, and to quantitatively track progresses towards these objectives a comprehensive metrics, including a set of multi-dimensional Key Performance Indicators (KPIs), should be developed. Such metrics should also support the comparison among circular initiatives in different sectors. The objective is the creation of metrics to track baseline situations and track progresses and impacts achieved at systemic level by circular economy initiatives. This solution would make it possible to report achievements and express desiderata that can enlight the need for future actions, in a comprehensive and comparable manner. Although an initial attempt has been made, through the Monitoring Framework – COM (2018) 29 Final of the European Commission, further actions are needed to bring these indicators in operation at Regional level and to make them accepted and shared by the stakeholders.	**2,8**	**2,0**	**2**
VC01TOther	**Inter-regional waste management protocols**	Trans-regional transportation and exchange of waste could become a relevant circular economy enabler if properly regulated and managed. This opportunity aims to develop safe and conscious inter-regional waste management protocols. In particular, these protocols shall be focused on the enhancement, both in terms of quality and traceability, of the procedures of waste management, from collection to recycling in every sector. The development of IT waste management platforms in a Zero Waste perspective could support the transparent implementation of such protocols.	**3,3**	**1,0**	**4**

European Union
European Regional
Development Fund

PP01_S5_033	**Implementation of a multi-user web platform for value-chain integration**	Information sharing among different stakeholders of the value-chain is one of the most promising enablers for emerging circular economy business models. A cross-sectorial web platform should be implemented for the creation of a virtual market containing the description, the volumes and the geographical localization of the waste materials coming from different sectors (for example, from construction and to textile to other sectors). The platform should be multi-users, in the sense that multiple stakeholders should provide and retrieve information, in different stages of the value-chains. For example, plant managers may provide data related to processing capabilities, product designer may retrieve data about material characteristics, recyclers may retrieve data about products to be processed. In the Lombardy Region, ANCE Lombardia (construction sector), ANPAR (recycling sector) and Centrocot (textile sector) are independently setting up or already testing similar digital platforms.	**3,2**	**1,0**	**4**
PP01_S5_034	**Standardization of waste management procedures from collection to recycling**	The development of common rules and standard procedures for waste management, from collection to recycling of end of life products, can support a more efficient and effective recovery and recycling of goods across all sectors.	**2,6**	**1,0**	**3**

European Union
European Regional Development Fund

Built Environment

ID	Name	Description	AHP ranking	SH ranking (3 max, 1 min)	Quadrant
PP01_New_4	**Increase the quality of recycled aggregates (and of all the materials used in building)**	A major challenge for unlocking the massive re-use of post-use materials in the built environment sector is the achievement of high quality standards of the recovered recyclates. Actions targeted to increase the quality of the produced aggregates, in order to increase their use in different sectors, supporting the development of homogenous input flows in the recycling plants and the use of the best available technology for plant design and installation should be supported. This objective can be achieved by innovative material inspection and quality control methodologies, innovative identification and sorting technologies, more effective material separation practices and strategies to select high quality and re-usable materials in the construction industry.	**3,4**	**3,0**	**1**
PP01_S5_009	**Implementation of a multi-user web platform for value-chain integration**	Information sharing among different stakeholders of the value-chain is one of the most promising enablers for emerging circular economy business models. A cross-sectorial web platform should be implemented for the creation of a virtual market containing the description, the volumes and the geographical localization of the waste materials coming from different sectors (for example, from construction and to textile to other sectors). The platform should be multi-users, in the sense that multiple stakeholders should provide and retrieve information, in different stages of the value-chains. For example, plant managers may provide data related to processing capabilities, product designer may retrieve data about material characteristics, recyclers may retrieve data	**3,7**	**2,5**	**1**

European Union
European Regional Development Fund

		about products to be processed. In the Lombardy Region, ANCE Lombardia (construction sector), ANPAR (recycling sector) and Centrocot (textile sector) are independently setting up or already testing similar digital platforms.			
PP01_S5_011	**Increase the quantity of secondary raw materials use in the built environment**	The growth of secondary raw materials use in the built environment is an important opportunity that can be boosted in particular by increasing the percentage of recycled materials in the construction of new infrastructure (e.g. binder, milled material, aggregates, concrete). In order to develop this opportunity an important policy option is to stimulate the regional authorities towards the development of new technical specifications and legislations targeted incentivizing material re-use in construction. More concretely, in this context the relevance acquired by the MEC (Minimum Environmental Criteria) in Green Public Procurement policies seems to be a real opportunity. The challenge is to increase the MEC relevance (currently compulsory, but no fees or penalties are foreseen in case these principles are not adopted) and the percentage of recycled materials through mandatory laws for the private sector.	**3,4**	**3,0**	**1**
PP01_S5_012	**Reuse of built environment waste materials**	In Lombardy, particular attention is placed on the reuse of building components of particular value, namely historical or architectural (as bricks, tiles, ornamental stones, wrought iron, beams), aiming at extending their life-time and preserve their conditions. An alternative destination and application should be thought also for other waste materials coming from the built environment, thus providing an effective solution to the associated problem of disposal of these materials (avoiding landfilling and the related issues), targeting the goal of "zero-waste" in building and construction.	**3,3**	**1-n.d.**	**4**
PP01_S5_008	**Selective demolition**	A major opportunity for increasing the capability of re-using waste materials in building demolitions originates from the idea of selectively disassembling homogeneous building components before size reduction and sorting. Indeed, once materials are mixed in traditional demolition, the challenge to identify and sort them before re-use arises, which is cause of loss of quality and purity of the recyclates, ultimately affecting their re-use potentials. To overcome this problem, the selective disassembly of buildings should be implemented to facilitate the reuse or	**3,2**	**2,0**	**4**

