

# Lighthouse Raw Materials and Circular Societies

## Position Paper

EIT RawMaterials GmbH

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## Table of Content

1.	Circular Economy in Europe	3
2.	Raw Materials and Circular Societies Lighthouse Objectives	6
3.	Raw Materials and Circular Societies contributions to the Green Deal	7
4.	Raw Materials and Circular Societies contributions to key SDGs	8
5.	Raw Materials and Circular Societies approach and impact	9
6.	Raw Materials and Circular Societies innovation topics:	9
7.	Education for Circular Societies	13
8.	Business Creation for Circular Societies	15
9.	Raw Materials and Circular Societies Lighthouse strategic actions	16

# Raw Materials and Circular Societies

## 1. Circular Economy in Europe

According to the European Environmental Agency,<sup>1</sup> the per-capita consumption of energy and materials is respectively three times and two times greater than that consumed by our ancestors in 1900. Moreover, we have to consider that there are now over 7.2 billion humans sustained by these resources, compared with 1.6 billion back in 1900. Humans are now consuming more resources than the Earth can regenerate. Every year the Global Footprint Network<sup>2</sup> calculates the so-called “Earth Overshoot Day”, the day when the humanity’s demand for natural resources exceeds what the Earth can regenerate over the entire year. According to this calculation, in 2019 this happened on the 29<sup>th</sup> of July.

The concept of a circular economy has recently gained traction in Europe as a positive, solutions-based perspective for achieving economic development within increasing environmental constraints. Raw, processed and advanced materials, from primary and secondary sources, are the backbone of the economy. *A radical shift is required from linear to circular thinking.* End-of-life products must be considered as a resource for another cycle, while losses and stocks of unused materials must be minimized and valorised along the value chain. In addition, the interactions between materials must be considered to define the best circular solution from a systemic standpoint. Awareness of the benefits of *closing material loops* must be raised in society. The successful transition of a society to the circular economy at the global scale depends on the reliable and *sustainable supply and management of raw materials.*

Critics assert that the locution and the concepts behind Circular Economy mean different things to different stakeholders. A recent article by Kirchherr *et al.* analyses 114 definitions<sup>3</sup>, taken from peer-reviewed literature as well as other publications (e.g., those from the Ellen MacArthur foundation<sup>4</sup>). In their paper, Kirchherr *et al.* analyse also the different core principles, including the most popular 4R (*reduce, reuse, recycle, recover*), which is embedded in the definition provided by the European Commission<sup>5</sup>, as well as more complex, comprehensive and analytical frameworks such as the 9R.<sup>6</sup> Finally, the paper suggests an

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<sup>1</sup> The economy: resource efficient, green and circular

<https://www.eea.europa.eu/signals/signals-2014/articles/the-economy-resource-efficient-green>

<sup>2</sup> <https://www.footprintnetwork.org/>

<sup>3</sup> Kirchherr, J., Reike, D., Hekkert, M., 2017. Conceptualizing the circular economy: an analysis of 114 definitions. *Resour. Conserv. Recycl.* 127, 221–232 Dec

<sup>4</sup> Ellen MacArthur Foundation, 2012. *Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition.*

Available at. <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf>

<sup>5</sup> European Commission, 2008. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and Repealing Certain Directives. Available at. <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN>

<sup>6</sup> Potting, J., et al., 2017. *Circular Economy: Measuring Innovation in the Product Chain.*

Available at. <http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2016-circular-economy-measuring-innovation-in-product-chains-2544.pdf>

additional definition, in the attempt to formulate a more comprehensive vision, which not only includes the typical 4R principles, but also the need for a radical systemic change that is needed to truly implement a Circular Economy.

The realisation of the **circular economy** implies the following needed actions:

- i) Behavioural changes by consumers, who need to embrace different lifestyles and consumption modes
- ii) Regulatory changes, involving for example the introduction of public incentives or new regulations to address end-of-life products and secondary raw materials.

Therefore, innovation, intended strictly as “technological innovation” is not the only driver, but in specific cases is a key enabler. Potting *et al.*<sup>7</sup> identify three types of Circular Economy changes with regard to the use of technology in the product value chain:

1. Products/services representing a completely new paradigm shift, relying heavily on technology and less on specific consumers’ behaviour. An example of this kind are the biodegradable plastics, that have already taken some market shares;
2. Products/services where technology is of minor importance, but where consumers’ behaviour is fundamental and adaptation to a different consuming style is a key success indicator. The example brought in the publication is the spreading of packaging-free shops;
3. Products/services where consumers’ style is fundamental and where the technology is the key enabler. Examples of this kind are sharing economy services (bikes, cars and even dishwashers), where the use of digital platforms facilitate the implementation of the business model.

