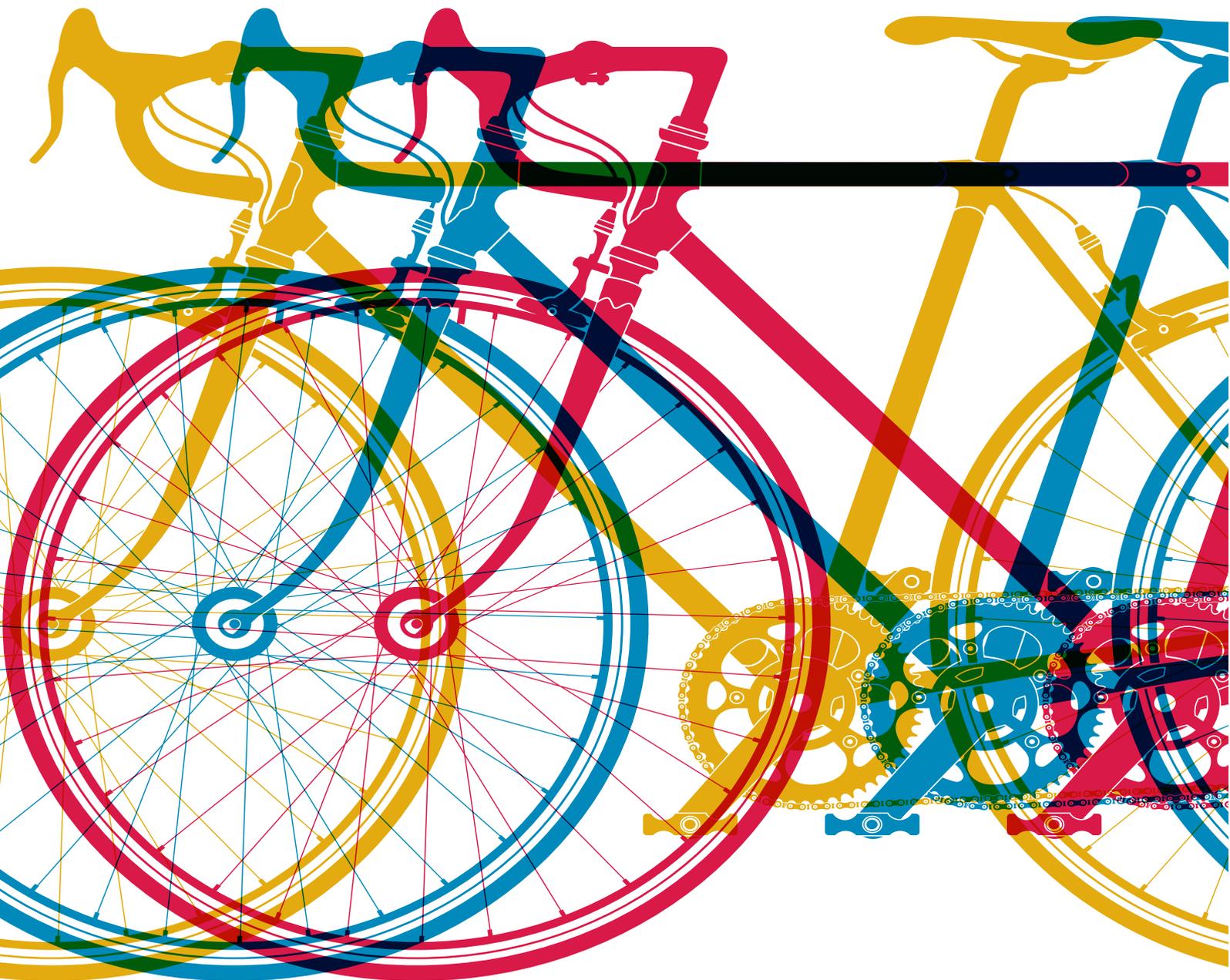


Circular Economy and Lifelong Learning

Scenarios - Methodologies - In action



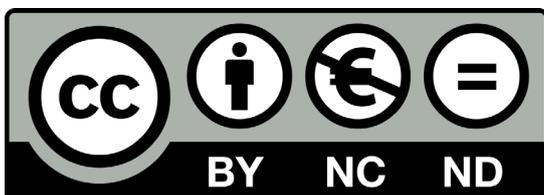
A publication by ACR+ and Zero Waste Scotland

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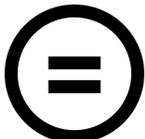
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Table of Contents

| | |
|-------------------------------------------------------------------------------------------------------------------------------------|----|
| About this publication..... | 4 |
| Foreword | |
| Mainstreaming circular thinking in lifelong learning policies. | |
| Silvia Costa | 5 |
| Introduction | |
| Towards international cooperation for circular economy education | |
| Iain Gulland | 7 |
| 1. Circular thinking in education | |
| SPARKing a circular holistic approach. Heleentje Swart & Sander Bos | 9 |
| How circular economy learning approaches are gaining traction among higher education. Nora Clinton | 11 |
| Promoting a mindshift in educators. Graham Attwell | 13 |
| 2. Upskilling the waste, repair & reuse industry | |
| The SWITCH Forum: making the resource management industry healthier and more attractive. Fiona Craig | 16 |
| The circular economy as a model towards greater efficiency in productive processes.LIPOR Academy. Roberto Cerqueira | 19 |
| Supporting vocational training and lifelong learning for the circular economy. Sarah Miller | 21 |
| 3. Facilitating the transition towards the circular economy | |
| Mapping jobs and skills in the circular economy. Joke Dufourmont | 23 |
| The circular economy in Italian companies. Barucca, Di Maria, De Marchi, Mancini | 25 |
| Helping local administrators to support the transition towards circular economy. Luigi Acquaviva | 28 |
| The role of local authorities boosting entrepreneurship education and circular economy. Francesco Lembo | 30 |
| About the authors | 33 |

About this publication

The momentum for the circular economy has never been stronger. Global issues, such as climate change and natural resource consumption levels, urgently require a change in our lifestyles and a transformation in our ways of thinking and acting. To achieve this change, we need new skills, new values and new behaviours that lead to more sustainable societies. Is it possible to find a shared definition of circular economy (CE) education?

On 19 February 2019, ACR+ in partnership with Zero Waste Scotland organised a workshop entitled “Circular Economy Competencies. Making the Case for Lifelong Learning”. The workshop, held within the framework of the Erasmus+ CYCLE project, brought together local authorities, experts and practitioners in the field of environmental and sustainability education to discuss this topic.