European Union
European Regional
Development Fund

		recycling of valuable materials such as wood, structural brick, and high functional finished components like windows, doors, cabinets, and decorative materials. However, selective disassembly is more expensive than traditional processes. Therefore, the economic and financial conditions as well as the proper support technologies for selective demolition should be properly investigated and fine tuned. This Opportunity is also a tool to support Opportunity PP01_New_4.			
PP01_S5_006	**Waste recovery from renovation activities**	In Italy the building renovation-refurbishing activities are usually more frequent than the demolition activities. In particular, the main practice is the micro-renovation, defined as the renovation activities on small buildings or on small parts of them. The high number of these micro-demolition produces high amount of waste, with low quality. Thus it is of paramount importance to focus on the improvement of these practices, boosting the development of a stable network for collecting, processing and re-using materials from renovation activities. Such activities are usually spread on the regional territory, more difficult to monitor than building demolition, and require specific protocols to be turned into valuable secondary material sources.	**3,1**	**3,0**	**1**
PP01_S5_005	**Reverse logistics in built environment**	This opportunity aims at establishing a network to support the return of homogeneous waste coming from the demolition to the producer through a selective process. When a product normally moves through the forward supply chain network, the aim is to reach the distributor or the final customer. A reverse logistic should be design to transfer post-use components and materials for the purpose of capturing value, or proper disposal. In the reverse logistic the manufacturing firm should then organize the shipping of the waste, testing, dismantling, repairing, recycling or disposing the product. In order to avoid the delivery of inert waste in landfill, a solution could be to set up a CLSC (Closed-Loop Supply Chain). Building materials would be extended after the end of life of the building itself by keeping them in the loop through systematical extraction, purification and repurposing. They will be reused in some parts of other buildings or they will be inserted in the secondary material markets. This procedure might	**3,1**	**2,5**	**1**

European Union
European Regional
Development Fund

		include reusing the extracted items directly or after different levels of recovery processes.			
PP01_S5_013	**Certification for sustainable buildings and infrastructures**	Inspired by existing standards for the energy classification of buildings, this opportunity aims at promoting the use of standard and certification protocols for a new building classification based on sustainability. Different degrees of certifications can be reached depending on the environmental footprint of the building and infrastructures. A fundamental feature of building footprint should be related to the adopted materials. In this direction, the percentage of recycled materials used during their construction (e.g. containing recycled and manufactured aggregates, fly ashes) should reduce the value of the building environmental footprint. This certification could boost the use of recycled materials and aggregates in the construction sector.	**3,1**	**2,8**	**1**
PP01_New_5	**Environmental certification of products**	This opportunity aims at offering verified, transparent and comparable environmental information about a product sold to the market, both concerning technical aspects and the environmental sustainability. Such information shall be useful for enhancing the capability of properly treating or disposing these products at the end-of-life. Moreover, it should be integrated into proper eco-design legislation to motivate manufacturers to increase the environmental performance of their products.	**3,7**	**2,8**	**1**
PP01_S5_007	**Increase the (quality of the) regeneration of (target) city areas and thus increase the recovery of construction and demolition waste**	An important element for achieving Circular Economy principles in the construction sector is the development of standardization policies targeting urban regeneration. The standardization policies on urban regeneration will address the recovery of city areas and, in parallel, the recover of important quantities of construction and demolition waste. The Lombardy Region has launched a working group to implement it. Such concept should be further boosted through the promotion and implementation of live demonstration and pilot projects proving the benefits of this approach in specific urban areas under renovation.	**3,0**	**2,8**	**2**
PP01_S5_010	**Enhance (the quality and traceability of) the procedure of waste management, from**	This opportunity can be significantly supported through the implementation of the EU Protocol for built environment, in particular working for the best transposition and effective use in each European contest (country), with specific and effective, sound and coherent links with the national and regional laws, in order to make it really operational.	**3,0**	**2,5**	**2**

European Union
European Regional
Development Fund

	collection to recycling in built environment	This Protocol complies with the Construction 2020 strategy, as well as the Communication on Resource Efficiency Opportunities in the Building Sector. The Protocol consists of 5 components (the first three are based on the C&D waste management chain and two are of a horizontal nature). a. Waste identification, source separation and collection; b. Waste logistics; c. Waste processing; d. Quality management; e. Policy and framework conditions. Widespread the protocol at a national scale is an opportunity. This Protocol has been developed for application in all 28 EU countries and has the following target groups of stakeholders.			
VC03Other	**Enhance the role of customers towards circular economy**	Customers need to become more and more aware of their power to influence the way companies design, produce and distribute their products. Large public institutions can play an important role in this transition by becoming themselves conscious customers of green products and thus influencing the manufacturers' attitude towards circular economy.	**3,3**	**3,0**	**1**
VC01TOther	**Inter-regional waste management protocols**	Trans-regional transportation and exchange of waste could become a relevant circular economy enabler if properly regulated and managed. This opportunity aims to develop safe and conscious inter-regional waste management protocols. In particular, these protocols shall be focused on the enhancement, both in terms of quality and traceability, of the procedures of waste management, from collection to recycling in every sector. The development of IT waste management platforms in a Zero Waste perspective could support the transparent implementation of such protocols. As an example, traceability is fundamental for textile, concerning for example the chemicals used during production. The product passport in the textile already exists, and is related to ECOTEX. ECOTEX is a textile international standard for companies created by companies themselves. ECOPASSPORT is the quality certification aimed at evaluating the sustainability of the value chain.	**3,3**	**1,5**	**4**

European Union
European Regional Development Fund

PP01_S5_020	**Increase the networking of Small and Medium entities**	An existing barrier towards the creation of a stable circular economy sector in the region is the high fragmentation of competences and technical capabilities and the lack of interaction between the local SMEs. The objective of this action is to gather the attention of SMEs through communication and active involvement campaigns and to demonstrate the benefits and the sustainability of a collaborative networked business approach, on the medium-long term. At a regional level, this could lead to the creation of a stable SMEs regional network, able to align the activities and strategic objectives towards the target goal of becoming a circular economy Region.	**2,8**	**2,2**	**3**
VC02Other	**Development of circular economy metrics**	Circular economy is recent a paradigm that has not been properly formalized yet both at scientific and industrial levels. With the goal to state baseline industrial situations with respect to circular economy, to fix target objectives, and to quantitatively track progresses towards these objectives a comprehensive metrics, including a set of multi-dimensional Key Performance Indicators (KPIs), should be developed. Such metrics should also support the comparison among circular initiatives in different sectors. The objective is the creation of metrics to track baseline situations and track progresses and impacts achieved at systemic level by circular economy initiatives. This solution would make it possible to report achievements and express desiderata that can enlight the need for future actions, in a comprehensive and comparable manner. Although an initial attempt has been made, through the Monitoring Framework – COM (2018) 29 Final of the European Commission, further actions are needed to bring these indicators in operation at Regional level and to make them accepted and shared by the stakeholders. "	**2,8**	**2,2**	**3**
PP01_S5_021	**Enhance the role of clusters in the regional eco-system**	Every region should strongly promote the role of the regional clusters as intermediaries favouring an interaction among the Regional offices, the companies and the Universities operating in the same sector of the cluster, in order to create research and innovation projects and sustainable paths to scale-up innovative solutions and to promote the creation of networks in the area of circular economy.	**2,6**	**1,0**	**3**

