



EXECUTIVE SUMMARY



Training for Circular Economy in the
Construction and Furniture Sectors

ANALYSIS OF TRAINING NEEDS, STATE OF THE ART, TRENDS AND POLICIES



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Background

KATCH-e project is a knowledge alliance among High Education institutions, companies and research centres and the main objectives is to promote the building of competences in the field of product-service development for the Circular Economy (CE) and sustainability in the construction and furniture sectors.

The summarized main aims of this project is: Understanding CE with social developments and trends contributing to a common vocabulary and a better understanding of the CE concept and related issues, i.e. principles and implications of the new paradigm, which means opposition when CE comes to implementing new strategies and solutions; Understanding CE related

policies and trends discussing and showing the companies and students how EU policies and regulations on CE can be articulated with global competition how to make companies more competitive and simultaneously make the economy more circular; Combination of design and business models' solutions introducing information and training material about the new business models and value chains analysis to a sectoral approach in the project; Combination of design and CE solution including not only product design, but also service design in the project. Clarify the possibilities of integrating CE principles with other existent strategies and Learning approaching promoting a multidisciplinary approach to teach, implement and test CE principles and also, bring different stakeholders to the discussion.



INTRODUCTION

The European Union economy is largely linear (take – make – use – dispose) by design, resulting in avoidable environmental and human health impacts [1]. In a international forecast by World Economic Forum, three billion new consumers entering the market worldwide in the next 20 or 30 years will put an enormous pressure on our shared resource base if we continue along the linear way [2].

Under this context, the European Commission is engaged in fostering the transition from the largely current linear model and published in 2015 the roadmap: “Closing the loop – An EU action plan for the circular economy”[3]. Circular economy (CE) principles have also been gradually integrated in industrial best practices, green public procurement, the use of cohesion policy funds, and through new initiatives in the construction and water sectors [4].

In this sense, studies point to the need of adequate skills and education for CE [5], and principles of CE should become an integral part of high education (HE) programs and life cycle thinking as a core aspect of all projects [6]. Future architects, engineers, designers and others should learn to employ systems thinking to understand the drivers behind the problems and to propose solutions accordingly, without forgetting the social and economic aspects.

Creating a CE requires fundamental changes throughout the value chain, from product design and technology to new business models; new ways of preserving natural resources and turning waste into resources; new modes of consumer behaviour; new norms and practices; education and finance [7].

According to this, the professional and designers knowledge are challenged by new environmental, social and economic needs so

they must adopt a holistic approach to problems solving [8]. This statement is backed up when considering that most of the characteristics of a product throughout its life cycle, including environmental impacts, are defined at the design stage [9]. Currently, the design for CE, knowledge on sustainable design, identification of challenges and opportunities at design for CE, are not mandatory skills within the professional field, but it will be increasingly important and even mandatory in the foreseeable future as it is happening at HE [10].

Economy sectors such as construction and furniture are some of the key in this transition process, as the design of construction materials and furniture is responsible, to a large extent, for defining the circularity potential of products: i.e., their reparability, longevity, proportion of recycled and renewable materials, and their suitability for refurbishment and remanufacture [1].

Therefore, the KATCH_e project was proposed, whose rationale is a knowledge alliance among HE institutions, companies and research centres to promote the building of competences in the field of product-service development for the CE and sustainability in the construction and furniture sectors. Both sectors are considered a priority to accelerating the CE in the EU [7].

The present document contains a summary of the situation analysis report conducted during the first stage of the KATCH_e project. The outputs from this analysis has helped to define the structure and contents of the KATCH_e didactical material, which includes feedbacks from main stakeholders, current HE training offers from different Universities and relevant references, among other sources of information. Further information: www.katche.eu.