**Different type of stakeholders, such as business, consumers, citizens, cities etc, are key in driving this process. This Lighthouse will consider Society as a whole (business and cities), defining actions (strategic and operational) to support the transition from linear to Circular Society.**

The United Nations estimate that by 2030 about 5 billion people will live in cities, and that by 2050 two thirds of the global population will live in urban areas (UNDESA, 2012). Cities and urban communities offer better opportunities – economic, educational, entrepreneurial. They are places with concentration of food, people, technology, entertainment and community.

**Urbanisation and its impacts are a major global challenge.** Today cities account for 60 to 80% of energy consumption and 75% of carbon emissions while using only 3% of the land surface. To ensure a sustainable future, the ecological and societal challenges must be addressed simultaneously (Raworth, 2017). In this

context, **materials are also the enablers of sustainability** and are the natural integrators, if used in a resource efficient way.

**In sustainable and modern smart cities, everything consists of a complex interconnected system, with the connections being interactions among: different contributors and challenges (food, water, energy, materials, waste, etc.); business, people and government; the existing infrastructures, industries and systems and the future ones; digital and non-digital; local, regional and (inter-)national; rural and urban. These relationships are often highly complex, non-linear, and technical, economical, cultural and social/societal at the same time.** Therefore, the quantification of the resource efficiency and design of sustainable cities requires unique platforms that **digitally** link the various stakeholders.

The choices made by millions of consumers can support or hamper the circular societies. Therefore, this Lighthouse will also deal with education and awareness activities focused on consumers, to guide them to a better understanding of the concept of Circular Society and to show them the pathway to ensure the transition.

Industry is a key player for the transition process to Circular Society. Each industry sector is different when it comes to resource use, waste generation and management. Resource efficiency ensuring the rational and efficient use of raw materials as well as the efficient industrial waste valorisation through industrial symbiosis approaches are absolutely key aspects to achieve circular industries. This process to Circular Industries will lead to new materials, methodologies/tools, technologies and business models.

## 2. Raw Materials and Circular Societies Lighthouse Objectives

This Lighthouse will demonstrate that the raw materials sector is a major strength and central service provider for the transition to Circular Societies.

The main objective of this Lighthouse will clearly be to support and boost the transition from Linear Societies to Circular ones through the support to innovative solutions to be implemented in cities and industries. These solutions will include:

- new technologies;
- new educational approaches related to new skills required for this transition process;
- new educational and awareness approaches to encourage citizens/consumers to participate in and support this transition process;
- new methodologies to assess circularity;
- new methodologies to support the transition to Circular Cities;
- new business models;
- new circular products.

This Lighthouse will also have clear strategic objectives aiming to position EIT Rawmaterials as a key stakeholder leading this transition process to Circular Societies together with other stakeholders (e.g., leading a Cross KIC initiative for the Circular Economy).

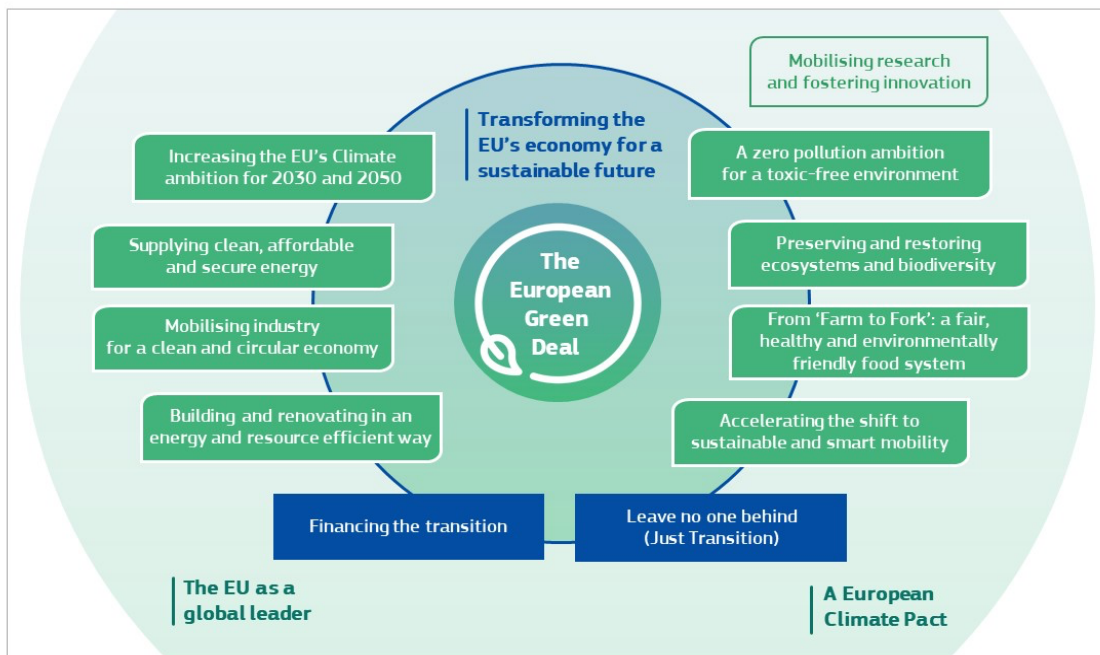
These strategic objectives will contribute to achieving the European initiatives for Zero Waste Society, Resource Efficient Europe and the European Action Plan for Circular Economy.