European Union
European Regional
Development Fund

Food waste

ID	Name	Description	AHP ranking	SH ranking (3 max, 1 min)	Quadrant
PP01_New_1	**Integration of agro-food industry, biotechnological industry and green chemistry**	The food supply chains are large in volumes, significant in economic and environmental terms and central to the management of many biological materials. They currently generate significant amounts of waste and are associated to high environmental impacts. The waste streams are generated during harvesting, storage and transport prior to primary processing (primary stream), during primary processing within the agro-food industry (secondary stream) and during production or consumption by end users (tertiary stream). This is recognized as a priority sector where accelerating the circular economy would be beneficial and where EU policy has a particular role to play. This include also the idea of valorising food and beverage industry wastewaters based on the outcomes of the EU H2020 Saltgae project involving partner Regions in CIRCE (e.g. Lombardy, Slovenia). To do so, novel R&D and industrial collaborations will be identified within these Regions, starting from Saltgae partners, to ensure further scaling up and future potential industrial implementation of Saltgae outcomes.	**3,3**	**3**	**1**
VC03Other	**Enhance the role of customers towards circular economy**	Customers need to become more and more aware of their power to influence the way companies design, produce and distribute their products. Large public institutions can play an important role in this transition by becoming themselves conscious customers of green products and thus influencing the manufacturers' attitude towards circular economy.	**3,3**	**3**	**1**

European Union
European Regional
Development Fund

PP01_S5_033	**Implementation of a multi-user web platform for value-chain integration**	Information sharing among different stakeholders of the value-chain is one of the most promising enablers for emerging circular economy business models. A cross-sectorial web platform should be implemented for the creation of a virtual market containing the description, the volumes and the geographical localization of the waste materials coming from different sectors (for example, from construction and to textile to other sectors). The platform should be multi-users, in the sense that multiple stakeholders should provide and retrieve information, in different stages of the value-chains. For example, plant managers may provide data related to processing capabilities, product designer may retrieve data about material characteristics, recyclers may retrieve data about products to be processed. In the Lombardy Region, ANCE Lombardia (construction sector), ANPAR (recycling sector) and Centrocot (textile sector) are independently setting up or already testing similar digital platforms.	**3,2**	**3**	**1**
VC01Food	**Smart Packaging**	The development of smart packaging and labelling could make it possible to increase the traceability of food packaging, to achieve a more controlled and safe value chain, and the reduction of waste, thus positively influencing both producers and customers. However, since the cost of smart packaging may be higher than the cost of traditional packaging solutions, the development of new legislations and incentives aiming at promoting these innovative packaging design solutions should be envisaged.	**3,1**	**3**	**2**
PP01_New_2	**Improve the effectiveness of food waste reduction programs in companies**	This opportunity aims at developing inter-regional food waste management protocols to obtain the standardization on waste management from collection to recycling and improving the effectiveness of food waste avoidance programs in companies.	**3,0**	**3**	**2**
PP01_New_3	**Increase the networking among stakeholders**	An existing barrier towards the creation of a sustainable and circular food sector in the region is the high fragmentation of competences and technical capabilities and the lack of interaction between the local stakeholders. Local actors need to understand the importance of creating networks, in order to grasp business opportunities together and contribute to the development of circular initiatives in the sector. The objective of this opportunity is to encourage the creation of a stable	**2,8**	**3**	**2**

European Union
European Regional
Development Fund

		network of stakeholders within the food value chain. This will be possible identifying complementarities among different realities in the value-chain, creating synergies along the value chain and promoting the innovation and best practice exchange.			
VC02Other	**Development of circular economy metrics**	Circular economy is recent a paradigm that has not been properly formalized yet both at scientific and industrial levels. With the goal to state baseline industrial situations with respect to circular economy, to fix target objectives, and to quantitatively track progresses towards these objectives a comprehensive metrics, including a set of multi-dimensional Key Performance Indicators (KPIs), should be developed. Such metrics should also support the comparison among circular initiatives in different sectors. The objective is the creation of metrics to track baseline situations and track progresses and impacts achieved at systemic level by circular economy initiatives. This solution would make it possible to report achievements and express desiderata that can enlight the need for future actions, in a comprehensive and comparable manner. Although an initial attempt has been made, through the Monitoring Framework – COM (2018) 29 Final of the European Commission, further actions are needed to bring these indicators in operation at Regional level and to make them accepted and shared by the stakeholders.	**2,8**	**3**	**2**
PP01_S5_001	**Enhance the territorial network for the recovery and re-distribution of food waste**	The objective is to enhance the development of a network of territorial stakeholders (GDO outlets, shops, distributors, canteens) for reducing food waste. For example, Banco alimentare della Lombardia manages a hub for collecting and recovering surpluses in delimited territories in Lombardy, redistributing them to charitable structures in the same territory. The benefits of the network are: 1) to ensure a better dietary mix for the assisted person; 2) to maximize the collection from mid / small groups leveraging on the local presence; 3) to optimize the recovery of fresh food and cooked meals by improving the efficiency through the creation of local food bank wharehouses; 4) to activate networks of relationships on the territory that can create links and implications in terms of inclusion and social cohesion.	**2,7**	**3**	**2**

European Union
European Regional
Development Fund

		Such a virtuous approach should be further supported at larger scale, promoting the development of new pilot applications in areas currently not covered by this service and establishing links with relevant stakeholders distributed on the regional territory.			
PP01_S5_002	**Increase the performance of school canteens on food waste**	Food waste in schools is a significant challenge that should be addressed to reduce food waste in the Region. This opportunity aims at extending the scope of Siticibo Ristorazione in School canteens, best practice of Lombardy Region, through the full deployment of the program, also including the collection of cooked meals in addition to bread and fruit already recovered. The most significant policy option include the development of specific legislations fixing targets to the amount of food waste. Further actions should aim at improving the availability of infrastructures to manage fresh food in this context, to boost the development of technological solutions for higher food traceability and to develop pilot applications in specific educational contexts.	**2,5**	**3**	**2**
VC02Food	**Promote local and urban food growing**	Moving food production closer to the consumption areas is a virtuous practice that has the benefits of reducing logistics costs and environmental impacts, at the same time posing lower requirements on packaging performance and increasing the traceability of the food chain. For these reasons, it is becoming more and more attractive for citizens, especially in high density urban areas. As a consequence, if properly implemented, this opportunity will make it possible to reduce CO2 emissions and packaging material use, thus leading to a reduced amount of packaging waste. Furthermore, it is expected that the short value chain can reduce food waste, because food is consumed more directly, a better prediction of demand is possible and overproduction is avoided. However, actions are needed to further boost this practice, such as the creation of specific markets for distributing urbanely grown food, the development of specific campaigns for consumers' awareness creation and the support to urban food growing areas.	**2,9**	**2**	**3**

