

Deliverable report

Deliverable no./title: 8.7 SLO methodology for CREAToR
Lead beneficiary: ITRB
Nature of deliverable: Report
Dissemination level: PU – Public
Due date: 31.03.2023

Grant Agreement number: 820477
Project acronym: CREAToR
Project title: Collection of raw materials, Removal of flAme reTardants and Reuse of secondary raw materials
Funding scheme: H2020-SC5-2018-2019-2020
Coordinator: FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.
Project Website: www.creatorproject.eu

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CREATOR CONSORTIUM

PARTICIPANT NUMBER	ABBREVIATION	ORGANISATION
1	ICT	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung – Institut für Chemische Technologie
2	VLB	Volbas S.A.
3	MOS	Machinefabriek Otto Schouten BV
4	CLR	Coolrec BV
5	REL	Treee SRL
6	GKR	Fundacion Gaiker
7	TCK	Transfercenter für Kunststofftechnik GmbH
8	RMA	Erema Engineering Recycling Maschinen und Anlagen Ges.m.b.H
9	CTB	Centre Scientifique & Technique De L'industrie Textile Belge
10	MAI	Maier S. Coop.
11	DAW	DAW SE
12	CYC	Cyclefibre S.L.
13	CID	Fundacion Cidaut
14	KLU	Kühne Logistics University GmbH
15	OVM	Openbare Vlaamse Afvalstoffenmaatschappij
16	RWE	RWEnergia Robert Wudarczyk
17	ITB	ITRB Group LTD

DOCUMENT HISTORY AND CONTRIBUTION OF THE PARTNERS

Version management

VERSION NR	REVISER	CONTENT
V0	ITB	Deliverable template
V1	ITB	First draft
V2	ICT	Revision

Partners' contribution to the deliverable

PARTNER	SHORT NAME	ROLE IN THE WP	CONTRIBUTION TO THE DELIVERABLE
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Transfercenter für Kunststofftechnik GmbH	TCK	Contributor	Organised one of the training programmes
Kühne Logistics University GmbH	KLU	Contributor	Organised one of the training programmes
Rest of the partners		Contributors	All the partners collaborated in the events and contacted different stakeholders.

ABBREVIATIONS

BFRs	Brominated flame retardants
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EoL	End of Life
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HBCD	Hexabromocyclododecane, a brominated flame retardant
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HRB	Horizon Results Booster
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LCCA	Life cycle cost analysis
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LCSA	Life cycle sustainability assessment
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PCMI	Plastic Circularity Multiplier Initiative
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QA	Quality assurance
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QC	Quality control
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QMS	Quality management system
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QS	Quality system
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SDGs	Sustainable Development Goals
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SLO	Social license to operate
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1 INTRODUCTION AND DELIVERABLE'S OBJECTIVE

The CREAToR project is focused on process and material development and demonstration to sort and remove hazardous, already banned bromine-containing flame-retardants from waste streams using continuous sorting and purification technologies: LIBS technology for sorting and supercritical CO₂ and natural deep eutectic solvents (NADES) for continuous extraction in twin-screw extruders.

To achieve these objectives, CREAToR will cover the whole value chain, starting with the collection of thermoplastic waste streams from building and construction and from electrical and electronic equipment. The project will implement ways to identify the presence of hazardous flame retardants and to sort the polymer material accordingly, to remove these contaminants from the materials and finally to reuse the materials in new applications.

Brominated flame retardants (BFRs) are a large group of substances used in several products to prevent fire hazards. Due to the abundance, low cost and high performance of bromine, brominated flame retardants (BFRs) have had a significant share of the market for years. Some BFRs are toxic and pose a risk of causing adverse effects to human health and the environment. They are capable of long-range transport, persist in the environment and in foods, and bioaccumulate in human and animal tissue.

As case studies, the purified polymeric materials will be reused as valuable secondary raw materials for new B&C insulation panels, for automotive interior applications, and for producing 3D-printed parts for aerospace applications to increase the acceptance of the recycled materials and show their contribution to the circular economy.

To further increase the economic feasibility of the approach, an optimised logistic concept and a harmonised material quality classification scheme will be developed and applied. CREAToR will develop a circular economy solution, transforming waste streams that are currently incinerated into value-bringing secondary raw materials. The economic viability of CREAToR will be validated through material benchmarking and the assessment of the whole value chain and its costs, resulting in next generation products.

The objective of this deliverable is to contribute to the increase of consumer acceptance of recycled products. To achieve this objective, a "social license to operate" toolkit has been developed. This has been implemented and validated in CREAToR, so for each recommendation examples from the project have been included to show how the implementation can work in practice.