KEY FACTS AND FIGURES ABOUT KATCH_e SECTORS

CONSTRUCTION SECTOR

The construction sector plays an important role in the European economy. It generates almost 10% of gross domestic product (GDP) and provides 20 million jobs, mainly SMEs (small and medium-sized enterprises) and big companies. Construction is also a major consumer of intermediate products (raw materials, chemicals, electrical and electronic equipment, etc.) and related services. Because of its economic importance, the performance of the construction sector can significantly influence the development of the overall economy (COM(2012) 433 final).

The construction and use of buildings in the EU account for about half of all our extracted materials and energy consumption and about a third of our water consumption. The sector also generates about one third of all waste and is associated with environmental pressures that arise at different stages of a building's life-cycle including the manufacturing of construction products, building construction, use, renovation and the management of building waste (COM(2014) 445 final).

The next table shows main trends in the construction sector have been visible the last years.

TRENDS IN THE CONSTRUCTION SECTOR	
1	Skilled labour shortage and recession
2	Prefab/offsite construction methods
3	Smaller, smarter homes
4	Open floor plans
5	Green building
6	Building information modelling
7	Security of buildings
8	Booming multifamily sector has slowing down as rise up single-family sector picks up steam
9	Laser scanning technology
10	Remodelling
11	Cities with simple architecture and walkable communities

Table 1: Main trends for the construction sector

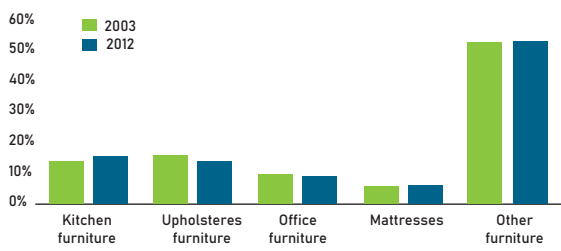
FURNITURE SECTOR

The furniture industry in the EU is an intensive and dynamic sector, dominated by micro firms and SMEs (small and medium-sized enterprises). The sector employs around 1 million workers in 130 thousand companies generating an annual turnover of around EUR 96 billion [11].

The European furniture sector faces enormous competition from countries having low production costs, in particular in the low- and mid-range price segments, where the EU share in world furniture trade has significantly dropped in the last decade.

Figure 1 depict the furniture production by main sub-segments (percentage shares over total furniture production).

EU28 furniture production by main sub-segments.



Source: (CSIL processing of data from Eurostat, National Statistical Offices, National Furniture manufacturers associations)

In terms of materials used in the referred segments, the most common material used for furniture is wood (56% of the pieces of furniture) metal is the second material most commonly used in furniture industry (12% of items produced, followed by plastics (6% of items produced) [13].

Furniture products can cause very different environmental impacts depending on the type of furniture considered (office, kitchen, etc.), the materials and processes used in the manufacturing, the energy source (fossil fuels, or renewable) and origin of the wood (local, from sustainable forest, etc.). The total annual EU28 furniture waste equates to 10.78 million tons, the majority of which is destined for either landfill or incineration [14].

Research in advanced manufacturing technologies can result in the creation of high technology, reducing impacts and creating knowledge and jobs. This could help rejuvenate the sector while keeping it highly competitive on the world stage. Table 2 resume the main trends for the furniture sector currently.

TRENDS	
1	The demand of luxury furniture is increasing
2	Multifunctional furniture on demand
3	Eco-friendly furniture
4	Material innovation
5	Role of ICT's
6	Process innovation
7	Design and an efficient use of space
8	Ergonomic and functional design

Table 2: Main trends for the furniture sector



POLICY TRENDS, STRATEGIES ON CIRCULAR ECONOMY

EUROPEAN LEVEL

The EU Commission adopted in 2015 an ambitious new Circular Economy Package to stimulate Europe's transition towards a circular economy.

The Action Plan included several legislative proposals, in the first place on waste setting clear targets for waste recycling and estab-

lishing an ambitious long-term path leading towards waste prevention and recycling. Furthermore there were other proposals such as for example on online sales of goods.