PP01_S5_031	**Improve reverse logistics efficiency in every sector**	The idea of further developing and making more efficient the logistics chain from the end-of-life product collection to the repair/remanufacturing/recycling of components could be widespread and applied to products and goods in all sectors. An opportunity comes from the synergic exploitation of forward and reverse logistics chains and from the enhancement of the strategic role of retailers in the reverse logistics, which provide a direct contact to customers but is currently mainly unexploited.	**2,9**	**1**	**3**

European Union
European Regional
Development Fund

Plastics

ID	Name	Description	AHP ranking	SH ranking (3 max, 1 min)	Quadrant
PP01_S5_022	**Increase the percentage of recycled plastics into new products**	Closed loop plastics recycling has been successfully implemented in several sectors (e.g. automotive, electronics and white goods) by re-using industrial plastic scrap from injection moulding or forming processes. However, there is potential to properly extend this approach also to post-use plastics, already in the market. This opportunity can be exploited by collaborating with plastics industries to have a percentage of recycled material inside new plastic products that is higher than the current value, thus significantly reducing virgin plastic production.	**2,9**	**3,0**	**2**
PP01_S5_034	**Enhance (the quality and traceability of) the procedure of waste management, from collection to recycling in every sector (see opportunity n° 10)**	This opportunity, coming from a cross-sectorial analysis, aims to build a common protocol on waste management from collection to recycling of end of life products, enabling a more efficient recover and recycling of goods. These protocols can be thought in two directions: towards citizens and towards companies and institutions, to support to build awareness and credibility and achieve long-term sustainability of the system.	**2,6**	**3,0**	**2**
PP01_S5_036	**Increase the percentage of secondary raw materials used in the production of goods**	Thie objective of this opportunity is to enhance and increase the use of secondary raw materials in the production of plastic goods. A particular focus should be placed to the development of sustainable certification protocols applicable to the re-usable materials as well as to the final products.This would increase the customer acceptance towards product re-using plastics, thus extending the market attractiveness of this approach.	**3,1**	**2,0**	**1**
PP01_S5_032	**Standardization of waste management procedures from**	The development of common rules and standard procedures for waste management, from collection to recycling of end of life products, can	**2,7**	**2,0**	**2**

European Union
European Regional
Development Fund

	collection to recycling (see opportunity n° 7)	support a more efficient and effective recovery and recycling of goods across all sectors.			
VC03Other	**Enhance the role of customers towards circular economy**	Customers need to become more and more aware of their power to influence the way companies design, produce and distribute their products. Large public institutions can play an important role in this transition by becoming themselves conscious customers of green products and thus influencing the manufacturers' attitude towards circular economy.	**3,3**	**2,0**	**1**
VC01TOther	**Inter-regional waste management protocols**	Trans-regional transportation and exchange of waste could become a relevant circular economy enabler if properly regulated and managed. This opportunity aims to develop safe and conscious inter-regional waste management protocols. In particular, these protocols shall be focused on the enhancement, both in terms of quality and traceability, of the procedures of waste management, from collection to recycling in every sector. The development of IT waste management platforms in a Zero Waste perspective could support the transparent implementation of such protocols. As an example, traceability is fundamental for textile, concerning for example the chemicals used during production. The product passport in the textile already exists, and is related to ECOTEX. ECOTEX is a textile international standard for companies created by companies themselves. ECOPASSPORT is the quality certification aimed at evaluating the sustainability of the value chain.	**3,3**	**2,0**	**1**
PP01_S5_033	**Implementation of a multi-user web platform for value-chain integration**	Information sharing among different stakeholders of the value-chain is one of the most promising enablers for emerging circular economy business models. A cross-sectorial web platform should be implemented for the creation of a virtual market containing the description, the volumes and the geographical localization of the waste materials coming from different sectors (for example, from construction and to textile to other sectors). The platform should be multi-users, in the sense that multiple stakeholders should provide and retrieve information, in different stages of the value-chains. For example, plant managers may provide data related to processing capabilities, product designer may retrieve data about material characteristics, recyclers may retrieve data	**3,2**	**1,0**	**4**

European Union
European Regional
Development Fund

		about products to be processed. In the Lombardy Region, ANCE Lombardia (construction sector), ANPAR (recycling sector) and Centrocot (textile sector) are independently setting up or already testing similar digital platforms.			
PP01_S5_020	**Increase the networking of Small and Medium entities**	An existing barrier towards the creation of a stable circular bio-economy sector in the region is the high fragmentation of competences and technical capabilities and the lack of interaction between the local SMEs. For example, focusing on agri-biomass, SMEs need to understand the importance of creating networks, in order to grasp large-scale business opportunities together and become competitive in the global market. The objective of this action is to gather the attention of SMEs through communication and active involvement campaigns and to demonstrate the benefits and the sustainability of a collaborative networked business approach, on the medium-long term. At a regional level, this could lead to the creation of a stable SMEs regional network, able to align the activities and strategic objectives towards the target goal of becoming a circular bio-economy Region.	**2,8**	**1,0**	**3**
VC02Other	**Developement of circular economy metrics**	Circular economy is recent a paradigm that has not been properly formalized yet both at scientific and industrial levels. With the goal to state baseline industrial situations with respect to circular economy, to fix target objectives, and to quantitatively track progresses towards these objectives a comprehensive metrics, including a set of multi-dimensional Key Performance Indicators (KPIs), should be developed. Such metrics should also support the comparison among circular initiatives in different sectors. The objective is the creation of metrics to track baseline situations and track progresses and impacts achieved at systemic level by circular economy initiatives. This solution would make it possible to report achievements and express desiderata that can enlight the need for future actions, in a comprehensive and comparable manner. Although an initial attempt has been made, through the Monitoring Framework – COM (2018) 29 Final of the European Commission, further actions are needed to bring these indicators in operation at Regional level and to make them accepted and shared by the stakeholders.	**2,8**	**2,0**	**2**