The speakers of the workshop shared stories of vocational training and green jobs, sustainable consumption education and system thinking, of pedagogical models capable of empowering learners and urging institutions to include the principles of sustainability in their management structures.



Figure 1: ACR+ and Zero Waste Scotland held a workshop on circular economy competencies on 19 February 2019.

What's in it for you?

This booklet is conceived with the aim of making those experiences a shared treasure, available to educators, policy makers and managers of NGOs and training organizations that intend to promote the development of local loops of circular economy through educational tools. The three chapters of the brochure are structured to cover different areas of the lifelong learning landscape:

Circular thinking in education. Educational designers will find useful insights on: the promotion of circular holistic approach in schools; a bird's-eye view on how tertiary education is integrating the circular economy into its educational offer; the creation of attractive learning pathways in adult training;

Upskilling waste, repair & reuse industry. Policy makers and professionals in the field of vocational training will find useful references on the development of professional standards and competence profiles for 3R's industries;

Facilitating the transition towards circular economy. The last chapter contains an analysis of the links between Industry 4.0 and circular economy in Italy, and the case history of a network of municipalities that have developed training courses to equip local authorities' staff for the circular transition. In conclusion, a final article analyses the possible positive correlations between entrepreneurial education and circular economy.

Foreword

The need for mainstreaming circular thinking in lifelong learning policies

Silvia Costa



I will start by sharing with you some good news, ahead of the crucial vote on the future Erasmus+ 2021/2027 programme we are having in the committee on Culture and Education of the European Parliament, where the dimension of sustainable development has been clearly included. As you know, the Parliament has embraced a vision for the decade to come, in line with the objectives of the Agenda 2030 and the UN Sustainable Development Goals.

To make this work, the European Union is focused on promoting a sustainable attitude among its citizens and on implementing adequate measures, such as the 2018 Circular Economy Package, which has introduced new waste-management targets regarding reuse, recycling and landfilling, strengthening provisions on waste prevention and extended producer responsibility.

However, we are very well aware that today circular economy is more ambitious than that, and combines various aspects with a societal relevance. It all starts with a new way of thinking - circular thinking that needs to be supported and complemented by relevant circular economy competencies. We also need to find a way to certify them in the curricula.

As made clear by the United Nations Sustainable development Goals (SDGs), particularly SDG 4, inclusive and equitable quality education and lifelong learning opportunities for all is a top priority. This booklet has the merit of shedding light on the virtuous interlinkage between education - especially in a lifelong learning perspective - and sustainable, innovative development.



Way too often we speak about innovation and circular economy without even mentioning the pivotal role of competencies, which we want to be more central in cross-sectorial European policies.

This is precisely the focus of this publication, which I praise today, for three reasons:

1. It aims at creating a shared treasure of knowledge and experience that facilitates the introduction of circular economy competencies and the continuous update of the relevant skills;
2. It wants to serve as a starting point to promote multi-stakeholder and international cooperation, which is essential for the sustainable development of circular economy policies;
3. It involves local authorities at regional and municipal level, which are the nearest institutions to the citizens. Without having them as allies we cannot fully conceive the ambitious circular economy model.

In fact, circular economy competencies are at a crossroads between citizenship competencies and entrepreneurial competencies, in equipping people - no matter what their age is - with tools to act in a rapidly changing, sustainable and responsible world.

At the European Parliament's Committee on Culture and Education, we have highlighted this new dimension of education and sustainable development in the New Skills Agenda for Europe, adopted by the EP in 2017; the green sector is one of the main net creators of jobs in Europe even during the financial and economic crisis.

Therefore, we called on Member States and the Commission to promote and invest in lifelong learning in particular in countries with a participation rate below the 15% benchmark; as well as to include elements of entrepreneurial learning, including a social dimension prioritizing alternative business models, such as cooperatives, in order to strive toward a more inclusive, sustainable and just economy.

It means that there is a rising awareness about sustainability being a transversal topic and not only strictly linked to environmental issues. In fact, sustainability is a much broader concept that concerns also educational, social and humanitarian matters. We are currently working on the future Erasmus+ programme, where we go beyond the mere reference to tackling climate change and the Paris Agreement with more precise references to Agenda 2030.



We are shaping a new programme - the most inclusive ever - able to concretely contribute to the sustainable development agenda by supporting efforts to develop the necessary skills for sustainable development, and to educate people about sustainability, environmental protection, climate change and circular economy through formal, non-formal and informal education.

The first step to develop a sustainable and circular economy is to reshape our attitude and the way we think about industry and the economy. Here is where education and vocational training come into play. For this reason, the next Erasmus+ programme will put effort into developing the necessary skills for every citizen to meet the emerging demands of the new job market and to accompany the transition to a circular economy.

To speak more concretely, in the new Erasmus, I see a promising place for forms of cooperative learning and training and social innovation in fields like sharing, reuse, eco-design, up-cycle and remanufacture, business model innovation, intended as incorporation of circular thinking concepts throughout business models, active dialogue among training institutions, local authorities and private stakeholders to promote awareness on eco-production and eco-consumption, sustainable behaviours and innovation.

Introduction

A roadmap towards international cooperation for circular economy education

Iain Gulland



Promoting the circular economy internationally and securing cooperation for projects that are working towards building capacity in knowledge, skills and competence in circular economy thinking is a key aspect of ACR+ current activities.

This is already an important topic in Scotland and the recent ACR+ workshop that took place in Brussels also served to highlight the high level of support in countries throughout Europe. It is testament to this that those taking part were able to look towards developing plans that ensure our education and current and future workforce skills development is embedded with circular economy thinking.

As President of ACR+ and with a strong interest and willingness to grow the approach already being adopted, we now need to capitalise on this by creating a roadmap that increases joint working practices across borders.

At Zero Waste Scotland our goal is to realise the economic, environmental and social benefits of making best use of the world's limited natural resources. We exist to create a society where resources are valued and nothing is wasted. In support of this, the Scottish Government has placed the circular economy at the core of Scotland's Economic Strategy and Manufacturing Action Plan, and its [Making Things Last](#) strategy highlights priority areas with the greatest opportunity to deliver economic, environmental and social benefits.

We are leading a strategic partnership, which includes government agencies to create a Circular Economy Skills and Education Hub. This seeks to influence the skills policy agenda, to provide thought leadership and opportunities for collaboration and to provide tangible resources to enable Scotland to seize the opportunities presented by the transition towards a circular economy.

By creating this innovative hub, we are strategically instigating change in our partner and stakeholder delivery, now and in the future. This will enable us to have the greatest impact and make a significant difference to growing circular thinking and conscious action on behaviour change.