Next figure shows the key delivers since the adoption of the Action Plan in chronological order of their completion (2016–2018).

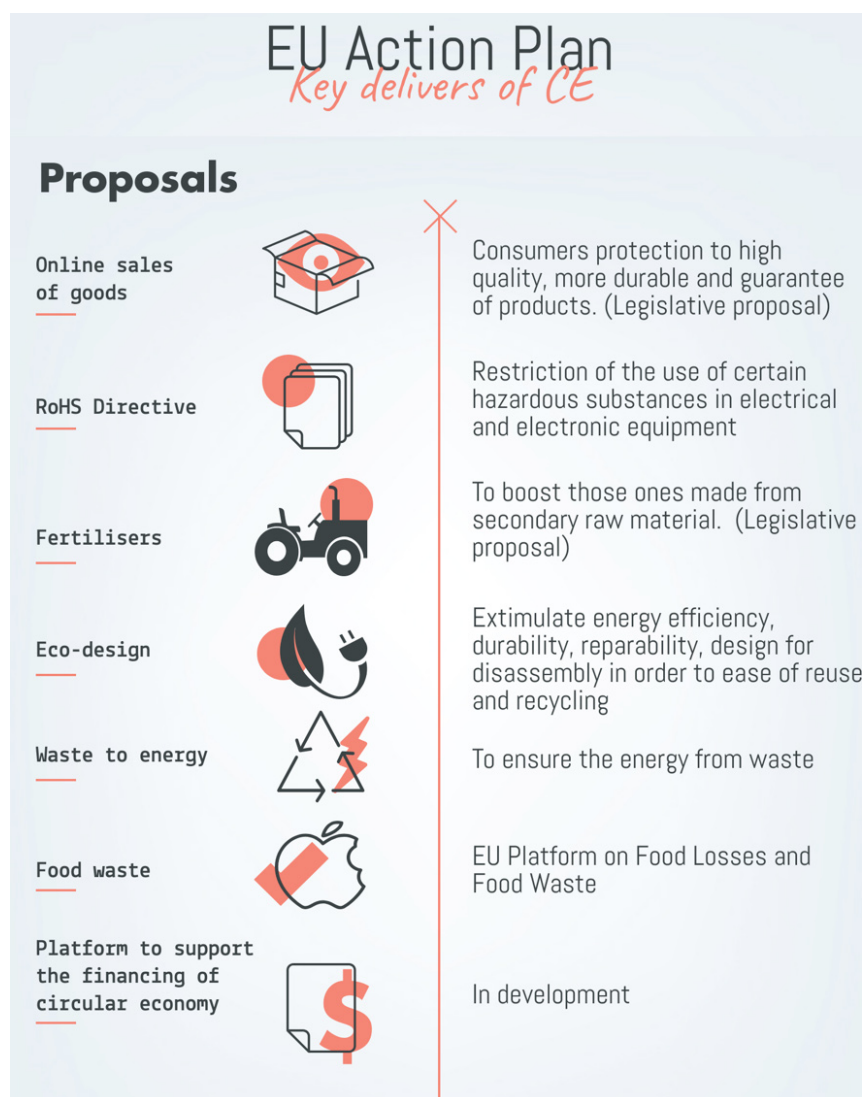


Figure 2: Key delivers of the Action Plan

CIRCULAR ECONOMY INITIATIVES FROM KATCH-e PARTNERS

Policy trends in Austria

In its latest EU Environmental Implementation Review (EIR) country report for Austria [15] the EU concludes that concerning waste management Austria is among the top performers in the EU. The recycling rate of municipal waste is well above the EU level (in 2014: 58% in Austria vs. 44% EU average) while the landfilling rate (4% vs. 28%) is far lower. Regarding eco-innovation to the CE, was launched a report highlighting the Austrian Resource Efficiency Action Plan (REAP) [16] and the RESET2020 [17] initiative.