European Union
European Regional Development Fund

PP01_S5_021	**Enhance the role of clusters in the regional eco-system (see opportunity n° 21)**	Every region should strongly promote the role of the regional clusters as intermediaries favouring an interaction among the Regional offices, the companies and the Universities operating in the same sector of the cluster, in order to create research and innovation projects and sustainable paths to scale-up innovative solutions and to promote the creation of networks in the area of circular economy.	**2,6**	**1,0**	**3**
PP01_S5_031	**Improve reverse logistics efficiency in every sector (see opportunity n° 5)**	The idea of further developing and making more efficient the logistics chain from the end-of-life product collection to the repair/remanufacturing/recycling of components could be widespread and applied to products and goods in all sectors. An opportunity comes from the synergic exploitation of forward and reverse logistics chains and from the enhancement of the strategic role of retailers in the reverse logistics, which provide a direct contact to customers but is currently mainly unexploited.	**2,9**	**1,0**	**3**
PP01_S5_023	**Increse the production of sustainable and biodegradable plastics**	Increasing the production of more sustainable and biodegradable plastics, not based on petroleum and non-renewable natural resources, can limit the environmental burden of traditional plastics, being in turn beneficial for the human health, the marine species survival, and to the ocean.	**3,3**	**1,0**	**4**

European Union
European Regional Development Fund

Textile

ID	Name	Description	AHP ranking	SH ranking (3 max, 1 min)	Quadrant
PP01_S5_009	**Implementation of a multi-user web platform for value-chain integration**	Information sharing among different stakeholders of the value-chain is one of the most promising enablers for emerging circular economy business models. A cross-sectorial web platform should be implemented for the creation of a virtual market containing the description, the volumes and the geographical localization of the waste materials coming from different sectors (for example, from construction and from textile to other sectors). The platform should be multi-users, in the sense that multiple stakeholders should provide and retrieve information, in different stages of the value-chains. For example, plant managers may provide data related to processing capabilities, product designers may retrieve data about material characteristics, recyclers may retrieve data about products to be processed. In the Lombardy Region, ANCE Lombardia (construction sector), ANPAR (recycling sector) and the partnership Centrocot (textile sector) - UNIVA (association of industries from different sectors) are independently setting up or already testing similar digital platforms.	**3,7**	**3,7**	**1**
PP01_S5_015	**Increase the percentage of recycled materials**	Legislation can have an important role in motivating manufacturers to design their product integrating higher fractions or recycled materials, without compromising in performance. The challenge is to design targeted and well-accepted laws aiming at increasing the percentage of recycled materials used in products, thus increasing circular economy opportunities. A potential opportunity, already well investigated, is to boost the Minimal Environmental Criteria principle in Green Public Procurement. Other opportunities come from eco-design directive, currently under development at EU level.	**3,4**	**3,4**	**1**

European Union
European Regional Development Fund

PP01_S5_016	**Reuse of textiles in other sectors**	Material re-use is a promising circular economy alternative that could be more widely exploited for the waste materials coming from the textile sector. A relevant example is the reuse of wasted textiles as secondary raw materials in the built environment sector, becoming an insulator material to be used during the construction of buildings. Since the built environment sector is a high volume sector, such an approach may significantly decrease the un-processed waste produced by the textile industry.	**3,2**	**3,2**	**1**
PP01_S5_018	**Influencing fashion designer in the use of secondary raw materials (textiles)**	Inducing fashion designers to make clothes including recovered textiles is an opportunity that could be better exploited. Although several fashion brands and fashion designers are becoming more sensitive to sustainability issues, the use of waste textiles into the design of new collections remains limited. Possible actions include the design of specific incentives, the promotion of sustainability-oriented marketing initiatives and awareness creation initiatives targeted to consumers, thus leading to a more sustainable sector and to a lower production of wasted textiles.	**3,2**	**3,2**	**1**
VC02 Textile	**Support for new circular textile start-ups**	Through a careful and continue cross-regional value chain analysis, potential synergies among different sectors may arise, especially targeting start-ups. Indeed, start-ups are at the core of the innovation eco-system of a Region. Thanks to their light and dynamic structures and the less established brand vision, start-ups can experiment innovative circular business cases and expand them in line with the company growth strategy. An opportunity comes from the extension of the Advance London program good practice (established by LWARB) to other Countries to support young start-ups. Lombardy region shows a real interest on this possibility.	**3,2**	**3,2**	**1**
VC01Textile	**Sustainable textile manufacturing**	The objective of this opportunity is to invest in textile SMEs implementing innovative circular economy solutions, both in terms of sustainable technologies for textile manufacture and processes for large scale re-use of fibers. This will increase recyclability rates of textile materials and, in turn, will create a market for recycled fibers, yarns and manufactured clothes.	**3,1**	**3,1**	**1**
VC03Textile	**Reduction of waste due to structural degradation of**	Innovative procedures and technologies should be designed and tested to enable a considerable reduction of waste caused by structural	**3,1**	**3,1**	**1**