This social license to operate methodology includes a methodology on sustainable business practices, a local community protocol, and a training program.

2 SOCIAL LICENSE TO OPERATE

2.1 DEFINITION

A social license to operate (SLO) refers to a company's informal agreement with its stakeholders, including local communities, to act in an ethical and responsible manner. The SLO encompasses a company's reputation, community support, and acceptance of its operations and activities. It is based on the understanding that the company will comply with legal requirements and also consider the social and environmental impacts of its operations. A strong SLO can contribute to the long-term viability and success of a company, while a lack of it can result in opposition, delays, and negative publicity.

2.2 METHODOLOGY

Developing a social license to operate for a new recycling process involves engaging and collaborating with key stakeholders to gain their support and approval for the process. The following steps should be taken:

1. **Identify key stakeholders:** This includes the community, government, environmental organisations, industry associations, suppliers, customers, and employees.

During the CREAToR project, members of the consortium were in contact with different stakeholders in order to share knowledge (dissemination and communication), through their involvement in various initiatives (NONTOX initiative¹ and Innovation Forum²) and through their participation in events with different types of stakeholders. The main stakeholder events are summarised in chapter 2.3, and more information is provided in the reports D8.8 (M18) and D8.9 (forthcoming in M46) as well as the CREAToR webpage³.

In addition to these events, the consortium carried out several surveys to obtain impressions and information from different types of stakeholders:

- In task 1.4 Analysis of recycling operators' conceptions & beliefs for and about harmonized material codification scheme/smart labelling system, CREAToR collected the impressions of recyclers about the implementation of different labels in their cycle⁴.
- In task 1.6 Definition of European legal, process and "end users'" limitations using recycled polymers in new products and regulatory gaps including input into standardization processes, a survey was carried out concerning the barriers to using plastic recyclates⁵. The deliverable 1.8, which summarises the results of this survey, is publicly available, and can be consulted on the project webpage from April 2023.
- In task 5.1 Mapping of best practices for reverse cycle logistics, information was collected and interviews conducted to obtain an overview of the reverse cycles for different end-of-life products from the collection of the waste until the use of the secondary raw material.

The main stakeholders contacted are:

- Recycling companies: Recycling companies may be interested in a new recycling process as it may provide them with a new opportunity to expand their business or improve their existing recycling operations.

1 https://creatorproject.eu/wp-content/uploads/2022/01/HRB_Nontox_PolicyBrief_CREATOR-October2021.pdf

2 <https://theinnovationforum.eu/>

3 <https://creatorproject.eu/publications/>

4 <https://www.creatorproject.eu/wp-content/uploads/2021/08/D1.4-Analysis-of-recycling-agents-conceptions-beliefs-on-SLS-methodology.pdf>

5 <https://creatorproject.eu/creator-launches-survey-on-barriers-to-use-plastic-recyclates/>

- **Waste generators:** Waste generators, such as households, businesses and industries may also be stakeholders, as they are the primary sources of waste that can be recycled using the new process. CREAToR contacted stakeholders from different sectors related to the project work (including automotive, building & construction, aircraft) and also unrelated sectors (hotels, packaging).
- **Consumers:** Consumers who are concerned about the environment may be stakeholders in a new recycling process, as they may be interested in supporting companies and products that promote sustainability. The waste generators in CREAToR are the consumers of the recyclates generated.
- **Regulatory bodies:** Regulatory bodies may also be stakeholders, as they may be responsible for ensuring that the new recycling process meets regulatory requirements and standards.

2. Understand stakeholder concerns: Conduct research to understand what matters most to stakeholders, such as environmental impact, safety, job creation, and economic benefits.

As the CREAToR project encompasses the closed cycle of plastic material contaminated with brominated flame retardants, different points in the cycle were discussed, including the needs of recyclers, the traceability of materials, regulatory issues, and the needs of end users of the recycled/purified material.

The studies carried out in the tasks explained above helped the consortium to better understand the problems that can be found in the recycling cycle and develop results based on these insights.

3. Engage stakeholders: Develop a communication strategy that outlines how you plan to engage stakeholders and share information about the new recycling process. Use a variety of methods such as public meetings, social media and surveys to gather feedback.

During the first months of CREAToR, a communication plan was developed for the duration of the project. The targeted audience was selected by leveraging the presence of all partners in several innovation, clustering and industry-related fora, as well as the specific network of all consortium partners.

