



R2.1

Comprehensive analysis of qualification needs
within the market and educational offer



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Glossary of terms, abbreviations and acronyms

Abbreviation / Acronym / Term	Description
CE	Circular Economy
CHAINS	CHallenges INnovation teams. Collaborative teams of students of the PackAlliance post-graduate programme to work on a specific industry challenge
EACEA	Education, Audiovisual and Culture Executive Agency
HEI	Higher Education Institution
PackAlliance Hubs	Physical places where the academia-industry collaboration within the project will take place
WP	Work Package

Partner shortname	
P1-Campus Iberus	Partner 1 - Campus Iberus (Spain)
P2-Ecoembes	Partner 2 - Ecoembes (Spain)
P3-AGH	Partner 3 - AGH University of Science and Technology (Poland)
P4-Synthos	Partner 4 - Synthos Group (Poland)
P5-TAMK	Partner 5 - TAMK Tampere University of Applied Sciences (Finland)
P6-Pyroll	Partner 6 - Pyroll Group (Finland)
P7-Proplast	Partner 7 - Consorzio per la promozione della cultura plastica - Proplast (Italy)
P8-UNISA	Partner 8 - Univeristà degli Studi di Salerno (Italy)

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1. Introduction

The report summarises the results of the research on market trends, examples of innovative solutions, educational offer, and national and regional strategies and policies. The report aims to analyse and structure:

- Market trends, innovations and challenges in the context of transition into the circular economy within the plastic packaging sector,
- Educational and training offer, as well as resources and qualifications offered by the HEI of the partner countries of the project in the context of a circular economy, applied to the plastic packaging sector.
- Inclusion of the CE and educational & socio-economic components related to CE, especially in the context of plastic industry in regional, national and European policies and strategies.

PackAlliance (funded by Erasmus+ Knowledge Alliance programme in 2020-2022) intends to contribute to modernising the Higher Education curricula by enhancing its alignment with the labour market needs of Plastics Packaging. The Knowledge Alliance project brings together academic and industry partners from Spain, Poland, Finland, and Italy to foster Academia-Industry collaboration for Innovation and competence building in innovative and sustainable packaging. This is seen as a nuclear element for the transition to the Circular Economy within the plastic industry.

The structure of the report is the following:

Chapter 1 Introduction

Chapter 2 Observed Market Trends and Innovations

Chapter 3 Education and training offer

Chapter 4 National and European policies and strategies

The report focuses on showing the primary data, which was collected from the project partners based on their research made on the plastic packaging sector. The data will be used as a basis for the development of the Post-Graduated Study Programme as a main outcome of the PackAlliance Project.

2. Observed Market Trends and Innovations

The study aims to identify the existing solutions and match them up with the leading market trends and innovations in the plastic packaging sector.

2.1. Market Trends

The aim was to identify the key solutions aligned to the market trends in the plastic packaging sector, which support the transformation towards CE. All partners in Spain, Poland, Finland, and Italy have researched the market trends basing on the data gathered by the Observatory for Future Packaging and its promoter – Ecoembes. The observed innovative solutions were grouped into six particular market trends, defined by Ecoembes as follows:

1. Use of recycled plastics with improved economics and quality
2. Reusable packaging
3. Redesign packaging for small-formats such as lids, caps, tear-offs, etc. that usually escape collection and sorting systems and are not reused or recycled.
4. Innovation in materials and reprocessing technologies for multi-material packaging with inseparable layers of different materials
5. Replace uncommon plastics packaging materials like PVC and others
6. Use of compostable plastics for targeted applications (such as nutrient-contaminated coffee capsules, organic waste bags, takeaway food packaging) to help recover nutrients or packaging contents

In most of the cases, it is not possible to fully distinguish the scale of the implementation, which can be either introduced globally or on the national level. Multi-national consortia often take the leading role in setting the trends in the plastic packaging sector. The total number of examples found in a given area of observed market trends is presented in Figure 1.

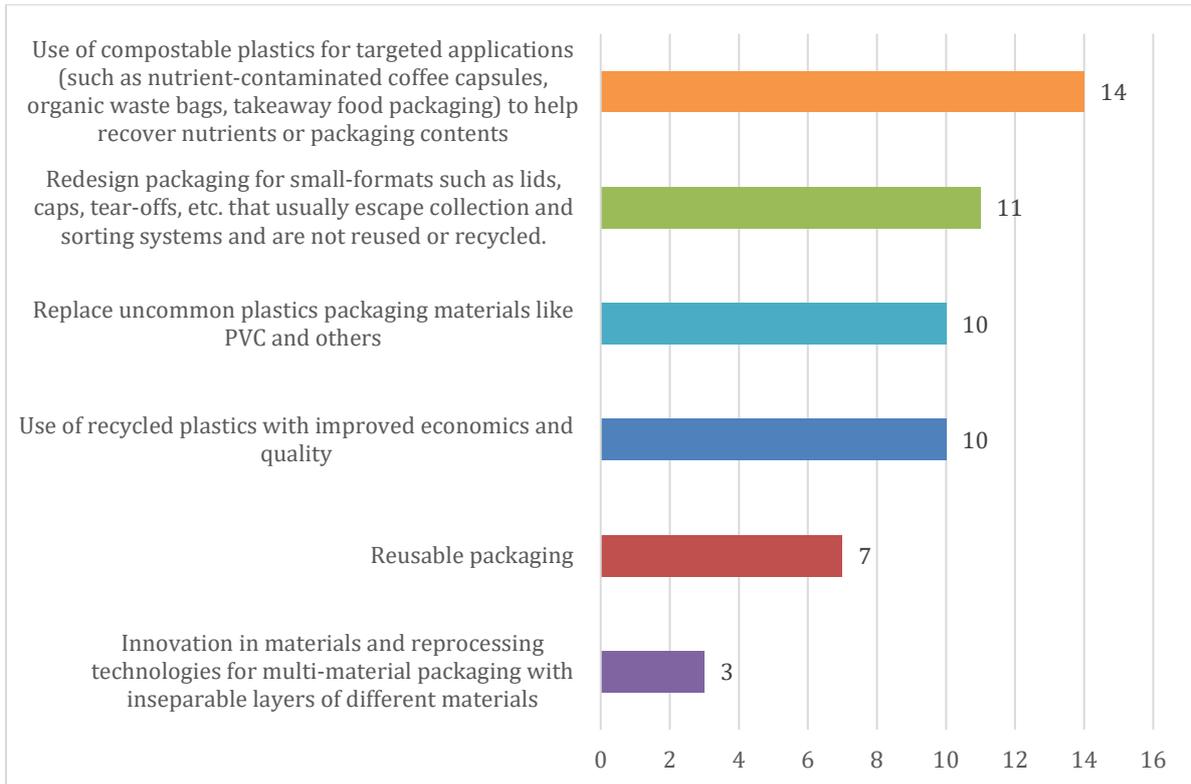


FIGURE 1 - The total number of the solution aligned with market trends

2.2. Innovations

The next step of the analysis was identifying the national innovations in the plastic packaging sector. Each Partner finds out two innovative solutions each per following areas: product, process, service, business model, marketing, architectural, social. Each example had to be developed on a country scale. Additionally, the innovative solutions were grouped into four leading thematic group such as 1) New materials and bio-based materials, 2) Eco-design and novel manufacturing processing, 3) Citizen interaction & eco-marketing, and 4) Residue management and valorisation. (Figure 2)

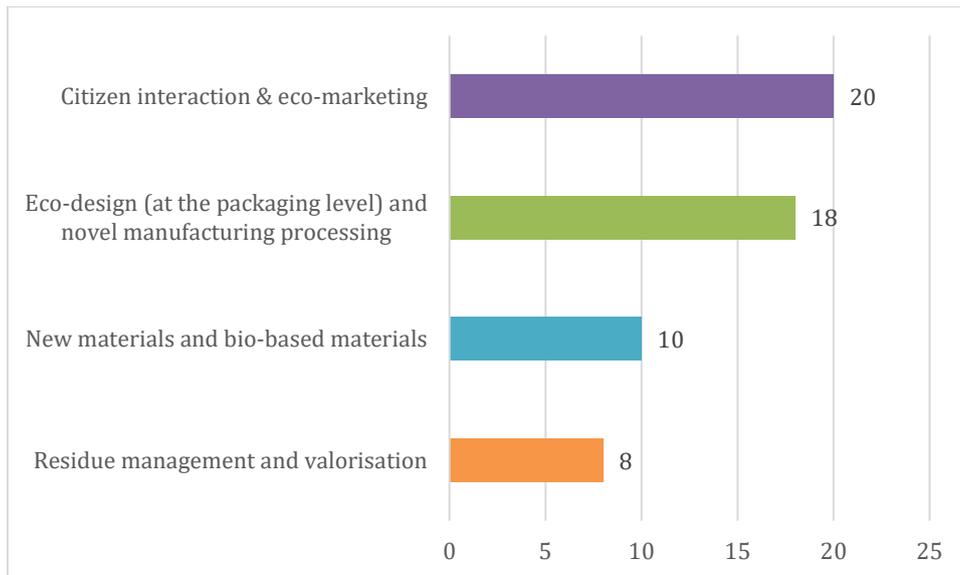


FIGURE 2 - Innovative solutions grouped into four areas identified by Project Partners within the project.