As an example, a report has been commissioned on skills issues facing the manufacturing sector in Scotland as it adopts circular economy principles. This is also informing other pilot projects across the sector to examine and build circular economy apprenticeship skills as well as providing evidence of industry demand for circular economy skillsets.

We know from international research that employment within a circular economy is diverse with the skill demands of these jobs mirroring that diversity.¹ This is seen not least in links with science, technology, engi-

1 Circular Jobs and Skills in the Amsterdam Metropole Area, Circle Economy, October 2018



The vision for a future where the economy is regenerative and restorative by design will only become reality if we manage to shift our mindset. We must view the economy, society and the environment as complex interconnected systems with rich flows of resources, materials and information.

neering and mathematics where work is underway to build the knowledge capacity of school and vocational college teachers.

Skills and education as part of life-long learning are central to this and are part of an area we would like, in partnership with you under the banner of ACR+, to build an international network to shared learning and resources on circular competence, skills and education.

Our mission should be to influence and enable change. By building evidence together across national and international boundaries we can inform the skills and education agenda, and this is key for all of us.

Section 1

Circular thinking in education

SPARKing a circular holistic approach

Heleentje Swart & Sander Bos



In Friesland we have a dream. A common dream of civil society, businesses, knowledge institutions and local government. Together we want to build a sustainable, circular world. Everywhere there are initiatives of people who look beyond today and who take care of themselves, others and the earth. Spark stimulates this movement in education. Our ambition is to unite all Frisian educational institutions, from primary schools to universities, in the movement towards a circular world. To take steps themselves, to celebrate successes and thus be an inspiration to each other.

The UN's seventeen Global Sustainable Development Goals (SDGs) provide a clear picture of what this means in concrete terms. Education and smart and decisive cooperation with various parties (SDGs 4 and 17) are prerequisites for the realisation of the objectives. Spark is proud of the international name that young people came up for us. Every fire starts with a spark, we start in Friesland and connect with the worldwide movement of people who are committed to positive change.



Our goal is to transform the education paradigm from a linear perspective to a circular holistic approach. This transition is based on three pillars. Firstly, the movement is aligned with regional ambitions of both government and business with regard to the circular economy. The growing Circular Friesland Association of organizations from the whole quadruple helix has high ambitions on circular economy. Spark is directly connected to this movement. Secondly, we are connecting and celebrating what is already going on in schools. A lot of schools in our region already have beautiful projects in which they address circular economy and the SDGs. Our goal is to give podium to these hidden gems ('sparks') and connect them.



Thirdly, building on these sparks we want to strengthen and extend the emerging movement in three phases:

1. Activity oriented: individual sparks by schools and training courses are bundled and made visible
2. Process oriented: sparks are interlinked and reinforce each other
3. System oriented: sparks are to find a structural embedding in the shared, regional learning process for a sustainable world.

These phases are not necessarily chronological, but in the beginning there is more attention for phase 1, after which the emphasis shifts to consolidating and connecting and finally the focus is on structural anchoring.

Phase 1 - Gallery of Honour

As a tool to speed up phase 1, Spark offers a digital platform where primary and secondary schools and individual vocational and university courses can add their initiative to the gallery of honour. Every lesson, every project, every action that contributes to a sustainable world is for us a Spark. We also appreciate small sparks: every contribution can raise awareness of the importance of looking at our world differently.

Phase 2 - Physical meetings

By combining the Sparks, we stimulate the realisation that together we can make a difference. This leads to joint learning questions, for example, on how to make business operations more sustainable.

Phase 3 - Self-scan

Learning to do and think sustainably is more than just going through a lesson or a project: it requires us to learn to look at the world in a different way. That is why Spark also offers a free self-scan, which can be used by educational teams to reflect on what is already happening with regard to learning for sustainability and to help them gain insight into how they can develop this further.

The self-scan is based on the Whole School Approach to sustainability (Swart, Wals & Fernandes, 2016) (see figure to the right). Five questions are central to this integral school approach. In addition to what we teach young people, it is also important to think about how we learn, where we learn, from whom we learn and with whom. By aligning the curriculum, the didactics, the operational management, our expertise as teachers and the relationship between the school/training and society (the school culture), we increase the impact of what we want to help young people discover in this case: how can you and your talent be of significance in this world?

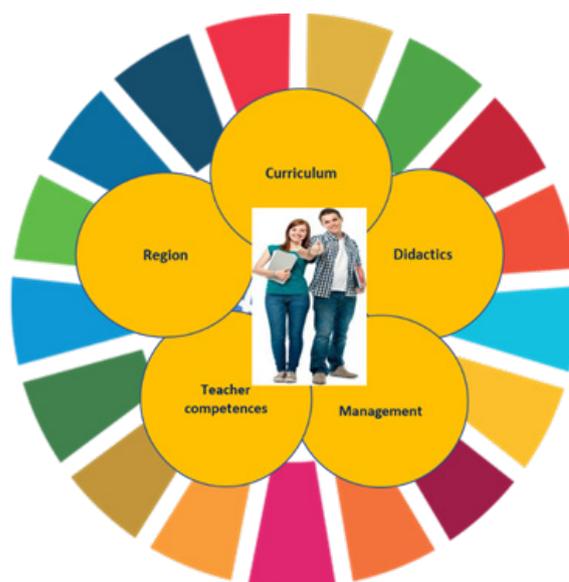


Figure 2: The Whole School Approach to Sustainability. Swart, Wals & Fernandes (2016).

Strengthening the movement

Both uploading a Spark and taking a self-scan are appreciated by Spark. We do this by awarding the Spark of the Month for interesting, special initiatives and by presenting a Spark Award for completing the self-scan. Finally, every school or training course that starts working with circular economy or the SDGs can claim an advisory interview from Spark the Movement.

How circular economy learning approaches are gaining traction among higher education

Nora Clinton



The circular economy is a new framework which challenges the way we currently produce and consume. Our economy today is predominantly linear- we take materials from the ground, we produce goods from this material and more often than not these goods are disposed of with significant negative consequences such as pollution and loss of biodiversity to name but a few. The circular economy calls this linear system into question and challenges us to recognise that the way we design our products and systems from the outset, holds the key to a new systemic approach.

This fundamental rethink translates into an exhilarating innovation challenge. How can we design out waste and pollution from our manufacturing systems and services? How can we keep products and materials in use to curtail the consumption of natural resources? How can the products we create regenerate rather than degrade natural systems? The circular economy framework is a strategy of change, a positive pathway which offers a much-needed solutions approach to these pressing problems.

Education systems are key in the transition; more than adapt they need to lead this transformation not only by adopting the teaching of circular economy in classrooms but also through providing students with the right skills and thinking to make the transition happen at scale.