### 3. Raw Materials and Circular Societies contributions to the Green Deal

This Communication sets out a European Green Deal for the European Union (EU) and its citizens. It resets the Commission’s commitment to tackling climate and environmental-related challenges that is this generation’s defining task.

The European Green Deal is a response to these challenges. It is a new growth strategy that aims to **transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy** where there are **no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use**<sup>7</sup>.

The figure below illustrates the various elements of the Green Deal<sup>8</sup>.



<sup>7</sup> The European Green Deal, COM (2019) 640 final

<sup>8</sup> The European Green Deal, COM (2019) 640 final

Circular Economy/Resources Efficiency will be one of the main pillars that will support the ambitious objectives defined in the Green Deal. This main pillar matches perfectly the Circular Societies Lighthouse. Therefore, the achievements of this Lighthouse (Operational Actions including demonstration, Education and Business Support Actions) are fully aligned with and will clearly support the implementation of the Green Deal.

At the same time, the Strategy Actions (e.g., Cross KIC Action for Circular Economy; coordination with other European Initiatives) also included in this Lighthouse will support an efficient coordination to ensure higher impact.

#### 4. Raw Materials and Circular Societies contributions to key SDGs

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The 17 SDGs are **integrated**—that is, they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability<sup>9</sup>.

This Circular Societies Lighthouse will have a significant impact on goal 12 - “Responsible Production and Consumption”. This goal is fundamental for the achievement of the other goals. EIT RawMaterials and the Circular Societies Lighthouse will clearly support the specific objectives of this goal regarding the reduction of the carbon footprint and the change in the way we produce and consume.

Through this Lighthouse, EIT RawMaterials will have a vehicle to promote inclusive and sustainable industrialization and contribute to goal 9, which states that by 2030 there will be a significant increase in industry’s share of employment and gross domestic product, an infrastructure upgrade and retrofitting of industries to make them sustainable, with increased resource-use efficiency and more widespread adoption of clean and environmentally sound technologies to industrial processes, in line with national circumstances.

This Lighthouse will also have a clear impact on goal 11 - “Sustainable Cities and Communities”, not only through the development of new technological solutions aiming to achieve resource-efficient cities and communities, but also by educating consumers and young people for a behavioural change.

All these actions will also have a clear positive impact on goal 13 - “Climate Action”.

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<sup>9</sup> <http://www.undp.org/content/undp/en/home/sustainable-development-goals.html>



## 5. Raw Materials and Circular Societies approach and impact

The Circular Societies Lighthouse will achieve its main objectives through the implementation of calls for projects from the operational perspective but also through the development and implementation of strategic actions aiming to get EIT RawMaterials as one of the main European stakeholders contributing to the effective implementation of the transition from linear to circular societies.