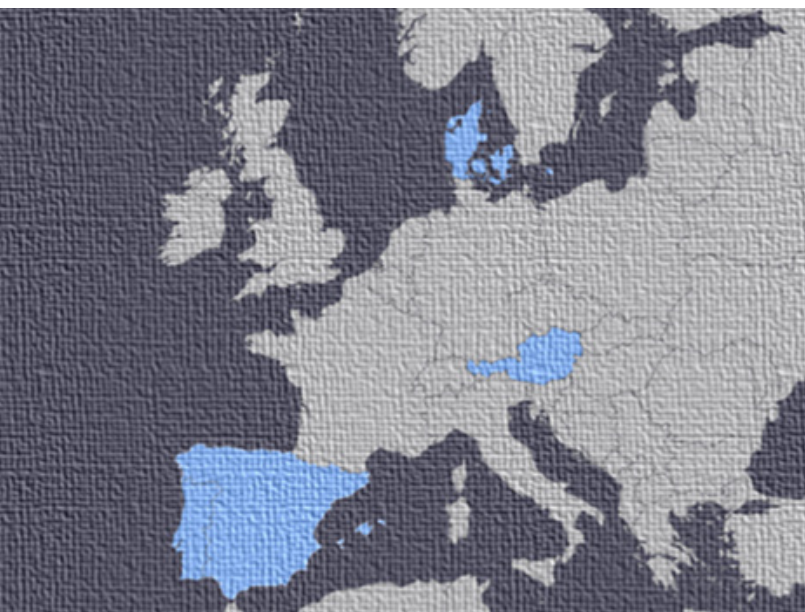
An important legal development in relation to the Austrian construction sector is the amendment of the “Recyclingbaustoffverordnung”, BGBl. II. Nr. 290/2016, in force since October 2016. The regulation aims to improve existing recycling options for mineral construction waste, by introducing certain standards for recycled materials, which then can be marketed and sold as new building materials.

Environmental policies in the construction and furniture sector are mainly concerned with energy efficiency in production and during usage, recycling and human health.

Policy trends in Portugal

The Action Plan for the Circular Economy (PAEC, in Portuguese), approved on 23/11/2017, is organized in seven actions that either consolidate ongoing initiatives by the Government or introduce complementary ones. It has three levels of operation: the national, sectoral and regional levels and the sectoral (e.g. industrial symbiosis networks, circular cities, circular companies) and regional levels (regional agendas).

The follow overview of government initiatives to promote the circular economy in Portugal are: Overarching policies (Portuguese Action Plan for the Circular Economy, ECO.NOMIA Portal); Research and education (National Strategy for Environmental Education (ENEA 2020), R&I Agenda on Circular Economy); Financial mechanisms (Fund for Innovation, Technology and Circular Economy, Environmental Fund, Tax Incentives System for Business R&D with eco-design (within SIFIDE), Operational Sustainability Resource Efficiency Program (PO SEUR).



Policy trends in Denmark

Denmark launched the resource strategies “Denmark without waste I and II 17” in 2013 and two years later extended their strategy of recycling. Danish local authorities are engaged in developing a more circular systems thinking, especially in the way they deal with public procurement. The Federation of Danish Municipalities has published a guideline and a number of cases to illustrate how it can be done [19].

In 2015, the Ellen MacArthur Foundation (EMF) published the report “Delivering the circular economy – a toolkit for policy makers” based on Denmark as a case study. The report looked into five sectors (Industrial production, 3D printing of building modules, materials reuse, high value recycling of components and materials, sharing and multi-proposing of space) where Construction and real estate showed the largest, economic potential.

Policy trends in Spain

The Spanish Circular Economy Strategy is developed on the basis of the corresponding Action Plans, the first of which is for the period 2018–2020. This Action Plan has a transversal character, fundamentally but not exclusively affects the actions of the General State Administration and makes it possible to coordinate a great diversity of activities of actions and group them together within a framework of initiatives aimed at achieving a common goal: the transition towards a circular economy. In this context, a total of 70 actions are planned under the 2018–2020 Action Plan [20].