The current landscape of circular economy learning across higher education

Learning and education have always been key areas of focus for the Ellen MacArthur Foundation as how we think shapes the world around us, and our ways of thinking are formed through learning. Our work includes a particular focus on higher education, recognising that universities exert major societal influence through research but also in inspiring and educating young professionals entering the workplace.

Through academic partnerships, the Ellen MacArthur Foundation has co-developed the world's first circular economy learning offerings of their kind: the MBA in 'Innovation, Enterprise and Circular Economy' at University of Bradford, UK, and 'Circular Economy: An Introduction' a massive open online course (MOOC) at TU Delft, Netherlands. In 2018, and supporting an emerging momentum in learning for a circular economy, we carried out a piece of work mapping the global landscape of circular economy learning offerings across 138 higher education institutions and taught in English, Finnish, Dutch and Chinese¹.

The offerings found varied in size and scope, with our research focusing on courses with credits exceeding 1.5 European Credit Transfer and Accumulation System (ECTS). MOOCs were also included. Our findings show that 38% of the 138 higher education institutions identified are located in Finland and the Netherlands; nations that are clearly driving the circular economy agenda at business and policy level. A further 15% of the offerings were found in the UK, 11% in China and 7% in the USA. The remaining offerings were principally in European nations.

1 Findings can be accessed at <https://www.ellenmacarthurfoundation.org/our-work/activities/universities/learning-landscape-research>

With regards to disciplines, engineering, business, and design are the most represented, and are traditional sustainability related studies. An analysis of course themes revealed a large focus on resource use and waste, life-cycle assessments, circular business models, the role of design, and the social aspects of circular economy. However, we see less focus in these offerings in areas which we believe are essential in the transition; both the roles of policy levers and digital technology. Circular economy also appears to be taught in the context of resource scarcity but not as a response to environmental issues such as climate change. Furthermore, we have not yet seen circular economy being distinctly taught in the context of economics.

It has to be noted that outside of the taught curriculum, the circular economy now features more prominently in the student challenge and case competition space. In these problem based, applied learning approaches, multidisciplinary groups work together to innovate for solutions to pressing global challenges. The 2019 [MIT Global Solve Challenge](#) on circular economy is a case in point. This is a very promising development; placing circular economy in a context of positive solutions-oriented frame, solving real world problems through multidisciplinary and participatory learning approaches.

Reflections

The framework of a circular economy is an inspiring vision which guides us in rethinking our current linear system and requires us to move to a new level of awareness as Einstein describes where “No problem can be solved from the same level of consciousness that created it”. The recent climate strikes in the UK show that young people today are very aware of our planet’s pressing problems such as rising CO2 emissions, climate change and biodiversity loss. Schools and universities also hold the Sustainable Development Goals in very high regard. As a consequence young people urgently want to see change whilst at the same time they must be those agents of change in their lives and chosen professions. The circular economy will be a big contributor to tackling climate change and biodiversity loss and therefore meeting some of the [Sustainable Development] Goals. In the space of higher education, we believe that students should be exposed to the principles of a circular economy as early as possible and across all disciplines.

The circular economy must be presented to students as a pathway assorted with clear strategies; and to inspire them to be part of this exciting innovation agenda which urgently needs their imagination and creativity.

The framework of a circular economy requires a systems thinking mindset in line with the science of complex systems, seeing real world systems as much more than a mechanism. Therefore, taking a broader educational view, one hypothesis is that we need start teaching children in early years education about the interconnected and complex nature of the world. Promoting a greater common understanding and wider inclusion of this thinking in our learning environments would serve as an important step to help further understanding of the circular economy and our transition towards it.

Promoting a mindshift in educators. The experience of the CYCLE project

Graham Attwell



In spring 2019, young people and students from Europe and all over the world have taken to the streets to demand action to halt environmental and climate change. On a day of action in March, organizers said there were more than 2,000 protests in 125 countries.¹ The student movement was inspired by 16-year-old Greta Thunberg, now nominated for a Nobel Prize, who kicked off a global movement after she sat outside Swedish parliament every Friday beginning August 2018. Young people have demanded the environment is included in the school curriculum.

Following the action by young people and students the movement has spread. In Easter 2019 demonstrators from the Extinction Rebellion movement disrupted large areas of central London. The demonstrators were demanding the declaration of a 'climate emergency', the urgency of which was subsequently underwritten by a report by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services that 1,000,000 species are threatened with extinction.²

Central to reducing damage to the environment and developing positive change is the development of the circular economy. In 2015 the European Commission adopted an action plan to help accelerate Europe's transition towards a circular economy, boost global competitiveness, promote sustainable economic growth and generate new jobs.³

A seminar held in the European Parliament in February 2019 brought together experts from circular economy organisations, NGOs and local government with educationists. Discussion at the seminar centered around the realization that the two different communities had only limited interchange, that education was vital for understanding what actions can be undertaken to promote the circular economy and that the support and activity of young people would be critical for developing and spreading the circular economy.

The seminar was organised by ACR+ who are a partner in the EU Erasmus Plus funded CYCLE project. The CYCLE project is creating a set of tools and resources to support adult trainers contributing to the development and expansion of their professional and educational skills in the circular economy.

Although there has been much work on the technical, professional and environmental aspects of the circular economy, less emphasis has been placed on the actions and behaviour of citizens in a transformation to sustainable growth. This is where educators will play an important role, both in defining transversal competencies for the circular economy that can be incorporated into existing training processes and in the development of training tools that facilitate this process.

1 <https://www.theguardian.com/environment/live/2019/mar/15/climate-strikes-2019-live-latest-climate-change-global-warming>

2 <https://www.ipbes.net/news/Media-Release-Global-Assessment>

3 https://ec.europa.eu/commission/priorities/jobs-growth-and-investment/towards-circular-economy_en

Making the transition to a circular economy requires new skills, competencies and approaches. Green awareness needs to be built into the education system from an early age.⁴ Educators, including in youth work, Vocational Education and Training and in Adult Education have a critical role to play in facilitating the development of the new skills and competencies. The ‘greening’ dimension of the circular economy needs to be incorporated in curricula and courses at all levels.

Furthermore, topping up and improving existing skills is at least as important as acquiring completely new skills. Complementing general skills with green skills can make a big difference.

The CYCLE project has defined competencies for the circular economy as those that are key to a sustainable future, ranging from a detailed knowledge of resources and raw materials to a rich understanding of social behaviours required to create a model that works for society, the economy and the environment.