2.3. Conclusions

Project partners analysed 55 examples of innovative solutions and products aligned with market trends (2.1) and 56 cases of country-level innovations (2.2.). Based on the gathered data, it is possible to step back and define a specific set of skills and competences, that is required from the perspective of potential employees, by the employers and labour market along with the policies related with the Circular Economy approach. The development of the plastic packaging sector may be boosted by extending the educational offer, which will aim to close the gap between the needs of the market, and skills, that potential employee are equipped with. The comprehensive analysis of the challenges in the HR sector will be provided in the section of *Characterisation of emerging professionals' profile*.

3. Education and training offer

To define the educational offer for the field of plastic packaging and circular economy, it was necessary before to identify and compare the Higher Education Systems itself. In the next step, based on the more detailed research done by partners on general education on CE on the level of HEI's. The primary goal of the research was to analyse the educational offer on plastic packaging according to the development of CE. Additionally, it was possible to highlight the good practices in educational practice related to that field.

3.1. Comparison of HEI's in Poland, Finland, Italy and Spain

The higher education institutions have an independent position concerning the state, and curriculum planning is the responsibility of individual institutions. However, The Higher education qualifications are referenced to the National Qualifications Framework as well as in the European Qualifications Framework. The frameworks, which are functioning in the European Higher Education Area were established as one of the tools within the Bologna Process in order to compare the learning outcomes and boost academic mobility. Regardless of that, in each country HE systems are different and those differences are necessary to be understood and taken into consideration before developing the study programme, as a result of the project. In Table 1 it was presented the comparison of the tertiary education in Finland, Italy, Poland and Spain

Table 1 - The specification of HEI in Finland Italy, Poland and Spain

	Finland	Italy	Poland	Spain
Types of Universities	<ul style="list-style-type: none"> - 13 universities -22 universities of applied sciences - Private universities are not officially recognised 	<ul style="list-style-type: none"> - 67 state universities (of which 9 are higher schools, or institutes, Called „special system higher schools”); - 29 non-state universities (of which 11 are online universities). 	<ul style="list-style-type: none"> - 130 public universities, - 262 non-public universities 	<ul style="list-style-type: none"> - 50 universities, -34 private universities (29 on-site teaching and 5 distance teaching).
Types of institution offer higher education	<ul style="list-style-type: none"> Universities of applied sciences have extensive autonomy and freedom of education and research. Universities of applied sciences are independent legal entities and make independent decisions on matters related to their internal administration. An 	<ul style="list-style-type: none"> - Universities (polytechnics included) - High level Arts and Music Education institutions (Alta formazione artistica e musicale - Afam) - Higher schools for language mediators (Scuole superiori per 	<ul style="list-style-type: none"> -university-type - non-university-type 	<ul style="list-style-type: none"> - university education - Advanced vocational training Specialised education, which includes advanced Artistic education, professional Plastic Arts and Design studies, and

	<p>operating license granted by the Government is required before any party can establish and manage a university of applied sciences.</p> <p>The basic task of the universities is to engage in scientific research and provide the highest level of education based on it.</p> <p>Universities promote lifelong learning, interact with society and promote the societal impact of research results and artistic activities.</p>	<p>mediatori linguistici - SSML)</p> <p>- Higher technical institutes (Its)</p>		<p>advanced Sports education.</p>
Number of Students	<p>293 000 degree students. (In universities of applied sciences over 140 000 students and in universities over 152 000 students.)</p>	<p>Total enrolled 2018/2019: 1 690 834</p> <p>Total graduated 2019/2019: 317.792</p>	<p>901801 in public universities</p> <p>328453 . Non-public universities</p>	<p>Enrolled: 1 575 579 students were enrolled in undergraduate,</p>
Bachelor's degrees	<p>24 500 Bachelor's Degrees(In universities of applied sciences) and 13 500 Bachelor's degrees (Universities)</p>	<p>Three-year first level degree (Laurea or Bachelor):</p> <p>Enrolled: 1,106,885; graduated: 186,549</p>	<p>437785 Bachelor degree, technical degree</p>	<p>Enrolled: 1,291,144 undergraduate students</p>
Master Students	<p>3 100 master level degrees. (In universities of applied sciences) 15200 Master's degrees (Universities)</p>	<p>Second level master's degree (Laurea Magistrale)</p> <p>Enrolled: 340,743; graduated: 98,649</p> <p>Single cycle (5 or 6 years cycle Master's degree)</p> <p>Enrolled: 311.867; graduated 40.274</p>	<p>164398 of master student</p>	<p>Enrolled: 205,049 master students</p>
Doctoral Students	<p>1800 Completed number of doctoral degrees</p>	<p>Enrolled: 28.635 students who have achieved the title: 33.754</p>	<p>Enrolled: 39269 doctoral students</p>	<p>Enrolled: 79,386 doctoral students</p>

Source: <http://ustat.miur.it/dati/>, <https://anagrafe.miur.it/php5/home.php>, https://eacea.ec.europa.eu/national-policies/eurydice/content/types-higher-education-institutions-39_en, http://www.stat.fi/til/akop/tau_en.html, http://www.stat.fi/til/yop/tau_en.html, <https://www.ciencia.gob.es/stfls/MICINN/Universidades/Ficheros/Estadisticas/datos-y-cifras-SUE-2018-19.pdf>, <https://stat.gov.pl/obszary-tematyczne/edukacja/>

3.2. *Education on CE in HEI's*

The education on CE is crucial for the development of sustainable solutions for the economy, environment and society. Therefore, it is important to provide the knowledge, that is need to boost and understand the upcoming transformation and enable learners to be well prepared. The CE education has various aspects which are, among the others: waste management, eco-design, bio-economy, sustainable consumption and production, resource efficiency. In order to support the development of these fields, it is crucial to set the mechanisms which ensure the multidisciplinary skills and competencies required, which are reflected in the study programmes.

The education on CE is closely connected with sustainable development. Therefore, often subjects/modules/programmes that are being taught, already contain some of the elements of the CE. Educational offer in that field, provided by HEI's is often related to the level of advancement of CE implementation on the local, regional, national level.

In each country, the development of education in the field of CE varies from each other. Therefore, each Partner was requested to answer on two questions related to CE educational offer in their country:

- Is it common to have plans concerning CE in HEI's? (how many courses about CE are introduced in the universities)
- Usually in which type of the universities the CE courses are introduced?

In the next step of the analysis, each country has described in its response up to ten examples from courses/modules/programmes from each country (Poland, Spain, Italy, Finland) related to CE. Where course/module was defined as: education that is offered by HEI's in respective countries that is related to the CE in form of a subject, module within the study programmes or the study programme itself. Described examples have to be provided within the undergraduate/bachelor and master studies.

3.2.1. *Characteristic of the education on CE in HEI's in Finland, Italy, Poland and Spain*

In Finland, circular economy education starts in day care, where children think about reducing food waste and learn how to sort waste correctly, and it continues through primary and secondary school all the way to higher education. Along the way, children learn about materials, business activities, the significance of art and about using personal skills and knowledge when enacting the change towards a circular economy society.

The education of future experts and raising the knowledge and skills of us all are prerequisites for the breakthrough of the circular economy. The Finnish Innovation Fund Sitra and the Ministry of Education and Culture are working to ensure the availability of future circular economy experts by determining the current status of education at various academic levels, by defining the skills needed and the supply of education. The objective is to introduce circular economy teaching to the courses offered at universities, universities of applied sciences and vocational schools in order to supplement major studies in as many orientations as possible.

Here a study of the degree programmes in Finnish universities and universities of applied sciences has been carried out. It reveals that in general, circular economy as such is not necessarily visible in most HEI's in Finland and is often connected to the sustainability goals. On the other hand, both universities and especially the universities of applied sciences have recognised the importance of circular economy and it is often seen as a cross-sectional factor in curricula of various degree programmes which also reflects the systemic nature of the circular economy.

In the study, CE-related courses or study modules were found, for example, in the fields of Economics, Environmental Law, Science, and Engineering. Most courses related to the CE were found in the degree programmes of Energy Technology, Chemical Engineering, or Environmental Sciences. Most of the contents and skills related to circular economy were connected to courses or course modules dealing with sustainability or bioeconomy but also on for example, life cycle analysis and waste management or recycling.

The modules provided for studying circular economy are often multidisciplinary undergraduate elective courses in subject studies, or post-graduate programmes. The course contents were not directly aiming at addressing the CE in packaging or plastic materials industry. The modules provided for studying circular economy are often multidisciplinary undergraduate elective courses in subject studies, or post-graduate programmes. The course contents were not directly aiming at addressing the CE in packaging or plastic materials industry.. Tampere University of Applied Sciences offers a master level post-graduate programme Risk Management and Circular Economy. In addition, the LUT university also provides a Master's programme of circular economy. Tampere University offers a multidisciplinary circular economy minor as do a consortium of Aalto University, University of Helsinki, LUT University, Oulu University, UEF University, who have a multidisciplinary study module in circular economy. The 3UAS (Haaga-Helia, Laurea, and Metropolia) offer a Bachelor's level circular economy for sustainable growth study module as part of their Circular Economy Learning Lane. Another example how sustainability is connected to the CE is the Sustainability Studies – cross faculty minor subject offered by the Åbo Akademi University. The CE is connected to leadership for sustainable change in a MOOC provided by the University of Helsinki, Tampere University, and the Open University of Helsinki. Another MOOC, CIRCULAR now concerning the CE is provided by LUT University, University of Helsinki, Aalto University, and University of Eastern Finland. Examples of degree programmes containing embedded circular economy

studies include the Degree Programme in Bioeconomy Engineering and Sustainable Development, both provided by Häme University of Applied Sciences.