Spanish main lines of Action Plan for the Circular Economy are: production and design; consumption; waste management; secondary raw materials market; water recycling; research, innovation and competitiveness; public and private participation and awareness; employment and training



How are High Education integrating Circular Economy aspects?

Consortium of KATCH-e project analyse the training offers on CE on high education in the KATCH-e projects. Moreover, other offers from reference universities, pioneers in the CE field, have been considered. These offers can be download through: www.katche.eu.

The topics found about CE have been grouped in three categories: Environmental, Economics and Design. (Table 3). The analysis includes a total of 73 offers between official masters, postgraduate courses, and independent courses.

TOPICS	MAIN SUBJECTS
ENVIRONMENT	Circular Economy topic, Resource Efficiency, Resource Cascading and Reuse / Repair / Remanufacture / Recycle in Environmental group
ECONOMICS	Industrial Symbiosis, Sustainable Business Model, Product-Service Systems, Circular Business Model and Performance Economy in Economic group
DESIGN	Design for Sustainability, Circular Design, Cradle to Cradle Design, Social Innovation and Design for Social Innovation in Design group

Table 3: Topics about Circular Economy

Figure 3 shows, for each of the groups of offers, the percentage in which each topic is present.

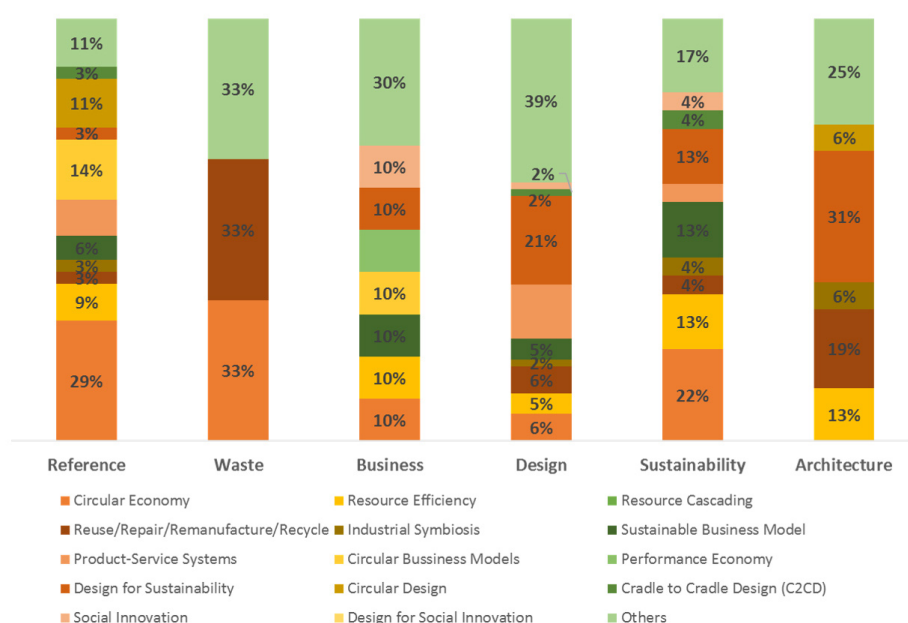


Figure 3. Offers summary

Figure 3 summarises the analysis. In overall, Design for Sustainability is the most frequent one, followed by Circular Economy.

Resource Cascading and Design for Social Innovation are not address, at least by this denomination.

What is required from KATCH_e relevant stakeholders?

A series of interviews and several workshops were conducted. These activities are appropriated to gather valid and reliable information and provide in-depth understanding of concepts through posing direct questions to the interviewee. Different stakeholders profiles were considered: Students; Professors; Researchers; Companies; Business Associations; Public Authorities (PA); and NGO's. All stakeholders were related, in some way, in the design field of furniture and construction sector.