European Union
European Regional Development Fund

	textile materials during the production, use and maintenance phases (along the value chain).	deterioration of textile products and materials during production, use and maintenance phases, along the value chain. This waste is segregated by the product throughout its life-time and it is irreversibly lost in the environment, posing serious challenges. A major objective should be, for example, the mitigation of microplastics impact caused by textile washing processes.			
PP01_S5_014	**Increase the recovery of waste clothes**	The Lombardy Region produces 13-15 kg per year per person of wasted clothes, but only 2-3 kg are actually recovered. If properly exploited, this material availability opportunity can be exploited to develop new concepts of sustainable clothes made of recycled textile. For example, textile materials can be reused and inserted into new clothes, thus reducing the amount of generated clothes waste and virgin material usage, at the same time.	**3,1**	**3,1**	**1**
VC05Textile	**Citizen education on textile recovery through the introduction of separate collection**	Starting from different good practices regarding second-hand clothes (as "La Terza Piuma" in Lombardy region or "Humana" in Catalonia region) and taking inspiration from different campaigns (such as the "Love Your Clothes" campaign in LWARB region), targeted to textile users, and citizens in general, it is possible to favour the development of an efficient separate collection schema for textiles. This would be a pre-requisite for an efficient treatment of textiles targeted to their re-use.	**3**	**3**	**3**
PP01_S5_019	**Greater involvement of fashion companies**	Fashion brands can develop a specific survey for their suppliers in order to clarify their environmental and social performance on relevant circular economy topics, such as resource saving, transport impact reduction, packaging reduction, short value chain introduction, clear labelling and origin of the clothes, sharing the sustainability principles and visions with their customers, directly at the retail points. This would be a first step towards the improvement of the percentage of recycled materials into new clothes, making the sustainability their first brand paradigm. In order to trigger high response rate to these initiatives, specific awarding methods targeted to conscious customers who provide their feedback could be designed.	**2,9**	**2,9**	**3**
PP01_S5_017	**Increase second-hand clothes collection and redistribution**	In textile clothing two types of waste streams are significant, including clothes that lost their original functionality, due to extensive use, as well as clothes that are “unsold items” and become waste due to obsolescence and market reasons. From both streams, an increased	**2,9**	**2,9**	**3**

European Union
European Regional
Development Fund

		amount of textile waste could be redistributed and used in second-hand collection channels. The objective of this opportunity is to increase the reuse of clothes that are still wearable, by donating them to poor people or by reinserting them in the redistribution cycle, with the possibility to increase their attractiveness through the possibility of a redesign of the clothes.			
VC04Textile	**Standardization of waste management from collection to recycling**	Starting from the Cross-cutting project ECAP (European Clothing Action Plan) the need of a standardization of waste management from collection to recycling emerges. This action could enhance and increase the recovery of waste clothes.	**2,7**	**2,7**	**3**
PP01_S5_031	**Improve reverse logistics efficiency in every sector (see opportunity n° 5)**	The idea of further developing and making more efficient the logistics chain from the end-of-life product collection to the repair/remanufacturing/recycling of components could be widespread and applied to products and goods in all sectors. An opportunity comes from the synergic exploitation of forward and reverse logistics chains and from the enhancement of the strategic role of retailers in the reverse logistics, which provide a direct contact to customers but is currently mainly unexploited.	**2,9**	**2,9**	**3**
PP01_S5_032	**Standardization of waste management procedures from collection to recycling (see opportunity n° 7)**	The development of common rules and standard procedures for waste management, from collection to recycling of end of life products, can support a more efficient and effective recovery and recycling of goods across all sectors.	**2,7**	**2,7**	**3**
VC03Other	**Enhance the role of customers towards circular economy**	Customers need to become more and more aware of their power to influence the way companies design, produce and distribute their products. Large public institutions can play an important role in this transition by becoming themselves conscious customers of green products and thus influencing the manufacturers' attitude towards circular economy.	**3,3**	**3,3**	**1**
VC01TOther	**Inter-regional waste management protocols**	Trans-regional transportation and exchange of waste could become a relevant circular economy enabler if properly regulated and managed. This opportunity aims to develop safe and conscious inter-regional waste management protocols. In particular, these protocols shall be focused on the enhancement, both in terms of quality and traceability, of the procedures of waste management, from collection to recycling in every	**3,3**	**3,3**	**1**

European Union
European Regional Development Fund

		sector. The development of IT waste management platforms in a Zero Waste perspective could support the transparent implementation of such protocols. As an example, traceability is fundamental for textile, concerning for example the chemicals used during production. The product passport in the textile already exists, and is related to OEKO-TEX. OEKO-TEX is a textile international standard for companies created by companies themselves. ECOPASSPORT is the quality certification (related to chemicals) aimed at evaluating the sustainability of the value chain.			
PP01_S5_020	**Increase the networking of Small and Medium Enterprises**	The objective is to increase the attention of small and medium enterprises towards circular economy, through communication and active involvement campaigns, to create a stable regional network (eco-system), that can cooperate in the direction of developing circular economy EU regions. The SMEs need to understand the added value of creating networks among them, sharing opportunities, objectives and risks, in order to gain resilience and grasp more significant business opportunities without increasing operational costs.	**2,8**	**2,8**	**3**
VC02Other	**Development of circular economy metrics**	Circular economy is recent a paradigm that has not been properly formalized yet both at scientific and industrial levels. With the goal to state baseline industrial situations with respect to circular economy, to fix target objectives, and to quantitatively track progresses towards these objectives a comprehensive metrics, including a set of multi-dimensional Key Performance Indicators (KPIs), should be developed. Such metrics should also support the comparison among circular initiatives in different sectors. The objective is the creation of metrics to track baseline situations and track progresses and impacts achieved at systemic level by circular economy initiatives. This solution would make it possible to report achievements and express desiderata that can enlight the need for future actions, in a comprehensive and comparable manner. Although an initial attempt has been made, through the Monitoring Framework – COM (2018) 29 Final of the European Commission, further actions are needed to bring these indicators in operation at Regional level and to make them accepted and	**2,8**	**2,8**	**3**

European Union
European Regional Development Fund

		shared by the stakeholders. "			
PP01_S5_034	**Enhance (the quality and traceability of) the procedure of waste management, from collection to recycling in every sector (see opportunity n° 10)**	This opportunity, coming from a cross-sectorial analysis, aims to build a common protocol on waste management from collection to recycling of end of life products, enabling a more efficient recover and recycling of goods. These protocols can be thought in two directions: towards citizens and towards companies and institutions. This would enable to support building awareness and credibility and achieve long-term sustainability of the circular system.	**2,6**	**2,6**	**3**
PP01_S5_038	**Enhance the role of clusters in the regional eco-system (see opportunity n° 21)**	Every region should strongly promote the role of the regional clusters as intermediaries favouring an interaction among the Regional offices, the companies and the Universities operating in the same sector of the cluster, in order to create research and innovation projects and sustainable paths to scale-up innovative solutions and to promote the creation of networks in the area of circular economy.	**2,6**	**2,6**	**3**