An Industrial Exploitation Board was established, i.e. a group of companies from different sectors that helps CREAToR to understand the industrial recommendations for CREAToR end of life (EoL) valorisation.

4. Address concerns: Use stakeholder feedback to address concerns and make changes to the recycling process if necessary. This will demonstrate that you are taking their input seriously.

During the project, the need arose to collect first-hand information from stakeholders. For example, a survey was sent by email and uploaded to the internet for different stakeholders to provide opinions on the barriers preventing the use of plastic recyclates, as described above. The outcome of this survey was reported in D1.8 Report of process and end users' limitations and regulatory gaps, in March 2023⁶.

Moreover, CREAToR served as a stakeholder for other associations, providing its own perspective on the recycling process. For example, CREAToR contributed to the EU Zero Pollution Action Plan⁷. This report gives an overview of the contribution of selected Horizon 2020 projects to the nine flagships of the Zero Pollution Action Plan. Moreover, CREAToR collaborated with the projects NONTOX and PLAST2bCLEANED in a public consultation on the regulation of persistent organic pollutants⁸. It also published a white paper on legacy flame retardants in polymeric products, recycling and analysis⁹.

5. Provide benefits: Highlight the benefits of the new recycling process, such as reducing waste, creating jobs, and promoting sustainability. This will help gain support and approval from stakeholders.

⁶ Can be later downloaded at the CREAToR webpage [Publications – CREAToR \(creatorproject.eu\)](https://creatorproject.eu/publications) and in the European Commission's database Cordis [Collection of raw materials, Removal of flame reTardants and Reuse of secondary raw materials | CREAToR Project | Results | H2020 | CORDIS | European Commission \(europa.eu\)](https://cordis.europa.eu/Collection-of-raw-materials-Removal-of-flame-retardants-and-Reuse-of-secondary-raw-materials-CREAToR-Project-Results-H2020-CORDIS-European-Commission-europa.eu)

⁷ [Horizon projects supporting the zero pollution action plan - Publications Office of the EU \(europa.eu\)](https://ec.europa.eu/publications/horizon-projects-supporting-the-zero-pollution-action-plan-publications-office-of-the-eu-europa.eu)

⁸ [PoP-Regulation.pdf \(creatorproject.eu\)](https://creatorproject.eu/PoP-Regulation.pdf)

⁹ [CREAToR-comment-to-legacy-flame-retardants-in-polymeric-products-recycling-and-analysis.pdf \(creatorproject.eu\)](https://creatorproject.eu/CREAToR-comment-to-legacy-flame-retardants-in-polymeric-products-recycling-and-analysis.pdf)

CREAToR's partners presented the results of the project and its benefits in various types of events. The main benefit is the purification of some plastics from toxic flame retardants. Moreover, if more materials can be reused in the circular economy, fewer primary resources will be needed.¹⁰

A life cycle assessment (LCA) is being developed to evaluate the environmental impact of the CREAToR cycle (sorting, purification process and production). This report will be confidential, but the report D6.1 Life cycle Inventory can be found on the CREAToR webpage. Moreover, the report D 6.6. Eco-toxicity roadmap, which reports the environmental risks of the recycling chain of the CREAToR project, will also be uploaded on the CREAToR webpage¹¹.

6. **Build trust:** Establish trust with stakeholders by being transparent about the process, providing regular updates, and addressing any issues that arises in a timely manner.
7. **Monitor and evaluate:** Continuously monitor and evaluate the recycling process to ensure that it meets stakeholder expectations and complies with regulations.

The CREAToR project set up a management structure and procedures (outlined in the project's Grant Agreement) to monitor and evaluate the progress of the project. All partners reported their results and their expenditure twice per reporting period (i.e. approximately every 9 months).

In CREAToR we developed a qualification assurance system. This system comprises the procedures for the companies that implement the purification process to maintain the quality during the process. This system has been developed during the project and has been presented in 3 confidential deliverables to the European Commission. An explanation of the system is provided in the report D1.4 Analysis of recycling agents' conceptions & beliefs on SLS methodology, which can be found on the CREAToR webpage¹².

¹⁰ [News – CREAToR \(creatorproject.eu\)](https://creatorproject.eu/news)

¹¹ [Publications – CREAToR \(creatorproject.eu\)](https://creatorproject.eu/publications)

¹² [CREAToR D1.4 Analysis of recycling agents' conceptions & beliefs on SLS methodology \(creatorproject.eu\)](https://creatorproject.eu/creatord14-analysis-of-recycling-agents-conceptions-beliefs-on-sls-methodology)

2.3 STAKEHOLDER EVENTS

The CREAToR project and its results have been presented at multiple events throughout the project duration. In the following section, an overview is provided of the events whose main objective was not only to present the initiatives (projects, technologies) but also to connect different stakeholders and allow an exchange of feedback.