Competencies can be divided into:

- Cognitive: Skills related to knowledge, concepts and ideas;
- Psychomotor: Abilities related to the performance of actions, basic skills and abilities; and
- Affective: Capacities related to feelings, emotions and attitudes.

This, in relation to the circular economy, translates into knowledge and action in terms of knowing, being and knowing how to do.

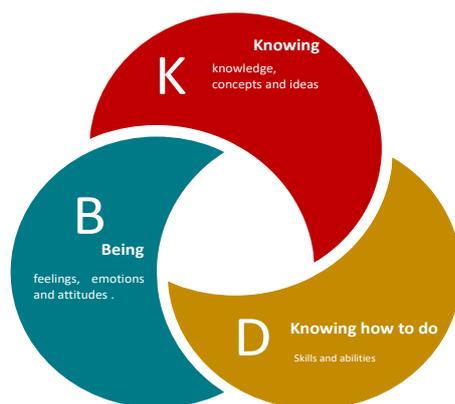


Figure 3: CYCLE competence model

The circular economy model is based on three key pillars:

- Value materials, products and resources for as long as possible;
- Optimize the use of materials and reuse them giving them another type of value;
- Recycle these materials and products and create others from them, thus closing the loop in their life circle.

These three ideas, defined in different ways, are common to all definitions of the term circular economy. This is the approach to determine three large groups of competencies (see Figure 4, next page).

4 Transforming Jobs and Skills for a Resource Efficient, Inclusive and Circular Economy: Recommendations and Summary of the Event” (2014).

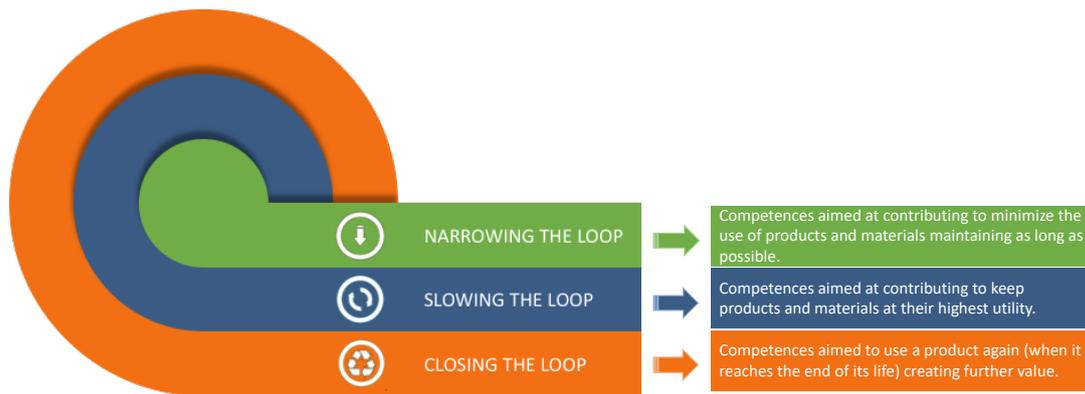


Figure 4: CYCLE competence framework structure

Based on a circular approach, there are three types of competence:

1. Competencies aimed at contributing to minimize the use of products and materials maintaining value as long as possible (preserving) – narrowing the loop;
2. Competencies aimed at contributing to maintaining products and materials at their highest utility (optimizing) – slowing the loop;
3. Competencies aiming to use a product again (when it reaches the end of its life), creating further value (fostering effectiveness) – closing the loop.

The CYCLE project is developing a resource bank of Open Educational Resources around the Circular Economy which are freely available for download and for adapting to needs for use with different groups. At the same time participants in the seminar at the European Parliament are looking at how they can build on the growing momentum around education and the circular economy. A new project is being developed under the Youth strand of the Erasmus Plus programme aiming to develop a permanent dialogue between youth organizations and local authorities to promote circular economy practices, as well as supporting young people in developing local projects and collaborating in sharing knowledge and practice in Europe.

Section 2

Upskilling the waste, repair & reuse sector

The SWITCH Forum: making the resource management industry healthier and more attractive

Fiona Craig



The Scottish policy context

The original idea for the SWITCH Forum was borne out of the Scottish Government's Zero Waste Action Plan which tasked Zero Waste Scotland with **developing “a programme to support continual improvements in health and safety and workforce skills in the resource management sector.”** In its 2016 Circular Economy Strategy, “**Making Things Last**”, the Scottish Government expresses the need to build capacity and develop people “to make sure Scotland’s workforce has the right skills to take advantage of opportunities from a more circular economy.”¹

There is a recognition that there will be increasing challenges and opportunities placed on the workforce within the resource management industry specifically in relation to innovation, technological change, and the transition to a circular economy in Scotland. Understanding the opportunities this presents and having the knowledge, skills and competence to address these challenges will be a significant step in developing an industry ready to be a key contributor to the circular economy in Scotland. By establishing a multi-agency partnership to provide leadership on this across the industry is an effective and sustainable way to influence change.

Zero Waste Scotland

Zero Waste Scotland exists to create a society where resources are valued and nothing is wasted. Our goal is to help Scotland realise the **economic, environmental and social benefits** of making best use of the world’s limited natural resources. Our mission is to influence and enable change – from gathering evidence and informing policy, to motivating practical behaviour change in individuals and organisations through our programmes.



Zero Waste Scotland believes that the development of circular economy competence, education and skills will enable Scotland to seize the opportunities presented by the transition towards a circular economy.

1 Scottish Government: Making Things Last 2016. <https://www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland/>



To achieve this, we lead a national strategic partnership to create a circular economy skills and education hub, as tasked by Scottish Government's Circular Economy Strategy, to influence the skills and education policy agenda, to provide thought leadership and opportunities for collaboration around circular economy skills, learning and education. This will aim to provide tangible resources to enable Scotland to seize the opportunities presented by the transition towards a circular economy.

By creating collaborative culture, we aim to strategically instigate change in our partner and stakeholder delivery, now and in the future. This will enable the greatest impact and make a significant difference to growing circular thinking and conscious action on behaviour change in Scotland.

One such way has been the development and support of the SWITCH Forum, as an industry-wide body of which Zero Waste Scotland is a partner and founding member.

SWITCH

From its inception in 2014, SWITCH continues to grow its membership and includes partners from public, private and third sector waste organisations, trade associations, professional bodies, national education and skills agencies along with representatives from the Scottish Government, Health and Safety Executive, Scottish Environmental Protection Agency and the Scottish Trade Union Congress.

In collaboration, these organisations have worked closely to establish SWITCH's governance structures, strategic objectives, partnership and membership arrangements. On a voluntary basis, the work of SWITCH is enabled through its membership structure of a network and ambassadors. Ambassador members sit on and contribute to three working groups: executive; education, training and competence; and health and safety.