European Union
European Regional
Development Fund

WEEE

ID	Name	Description	AHP ranking	SH ranking (3 max, 1 min)	Quadrant
VC03Other	**Enhance the role of customers towards circular economy**	Customers need to become more and more aware of their power to influence the way companies design, produce and distribute their products. Large public institutions can play an important role in this transition by becoming themselves conscious customers of green products and thus influencing the manufacturers' attitude towards circular economy.	**3,3**	**3**	**1**
PP01_S5_029	**Increase the percentage of materials (eg rare elements metals…) recovered from WEEE**	Waste from Electric and Electronic Equipment (WEEE) is the fastest growing waste stream in EU, with 5% increase per year. Electronic waste can represent a very important source of key- metals for advanced technological products. WEEE are complex products where a multitude of metallic and non-metallic materials are mixed to provide the required functionality to the product. For example, PCBs (Printed Circuit Boards) are called “urban mineral resources” since 25%-40% in weight of their composition is made of valuable metals such as copper, tin, nickel, gold and silver. Moreover, small quantities of critical metals such as indium, palladium, ruthenium, gallium, tantalum and platinum are present. However, such materials are found in small concentration within the overall electronic product but in high concertation within specific electronic components. This makes recycling extremely challenging thus calling for a new generation of highly selective and smart WEEE recycling technologies. This opportunity aims to support and improve current technologies and to develop new technologies and processes to increase the percentage of materials recovered from Waste from Electric and Electronic Equipment, with particular focus on precious metals and rare earths.	**3,1**	**3**	**1**

European Union
European Regional Development Fund

PP01_S5_036	**Increase the percentage of secondary raw materials used in the production of EEE goods**	New electronic products are rarely designed considering the option of embedding recycled materials to reduce the environmental footprint of the product. However, this option would be technically applicable, especially to those structural and aesthetical components that are less subject to technological innovation cycles. With a proper re-design of the product, secondary materials such as plastics and aluminum could potentially be re-used in new electronic products. The objective of this opportunity, coming from a cross-sectorial analysis, is to enhance and increase the use of secondary raw materials in the production of electric and electronic equipment. A key tool in this opportunity is the ability to certify the secondary material and the final good properties and functional requirements.	**3,1**	**3**	**1**
PP01_S5_020	**Increase the networking of Small and Medium entities**	An existing barrier towards the creation of a stable circular economy sector in the region is the high fragmentation of competences and technical capabilities and the lack of interaction between the local SMEs. The objective of this action is to gather the attention of SMEs through communication and active involvement campaigns and to demonstrate the benefits and the sustainability of a collaborative networked business approach, on the medium-long term. At a regional level, this could lead to the creation of a stable SMEs regional network, able to align the activities and strategic objectives towards the target goal of becoming a circular economy Region.	**2,8**	**3**	**2**
PP01_New_6	**Boost EEE maintenance, repair, reuse and remanufacturing economy**	Currently applied WEEE end-of-life treatment practices primarily aim at recovering valuable materials with destructive processes. While this makes it possible to avoid material landfill and to enable the gathering of residual material value, it prevents from reusing functions from the post-use products. However, depending on the condition of the post-use electronic product, more valuable end-of-life practices aiming at recovering, re-using and upgrading the product functions through remanufacturing could be technically feasible. This opportunity explores the potentials of applying new circular economy options to the WEEE sector. In particular, the focus is on the enhancement of maintenance, repair, reuse and remanufacturing of electric and electronic equipment, enabling a closed loop framework. Technical challenges related to the flexibility of demanufacturing and remanufacturing processes as well as	**3,3**	**2**	**4**

European Union
European Regional
Development Fund

		non-technical challenges, such as the customer acceptance and the legislation barriers need to be addressed.			
VC01WEEE	**Creation of a common vision of the sector circularity**	The WEEE sector is currently characterized by high fragmentation, lack of information sharing among producers and recyclers, and limited systemic vision of the circularity potentials in the local eco-system. A common vision of the circularity of the electronics sector, the building of a shared scenario, and the sharing of objectives among the involved stakeholders would be fundamental to achieve long term target performance in this sector and to support financing the most valuable projects enabling the transition to this shared vision. The vision should support the identification of sustainable pathways to stimulate the recovery of the entire set of substances found in WEEE.	**2,7**	**3**	**2**
VC01TOther	**Inter-regional waste management protocols**	Trans-regional transportation and exchange of waste could become a relevant circular economy enabler if properly regulated and managed. This opportunity aims to develop safe and conscious inter-regional waste management protocols. In particular, these protocols shall be focused on the enhancement, both in terms of quality and traceability, of the procedures of waste management, from collection to recycling in every sector. The development of IT waste management platforms in a Zero Waste perspective could support the transparent implementation of such protocols.	**3,3**	**2**	**4**
PP01_S5_033	**Implementation of a web platform**	Information sharing among different stakeholders of the value-chain is one of the most promising enablers for emerging circular economy business models. A cross-sectorial web platform should be implemented for the creation of a virtual market containing the description, the volumes and the geographical localization of the waste materials coming from different sectors (for example, from construction and to textile to other sectors). The platform should be multi-users, in the sense that multiple stakeholders should provide and retrieve information, in different stages of the value-chains. For example, plant managers may provide data related to processing capabilities, product designer may retrieve data about material characteristics, recyclers may retrieve data about products to be processed. In the Lombardy Region, ANCE Lombardia (construction sector), ANPAR (recycling sector) and Centrocot	**3,2**	**1**	**4**

European Union
European Regional Development Fund

		(textile sector) are independently setting up or already testing similar digital platforms.			
VC02Other	**Creation of circular economy metrics**	Circular economy is recent a paradigm that has not been properly formalized yet both at scientific and industrial levels. With the goal to state baseline industrial situations with respect to circular economy, to fix target objectives, and to quantitatively track progresses towards these objectives a comprehensive metrics, including a set of multi-dimensional Key Performance Indicators (KPIs), should be developed. Such metrics should also support the comparison among circular initiatives in different sectors. The objective is the creation of metrics to track baseline situations and track progresses and impacts achieved at systemic level by circular economy initiatives. This solution would make it possible to report achievements and express desiderata that can enlight the need for future actions, in a comprehensive and comparable manner. Although an initial attempt has been made, through the Monitoring Framework – COM (2018) 29 Final of the European Commission, further actions are needed to bring these indicators in operation at Regional level and to make them accepted and shared by the stakeholders.	**2,8**	**1**	**3**

European Union
European Regional Development Fund

CircE Action Plan – Annex 4

The Regional Waste Management Program (RWMP)

European Union
European Regional
Development Fund

The waste management legislation (namely, art. 28 of Directive 2008/98/EC and art. 199 of Legislative Decree 152/2006) provides that the Regions approve regional waste management programs.