Information about the events that the project has attended can also be found in the news section on the CREAToR website¹³.

2.3.1 CREAToR'S PLASTIC RECYCLING WORKSHOP

The plastic recycling workshop took place on Tuesday, 10th of March 2020 at the Kühne University in Hamburg and in parallel online for participants who already weren't able to travel due to the COVID-19 outbreak. The workshop hosted 21 participants in total from Spain, Italy, Belgium and Germany; 7 joined the workshop in Hamburg and 14 joined the meeting online. Besides the project partners, 7 representatives from external companies attended included recycling companies, academics and consultants (s. Figure 1).



Figure 1 Plastic recycling workshop entrance

The workshop, organised by the CREAToR consortium, had two main topics:

- Supply chain design in recycling
- Plastics labelling & codification systems

The main contribution to the project was the selection of the type of label to develop in the project. Summarising, two initial types of smart labels were proposed within the consortium: one for the entry of waste into the sorting facilities that could help with the classification of the input stream, and a second label for the materials that were sorted as the output stream for a second application.

The first (material label for the input into sorting) was discarded after several meetings were held with recycling companies that are part of CREAToR's consortium and after conversations with the stakeholders in this event.

2.3.2 NONTOX INITIATIVE

Supported by the European Commission's Horizon Results Booster (HRB), CREAToR has established a deep and solid collaboration with 4 other EU-funded projects in the field of plastics: NONTOX, Circular Flooring, Plast2bCleaned and React. As a result, an initial policy brief was issued as a joint approach to recycling and eco-design, enabling the transition to the circular economy with advanced eco innovation technologies, processes, products and services.

The policy brief was presented during the Innovation Forum 2nd Edition in December 2021. This will form the basis of a second policy brief, which will be elaborated under the leadership of CREAToR with a group of participants from projects (Plast2bCleaned NONTOX, Circular Flooring and REMADYL) using a physical dissolution recycling technology, like CREAToR's purification process.

¹³ [News – CREAToR \(creatorproject.eu\)](https://creatorproject.eu/news)

The 1st policy brief was published in the web site and was well-received on LinkedIn. The 2nd policy brief will be upload in CREAToR website in May 2023.

2.3.3 PLASTIC CIRCULARITY MULTIPLIER INITIATIVE (PCMI)

The Plastics Circularity Multiplier Initiative is composed of 21 innovation projects which aim to boost European efforts towards a circular economy for plastics. The initiative seeks to improve value chain collaboration and create cross cooperation between EU projects. The initiative sees the participation of other Horizon 2020 projects in the field of plastics circularity:

CIRC-PACK, Circular Flooring, CREAToR, DECOAT, FiberEUUse, HARMONI, iCAREPLAST, ISOPREP, MultiCycle, NONTOX, PlastiCircle, polynSPIRE, PReSmart, REACT, REMADYL, REPAIR3D, SMARTFAN and TERMINUS

2.3.4 INNOVATION FORUM

The Innovation Forum is a permanent cluster of projects, set up by ITRB, aiming to create and foster synergies between H2020 projects, and encompassing the topics of raw materials scarcity, the development of new processes and the circular economy. In 2022 the PCMI became part of this forum.

The forum consists of more than 21 projects and over 200 organizations. 13 H2020 projects participated in its initial meeting, along with representatives from ITRB, ADMIRIS, SINTEF, MIP, NTNU, AoG, PNO Consultants, Vito, LOMARTOV S.L., NTUA, including stakeholders in mining, construction and the automotive sectors who aimed to explore commercial opportunities.

The 2nd edition of the Innovation Forum was held in Brussels in December 2021 in the offices of NTNU within a hybrid (physical / online) format due to the COVID 19 situation. CREAToR was present through ICT and CTB presentations in a session fully dedicated to plastic processing. The 2nd edition of the Innovation Forum was attended by more than 60 people connected on-line and 20 people in physical format.

2.3.4.1 INNOVATION FORUM 4 PLASTICS

When ITRB took the lead of the PCMI, it decided to organise an Innovation Forum dedicated only to plastics and plastic recycling.

The first Innovation Forum4Plastics was held in Mallorca on 13th and 14th October 2022. At TIRME's Headquarters, the Forum hosted 10 projects funded by H2020 and Horizon Europe, local initiatives related to plastic management and representatives of two municipalities - Artà and Sant Llorenç des Cardassar - together with the Council of the Island.