SWITCH's strategic objectives are that the resource management industry:

- is safe and healthy to work in;
- actively supports education, training, learning and development;
- increases workforce capacity and competence;
- develops and shares good practice;
- creates an industry that is attractive as a career choice;
- and creates clear career and learner pathways.

SWITCH's achievements

In five years, SWITCH has attracted a range of partners from across the industry committed to these objectives, demonstrated through what it has achieved in this time:

- the brand, which is a clear and recognisable and people are aware of SWITCH and its purpose;
- commitment and engagement from main stakeholders in the industry;
- the creation of SWITCH ambassadors (30+ members);
- the creation of the SWITCH network (200+ members);
- recognition by other national bodies;
- good practice events;
- sharing of resources;
- the launch of the Competence Framework, which is the first of its kind;
- the launch of the Waste Industry Passport Scheme;
- and communication and engagement strategies.

The future of SWITCH

SWITCH is currently moving towards establishing itself as a Scottish Charitable Incorporated Organisation (SCIO) which will enable it to be entirely self-sustaining. This development is an indication of the success of SWITCH, due to the multi-agency partnership approach and recognition that no one organisation can fix complex issues.

In its leadership for the resource management sector SWITCH members are committed to working collaboratively and taking ownership and collective responsibility for the forums development, competence and standard setting.

SWITCH is keen to share and exchange knowledge and experience and learn from other good practice across the European Union and in international communities of practice and networks. SWITCH would welcome and encourage the development of lifelong learning in circular economy.

The circular economy as a model towards greater efficiency in productive processes

Roberto Cerqueira



LIPOR - Municipal Waste Management Service of Greater Porto - is the entity responsible for the management, valorisation and treatment of the urban waste produced by the eight municipalities that comprise it: Espinho, Gondomar, Maia, Matosinhos, Porto, Póvoa de Varzim, Valongo and Vila do Conde. Established as an association of municipalities in 1982, LIPOR has been implementing integrated waste management, recovering, expanding and building infrastructures, complemented by public awareness campaigns. Every year, LIPOR treats about 500,000 tonnes of urban waste (UW) produced by about one million inhabitants. Based on modern UW management concepts, which advocate the adoption of integrated systems and the minimisation of waste disposal in landfills, LIPOR has developed an integrated strategy for the recovery, treatment and containment of the UW, based on three main components: multi-organic enhancement and energetic enhancement, completed by a sanitary landfill to receive rejects and previously prepared waste. Towards Sustainability, the motto of LIPOR's strategy, makes explicit, from the outset, a sustainable management that aggregates the three pillars of sustainable development, which LIPOR espouses and will continue to espouse.



LIPOR intends, with its Academy, to develop and improve skills through the training and qualification of people, using advanced teaching methods and equipment. The training of the LIPOR Academy is certified by the General Directorate of Employment and Labor Relations (DGERT) and by the CEFA Foundation - Foundation for Studies and Autarchic Formation. LIPOR is also a promoter accredited by the Order of Engineers. The training offered by the LIPOR Academy extends to different areas of knowledge, thus integrating courses or training actions specifically designed to meet market needs.

The various training actions, divided into five work areas, offer a balanced combination of theoretical and practical components, privileging the sharing of knowledge through case analysis, technical visits and practical work, which allows a real approximation in the most operational aspect concepts.

The axis of advanced training integrates LIPOR University, which in its last edition provided a *Program on Circular Entrepreneurship: Opportunities and Challenges* that sought to identify opportunities associated with circular entrepreneurship, transposing its action to the search for solutions that are an example of innovation and creativity in resolution problems. The pedagogical transversality covered subjects ranging from circular economy, innovation and creativity to financial planning and the concrete presentation of case studies. The goal was to provide an integrated perspective, motivating entrepreneurs to develop innovative, creative and circular business ideas.



The LIPOR Academy has sought to invest in the promotion of programs that enable trainees to acquire entrepreneurial skills. Aware of the lack of training available in the waste sector in Portugal, LIPOR obtained the certification as a training entity by the CEFA Foundation - Foundation for Studies and Autarchic Formation, creating the Lipor Academy. Since 2015, it intends to develop and improve skills through the training and qualification of people, using advanced teaching methods and equipment, thus stimulating a deeper knowledge of the sector.

In 2018, the LIPOR Academy stimulated 50 courses with a total duration of 340 hours of training, involving about 1,032 trainees. The courses focused on the themes of circular entrepreneurship, food waste, sustainability, selective collection, multimaterial separation, organic farming, among others. The training had several audiences, particularly catering to public and private entities, technicians of municipalities, teachers, recent graduates and the general population. The Academy thus reinforced the work previously done to promote solutions to the measure and increased the bet on e-learning and e-training.

The overall assessment of the work of the Academy was frankly positive. The quality of the training provided and the trainers involved corresponded to the expectations, as well as the observations regarding the work carried out by the LIPOR Academy.

Supporting vocational training and lifelong learning for the circular economy

Sarah Miller

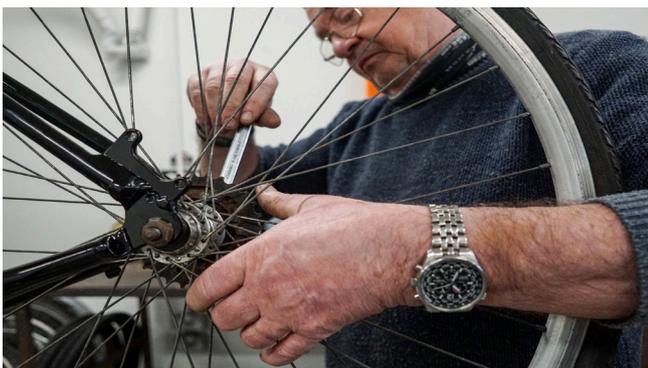


The Rediscovery Centre is a creative space connecting people, ideas and resources to support low carbon living. The Centre mobilises the skills and expertise of artists, scientists, designers and craftsmen to demonstrate sustainability through resource efficiency and reuse. As the Irish National Centre for the Circular Economy, the Rediscovery Centre supports the development of a circular economy and advocates for a more resilient and equitable society.