EIT RawMaterials has three clear and main strategic objectives:

1. Securing raw materials supply
2. Designing materials solutions
3. Closing Materials loops

This Lighthouse will develop/define/support/boost different type of solutions/initiatives to achieve those main strategic objectives from the perspective of the Circular Societies:

- 1 Securing raw materials supply: the Circular Societies Lighthouse will support this from the secondary perspective /Recycling and industrial waste valorisation.
- 2 Designing materials solutions: the Circular Societies Lighthouse will design solutions to address the whole life cycle in a systemic way, from raw materials supply to materials innovation, advanced materials, products, product-service systems, processes, design of products for circularity, new business models, new policy measures, new taxation approaches, and new education and awareness methodologies.
- 3 Closing materials loops: the Circular Societies Lighthouse will define solutions to close the loop through resource-efficient processing and by keeping materials in the loop for as long as possible using new product design approaches for circularity, recycling, reuse, repair and remanufacturing. This Lighthouse will also engage with students (especially children and young people), consumers of final products and industrial sectors consumers of raw materials.

The implementation of this Lighthouse will have clear and direct impacts on the SD Goals as previously described, but also it will contribute to the achievement of different European initiatives such as the Circular Economy Action Plan, the Zero waste initiative and the Resource Efficient Europe.

## 6. Raw Materials and Circular Societies innovation topics:

As already commented, the Raw Materials and Circular Societies Lighthouse will be implemented through both operational and strategic actions.

Those operational actions will include calls for projects in our Upscaling and Education calls but also in our Business Creation calls. This Lighthouse will specifically develop a call for a Circular Society Prize every year. The focus of this call will change depending of the main requirements in our community and those calls could go from new ideas for business models related to repair, reuse, remanufacturing and shared economy, to technological solutions aiming to achieve resource efficiency in industry and cities.

The operational actions will be driven by a number of specific topics:

1. **Resources Efficiency in the Metallurgical processing:** The Resource Efficiency roadmap developed by the European Commission clearly states that we need to decouple growth from resources use, and the Metallurgical sector is one of the main stakeholders involved in that decoupling process: we need to do more with less.

Resource efficiency is one of the main strategic policy priorities in Europe and globally. The second priority objective of the 7th European Environment Action plan (2003) is “to turn the Union into a resource-efficient, green and competitive low-carbon economy” (European Parliament and the Council of the European Union 2003). Resource efficiency does not only mean using resources efficiently (doing more with less), but reducing the overall environmental burden related to society’s resource use.

New resource-efficient production technologies have significantly helped achieve the targets set out in the EU’s strategies for a resource efficient and competitive low carbon economy. More flexible production units, responding to future consumer needs and with a highly skilled workforce, have made a significant contribution to higher production efficiency. Deployment of technologies to reduce industry emissions have contributed to the reduction of energy and water demand and carbon footprint. The positive impact results in lighter, tailor-made products, lower demand for raw materials and additives, increased by-product valorisation and an overall reduction in waste<sup>10</sup>. However, further efforts should be dedicated to developing/demonstrating solutions focused on the improvement of metallurgical processing, regarding for example process control, resources management, water use efficiency and wastewater treatment, new economically viable refining processing, etc.

2. **Circular products/Design for circularity/recyclability.** The development of these new types of products considering circularity from the design phase is one of the main priorities of EIT RawMaterials. These products will clearly help support the Circular Economy strategy, for example by extending life cycle, making dismantling easier or substituting current materials by more circular ones. One good example of this concept is modular design, a useful strategy for making products easier to repair, remanufacture, and upgrade. By making it easy to remove only part of a product, it becomes easier to disassemble it, thus lowering the cost and effort to swap out components when

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<sup>10</sup> VERAM Roadmap; <http://veram2050.eu>

they are damaged. Additionally, modular systems are easier to customize and therefore adapt to the variable and ever-changing needs of users, preventing products from becoming obsolete and ensuring they are kept in use for long periods of time<sup>11</sup>.

The transition to a circular economy requires better knowledge of the links between products, their underlying business model and the societal infrastructure and governance determining their lifecycle. Dedicated monitoring and analysis to identify key mechanisms and trends will be crucial in this respect<sup>12</sup>.

3. **Tools to support the transition to Circular Society**, circularity assessment and monitoring and LCA improved tools. This is clearly one of the main aspects to be further developed, bringing together experts from the resource efficiency, LCA, water and energy fields. This specific topic was clearly mentioned as a priority in the Resource Efficiency Session of our RawMaterials Summit.

Activities should be targeted to achieve a comprehensive understanding of different sustainability aspects, at the same time allowing easy implementation of the methods. The implementation and interpretation phases should be supported by flexible tools and compatible datasets. Methods and tools should be suitable to address different aspects of sustainability, and to conduct either comprehensive or streamlined studies, depending of the purpose.