Interviews

The interview scripts were comprised of different open-ended questions to offer the interviewees the possibility to explain their point of view, supporting it with examples when needed. Specific scripts were developed for each target group, these scripts can be download from: www.katche.eu.

Workshops

Participants from Higher Education (HE), Business community and Knowledge centres attended the workshop. Guided questions were answered, organizing the participants into multidisciplinary groups, and a general discussion was also held. Table 4 shows a summary of the contents discussed during the workshops held in each country.

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PARTNERS	MAIN SUBJECTS OF ACTIVITIES
Portugal	The workshop raised the questions “What are the priority challenges, products and services for design for the CE in the construction and furniture sectors?” and “What are the needs in terms of skills and training for the design and development teams?”
Austria	The overall idea was to discuss the current status of CE-related initiatives (research projects, business practices) and potentials/barriers for implementing CE in the furniture and the construction sectors and reflect on the need for competences.
Denmark	The theme was “Circular business models in the furniture sector, and the related need for competences”. Different types of circular business models related to the furniture sector and the challenges related to design, business development and sustainability were presented and discussed.
Spain	The workshop aimed at discussing CE, the potentials and barriers for the transition towards circularity in Spanish companies and the related need for competences. On this case, the workshop did not concentrate on furniture and construction sectors, it was open.

Table 4: KATCH-e partners subject training activities.



Key findings from interviews and workshops

Challenges

From companies: keep up with developments and trends ensuring to adjust the portfolio to the demands of the market and environmental legal requirements. From educational: HE sites will have to keep up with developments and trends, think and act in an interdisciplinary manner and act as a service provider qualifying future CE experts.

Understanding and perceptions of CE

The concept of CE is still not clear and harmonized and the variation on perceptions of CE can be a barrier to the concept.

CE implementation and promoting actions

CE framework should be included as a new topic in HE. Teachers demand CE training and implementation in the curricula in a more systematic way. CE is promoted in different perspectives from actors. Public actors claim to do an important effort of CE implementation, but same effort was not perceived in the same way by the business associations.