The second Innovation Forum 4Plastics was held in Brussels on 15th March 2023. The main sessions of this event were: Policy, R&D (for high-quality plastics, in the transport sector, in the building & construction sector, in food packaging, in bioprocesses and in the biobased materials sector), and upscaling (s. Figure 2).



Figure 2 2nd Innovation Forum4Plastics in Brussels

2.3.5 ONLINE INDUSTRIAL STAKEHOLDERS' EVENT

ITRB is organising an online event for potential industrial stakeholders who are interested in the purification technology or other solutions developed in the project. The main guests will be the members of CREAToR's Industrial Exploitation Board.

ITB, together with ICT, in the framework of task 6.6 (Framework, Industry and Policy Recommendation) has established a CREAToR Industrial Exploitation Board. In the first and second period the airplane recycling companies MoreAero, ICL (which later became insolvent) and AELS as well as the recycling association Plastics Recyclers Europe joined the board. In the General Assembly meeting held in Austria (4-5 April 2022),

new members were proposed and a vote was carried out to approve their invitation to the board by the consortium. In this event, we will present this SLO to the stakeholders.

2.4 TOOLKIT FOR SLO

2.4.1 METHODOLOGY ON SUSTAINABLE BUSINESS PRACTICES

Sustainable business practices are actions allowing a company to create a positive impact on people, society, and the environment while also making a profit. Sustainability is an essential part of social and environmental responsibility in business today and it is a necessary step toward preserving our planet for future generations.

The methodology for promoting sustainable business practices has different steps:

Define sustainability goals: Identify the specific sustainability goals for your organisation, such as reducing carbon footprint, conserving natural resources, or improving waste management practices.

Recycling is one of the best known ways to help the environment. Recycling has the potential to save raw material resources in significant amounts. If one recycling company implements CREAToR's purification process, it will help to improve the plastic recycling material rates.

Recycling contributes to several Sustainable Development Goals (SDGs) set by the United Nations:

- Goal 12: Responsible Consumption and Production - Recycling promotes responsible consumption and production by reducing waste and conserving resources. By recycling materials, we can reduce the amount of waste that goes to landfills and conserve natural resources such as trees, water, minerals and, in the case of polymers, crude oil and its derivatives.
- Goal 13: Climate Action - Recycling can help to reduce greenhouse gas emissions by reducing the need for extracting and processing raw materials. Recycling also reduces the energy required to manufacture products, which can further reduce carbon emissions.
- Goal 14: Life Below Water - Recycling can help to reduce marine pollution by reducing the amount of waste that ends up in oceans and other bodies of water. This can help to preserve marine life and ecosystems.
- Goal 15: Life on Land - Recycling can help to preserve natural habitats and reduce the destruction of forests and other ecosystems. By reducing the need for extracting raw materials, we can help to protect natural habitats and promote biodiversity.
- Goal 8: Decent Work and Economic Growth - Jobs in the recycling industry can contribute to economic growth and development.
- Goal 9: Industry, Innovation and Infrastructure - Recycling promotes innovation by encouraging the development of new technologies and processes for recycling and resource conservation.
- Goal 11: Sustainable Cities and Communities - Recycling can help to promote sustainable cities and communities by reducing waste and promoting resource conservation. This can lead to cleaner, healthier, and more livable communities.

Conduct a sustainability assessment: Evaluate the organisation's current practices and performance in terms of sustainability. This will help identify areas for improvement and determine the impact of changes.

Develop an action plan: Based on the results of the sustainability assessment, develop an action plan that outlines the steps to be taken to improve sustainability. This should include specific targets, timelines, and accountability measures.

Implement sustainable business practices: Implement the changes outlined in the action plan, such as reducing energy consumption, reducing waste, or increasing recycling. This may require changes to business processes, employee practices, or the adoption of new technologies.

Monitor and measure progress: Regularly monitor and measure the progress made towards sustainability goals, using key performance indicators (KPIs) and other metrics. This will help ensure that the organization remains on track and can make necessary adjustments along the way.