The same article 199 details which elements the regional waste management program must include.

The regional program (RWMP) is structured in two main sections:

- urban (municipal) solid waste;
- special waste.

In Lombardy, the waste management program in force was approved in 2014 (d.g.r. 1990, 20/06/2014); according to national and regional legislation (law 26/2003), regional planning must be updated every 6 years: consequently, the next update of the program must be issued by 2020.

1. The CircE project results

Considering the framework summed up above, it is the suitable time to start developing the updating of the program: policy recommendations emerged by the CircE Project fall properly.

In particular the CircE findings (opportunities, barriers, priorities and policy options) can provide detailed information, useful to produce more effective, pertinent and concrete actions.

Considering the wide range of information contained in the CircE analysis and the different scope of each opportunities, a significant contribution can be provided to all the activities described in the following, from the definition of the objectives to the identification, design and cost and benefits analysis of the actions.

In the process of development of the new program, the CircE stakeholder can bring their contribution, based on what they learnt and set up in the project, increasing the value and the usefulness of the project results.

Beyond the specific considerations expressed in any paragraph below, in the end the CircE methodologies and approaches can be furtherly used to support all the analysis and processes which need to be carried out to develop the new RWMP.

In the following paragraphs the RWMP's areas and tools which the CircE results can support to boost circular economy are presented. In those paragraphs some further details on the CircE support are presented.

2. Urban waste

Foreword

Urban waste is composed by waste produced by households and non-hazardous waste produced by business activities which, in terms of quality and quantity, are similar to domestic ones.

The national legislation provides that the regions can set up "binding" rules for the management of urban waste, in particular for the disposal activities and for the treatment activities of the undifferentiated fraction.

European Union
European Regional Development Fund

The overall framework of the specific targets for the recovery and recycling of urban waste, as well as minimum separate collection rates, is provided by both the EU and the national legislation.

Details

The current version of the RWMP carried out an analysis of the current situation, with particular reference to the production of urban waste, the level of separate waste collection, the tariff situation and the regional plant endowment involved in their management. Three scenarios of urban waste production and separate waste collection were then hypothesised on the basis of demographic, economic, obligations and actions envisaged by the program: among the three scenarios, the one with "intermediate" value forecast parameters was selected. Considering the scenario envisaged by 2020, the objectives of the program have been declined, borrowing them both from the regulatory obligations and from the prospects for improvement of the management system that the Lombardy Region has imposed itself.

For each of the objectives, actions, deemed necessary for their achievement, have been foreseen.

These actions are of various types:

- restrictions and authorizations;
- economic-financial instruments (eg "ecotax");
- support tools (guidelines);
- incentive tools;
- communication actions.

The Program has not set aside funds for the implementation of the actions so far. This will be done with future actions.

3. Special waste

Foreword

Special waste is waste produced by business activities (industrial, agricultural, tertiary sectors, etc.). Unlike urban waste, they are not ruled by particular "territorial" constraints set up by national and EU legislation; however, the general principles of proximity of treatment and maximization of recovery are commonly applied. The only specific target given by the legislation is related to the recovery of construction and demolition waste (70% by 2020).

Details

The regional program for special waste in Lombardy provided a survey about their production, their treatment and their flows to and from other regions. A theoretical self-sufficiency rate in the treatment of special waste was then defined.

The same assessments have been made for some specific groups of special waste, such as construction and demolition waste, sewage sludge, bottom ashes, sanitary waste, asbestos-containing waste, etc.

Concerning these cases, virtuous orientations rather than numerical targets (with the exception of inert waste) were set up. These orientations should be the references for regional actions in the following years.

European Union
European Regional Development Fund

The CircE findings (opportunities, barriers, priorities and policy options) can provide a significant contribution to define a scenario for the orientation furtherly more concrete, pertinent and updated.

4. The Waste Prevention Plan

The RWMP developed a Waste Prevention Plan, which, in the current version, is mainly focused on urban waste. In the Waste Prevention Plan of the new RWMP the special waste will gain a significant wider room.

The CircE results (opportunities, barriers, priorities and policy options) can support the drawing up of the new version of the waste prevention plan. The CircE findings can provide a sound feedback and support in defining how to act in specific sectors in order to produce an effective waste prevention, also based on the awareness of the barriers which can hamper this process and the policy options which can overcome them.

5. Potential actions envisaged towards Circular Economy

Reading the RWMP with the perspective of the Circular Economy development, some further lines of action can be identified.

More challenging objectives

More challenging objectives can be first set up than those imposed by Community and national legislations, in particular on issues concerning:

- recycling;
- reuse;
- prevention of waste production.

The CircE findings can support this analysis helping the policy makers to identify priorities, issues which can hamper the achievement of specific results, potential more feasible solutions, etc.. In other words they can be considered a significant base of knowledge and awareness (in the 3 perspectives: environmental, economic and social) to support their choices.

Actions on special waste

Although urban waste is the area in which the Region has the greatest competence to act according to the law, they represent a minority of the total waste produced in Lombardy: special waste is about 7 times municipal waste (in terms of quantity).

Therefore, acting on special waste would make it possible to obtain more consistent results. This action is certainly more difficult from a legal point of view, since their management is completely left to the free market.

Concrete actions through different implementation tools

In any case, the objectives set out in the RWMP must be followed by concrete actions to be achieved, taking into account the regional competences in this area.

European Union
European Regional Development Fund

The implementation tools of the objectives set out by the program may be different:

- authorization requirements for installations;
- financial incentive tools;
- calls for tenders;
- studies and research
- technical guidelines addressed to plants or local authorities, etc ...

Even in this case, considering the wide range of information contained in the CircE analysis and the different scope of each opportunity, a significant contribution can be provided to all the activities above: from the definition of the objectives to the identification, design and cost and benefits analysis of the actions.

Further actions on the RWMP

Further ways to act on the RWMP are:

- identifying the most promising waste management areas in terms of development of the Circular Economy (both in terms of quantity of waste, both in terms of feasibility of recovery technologies at present);
- proposing further actions feasible by Lombardy Region that go in the direction of the regulatory objectives or the most challenging objectives for Lombardy Region.

The CircE findings (opportunities, barriers, priorities and policy options) can provide detailed sectorial information and recommendations, useful to produce more effective, pertinent and concrete analysis and actions.

European Union
European Regional Development Fund