In the Italian university system, both public and private, the presence of courses of study regarding sustainability or the circular economy is increased in the last few years as demonstrated by the 37 courses dedicated to sustainable development, 9 of which launched in the last year. With a trend that continues to rise. Considering the 22 activation requests that University of Salerno have sent to the National University Council (Cun) and which will also be examined by Anvur, in 2020/2021 sustainability could characterise 59 degrees. When they were 17 ten years ago.

It is worthy to note that the education offer with the key word “sustainability” is characterised by a marked transversally, so much so that it can be found sustainability in the degree classes of the agricultural, food, biotechnological, biological, chemical, economic, engineering, architecture and tourism areas. On the other hand, although sustainability and circular economy are two very close concepts, it is less common to find degree curricula centred on the “circular economy”.

However, an important aspect to consider is that the courses of study dedicated to these topics are provided mainly within the socio-economic and biologic-agricultural areas and quite less often in science and technology. Namely, only one study programme of Master’s degree course (laurea magistrale) with the name of “Circular Economy” was found.

Furthermore, taking into consideration the educational offer of post-graduate programmes i.e. the university masters training courses (for both first and second level graduate students), even in this case it is very difficult to find specific paths on the circular economy.

From the analysis conducted, it appears that most of training courses on CE are provided by public universities in the context of economics or management engineering courses. Similarly, the offer from private universities falls within the management schools and is provided in the form of first or second level Masters (Post graduate programmes).

In Poland, educational offer, that is related to CE is usually provided on the universities of science and technology. Only one bachelor degree related to the field was found on Silesian University of Science and Technology. Only a few universities in Poland provide the courses directly related to the subject of CE such as AGH University of Science and Technology, University of Gdańsk, Silesian University of Science and Technology and Wroclaw University of Environmental and Life Sciences. The AGH University of Science and Technology as one of the first universities recognised the need of the CE provision within the courses in different field of studies. Respective faculties offer those: Faculty of Management, Faculty of Non-Ferrous Metals and Faculty of Energy and Environmental Engineering. Besides that, the two examples of post-graduate programmes were found, respectively on Cracow University of Science and Technology and Silesian University of Science and Technology. It has to be pointed out that other universities also provide the courses and training with elements of CE

as a part of the courses related to waste management, sustainable development and energy management.

For Polish HEI's, there are no statistics that would measure the development of the courses related to subjects associated with the concept of CE or sustainable development. There only one statistic was found, which shows the results of evaluation based on SDG's in three areas: research, outreach and stewardship. In these lists, there were five polish universities, respectively University of Gdańsk, University of Warsaw, AGH University of Science and Technology, Gdańsk University of Technology, Wrocław University of Science and Technology. In parallel, through the analysis of the educational offer, it is seen that Polish HEI's recognised the importance of education in the area of the circular economy. Nevertheless, the development of educational activities in regards to CE require more internationalisation and interdisciplinarity. The example of the project that aims to fulfil those needs is: RMsManager – project co-funded by EIT RawMaterials which seeks to develop the education programme on the area of CE

A study of the degree programmes in the areas of Economics, Science, Engineering and Design has been carried out in the fifteen main Spanish universities according to the U-ranking of the BBVA Foundation considering both performance and volume. The result of this study has shown that the contents and skills related to CE are scarce in the programmes. This deficiency is greater in Economics and Science studies. Only a few CE topics have been found in a couple of Economics programs in the introductory subjects. There are subjects on sustainability in the syllabus of Chemical Engineering and Environmental Sciences degrees. Subjects related to sustainability were also found in several engineering programmes, although they were optional subjects in most cases, for instance on life cycle analysis and design for sustainability.

University studies in circular economy itself are usually post-graduate programmes, and in no case, they are aimed at the packaging or plastic materials industry. In this sense, six examples have been found, of which only two of them correspond to official master's degrees: The Polytechnic University of Madrid master's degree in Circular Economy and Waste Management, which is implemented in face-to-face modality and the master's degree in Circular Economy by the University of Burgos, which is a blended programme.

The Campus Iberus consortium plans to offer a master's degree in Circular Economy for the next academic year 2020-21, and the International University of Valencia (private university) offers a master's degree in Circular Economy and Sustainable Development, but it is pending verification for official status.

Finally, and regarding other kinds of titles, information about a non-official master's degree by the Polytechnic University of Madrid on Circular Economy and Waste Management was found but it seems not to be currently offered. In addition, the Polytechnic University of Catalonia offers an Expert course in Circular Economy: Principles of Sustainability, which is an own, non-official title

3.1.2. Conclusions

In the sub-chapter, project partners analysed 44 courses/subject/modules/programmes related to the CE education, respectively in Finland, Spain, Italy and Poland. It is commonly seen that courses are provided on the Faculties related to economy and science. The CE courses are mostly seen as modules that contain general knowledge and are often not strictly related to the main scope of study programmes. In every out of four analysed countries, only few examples of the post graduated programme can be found. (Fig. 3)

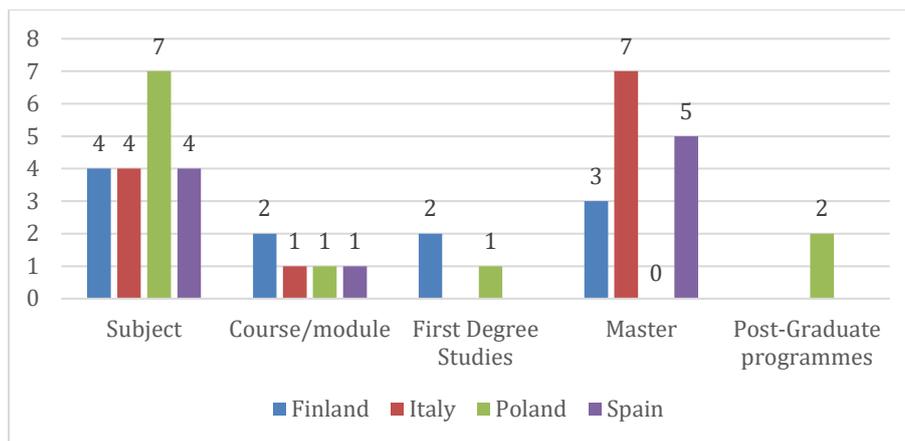


FIGURE 3 - The total number of subjects/modules/programmes by country

The idea of circular economy is closely related to the concept of sustainability. Therefore, a lot of courses about environment management consist of the elements of the CE. Fig. 4 presents whether the main subject of the courses taken into account during the analysis is strictly on CE or rather only related to CE.

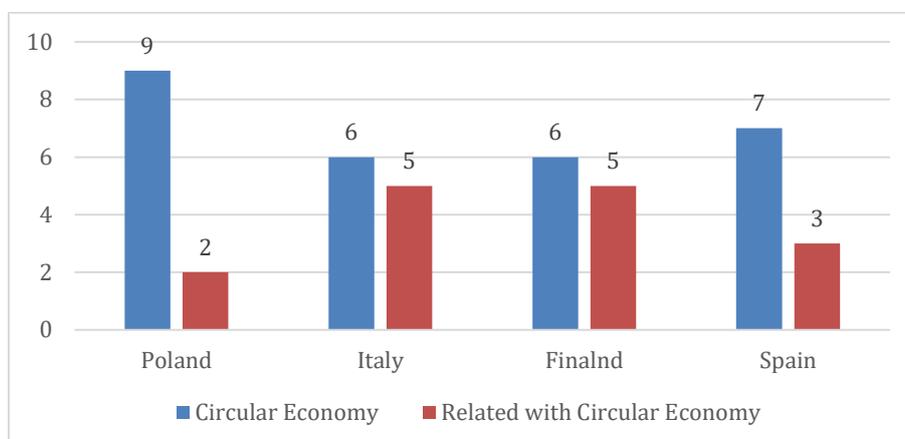


FIGURE 4 - The total number of subjects/modules/programmes focused directly on CE and closely related to CE.

3.3. Education Offer provided by HEI's on plastic packaging

Project Partners have researched the educational offer through the examples of programmes/ courses/modules or certain parts of the subjects that are related to the plastics, CE in plastic industry, packaging, plastic packaging, sustainable development of the plastics industry, plastic packaging on CE.

The data from 50 examples of the subject/course/modules/programmes were collected (Annex 4). The main focus of the analysis was the research on the intended learning outcomes of the education offer. Through the review, the learning outcomes related to four thematic areas of the project, namely: New materials and bio-based materials, Eco-design and novel manufacturing processing, Citizen Interaction & eco-marketing, Residue management and valorisation were chosen (Tab.2).