The action plan described in these four points could be set up by a recycling company (early adopter of the purification process) based on the following work carried out in CREAToR:

1. The life cycle sustainability assessment (LCSA). This refers to the evaluation of all environmental, social and economic negative impacts and benefits in decision-making processes, with the aim of achieving greater sustainability of products throughout their life cycle. The methodology for LCCA in CREAToR was performed using the SimaPro and MATLAB softwares. The sources of data considered are also identified, and the sub-processes that have the greatest impact on the economic performance of the overall process have been highlighted. The final reports are confidential, but a report on the life cycle inventory can be found on CREAToR webpage¹⁴.
2. The quality assurance system (QAS) for the purification process. A QAS ensures that a product or service meets the required standards and specifications, which increases stakeholder confidence and trust in the product or service. More information about this system can be found in D1.4 Analysis of recycling agents' conceptions & beliefs on SLS methodology¹⁵.
3. CREAToR's labelling system (Figure 3). The purpose of the labelling is to certify that the recyclers maintain a quality and safety system throughout their processes. Moreover, the QR code on the label contains information on the characteristics of the recycled material. More information on the label system can be found in D1.3 Smart labelling system methodology report¹⁶ and D1.6 Smart labels for the materials utilized within CREAToR¹⁷.



Figure 3 Recycled plastic label code for 3D-filament and for automotive components

Engage employees and stakeholders: Encourage employee engagement and involvement in sustainability initiatives and communicate the organisation's sustainability goals and achievements to stakeholders.

By engaging employees and stakeholders, a recycling company can promote a culture of sustainability and build strong relationships with its stakeholders. This, in turn, can lead to increased participation in recycling programs, improved recycling processes, and a more sustainable future.

Work on this issue could take account of the information collected in the following chapters: a local community protocol and a training program.

Continuously improve: Continuously assess and improve sustainability practices, incorporating new ideas and technologies as they become available. This will help ensure that the organisation remains at the forefront of sustainable business practices.

The improvements CREAToR made have not been limited to the outcomes of the project. The results obtained will be used in future projects that will further improve the purification process and other technologies, such as LIBS (laser-induced breakdown spectroscopy).

¹⁴ [CREAToR deliverable D6.1 \(creatorproject.eu\)](https://creatorproject.eu)

¹⁵ [CREAToR deliverable D1.4 \(creatorproject.eu\)](https://creatorproject.eu)

¹⁶ [CREAToR deliverable D1.3 \(creatorproject.eu\)](https://creatorproject.eu)

¹⁷ [CREAToR deliverable D1.6 \(creatorproject.eu\)](https://creatorproject.eu)

Collaborating with other organisations and stakeholders can help to promote engagement and broaden the impact of the company's recycling initiatives. This can include partnering with other recycling companies, non-profit organisations and government agencies.

Moreover, CREAToR has been developing a policy brief which also collected future needs for research on the CREAToR cycle. This policy brief will be included in the report D8.10 CREAToR Policy Brief, which will be uploaded on the CREAToR webpage at the end of the project.

2.4.2 LOCAL COMMUNITY PROTOCOL

A local community protocol to increase consumer acceptance of recycled products could include several key components:

1. **Education:** Providing educational resources and workshops to inform the community about the benefits and importance of using recycled products, including their impact on the environment and the local economy.

This is critical for promoting sustainability and protecting the environment. By educating the community, we can help to create a more sustainable future and build a better world for generations to come.

CREAToR has organised 2 educational events to promote plastic recycling:

- Summer School on Plastic Recycling
- Bootcamp on sustainability & plastic recycling

More information on these two events is provided in section 2.4.3 Training program.

2. **Collaboration:** Engaging local businesses, organisations, and government agencies to collaborate on promoting and selling recycled products, creating a supportive network for the community.

CREAToR has worked to create a support network for the purification process. The CREAToR consortium has attended multiple events to promote the work and results of the project.

There are some tasks which center on the stakeholders:

- ITRB, together with ICT, in the framework of task 6.6 (Framework, Industry and Policy Recommendation) have established a CREAToR Industrial Exploitation Board. This comprises companies from different sectors: aircraft, plastic recycling associations, 3D printing companies, automotive and recycling sectors.
- The Innovation Forum 4Plastics held in Mallorca had two objectives: to present the results of European projects and local initiatives related to plastic management. Moreover, the event was attended by representatives of two municipalities.

3. **Marketing and promotion:** Developing effective marketing campaigns and promotional events to increase awareness and encourage the use of recycled products among consumers.

One of the most effective ways to promote a new recycling technology is to highlight its benefits. This could include emphasising how the technology helps to reduce waste, save resources, lower costs, and improve environmental sustainability.

To open the discussions and have a wider audience in LinkedIn, ITB created the company profile of CREAToR (<https://www.linkedin.com/company/69154126>).