Established in 2005, the Rediscovery Centre is now located in a bespoke demonstration eco-facility. Supported through the European LIFE+ Fund in 2017, it is a centre of excellence in sustainability incorporating educational exhibits, renewable and efficient energy systems, sustainable building materials, rainwater harvesting, grey water recycling, composting toilets and gardens designed for biodiversity enhancement and environmental education. It defines the building and environs as an educational tool to inspire, inform and lead positive behavioural change with respect to resource management and efficiency. The Centre is open to the public Monday to Saturday 9-5pm and includes an eco store (supporting Irish producers and designers), a cafe and meeting spaces used to host sustainability gatherings and events.

The Rediscovery Centre delivers a wide array of educational activities. Life long learning for sustainable development and STEAM (Science, Technology, Engineering, Arts and Maths) is provided to students of all ages and varying needs. Research programmes investigate reuse and circular economy opportunities in Ireland and policy work aims to promote sustainable consumption, climate action and the SDGs.



The centre operates four reuse social enterprises: Rediscover Fashion; Rediscover Furniture; Rediscover Paint and Rediscover Cycling. All programmes use discarded materials which are repaired and upcycled to make new products realising significant environmental benefits. In addition to preventing waste being created and the negative impacts of waste management,

greater benefits are realised through abated CO2 emissions and pollution reduced as a result of material extraction, production & distribution avoided. Repair, reuse and other circular economy models employed negate the need for new products to be produced and retains the value within existing products for longer by keeping them in circulation and extending the value chain. All products created in the Rediscovery Centre's social enterprises are sold through the shop onsite or online. Profit gained is reinvested to support training and labour activation programmes.

Whilst the environmental and economic impacts of the Centre's activities are considerable, the more immediate and direct impacts are social and local. All of the centre's programmes offer vocational training for, and support to, long-term unemployed and those at most distance from the labour market living in the area. Historically an area of social deprivation, the Centre's enterprises provide a structured work-based training programme across a range of disciplines including carpentry, bike mechanics, upholstery, painting, fashion design and dress-making. Working with approximately 50 participants per year, training programmes last from nine months to three years depending on the individual's needs and includes personal development training and other key skills necessary to enter today's labour market. Over 90% of people on the programmes achieve full-time employment or progress to third level education upon completion. The programmes are designed to support social inclusion, diversity, active citizenship and importantly, to break cycles of generational unemployment prevalent in the area. As a result of labour activation initiatives the centre is also more embedded in the community with circa 50% of staff living locally.

The Rediscovery Centre's social enterprise financial model is of interest in that 50% of the operating costs are generated through the sale of services and products and 50% is provided through strategic and sustainability partners including the Environmental Protection Agency, Dublin City Council & the Eastern Midlands Waste Region. The model has been designed and developed over 13 years and is built on the recognition of a need for balance between economic and social return. Focussing on one particular impact affects the other ie., an over focus on social impact effects ability to generate income to sustain the programme, whereas the reverse is also true; a single focus on economic return effects the social impact (reduction in progression rates, retention and others).



The Rediscovery Centre has recently launched its Circular Economy Academy. The Academy will provide a nationwide support service to assist social enterprises to develop successful businesses using circular economy models and expand outreach educational programmes.

More information on the centre can be found at www.rediscoverycentre.ie.

Section 3 – Facilitating the transition towards the circular economy

Mapping jobs and skills in the circular economy

Joke Dufourmont



Our current, linear economy is failing citizens and the environment. While take-make-waste industries are producing economic benefits for many, they do so at high cost, with disadvantages concentrated among the more vulnerable social classes and causing irreparable damage to the planet. Today's challenges, including growing social inequality, climate change and increasing resource scarcity, require a systemic transition. The circular economy constitutes such a transition.

The circular economy continuously aims to reuse resources at the highest possible value, driving economic activity within the boundaries of our planet. When managed well, the transition to the circular economy may have multiple operational and strategic benefits, both on a micro- and macroeconomic level. The circular economy offers great potential for innovation, employment opportunities, quality of work and, ultimately, a more inclusive economy serving the needs of all people.

In order to make relevant policy and adequately support the circular transition of the labour market, there is a need for a more thorough understanding what exactly constitutes this potential, for who, and what is required to realise it.

The circular economy is a heterogeneous complex of sectors, value chains and economic activity, which are not easily captured in traditional sector divisions. The proliferation of different definitions and conceptualisations of the circular economy is the witness of this complexity. From a practical point of view, these definitions agree on seven key elements of the circular economy. There are three core circular strategies, which involve renewable resources, lifetime extension and recycling (in light blue), and four enabling circular strategies, which involve circular business models, circular design, digital technology and structural collaboration (in dark blue). Considering this diversity of activities in the circular economy, making universally applicable



Figure 5: The seven key elements of the circular economy. Source: <https://www.circle-economy.com/the-7-key-elements-of-the-circular-economy>

claims for the circular economy is similar to making universally valid claims about the entire economy. They give an idea, but lack actionable advice. The same holds for jobs in the circular economy, shortly ‘circular jobs’. Circular jobs are all occupations that contribute to one of the seven key elements of the circular economy. The circular labour market is therefore constituted of jobs that directly intervene in material cycles - think for example of the recycling operative or appliance technician; these are ‘core circular jobs’. A second layer of circular jobs are those that develop the systemic elements that are required to scale up, accelerate and mainstream the core circular jobs - think of the data scientist or architect - these are ‘enabling circular jobs’. A third layer of circular jobs comprises all employment that is indirectly generated by core and enabling circular jobs - these can range from package deliveries to teachers - they are ‘indirectly circular jobs’. Following this definition of circular jobs, in the Netherlands, roughly 8% of all jobs are considered circular. Core, enabling and indirectly circular jobs each constitute a significant share. The extent and diversity of the circular labour market now becomes clear.

This diversity of circular jobs translates into nuanced consequences for the demand for skills and knowledge. Where enabling circular jobs in general require higher education levels, on-the-job training is more important for core circular jobs. The enabling jobs that require higher education involve a wide range of knowledge fields. In other words, a circular economy calls for both engineers and business developers, both communication experts and sales representatives with circular economy knowledge. At the same time, the increasing

collaboration between and integration of different steps in the value chain results in vertical diversification across value chains, and therefore a general upskilling of everyone active in it. Indeed, unlike green jobs, circular jobs demand a very high diversity of labour.

In order to develop the necessary circular labour force, this diversity needs to be converted in a range of government and industry interventions. For example, to meet the needs in highly educated labour, circular economy thinking should be integrated and mainstreamed across tertiary education. When it comes to practically trained labour, then, public-private partnerships with initiatives in dual learning should connect industry and education to anticipate quickly developing technologies. To this end, sectors should initiate their own programmes, as they are at the forefront of these technological and sectoral developments. Yet, governments should assume responsibility to ensure healthy and ubiquitous system linkages and facilitate cross-over opportunities.