Table 2 - Learning outcomes based on the education offer in Finland, Italy, Poland and Spain

Intended Learning Outcomes
New materials and bio-based materials
<p>The students:</p> <ul style="list-style-type: none"> • know how to develop resources for the presentation of these concepts and their launch to the market, also in terms of the interpretation and development of their packaging and distribution needs - identify the technical specifications in the product sheet, detailing their environmental impact and facilitating the evaluation of the sustainability strategy to be implemented - know and select different advanced polymeric and composite materials and their manufacturing processes in the field of packaging - apply knowledge of the functional properties of polymeric materials to applications in the field of packaging - identify the most suitable materials for food packaging, - Understand materials research and development in academia and industry, with aptitude to grasp the economic and environmental effects of new materials - can appreciate the role that fibres, polymers and materials derived from them, play in sustainable development. - will: have a deep understanding of the fibre and polymer value chain, from raw material to customer-specific end products - will acquire skills related to operations and packaging technologies for the maintenance of food quality. <p>The students has:</p> <ul style="list-style-type: none"> - Ability to select shapes and materials for packaging design. - Ability to carry out three-dimensional design and plans for the packaging of the product being designed - Ability to carry out the specification of containers and packaging - Ability to develop new polymer or cellulose-based material systems and related processes with specifications that require integration of knowledge from different fields that provide e.g. technical, food packaging, health and safety, environmental, economic and industrial constraints - Ability to evaluate materials properties and to understand engineering possibilities and limitations of new materials. These include composites, hybrid, biomimetic and nanomaterials, and active, functional, responsive and smart materials for sensing, actuation and self-repair - Ability to develop new polymer or cellulose-based material systems and related processes with specifications that require integration of knowledge from different fields that provide e.g. technical, food packaging, health and safety, environmental, economic and industrial constraints.

<ul style="list-style-type: none"> - Ability to develop new polymer or cellulose-based material systems and related processes with specifications that require integration of knowledge from different fields that provide e.g. technical, food packaging, health and safety, environmental, economic and industrial constraints - Advanced laboratory skills to test and analyse polymer materials, and to design experiments for polymeric materials of a practical problem, or for a new material.
Eco-design and novel manufacturing processing
<p>The student:</p> <ul style="list-style-type: none"> - apply the principles associated with efficient packaging design - evaluate the main parameters in the framework of the design of a specific package and its application and interpretation to real environments - know machines for the production and processing of packaging materials - acquire useful knowledge to design the packaging, also evaluating the regulatory and economic aspects with increasing attention to the recovery of packaging and the environment - understand the role of packaging in the food industry, will learn the main characteristics and performances of food packaging materials, the legislation on food-contact materials - learn to look at design objects in a variety of ways from the perspectives of the packaging industry as well as brands and customers - Interpret and define specifications that consider regulations and standards related to the legal environment of packaging - Design plans related to the eco-design of packaging to minimise environmental impact. - Implement packaging and packaging manufacturing and printing processes, as well as incorporate the most appropriate packaging technologies - have knowledge about the methods of production of packaging materials <p>The student has:</p> <ul style="list-style-type: none"> - Ability to apply European regulations to the design of containers and packaging. - Ability to select shapes and materials for packaging design. - Ability to carry out three-dimensional design and plans for the packaging of the product being designed - Ability to design, manage and operate polymer transformation processes and equipment, and determine their influence on the quality and cost of the product obtained -
Citizen interaction & eco-marketing,
<p>The student:</p> <ul style="list-style-type: none"> - understand the link between a social and cultural context and the products that are part of it, and the way they are related and influenced - aware of the importance and understanding of non-technical aspects and effects of engineering activities in the field of plastics, including their impact on the environment, and the related responsibility for the decisions taken - understand the importance of an industrial operating environment and good working life skills - operate in a commercial environment, but also to know how to consider people social and ethical needs as well as the ecological needs of the environment. - get a complete picture of the packaging sector as well as networking with other packaging professionals <p>The student has:</p> <ul style="list-style-type: none"> - Ability to evaluate sustainability issues concerning polymers from renewable resources and biodegradable polymers - Ability participate in the social discussion of issues related to materials technology, considering the requirements of users, technology, society and the environment. -
Residue management and valorisation.
<p>The student:</p> <ul style="list-style-type: none"> - have the knowledge of recycling and recovery of polymer materials. Principle 3/4 R. - have basic knowledge of environmental protection using different plastic materials production technologies, methods of material recycling and possibilities of reuse. - have a basic knowledge of the life cycle of plastic structures in terms of the materials and manufacturing techniques used and understands the material causes of wear or damage to the structure <p>The student has:</p>

- Ability to recognise the most suitable materials for the products to be packaged
- Ability to evaluate the regulatory and economic aspects with increasing attention to the recovery of packaging and the environment

Source: Based on internal investigation of the Partner through educational offer

Based on the input, the gap analysis was conducted by each partner country:

- Finland

According to the study, in Finland HEI programmes on Circular Economy are scarce, at present, LUT University provides a major and Tampere University a minor in CE. These programmes are not specifically targeted to the needs of plastic packaging industry. Several universities and universities of applied sciences have CE embedded in their curricula as cross-sectional to versatile subject areas, from the economics, management, economy, and engineering to social sciences. The CE is very often related to sustainability and bioeconomy. In Finland, especially the Finnish Innovation Fund Sitra and the Ministry of Education and Culture have provided with financial support for promoting the various levels of CE education and for example, a great number of education materials has already been developed and will be published later this year (2020). It was shown here that the higher education offer specialised in plastics and packaging is scarce and at present, no majors or minors are available. However, educational offer for plastics and packaging can be often found as separate courses in several HEI's in Finland. The Finnish Packaging Association provides a packaging course but that may be beyond reach due to the costs. The target group for the course is merely packaging professionals than students. Therefore, there is a need for new education offer combining plastics, packaging, and CE. Of the four thematic areas described in this project, residue management and valorisation, as well as citizen interaction and eco-marketing seemed to be the least appreciated themes in the syllabi studied, whereas eco-design and processing, and new materials and biomaterials were more clearly recognisable and might be also applicable for the plastics packaging sector.

- Italy

The educational offer in Italy in the fields of "Polymeric food packaging" and "Circular economy" are really few. The specific topics of interest for the project are almost completely absent. Furthermore, the subjects "food packaging" and "polymeric materials" are often present as course modules in many degree or master's degree courses. In particular, the subjects "polymeric materials" or "polymer technology" are present in various degree courses in the field of Chemistry, Chemical Engineering, Mechanical Engineering or Management Engineering. The subjects "packaging" or "food packaging", are typical course modules in the "Food Technologies" or "Agricultural Sciences" degrees (both, first level or master's degrees). In these courses, the general aspects related to polymer process technologies, synthesis and Characterisation of properties are discussed, the food contact issue, regulatory aspects. There is no specific mention of sustainability, eco-design, communication or circular economy. From the analysis of the examined programs, it can be seen that only general information or just in

terms of hints about these aspects are present. This strongly justifies the need in Italy to think about training courses which deal specifically with circular economy, sustainability and eco-design in the field of polymer packaging.

- Spain

In Spain, university programs on Circular Economy are scarce and have a general scope, and in no case, they are aimed at the plastic packaging industry. In relation to the educational offer specialised in packaging, as it has been shown, it is in private hands and although the programmes are very interesting from a practical-applied point of view, they are not available to everyone. This social gap of access could be solved by the programme that will be developed and implemented as a result of this project. There is also a lack of international mobility in these programs and in their internships.

Furthermore, although the concepts of sustainability and circularity are present in the two private post-graduate degrees mentioned, they do not constitute the focus of the program. The focus is more on management and logistics. On the other hand, these programs are not specific to plastic packaging.

In general, in the description of their syllabus there is not enough information to affirm that contents of great relevance for the adaptation of the plastic packaging industry to the new scenario of circularity and sustainability demanded by society and regulations are deeply approached. It seems necessary to delve into issues such as the eco-design of plastic packaging using new materials and recycled materials as they are trending topics in the plastic packaging market. For instance, there are not specific modules about the Characterisation of bio-based materials, their advantages and limitations, their regulation. Also, contents related to citizen interaction and eco-marketing, and residue management and valorisation seems insufficient.

- Poland

Based on the provided analysis, there is a lack of sufficient educational offer, which is related to the plastic packaging as a part of the subject/ course/modules/programmes of the circular economy. However, when this is the case, those specific curricula on plastic packaging are mostly offered by Chemical Engineering, Material Engineering and Industrial Design Departments. There are also a few courses about plastic packaging in the food industry. The analysis of syllabuses has shown that programmes are focusing mostly on the polymer process technologies, methods of production of packaging, technological processes. In the economic studies, Master Studies programme related to packaging was found; however, there is no subject related to the environmental aspects.