The company profile in LinkedIn is now followed by 338 LinkedIn members. Its continuous (and focused) posting gives a high visibility to the project.

Figure 4 shows the type of stakeholders that are interested in CREAToR's results.

[CREAToR video explainer – CREAToR \(creatorproject.eu\)](#)

[CREAToR's smart labelling – CREAToR \(creatorproject.eu\)](#)

4. **Incentives and rewards:** Offering incentives and rewards to consumers who purchase recycled products, such as discounts, promotions, or recognition programs.

These incentives have not been used in CREAToR but there are multiple examples in Europe. In some Spanish autonomous communities, there are machines that use the system called reverse sale. It consists of paying the citizen for recyclable materials received.

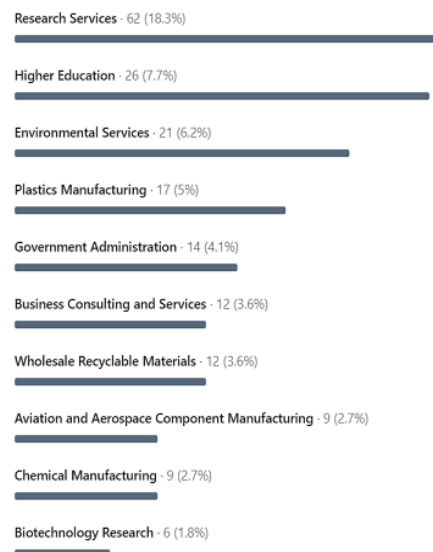


Figure 4 LinkedIn follower demographics: Type of industry

A similar system is RECiCLA by ECOEMBES, an app in which the user takes pictures of the materials in front of the corresponding color container. Thus, money is accumulated that can be paid to a bank account. Other example is the Pfand system, implanted in Germany, in which supermarkets pay citizens to recycle. This system is very similar to the Spanish system, i.e. it is also based on reverse sale.

- 5. Product availability:** Ensuring that a wide variety of high-quality recycled products are readily available in local stores and online.

CREAToR has presented various demonstrators to show the applicability of recycled materials. For example, Figure 5 shows the CREAToR recycled materials presented in the last Innovation Forum 4 Plastics on March 15 2023 in Brussels¹⁸.

- 6. Quality standards:** Implementing and enforcing quality standards for recycled products, so consumers can be confident in their quality and performance.

In the CREAToR project, a new process was developed for the purification of thermoplastic materials containing brominated flame retardants. CREAToR's process, not yet introduced to the market, is not covered by any industry standards. Because of this, an internal quality standard was created for this new process: a quality assurance system (QAS) which was reported in 3 confidential deliverables.

This system is proposed to certify that the necessary procedures will be established for recycling organisations that implement the purification process developed in CREAToR¹⁹. These procedures will be based on the quality procedures followed by the partners during the project.

- 7. Feedback and continuous improvement:** Gathering feedback from consumers, businesses, and other stakeholders on the effectiveness of the protocol and continuously improving it based on their input.

This point is common to all the tasks involving stakeholders. Feedback from consumers and stakeholders is crucial for businesses to understand their impact on society and the environment. By actively seeking feedback and implementing changes, businesses can improve their operations, build stronger relationships with customers and stakeholders, and ultimately become more sustainable and socially responsible.



Figure 5 CREAToR demonstrators.

¹⁸ [Innovation Forum – Sharing & shaping innovation \(theinnovationforum.eu\)](https://theinnovationforum.eu)

¹⁹ [CREAToR deliverable D1.4 \(creatorproject.eu\)](https://creatorproject.eu)

2.4.3 TRAINING PROGRAM

In this chapter, the guidelines for organizing a training program and examples from the CREAToR project are included. The CREAToR project developed 2 training programs to improve consumer acceptance of recycling and recycled products.

2.4.3.1 HOW TO ORGANISE A TRAINING PROGRAM

The training program can be delivered in different formats, such as a workshop, seminar, or webinar, and can be customised to meet the specific needs and interests of the target audience.