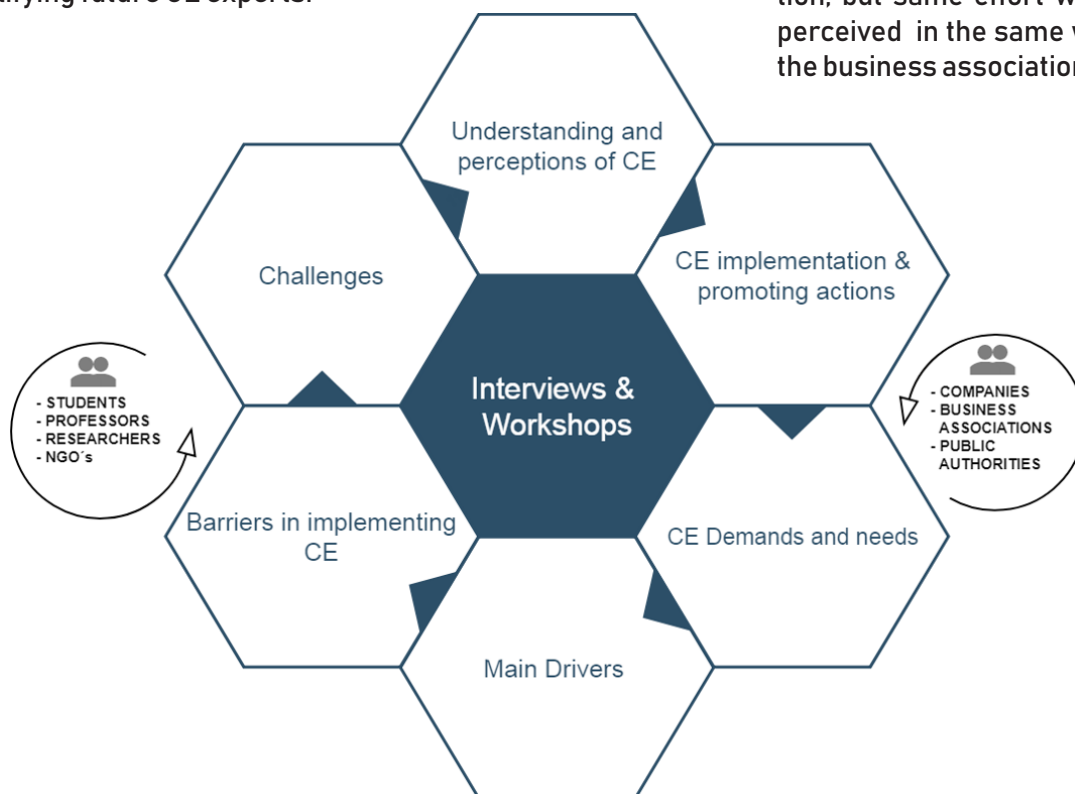


Figure 4: Activity topics considered in the interviews and workshop and stakeholders.

Barriers in implementing CE

Traditions and culture among politicians and public and private institutions are regarded as main barriers since social structures and infrastructures are adapted to linear practices.

Main Drivers

The main categories of drivers identified (in order of relevance) are: Legal/Political; Education/Awareness; Environment pressure; Business/Financial; Consumer/Market; Innovation; and Younger Generations.

CE: Demands and needs

This approach regards different social, cultural, economic and environmental needs, were stakeholders pointed main needs as: investments, new business model and legislation adaptability.

EXPECTATIONS FROM KATCH-e

According to the different outputs and main findings detected during the situation analysis, some recommendations have been considered to develop the structure of KATCH_e didactic material:

TOPICS	
Understanding CE with social developments and trends	Contribute to a common vocabulary and a better understanding of the CE concept and related issues, i.e. principles and implications of the new paradigm, which means opposition when CE comes to implementing new strategies and solutions.
	Promote the CE with positive messages and clear information for the final user. This is, to get CE demanded because society realizes that it is convenient for all of us.
Understanding CE related policies and trends	To discuss and show the companies and students how EU policies and regulations on CE can be articulated with global competition – how to make companies more competitive and simultaneously make the economy more circular.
	Take into account the National Agenda for Research and Innovation on CE and its areas of knowledge that need to be explored.
	Identify the possible existing tax and financial incentives that in some way could support the CE initiatives and/or the creation of new and specific for the CE in companies.
Combination of design and business models' solutions	Include in the training material case studies and practical examples, with a heightened focus to generate business models in CE.
	Include information about the new business models and the capability to adapt the theory to the type of companies (sizes and position).
	Introduce in the training the thematic of value chains analysis, rather than (or complementary to) a sectoral approach in the project.
Combination of design and CE solution	Include in the project training in materials and substitute materials, which designers lack.
	Include not only product design, but also service design in the project. Clarify the possibilities of integrating CE principles with other existent strategies (such as labelling, environmental, quality, energy, H&S, and other management systems, innovation tools, etc.) already tested and implemented in companies.
Learning approach	Promote a multidisciplinary approach to teach, implement and test CE principles and also, bring different stakeholders to the discussion (e.g. companies, universities, public sector, NGO's etc.).
	Validate the in-classroom training through case studies developed in partnership between universities, companies and other entities.
	Include in the project visits to companies for students to structure knowledge based on practical case studies.
	Compile the most relevant information on CE and adapt it according to the needs and demands identified during the situation analysis. Moreover, KATCH_e should act as a filter of relevant resources for the target sectors.
	Develop simple and easy tools and methods to perform a self-checking in companies.

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How we can get more information about KATCH-e project?

This project is coordinated by LNEG and involves public and private institutions in Austria, Denmark, Spain and Portugal.

Full Situation Analysis report and other specific contents of interest can be download from:

www.katche.eu

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