Education in the field of plastic packaging concentrates on the area of Eco-design (at the packaging level) and novel manufacturing processing and New Materials and Biomaterials. There is a lack of sufficient pressure put towards residue management and valorisation, as

well as citizen interaction and eco-marketing within the subject/course/modules/programmes. Therefore, it is necessary to emphasise the importance of interdisciplinary education, which will be provided on the post-graduate programme of plastic packaging.

3.4 Conclusion

Based on the analysis of educational offer in Finland, Spain, Poland and Italy, there is a visible lack of subject/modules/programmes related to plastic packaging on CE.

Due to the gap analysis, it can be concluded that:

- In summary, it seems that in the area of citizen interaction and eco-marketing, and residue management, there are no sufficient education offers;
- Majority of the courses related to the plastic packaging were included in the programmes related to Chemistry, Chemical Engineering, Mechanical Engineering;
- The space for development can be notice in the context of international academic mobility.
- Educational offer for plastic packaging can be often found as separate courses in several HEI's

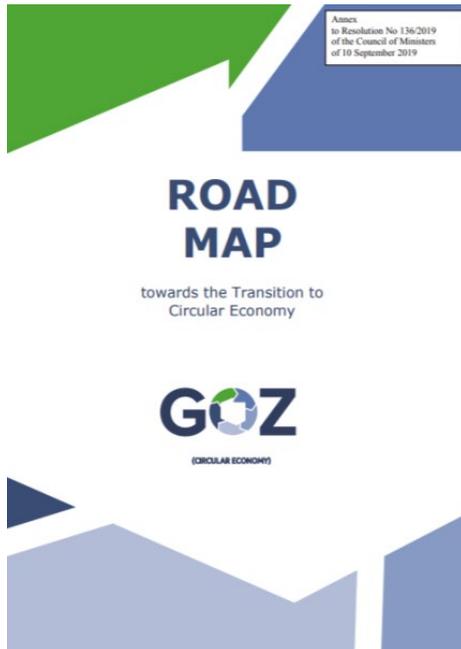
4. National and European policies and strategies

Policies and strategies on CE, especially for the plastic industry in the countries of the participating partners will be identified and analysed to determine the inclusion of the CE and educational; socio-economic components related to CE

Additionally, the European education and sectorial-specific policies will be assessed to detect whether policymakers and public bodies are aware of skills needs and if they promote sufficient and appropriate educational initiatives for CE in the plastic sector. In particular, the Action Plan of the EU for the CE and the EU Strategy for Plastics in a CE will be studied in-depth, as well as the “A New Skills Agenda for Europe” and the “Renewed EU agenda for higher education”.

4.1. Introduction of CE at the national level

Majority of EU countries have already reflected the CE in national strategies. For each of the countries involved in the project, namely Poland, Spain, Finland and Italy, the policy papers and strategies are presented below.



Date of implementation: The Polish Circular Economy Roadmap was adopted by the Resolution of the Council of Ministers of 10 September 2019.

Main assumption: The document defines 42 actions in the area of:

- SUSTAINABLE INDUSTRIAL PRODUCTION

Waste from mining, processing and energy industry
 Extended liability of the manufacturer
 Environmental life cycle assessment

- SUSTAINABLE CONSUMPTION

Municipal waste
 Food waste
 Education

- BIOECONOMY

Key actions in the field of creating conditions for the development of bioeconomy
 Actions in the area of building local value chains and raw material base

Actions in the area of energy
 Actions in the area of industry

- NEW BUSINESS MODELS
- IMPLEMENTATION, MONITORING AND FINANCING OF CE

The documents include the various action in the environmental, social, economic area. Based on the proposed actions include among others:

- proposal of legislative changes aims to support the transformation towards CE;
- analyzing of waste and possibilities of their utilization in particular branches of the Polish industry;
- create of information campaign which will support the tools and models and the concept of CE
- development of information and educational materials concerning the calculation of the environmental impact of products and economic activities based on the methodologies developed by the European Commission;
- Monitoring the effectiveness and efficiency of the current regulations and developing recommendations for CE;
- Conducting periodical statistical research on the scale, structure and directions of processes related to food waste in Poland;
- Developing the concept of a government information platform on choose topics related to CE;
- Establishing a permanent team of department directors at government agencies responsible for development of some areas of CE
- Identification of research, development and Innovation (R&D&I) priorities for the development of bioeconomy in Poland;
- Feasibility study on the creation and development of local bio refineries;

- Analysis of the possibility of amending the tax system, which would allow for the increase of competitiveness of enterprises operating on the basis of CE business model;
- Developing guidelines for increasing the role of CE in economic clusters in the field of circulation of raw materials and waste from particular industry sectors, including the processing industry;
- Establishment of the National Intelligent Specialization for CE
- Developing a system of incentives for universities to introduce research programmes and curricula concerning CE
- Implementation of monitoring system for CE.

Towards a Model of Circular Economy for Italy

Overview and Strategic Framework



Date of implementation: Towards a Model of Circular Economy for Italy - Overview and Strategic Framework was adopted by the Italian Government on 2 October 2017.

Main assumption:

The document defines Italy's strategic positioning on the issue in line with the commitments adopted under the Paris Agreement, UN Agenda 2030, G7 Communiqué and within EU.

The action plan of the document:

The document calls for a "change of paradigm" for Italy's economy, for a new way to consume, produce and do business. There is a need for a new industrial policy aimed at sustainability and Innovation capable of increasing the competitiveness of products and manufacturing.

Considering the importance of the document, the Italian government decided to collect the contributions of all institutions, firms, experts and citizens who deal with the issue to develop a document that is the result of a shared and participatory process.

The main expected results of the possible actions taken in the context of CE:

Investing in research and development through a cooperative network is a real possibility for SMEs, especially the manufacturing ones, to rethink and change their production model and to consolidate their presence in global value chains.

Moreover, the creation of a circular economy spread throughout the country helps transform a series of problems, typical of our national production system, into opportunities.

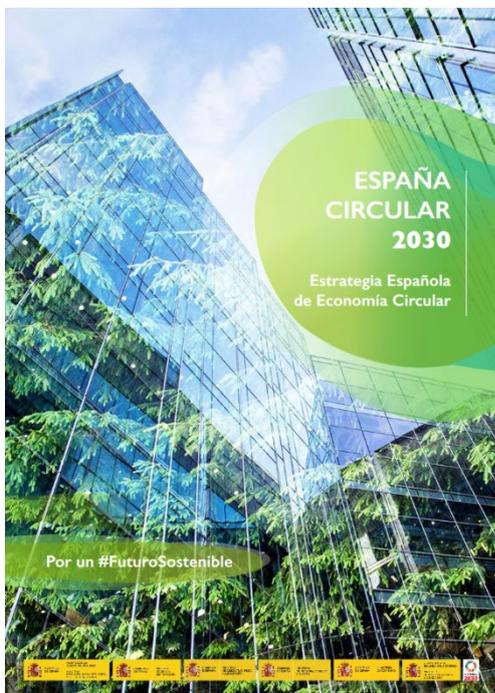
Firstly, it is necessary more information on production processes (use of resources, quantity of recycled material used or not sent to landfill, etc.). The resulting greater transparency on the one hand helps reduce illegal practices, both in phase of production and waste disposal,

on the other hand, thanks to traceability, allows consumers, who are increasingly attentive and aware, to reward virtuous enterprises for the quality of their productions.

Furthermore, the use (and reuse) of internally generated recycled materials allows a country like Italy, poor in raw materials, to be less dependent on foreign procurement, with lesser vulnerability to price volatility, especially at a time of great instability in countries owning the greatest endowments of these resources. The reduced dependence on foreign countries, together with the rationalisation of production systems, allows optimising the costs of production activities with benefits for both businesses and citizens, with a consequent positive impact on international competitiveness, based on higher quality at lower prices.

To this end, development and consolidation of the secondary raw materials market are also necessary. With regard to employment, it is necessary to invest in the training of new skills (at planning and operational level), which become instruments and at the same time beneficiaries of the circular-oriented economic process.

In hard times in the creation of new employment, circular economy could start a virtuous process. It was useful to reduce the massive egress of young Italians abroad, to decrease the number of those who are not engaged in education, employment or training (NEET) and to ensure sustainable, fair, and acceptable jobs, limiting the contrasts among the growing population (Italians and foreigners) who have difficulty living adequately.



Date of implementation: Spanish Circular Economy Strategy was drafted in February 2018 and still pending for a final version, details different axis of action with different specific actions.

Main assumption:

In order to promote the transition towards a circular economy model, the Government of Spain is leading the Spanish Circular Economy Strategy, under the coordination and leadership of the Ministry of Agriculture and Fisheries, Food and Environment and the Ministry of Economy, Industry and Competitiveness. Collaboration with the rest of the ministries involved, the autonomous communities and the Spanish Federation of Municipalities and Provinces is sought.

The document has a special consideration for 5 flagship sectors in Spain which are considered to be critical in the achievement of the shift: construction, agro food, industry, consumer goods and tourism.

The action plan of the document:

Taking as reference the EU Commission's Action Plan, the axes of action on which the Spanish Circular Economy Strategy will be focused are:

- 1) production and design,
- 2) consumption,

- 3) waste management,
- 4) secondary raw materials, and
- 5) reuse of water.