- **Introduction:** Explain the importance of recycled products in reducing waste and protecting the environment, and set the context for the training.
- **Understanding the barriers:** Discuss common barriers to the adoption of recycled products, such as perceptions of quality, price, and availability.
- **The benefits of recycled products:** Highlight the environmental and economic benefits of recycled products, such as reducing the use of raw materials and energy, and lowering greenhouse gas emissions.
- **Product awareness:** Provide an overview of the types of recycled products available, including their features and benefits.
- **Understanding the recycling process:** Explain the steps involved in the recycling process, from collection to processing and manufacturing, and demonstrate how recycled products are made.
- **Marketing recycled products:** Discuss effective marketing strategies for promoting recycled products, such as product labeling and advertising.
- **Overcoming consumer objections:** Address common objections to recycled products, such as concerns about quality, and provide examples of recycled products that are high quality and perform well.
- **Encouraging adoption:** Offer practical tips for encouraging consumers to adopt recycled products, such as offering incentives, demonstrating the impact of their choices, and promoting product availability.
- **Closing and action planning:** Sum up the key points of the training and encourage participants to develop an action plan for promoting recycled products in their local community.

2.4.3.2 CREAToR SUMMER SCHOOL ON PLASTICS RECYCLING

From 12th to 14th of July 2022, Transfercenter für Kunststofftechnik organised a summer school for interested students (Figure 6) on the topic of plastics recycling in Linz, Austria. About 20 participants took part in the programme with lectures, factory visits and a live demonstration of a recycling plant. The different approaches to mechanical and feedstock recycling were discussed.



Figure 6 Image of a class during the summer school

The course included lectures on the following topics:

- Why are plastics used in so many applications?
- How does plastics' recycling work in general?
- What are the different possibilities for recycling?
- How do logistics and supply chains work for recycling?
- How to get plastics back to products? = How to reuse plastics in new products?
- What is the legal and regulatory framework?

2.4.3.3 BOOTCAMP IN SUSTAINABILITY & PLASTIC RECYCLING

The bootcamp from 5th – 7th October 2022 was focussed on “improving plastic packaging recycling” in Hamburg, Germany. The students’ task was to challenge the current recycling system and to come up with ideas to increase the quality of recycled plastics. They were asked questions about how to improve the plastic recycling process from start to finish, meaning from product design and supply chain management to the use of the materials. Experts from the field presented the necessary input and support while students developed new solutions.

The event was organized by CREAToR, specifically the project partners Kühne Logistics University, Erema Engineering Recycling and Fraunhofer ICT. During the first day, students learnt in lectures and discussions with experts about the state of the art of plastics recycling. During the next two days, they had the opportunity to develop new ideas on how to improve plastic packaging recycling by trying to solve an important real-life case study presented by industrial partners. In addition, students had the chance to network and get an insight into career perspectives and learn about studying at Kühne Logistics University (s. Figure 7).

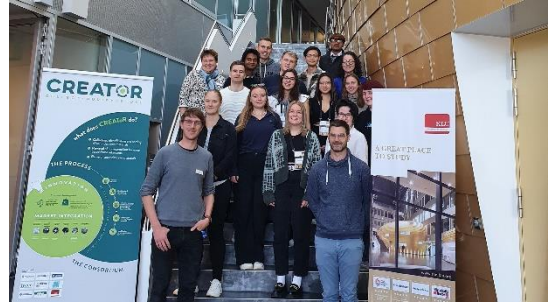


Figure 7 Bootcamp assistants at Kühne Logistics University

3 CONCLUSION

Conducting a social license to operate (SLO) assessment is crucial for a recycling company as it helps to evaluate its relationships with the community, stakeholders, and the environment. It provides a framework for understanding the expectations, concerns, and needs of these groups and identifying opportunities for collaboration and improvement.

Once the SLO assessment is completed, the company can draw conclusions about its current social license status and make necessary changes to improve it. Here are some potential conclusions that a recycling company might make after conducting an SLO assessment:

- **Strengthening relationships:** The SLO assessment might reveal that the company needs to strengthen its relationships with the community and stakeholders. This could involve engaging in more meaningful dialogue with these groups, listening to their concerns, and working collaboratively to address their needs.
- **Improving sustainability:** The SLO assessment might highlight areas where the company can improve its sustainability performance. This could involve reducing its environmental impact, increasing its recycling rates, or investing in renewable energy.
- **Addressing social issues:** The SLO assessment might reveal that the company needs to address social issues that are important to the community and stakeholders. This could involve implementing fair labour practices, promoting diversity and inclusion, or supporting local social programs.
- **Enhancing communication:** The SLO assessment might suggest that the company needs to enhance its communication efforts. This could involve developing more transparent and accessible reporting systems, providing regular updates to stakeholders, or creating a communication strategy to promote its sustainability initiatives.

Overall, a social license to operate assessment helps a recycling company to understand its social and environmental impact, identify areas for improvement, and strengthen its relationships with stakeholders. By addressing the concerns and needs of these groups, the company can build a more sustainable and socially responsible business model that benefits both the company and the community.