Innovative activities will be targeted in further development and standardization of the environmental, economic and social assessment methods and related tools, increasing robustness of the methods and considering possibilities to ease the implementation phase with new tools and automation. In addition, emphasis will be placed on different options to increase data availability, through joint efforts and by finding ways to overcome current technical challenges related to interoperability and incompatibility. The Raw Materials and Circular Societies Lighthouse will also support the development of actions aimed at enabling the flexible integration and implementation of different methods and tools. This would be important for the application of sustainability assessment methods in different decision-making contexts and for addressing the needs of the stakeholders<sup>13</sup>.

4. **Data gathering/Data management tools**. The availability of easily accessible secondary raw materials data will support Europe's position on raw materials supply, with the ability to accommodate more wastes and resources in the future. There is a need to provide data to improve the management of different waste streams and to enhance the resource efficiency of collection, treatment and recycling. A wide range of end-users are addressed, including the recycling industry

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<sup>11</sup> Ellen Macarthur; Circular Design Guide

<sup>12</sup> Circular by Design; EEA (<https://www.eea.europa.eu/publications/circular-by-design>)

<sup>13</sup> SAMT project roadmap, 2016.

(collectors, treatment facilities and processors), producers, producer compliance schemes, policymakers and academia<sup>14</sup>.

This topic will cover, among others, innovation solutions aimed at improving the identification of materials in waste streams; the quantification of stocks and flows; harmonisation, quality and interoperability of data; and knowledge base in materials' recovery and supply.

5. **Recycling of end-of-life products including dismantling, sorting and recovering technologies.** The European Union's economy loses a significant amount of raw materials in current waste streams, due to inadequate collection performance, inadequate sorting and recycling performance.

Effective collection and optimized sorting, dismantling and recovery technologies are essential aspects to be considered to achieve efficient recycling on Europe. Adequate market framework, policies/legislation and adequate design approaches are also relevant factors that the Raw Materials and Circular Societies Lighthouse will also cover through strategy actions and a specific thematic area on design.

Effective collection concerns appropriate, easily available and cost-effective collection systems where user behavior (to be considered through our education activities) has been taken into consideration. For most of the waste streams, well-functioning source separation is a crucial part of the collection system, both with respect to the amounts and the quality of the collected materials/products. To optimize recycling of materials, the realization of effective and flexible sorting and recycling techniques adapted to process-discarded products entering the end-of-life chain is necessary<sup>15</sup>.

Some examples of specific innovation areas to be promoted are: Improve reverse logistics, design of efficient collection systems, optimize sensor-based sorting system, use of robotics in sorting and dismantling, system analysis of treatment strategies, development of information systems within regard to material content (Topic 4).

6. **Industrial waste valorisation/Industrial Symbiosis.** Industrial symbiosis (IS) is a system approach to a more sustainable and integrated industrial system, which identifies business opportunities that leverage underutilised resources (such as materials, energy, water, capacity, expertise, assets etc.). IS involves organisations operating in different sectors of activity that engage in mutually beneficial transactions to reuse waste and by-products, finding innovative ways to source inputs and optimising the value of the residues of their processes<sup>16</sup>.

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<sup>14</sup> PROSUM Project Recommendations Report, 2017.

<sup>15</sup> NewInnonet project SRIA, 2015.

<sup>16</sup> Cooperation fostering industrial symbiosis market potential, good practice and policy actions. Domenech T.; Doranova A.; Roman L., Smith M.; Artola I. 2018

The valorisation of non-scrap metal and mineral waste is gaining momentum with interesting opportunities. Both industry and academia invest in R&D for valorising this important material stream which can be considered as a promising source of secondary raw materials. While for ferrous non-scrap metal and mineral waste applications are predominantly sought in construction, hydraulic engineering and environmental applications, for the non-ferrous metal non-scrap waste the research and valorisation focus tends to be on the recovery of metals. Examples of research avenues are the development and use of geo-polymers, the use of non-scrap metal waste in blended cements, carbonisation for the production of building blocks that can be used in construction applications, as well as energy efficiency. The potential is not only determined by the sheer size of the non-scrap metal waste flow, but also by the availability and proximity of the so-called European urban mine<sup>17</sup>.

Valorisation of industrial wastes in the metallurgical and mineral sectors can clearly reduce the primary resource consumption. The demonstration of new technological and products solutions will support further implementation of this relevant aspect also including reuse of water and extraction of valuable products from wastewaters.