This last axis is incorporated individually due to the importance of water in the Mediterranean arch and the special incidence in the Spanish economy.

On a cross-cutting basis, the 2018-2020 Action Plan additionally incorporates

- 6) awareness and participation due to the special importance that has citizen involvement in advancing towards a circular economy, considering both decision making at the time of consumption and waste separation,
- 7) research, Innovation and competitiveness, and
- 8) employment and training, as job creation, the improvement of existing positions and training for employment in a circular economy framework are intended to be promoted through specific policies.

The main expected results of the possible actions taken in the context of CE:

In accordance with the diagnosis of the situation and future prospects, eleven strategic objectives are set out, motivating the specific actions in the corresponding action plans and with the following expected results:

1. Protect the environment and guarantee people's health by reducing use of non-renewable natural resources and reusing the materials contained in the waste as secondary raw materials in the production cycle.
2. Promote the analysis of the life cycle of products and the incorporation of eco-design criteria, reducing the introduction of harmful substances in manufacture, facilitating the reparability of the produced goods, prolonging their useful life and enabling their valorisation at the end of it.
3. Favour the effective application of the waste hierarchy principle, promoting the prevention of its generation, promoting reuse, strengthening recycling and favouring its traceability.
4. Promote guidelines that increase Innovation and global efficiency of production processes, through the adoption of measures such as the implementation of systems environmental management.
5. Promote innovative ways of sustainable consumption, including sustainable products and services, as well as the use of infrastructure and digital services.
6. Promote a responsible consumption model, based on transparency of information on the characteristics of goods and services, their duration and energy efficiency, through the use of measures such as the use of eco-labelling.

7. Facilitate and promote the creation of adequate channels to facilitate the exchange of information and coordination with public administrations, the scientific and technological community and the economic and social agents, so that synergies are created that favour the transition.
8. Spread the importance of moving from the linear economy towards a circular economy, promoting transparency of processes, raising awareness and raising awareness of citizens.
9. Promote the use of common, transparent and accessible indicators that help to know the degree of implementation of the circular economy.
10. Promote the incorporation of indicators of social and environmental impact derived from the operation of companies, in order to evaluate beyond the economic benefits generated in them, as a consequence of their commitment to the circular economy.
11. Consolidate employment policies that favour the transition towards a circular economy, identifying new sources of employment and facilitating capacity building for them.



Date of implementation: Programme of Sanna Marin's Government 2019 was appointed 10 December 2019.

Main assumption:

One of the key targets related to sustainability and Circular Economy is the notation, that The Government's decisions will put Finland on a path towards achieving carbon neutrality by 2035. The programme states that in economic policy decision-making, account will be taken of the target for carbon neutral Finland and Finland's objectives and commitments with respect to EU and global climate policy. Therefore, an ambitious, consistent and predictable climate policy will create a stable investment environment, which will present opportunities for Finnish business and employment.

Government has identified eight strategic goals for the Government period. In document in Section 3.1 entitled

Carbon neutral Finland that protects biodiversity. The programme highlights the climate change, declining biodiversity and the overconsumption of natural resources to be among the most critical issues today. As part of the European Union, Finland is committed to the Paris Agreement on climate change.

The action plan of the document:

There are nine main objectives listed within Section 3.1 of the programme. Each of the objectives also contains a number of measures to be taken to reach the objectives. The most relevant in the context of CE in general and PackAlliance Project in particular are:

Objective 1: Finland will achieve carbon neutrality by 2035

- Measures: New climate policy objectives

Objective 2: Finland aims to be the world's first fossil-free welfare society

- As part of the sustainable development tax reform, the Government will carry out a complete overhaul of energy taxation by the 2020 government budget session

Objective 6: We will strengthen Finland's role as a leader in the circular economy

- Measures: Circular economy as the foundation for the new economy; Waste recycling; Public and private consumption

The main operational programme to guide concrete measures in the field of CE in Finland will be the strategic Enhancement Programme for Circular Economy, which is currently (May 2020) under preparation. The aim of this programme will be a transition where circular economy will form the basis for new economy.

The main expected results of the possible actions taken in the context of CE:

The Government Programme is always a political document and normally revised after change of government and depending on the distribution of political powers. However, it is important to note that Circular Economy has been strongly emphasised in all Government Programmes in Finland since 2015, independent of the political orientation of the parties forming the government.

4.2. The specification of the policy/strategy on CE and its application to the plastics sector

This paragraph covers policy/strategy frameworks on CE regarding to plastics sector, which were developed in Finland, Poland, Spain and Italy.



The road map formulated and published by The Finnish Innovation Fund Sitra plots Finland's route to the circular economy by 2025.

Area, which is covered by the document: the road map depicts in more detail the circular economy visions of various sectors of society and lists those measures that need to be taken to implement the transitions towards CE. In addition, the road map presents other necessary actions to which no stakeholders

have yet committed to implementing.

Main goal:

Renewal of the foundations of competitiveness and vitality

2. Transfer to low-carbon energy
3. Natural resources are regarded as scarcities
4. Everyday decisions working as a driving force for change

The four player groups to achieve the abovementioned goals are each handled separately:

1. Central government
2. Towns and cities
3. Business
4. Citizens

The main assumption related to the plastic industry:

The road map does not specify any direct strategic goals, measures or actions targeting specifically to the plastic industry, thus differentiating any industry sectors at a general level. However, the road map includes a large set of exemplary visions, recommendations and measures to be taken in creating and applying new circular economy business models such as renewability, sharing platforms, product as a service, product-life extension, and resource efficiency and recycling. These all are relevant also in the wider context of plastic industry including all value chain (supply and demand). The road map also emphasises the role of public sector in making sustainable choices aligned with the CE in public procurement processes, containing indications affecting the plastic industry transition towards CE.

Specific emphasis is put on citizen awareness and the role of citizen's in the consumption, putting more pressure on the supply side of CE-compliant products and services. These growing trends will affect plastic industry by pushing it to stronger research, development and manufacturing of sustainable materials and end products minimising the waste and closing the material loops in a more effective way.

REDUCE
AND REFUSE,
RECYCLE
AND REPLACE

A PLASTICS ROADMAP FOR FINLAND

The Plastics Roadmap

Area which is covered by the document:

The Plastics Roadmap was prepared by a broad-based working group appointed by the Ministry of the Environment. The document identifies measures used to reduce the harm caused by plastic waste and litter, help consumers deliver plastics to waste management, improve the efficiency of plastics recovery, recycling and product design, creating conditions for investments and innovations in the circular economy, and reducing the dependency on fossil raw ingredients by increasing bio-based and biodegradable solutions.

Main goal:

The Roadmap proposes and defines in more detail 10 key actions and several measures including the following:

1. Reduce littering and avoid unnecessary consumption
2. Study the possibility to introduce a tax on plastics
3. Increase significantly the recovery of plastic waste

4. Improve the identification of plastics in buildings and sorting of plastic waste at construction sites
5. Promote the recycling and replacement of plastics in agriculture and horticulture
6. Introduce diverse recycling solutions for recovered plastic
7. Invest in a big way in alternative solutions and set up a New Plastics knowledge network
8. Raise the plastics challenge high on the international agenda of Finland
9. Export expertise and solutions
10. Enhance research knowledge on negative health and environmental impacts of plastics and solutions to these.

The main assumption related to the plastic industry:

This Plastics Roadmap is the first proposal in Finland aimed to find diverse solutions to the plastics challenge in general and in a visionary way. Addressing the plastics challenge requires a wide range of measures, some of them new ones. Voluntary actions are needed as well. While some of the proposed measures could be launched and implemented quite quickly, actions spanning several government terms are also needed, and these should be started as soon as possible.

According to the Roadmap, the general aims as concerns transforming the role of plastic industry in the context of CE, among others, are to reduce littering and unnecessary consumption of plastics, improve the recycling of plastics, and replace plastics made from fossil raw materials with sustainable and renewable alternatives. Responding to societal challenges, including those relating to plastics, and turning them into opportunities requires a broad spectrum of players, strategic choices, solution-oriented policies, and resources for the sectors that are the most promising in terms of achieving sustainable development. Response of the plastic industry in Finland to the challenge is part of the efforts to promote circular economy.



Bolder than before!

The Plastics Roadmap was prepared by a broad-based working group appointed by the Ministry of the Environment.

Area which is covered by the document:

The latest Regional Development Programme of Tampere Region was adopted in December 2017 and it covers years 2018-2020. The programme will be revised again during autumn 2020 in order to be updated and renewed to be in line with the future prospects and megatrends. It contains both long-term development goals as well as concrete measures to reach these goals. Tampere Region Regional Program also includes a strategy for smart specialisation (RIS3) in the region, targeting EU development resources. Smart specialisation is a refining perspective in the program, sharpening its development entities to exploit the region's expertise base in the business development, Innovation and growth. The big goal of the Regional Programme is a smartly specialised Tampere Region, which makes strong choices. The implementation measures have



been grouped to four categories, namely:

1. Bright Tampere Region
2. Integrated Tampere Region
3. Sustainable Tampere Region
4. Accessible Tampere Region

Main goal:

According to the Programme, Sustainable Tampere Region uses clean nature-saving and emission-reducing solutions in its basic infrastructure. It highlights the participation in climate change mitigation to be carried out strategically and by supporting national policies and emission targets through regional responses. The strategy for smart specialisation (RIS3) in Tampere Region has four spearheads:

1. Digital manufacturing
2. Smart city solutions
3. Circular economy
4. Well-being and health services and systems

In CE, the goal is to improve resource efficiency and promote low carbon economy both as a competitive business edge and to gain savings and environmental benefits. This includes for instance productisation and Innovation in environmental, digital and cleantech expertise, the servitisation of products, start-up activities in bio/ circular/sharing economy, creation of resource intelligent networks and eco-efficient energy and material flows and biorefineries,

development and utilisation of recyclable and biomaterials and wider systemic environmental solutions and research activities in the field.