Not only technological solutions could be considered but also other relevant non technological aspects such as modelling, sharing platforms, new skills, regulatory, market, etc. Some of those relevant aspects could be considered in the Education and Business Creation calls of EIT RawMaterials, but also in specific strategic actions (e.g., collaboration with other relevant stakeholders, collaboration with the European Commission, etc).

## 7. Education for Circular Societies

A remarkable variety of education projects has been funded by EIT RawMaterials over the years in the four segments of learning under the RawMaterials Academy auspices. Those listed hereunder are perhaps the most relevant to the Raw Materials and Circular Societies Lighthouse but by no means constitute an exhaustive compilation.

In the higher education landscape, the fully funded two-year master's degrees are among the most visible education projects that have been funded by the KIC. Two of them fall under this Lighthouse. The first is SINReM, an EIT-labelled master program that addresses circular economy thanks to a curriculum focused on material science. In this two-year program students are taken through the entire value chain of raw materials

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<sup>17</sup> Analysis of certain waste streams and the potential of Industrial Symbiosis to promote waste as a resource for EU Industry. Various authors; 2016

and introduced to the challenges of sustainability through the prism of materials engineering. In the new edition of SINReM starting next year, a new mandatory course on sustainable circular cities and a list of elective courses will be added and connected to the activities of the City of Ghent. The second EIT-labelled master is AMIR. It develops a curriculum on materials recycling to educate tomorrow's engineers with a broad knowledge of chemistry at the crossroads between the academic and the applied materials science disciplines, as well as with a solid entrepreneurial flavour.

It is also worth mentioning that a number of projects targeting a wider audience can be found in our portfolio. These differ from the classic higher education paradigm and form, in what is referred to as Wider Society Learning (WSL). For instance, the GAME project developed a digital game for the STEM education of youngsters specifically on recycling topics, with the goal of disseminating recycling knowledge and advantages into the society. The gamification approach has attracted the attention of KIC partners and has been successful among a young audience from 10 to 19. The project SmartPlaCE@Schools also developed creative learning material on circular economy concepts and business models for high school education with the help of a game. This project created a virtual environment hosting the downloadable Risk&Race@Schools game, together with a range of complementary learning materials. In addition, the platform captured feedback from schools on their needs and experiences.

The project RM@Schools has become over the years the WSL flagship of EIT RawMaterials. Its objective is to involve school students under 19 in experiments dealing with raw materials, creating hands-on educational kits and communication activities. All students are introduced to the raw materials topics by experts from the project consortium. Students are then asked to become "Young Raw Matters Ambassadors" themselves and create additional dissemination products. This project attracted the attention of Universities, RTOs and companies and quickly became a remarkable success: only in 2019, around 1500 students across 70 schools have participated to the project and more than 60 teachers have attended the train-the-trainers programme. Today, RM@Schools is extending its activities throughout the ESEE region.

It is of paramount importance to give the new generations the tools to understand circularity in order to create a virtuous cycle whereby not only can we create excitement around raw and advanced materials studies and careers, but also achieve a European-wide impact in society by having an influence on the future behaviour of the European citizen and consumer. Therefore, alongside with other professional training and higher education offers, we will continue to support WSL projects. Along the strategic lines of RM@Schools, wider society projects have to reach out the highest possible number of participants by being rolled-out in every member state, creating adapted pedagogical material translated in every national language. By this means, youngsters will be given the knowledge, the skill set, and even the attitude necessary to understand and face the future challenges of the circular economy. As an ultimate goal, WSL projects have to be fully

accepted and integrated in the national curricula of the states where a significant number of schools have been assembled to form a “raw materials and circular society network”.

## 8. Business Creation for Circular Societies

Across the six thematic topics described above, EIT RawMaterials offers via its different business creation and support activities a fruitful basis to strengthen the entrepreneurial ecosystem around Circular Societies. Business Creation and Acceleration activities are aimed at transforming innovative ideas and projects into new business for existing companies (large and small) as well as through the creation of start-ups and spin-offs.

To reach these goals, all supported upscaling projects need to provide a solid Go-To-Market strategy and demonstrate that they established a new/improved product or service on the market within three years after the end of a KAVA project, and the creation of a start-up or spin-off is one solution to reach this goal. This is an attractive opportunity within this Lighthouse, e.g., for outsourcing the collection and dismantling activities from the core business of a recycling company. Moreover, it is recommended that all projects assess the life cycle of their product and evaluate the environmental and social impact of their solution.

To make Europe competitive in the long term, an entrepreneurial culture needs to be established throughout Europe. A key goal is therefore to create an entrepreneurial mind set among students, especially by helping graduates from EIT labelled MSc and PhD programmes to turn their business ideas into business models and start-ups. The EIT RawMaterials Jumpstarter programme offers initial training in business modelling to idea holders and research teams. At the end of the program, three winners (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> prize) in the category recycling and circular economy will be awarded and supported to strength their business idea and get in contact with relevant EIT RawMaterials partners in their sector.

In all the specific thematic topics mentioned above, EIT RawMaterials has supported start-ups in the past and will continue to do so in the coming years. In the start-up scene, the buzzwords “green”, “circular”, “climate friendly” and “sustainability” are trending at the moment, and these topics are promoted via many existing initiatives. Compared to the other Lighthouses, the creation of a new business related to the topics covered by the Circular Societies Lighthouse seems to be very appealing to start-ups, because especially the digital data management tools and sharing economy models are less CAPEX and OPEX intensive. However, there is also a growing number of tech driven start-ups, developing new processes for material recovery as well as new design solutions and circular products.

In the framework of the Start-up and SMEs Booster programme, EIT RawMaterials helps early stage companies to validate their business models and to connect them to the partner network. Combined with a financial support, this enables them to move faster and establish collaborations with strategic partners. This is essential in activities related to recycling and circular economy, as start-ups need to work across the value chain.

The programme “U-Start – Go circular” in collaboration with Veolia addresses all the Lighthouse topics with a changing annual focus. Promising start-ups receive the opportunity to test and validate their solution in the industrial environment of a strong player in recycling and receive mentorship from EIT RawMaterials and Veolia. Similar Co-Creation actions are envisaged with other EIT RawMaterials partners.

More mature start-ups receive support via the EIT RawMaterials Accelerator. This programme improves the success rate of market entry of scalable start-ups, focusing on addressing market risk. The Accelerator also includes coaching and instructions on a pan-European level to partners of EIT RawMaterials. The RawMaterials Accelerator supports scientists, researchers and entrepreneurs in developing their concepts for raw materials innovations into market-ready products and services.

Overall, the number of supported start-ups and the investment attracted by these start-ups will increase during the coming years. The Lighthouse will define the framework and reach a broader number of idea holders, as they will be attracted by additional awards (e.g., Circular Society Prize) and events. On the other hand, the Lighthouse will help define strategic areas (white spots) for the selection process, in order to create as much value and impact as possible for Europe and its raw materials sector.

## 9. Raw Materials and Circular Societies Lighthouse strategic actions

The Raw Materials and Circular Societies Lighthouse will include a relevant number of operational actions dealing with Upscaling projects, Education, Business Creation etc. as previously mentioned. However, this Lighthouse will also include a relevant number of strategy actions aiming to promote EIT RawMaterials as one of the most relevant stakeholders in the field of Circular Economy. Some of these strategy actions include:

- Initiate and strengthen collaboration with industrial associations (e.g., Sustainable Process Industry through Resource and Energy Efficiency (SPIRE), Factories of the Future (FoF)) on the circular economy.
- Initiate contacts with city associations such as ICLEI, Eurocities, ACR+ to define possible collaboration on education, business creation, etc.



- Strengthen the existing collaboration with the European Commission (DG Grow, EASME, DG Environment, DG RTD, DG Regio, JRC) on Circular Societies. Collaborate on different aspects related to Circular Economy initiatives as for example the European Environmental Technologies Verification Program, the BREF documents, policy development, a task force to coordinate activities related to Circular Cities, etc.
- Integrate existing and new databases on the circular economy in the RM InfoCenter.
- Coordinate a Cross KIC initiative (including EIT RawMaterials, EIT Climate KIC, EIT Digital, EIT Food, EIT Manufacturing and EIT Urban Mobility) on Circular Economy collaboration, aiming at strengthening collaboration between the different KICs and at creating a common voice from the KICs community.
- Strengthen collaboration with other relevant European stakeholders as for example EREK (European Resource Efficiency Knowledge Centre), European Urban Agenda, European Circular Economy Stakeholder Platform.
- Create an internal Task Force composed by representatives from all the internal groups (Education team, Business developers, CLC Managers, Senior Advisors, Management) to support an effective and efficient implementation of this LH.