The main assumption related to the plastic industry:

There are no specific notations related to plastic industry in the current Regional Development Programme of Tampere Region, including the RIS3. However, the statements concerning CE in a wider sense have been clearly indicated and highlighted. In addition, the needs of plastic industry are also reflected in the wider smart specialisation practices.

Transposition of the EU Directive 2019/904 on the reduction of the impact of certain plastic products on the environment

Area which is covered by the document:

EU Directive 2019/904 promotes circular approaches that give priority to sustainable and non-toxic re-usable products and re-use systems rather than to single-use products, aiming first and foremost to reduce the quantity of waste generated. This Directive contributes to the achievement of United Nations (UN) Sustainable Development Goal 12 to ensure sustainable consumption and production patterns, which is part of the 2030 Agenda for Sustainable Development adopted by the UN General Assembly on 2015. Competitiveness and resilience is intended to be boosted by retaining the value of products and materials for as long as possible and generating less waste, while reducing pressure on precious resources and the environment.

I
(Legislative act)

DIRECTIVES

DIRECTIVE (EU) 2019/904 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 5 June 2019
on the reduction of the impact of certain plastic products on the environment
(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 192(1) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee⁽¹⁾,

Having regard to the opinion of the Committee of the Regions⁽²⁾,

Acting in accordance with the ordinary legislative procedure⁽³⁾,

Whereas:

(1) The high functionality and relatively low cost of plastic means that this material is increasingly ubiquitous in everyday life. While plastic plays a useful role in the economy and provides essential applications in many sectors, its growing use in short-lived applications, which are not designed for re-use or cost-effective recycling, means that related production and consumption patterns have become increasingly inefficient and linear. Therefore, in the context of the Circular Economy Action Plan laid down in the Communication of the Commission of 2 December 2015 entitled 'Closing the Loop – An EU action plan for the Circular Economy', the Commission concluded in the European Strategy for Plastics laid down in its Communication of 16 January 2018 entitled 'A European Strategy for Plastics in a Circular Economy' that the steady increase in plastic waste generation and the leakage of plastic waste into the environment, in particular into the marine environment, must be tackled in order to achieve a circular life cycle for plastics. The European Strategy for Plastics is a step towards establishing a circular economy in which the design and production of plastics and plastic products fully respect re-use, repair and recycling needs and in which more sustainable materials are developed and promoted. The significant negative environmental, health and economic impact of certain plastic products calls for the setting up of a specific legal framework to effectively reduce those negative effects.

(2) This Directive promotes circular approaches that give priority to sustainable and non-toxic re-usable products and re-use systems rather than to single-use products, aiming first and foremost to reduce the quantity of waste generated. Such waste prevention is at the pinnacle of the waste hierarchy established in Directive 2008/98/EC of the European Parliament and of the Council⁽⁴⁾. This Directive will contribute to the achievement of United Nations (UN) Sustainable Development Goal 12 to ensure sustainable consumption and production patterns, which

⁽¹⁾ OJ C 42, 15.2.2019, p. 207.
⁽²⁾ OJ C 401, 21.12.2019, p. 210.
⁽³⁾ Position of the European Parliament of 27 March 2019 (not yet published in the Official Journal) and decision of the Council of 21 May 2019.
⁽⁴⁾ Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 25.11.2008, p. 3).

Main goal:

The objectives of this Directive are to prevent and reduce the impact of certain plastic products on the environment, in particular the aquatic environment, and on human health, as well as to promote the transition to a circular economy with innovative and sustainable business models, products and materials, thus also contributing to the efficient functioning of the internal market

The main assumption related to the plastic industry:

The Spanish regulation will necessarily include in its text the following items:

- To attain by 2026 a quantitatively measurable reduction of the consumption of single-use plastic goods for fast food service business (compared to 2022).
- Starting from 03/07/2021, certain single-use plastic items will be forbidden.
- Starting from 03/07/2021 certain products will come with visible labelling providing indications regarding proper waste management, as well as its environmental impact when dispersed into the environment.
- Starting from 03/07/2024 plastic bottles will need to be designed in a way the caps remain united to the body during the life of the product.

wersja 4 (aktualizacja od 1 stycznia 2018 r.)

  MINISTERSTWO ROZWOJU

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Smart Specialisation Strategies

Area which is covered by the document:

National Intelligent Specialisations indicate a preference for providing support for the development of research, development and Innovation (R&D&I) under the new financial perspective 2014-2020, including, inter alia, a focus on the development of (bio)technological processes for innovative (bio)products

Main goal among other:

1. Development of (bio)technological processes to produce innovative (bio)products
2. Advanced processing of biomass into specialised chemical products
3. Bioproducts and products of specialty chemicals

The main assumption related to the plastic industry:

- Technologies based on renewable raw materials to produce monomers and polymers and plastics
- Use of renewable raw materials in the synthesis of polymers and plastics using these polymers.
- Innovative (bio)polymers and (bio)plastics (including biodegradable polymers from renewable raw materials and petrochemical raw materials, polymers obtained by microbiological synthesis, polymers synthesised with the use of biocatalysts, natural polymers with thermoplastic properties, polymers with bioactive and biomedical properties, natural-synthetic compositions, biosensory polymers)
-

A Strategy for Responsible Development by 2020 (with an outlook to 2030)



Area which is covered by the document:

The prognosis of the environmental impact of the draft Strategy for Responsible Development assesses the potential environmental impact of the implementation of the objectives of the document.

Main goal:

The Strategy for Responsible Development sets out the main objective, which is to create conditions for the growth of income of the Polish population with a simultaneous increase of cohesion in the social, economic and territorial dimension.

The main assumption related to the plastic industry:

Among the indicators relating to environmental quality, the Strategy for Responsible Development emphasises the level of recycling and preparation for re-use of plastics from municipal waste.

REPORT ON CIRCULAR ECONOMY IN ITALY
10 Proposals and Research Summary

20
19

Report on circular economy in Italy 2019

Area which is covered by the document: 10 proposals for a circular economy in Italy



Main goal:

- Spread and enrich the vision, knowledge, research and good practices of a circular economy
- Implement a national strategy and action plan for a circular economy
- Improve the use of economic instruments for a circular economy.
- Promote a regenerative bio-economy
- Extend circular economy to public procurement.
- Promote the initiative of cities for a circular economy.
- Ensure a rapid and effective implementation of the new European directives on waste and circular economy.

- Rapidly activate an effective end of waste regulation: an essential tool for a circular economy.
- Ensure the necessary infrastructure for a circular economy
- Extend circular economy also to online commerce (e-commerce)



The main assumption related to the plastic industry:

There are no direct notations related to the plastics industry. However, there are various of rules which are in line with the PackAlliance Project.



100 ITALIAN CIRCULAR ECONOMY STORIES

Area which is covered by the document:

A hundred examples of excellence, which if we look closely at their key characteristics, tell of Italy's innovation story, in respect of its essence and traditions. They tell of a model of economy and society that is more sustainable, more competitive and fairer, that could represent the Italian response to the burning issues posed for the Planet by the present and the future.

Main goal:

The results of the good practices can be attributed to a virtuous synergy between innovation by companies, research and training by universities and the promotion of a new manufacturing model by business associations and consortia.

The main assumption related to the plastic industry:

100 stories document is recounting many different kinds of production systems divided into 11 categories, among others: Chemical and Pharmaceutical industry, from bioplastics, cosmetics to nutraceuticals. In the context of plastics, the document is mainly focused on the bioplastic; however, the good practices in the area of plastic packaging were also identified in it.

Additionally, based on the research carried out on the strategies and policy developed in Poland, Finland, Spain and Italy, the examples of educational and socio-economic components based on waste hierarchy were found.

Table 3 - The identified educational and socio-economic components (based on the waste hierarchy)

	Educational components	Socio-economic components
Waste prevention	<ul style="list-style-type: none"> - creating resource-efficient and energy-efficient products, whether new, improved, converted or refurbished - the manufacture of products using raw materials recovered from waste and wastewater - increase the durability and lifetime of equipment and products used - providing substitutes for hazardous, complex and burdensome substances in the recycling process - development of substitutes for non-renewable raw materials and water - ensuring the new use and/or reuse of articles, parts and materials 	<ul style="list-style-type: none"> - introducing incentives for society to see that waste reduction is cost-effective - conducting campaigns to promote eco-packaging - providing financial support to those who reduce waste (for example by measuring the amount of raw materials produced for recycling)

<p>Waste preparation for re-use</p>	<ul style="list-style-type: none"> - Building awareness among the community, not to throw it away right away, but to think about another use of plastic objects first. - Promoting good practice in using waste without throwing it away or recycling it - Conducting separate training modules designed only for methods of managing plastics without recycling 	<ul style="list-style-type: none"> -the introduction of incentives to encourage the public to believe that the reuse of a particular premotor is constantly profitable - conducting campaigns promoting eco-packaging - providing financial support for those who reduce waste (e.g. by measuring the amount of raw materials produced for recycling) - developing technologies that extend the life of plastic products
<p>Waste recycling</p>	<ul style="list-style-type: none"> -education on the role of recycling in the whole waste hierarchy - underlining the fact that recycling is only the third stage of waste management, which we first try to avoid as much as possible -- to indicate the fact that proper recycling starts already with packaging design 	<ul style="list-style-type: none"> -Technologies to process waste by mechanical, thermal, cryogenic, biological, microbiological, physical and chemical means - Technologies for securing waste treatment processes <ul style="list-style-type: none"> □ Waste treatment technologies that reduce emissions of CO2 and other gases atmospheric - Technologies for treatment of multi-material, multilayer and composite waste - Recovery technologies, including recycling of metals from waste - Equipment and lines for recovery, including waste recycling - Technologies for the management of waste treatment materials obtained - Multi-material and waste-based composite products for use in various industries
<p>Other waste use</p>	<ul style="list-style-type: none"> -optimal production and use of alternative fuels derived from waste - improving the technical capabilities of furnaces for the safe combustion of plastic fuels - Innovative solutions for energy recovery from waste other than incineration and co-incineration 	<ul style="list-style-type: none"> -Innovative technologies for energy recovery from waste - Technologies for optimal production and use of alternative fuels obtained waste - Technical development of power generators, gas turbines, safety furnaces -combustion of fuels extracted from waste - Innovative solutions for energy recovery from waste excluding incineration and co-incineration. - Technologies for recovery of products from waste by thermal decomposition
<p>Waste Disposal</p>	<ul style="list-style-type: none"> - education modules on how to best locate landfills - education modules on how to protect landfills against leakage of hazardous substances - education modules on the quantity of plastics stored in landfills 	<ul style="list-style-type: none"> - developing aspects showing that landfill is the least cost-effective solution for plastics - to show that storage of plastics is ultimately expensive - imposing charges for the collection of plastic waste so that people stop producing so much waste

4.3. European Education Area and sectorial-specific policies

The goal was to investigate the awareness of skills needs and sufficient promotion and appropriate educational initiatives for CE in the plastic sector, following the policies of the European Education Area and sectorial-specific frameworks.

The policies which were taken into account:

- “Action Plan of the EU for the CE” (A new Circular Economy Action Plan was taken into account in the analysis)
- “EU Strategy for Plastics in a CE”
- “A New Skills Agenda for Europe”
- “Renewed EU agenda for higher education”.

Table 4 includes a comparison between the European policies and the framework of the project.

Table 4 - European Policies vs PackAlliance Project

<p>„COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A NEW SKILLS AGENDA FOR EUROPE Working together to strengthen human capital, employability and competitiveness COM(2016) 381 final</p>	
Quote from the document	In line with PackAlliance Project
<p><i>„Skill acquisition and development are essential for the performance and modernisation of labour markets in order to provide new forms of flexibility and security for job seekers, employees, and employers alike”</i></p>	<p>PackAlliance is composed of 4 counterparts of national partners representing both Higher Education Institutions and the industry/business sector aiming to establish the post-grad study programmes. The consortium supports the founding of the programme to provide well-qualified employees for the labour market</p>
<p><i>„Formal education and training should equip everyone with a broad range of skills which opens doors to personal fulfilment and development, social inclusion, active citizenship and employment.”</i></p>	<p>The study programme has four main thematic areas which are mainly focused on interdisciplinary education.</p>
<p><i>„Differences between education and training systems in the EU, however, make it difficult for employers to assess the knowledge and skills of people with a qualification from another country than their own. Mobility across borders can help labour markets work well and opens up people’s life chances”</i></p>	<p>Project includes learning mobility programme for post-graduate students between the PackAlliance Hubs to be set up in ES, FI, PL and IT to reinforce internationalisation of the programme and its collaborative module (CHAINS).</p>

<p><i>„Higher level VET provision is steadily expanding and is valued by both learners and employers for providing skills needed on the labour market”</i></p>	<p>One of the participating project group within the programme should consist of: Professionals working already in the plastics packaging value chain and are willing to improve their competences and enhance career development in the sector.</p>
<p>COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on a renewed EU agenda for higher education COM/2017/0247 final</p>	
<p>Quote from the document</p>	<p>In line with PackAlliance Project</p>
<p><i>„A mismatch between the skills Europe needs and the skills it has: many parts of the EU are experiencing shortages in certain high-skill professions, both in terms of qualifications and the quality of the associated skills. At the same time, too many students graduate with poor basic skills (literacy, numeracy, digital) and without the range of transversal skills (problem-solving, communication, etc.) they need for resilience in a changing world”</i></p>	<p>The main goal of the PackAlliance project is to bridge the gap between the training offered by Higher Education Institutions and needs of the qualified workforce within the plastic packaging industry for implementing CE processes.</p>
<p><i>„Step up strategic support for higher education teachers, doctoral candidates and postdoctoral graduates through Erasmus+ to help them develop pedagogical and curriculum design skills through targeted opportunities for staff mobility for pedagogical training and strengthened cooperation between teacher training centres across the EU.”</i></p>	<p>By integrating the mobility strand within the pilot post-graduate programme, PackAlliance will not only allow for students to benefit from the international setting itself but also to validate and put it into practice their theoretical knowledge, that way acquiring practical competencies and making first contacts in their professional field</p>
<p><i>Some institutions are developing their profile as ‘civic universities’ by integrating local, regional and societal issues into curricula, involving the local community in teaching and research projects, providing adult learning and communicating and building links with local communities. Well-organised voluntary and community work can be a particularly effective way to help students develop their wider practical experience and skills.</i></p>	<p>The project will include the local communities, by among others:</p> <ul style="list-style-type: none"> -facilitating workshops, which will bring together local stakeholders from the plastic packaging sector and CE experts in order to discuss the practical needs of each region and provide training solutions that should be promoted in the HEI education on a local level. -local events, which will be organised, in each participating country (Spain, Poland, Italy, Finland) in order to promote the PackAlliance Hubs amongst plastic related businesses, universities & research centres, public authorities / decision-makers and other stakeholders. -training methodology also includes blended learning by facilitating local webinars and online masterclasses at consortium level to connect with other programmes, which will be implemented in countries involved.

<p>COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A European Strategy for Plastics in a Circular Economy COM/2018/028 final</p>	
<p><i>Thanks to improved separate collection and investment in innovation, skills and capacity upscaling, export of poorly sorted plastics waste has been phased out. Recycled plastics have become an increasingly valuable feedstock for industries, both at home and abroad</i></p>	<p>The parts of the programme will include :</p> <ul style="list-style-type: none"> - Use of recycled material and bio-based materials - Mindful product design (Anti-littering, recycling, etc.) - Methods to improve sorting and recycling systems
<p><i>Volumes and quality alone, however, do not fully explain the small market share held by recycled plastics today. Resistance to change among product manufacturers and a lack of knowledge of the additional benefits of closed-loop recycled plastics have also emerged as barriers to the higher uptake of recycled content</i></p>	
<p><i>The EU is taking a leading role in a global dynamic, with countries engaging and cooperating to halt the flow of plastics into the oceans and taking remedial action against plastics waste already accumulated. Best practices are disseminated widely, scientific knowledge improves, citizens mobilise, and innovators and scientists develop solutions that can be applied worldwide</i></p>	<p>Part of the project aims to establish the network of hubs also serving as transnational collaborative spaces. The consortium of PackAlliance project will work on enlarging this network and transfer good practices achieved within the project.</p>
<p>COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A new Circular Economy Action Plan For a cleaner and more competitive Europe COM(2020) 98 final</p>	
<p><i>For citizens, the circular economy will provide high-quality, functional and safe products, which are efficient and affordable, last longer and are designed for reuse, repair, and high-quality recycling. A whole new range of sustainable services, product-as-service models and digital solutions will bring about a better quality of life, innovative jobs and upgraded knowledge and skills.</i></p>	<p>PackAlliance will carry out a novel challenge-based training methodology, called CHAINS, will be developed to put in practice competence and skills acquired along with the training programme. This specific mechanism will focus on equipping students with transversal skills (particularly those related to creativity, innovation and digital skills) by establishing working teams at the PackAlliance Hubs</p>
<p><i>Circularity can be expected to have a positive net effect on job creation provided that workers acquire the skills required by the green transition.</i></p>	<p>One of the goals of the project is to generate new forms of jobs and business opportunities in CE in the plastic packaging value chain</p>

List of Annexes

PROJECT INFO

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Programme	Erasmus+
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Action Type	Knowledge Alliances for higher education
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PROJECT CONSORTIUM



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