To support, steer, monitor and adjust this action across territories and institutions, there is a need to develop

a shared understanding of the circular economy in general, and the circular labour market in particular. The necessary effort, parallel to the above mentioned talent management interventions, is therefore to develop uniform language and metrics on the topic of circular jobs. The seven key elements of the circular economy and methodology presented here have the ambition to further move in this direction.

The circular economy holds the potential to provide wellbeing for all within planetary boundaries. Jobs enhance this wellbeing by contributing to thriving societies and the equal distribution of wealth. Acting to ensure a positive transition to circularity for work and workers, at Circle Economy’s recently launched [Jobs & Skills Programme](#) we define and identify circular jobs, analyse the environment needed to create them and maximise their societal benefits, and examines how best technology can play a positive part.”

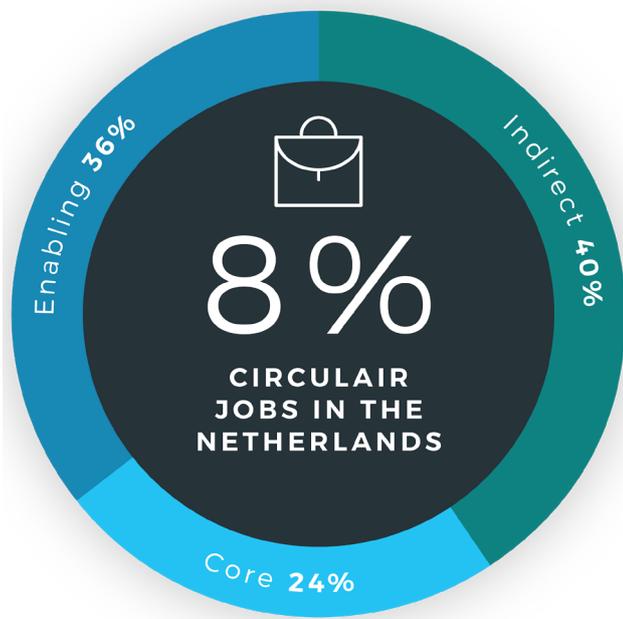
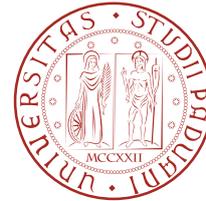


Figure 6: Core, enabling and indirectly circular jobs in the Netherlands. Source: <https://www.circle-economy.com/case/measuring-the-jobs-and-skills-that-are-boosting-amsterdams-circular-economy/#.XL7pJOszZTY>

The circular economy in Italian companies: the results of a recent survey

Lorenzo Barucca, Eleonora Di Maria,
Valentina De Marchi, Marco Mancini



Studies and analyses suggest that it is increasingly urgent to reconcile economic growth with sustainable development on the environmental and social front, supporting the transition to the circular economy paradigm, as opposed to the model of 'take-make-consume-dispose' that characterized the industrial economy of the last millennium. At the moment, however, little is known about how companies are taking up this challenge and the specific difficulties and opportunities that characterize this path. Below are the main results of a specific survey carried out by the Digital Manufacturing Laboratory of the University of Padua in collaboration with the scientific office of Legambiente .

How firms are implementing the circular economy paradigm

The activity most practiced by the companies interviewed is the prevention of waste production and waste reduction (85%). Moreover, more than half of the companies have invested in reducing the use of resources and reusing the waste from their activities in the production cycle. Significant are also the efforts to reduce their negative emissions, to use 'circular' raw materials (secondary raw materials) made by other companies or to make their waste available to other companies.

Reconciling profit and the environment: the business models used

Pursuing the principles of the circular economy represents an opportunity to create new business models. The one most often pursued by Italian circular enterprises (73.6%) is focused on the recovery, reuse and recycling of resources, which promotes the return of resource flows and transforms potential waste into value also through innovative services related to reuse and/or recycling, thus allowing reductions in production costs. Much less widespread (18.9%) is the business model focused on circular supplies or purchases, focusing on developing innovative resource materials from renewable sources, reuse and recycling, offering the possibility of differentiation towards market slices more attentive to sustainability while respecting the expectations of functionality and aesthetics required. Only 7.5% base their model on extending the useful life of the product, investing in a design focused on modularity, ease of maintenance and updating of functions and aesthetics, offering a more expensive product but with a longer lifecycle.

The investments that are needed

Becoming a circular enterprise required significant resources (on average 45% of turnover), an investment made mainly (for 81.5% of the companies interviewed) with equity capital. 38.9% of the companies stated

that they had resorted to bank financing, 18.5% to EU financing, 14.8% to regional financing and finally only 3.7% to crowdfunding and fundraising.

The research shows that marketing is the first activity in which companies have invested to create a “circular” business model. In this context, marketing is a necessary tool for bridging the gap between the purpose of increasing the value of the product and the real ability of the market (consumers) to recognise the greater value associated with innovation processes (product and process). When asked about the activities that have been very important to modify in order to become a ‘circular’ business, companies have, in fact, mainly indicated marketing and commercial activities (for 64.7% of companies), the development of new products (50%), the product portfolio offered (48.1%), logistics and supply management (42%) and the production process (41.2%). To achieve these results, it was necessary to invest in internal skills: for 42.3% of those interviewed, it was very important to update the skills of the technicians present in the company or even to acquire new professional figures of a technical or administrative/managerial nature (38.5%). In this perspective, investments in technologies are a useful complement: about 30% of respondents have adopted Industry 4.0 technologies, which can play an enabling role as a tool for knowledge and monitoring in the use of resources and products. In addition, most enterprises needed the complementary skills of external actors, mainly material suppliers (55.1%) and universities or public research centres (46.9%).

Reasons, benefits and difficulties

The circular economy responds to a desire for sustainable growth in the face of increasing pressures on resources. Among the main reasons that push a company towards the circular economy there are both reasons of an ethical nature and corporate social responsibility (88.5%), and reasons linked to the market (increase in the value of the product offered, 80.4%). But does being circular pay off? In view of the reasons that led companies to adopt a circular business model, the research also identified the main benefits perceived by companies: an improvement in the company’s reputation (88.5%) or in the motivation of staff and in the variety of products/services offered (69.2%) and the possibility of repositioning the brand (65.4%). It is also interesting to note that for 55.8% of the respondents investing in circularity led to an increase in employment (only for 3.8% a reduction), suggesting that the achievement of sustainability objectives does not necessarily come at the expense of economic performance objectives. However, becoming circulars is not a path without obstacles. The attractiveness of converting to sustainability is mainly clashed with legislation perceived as inadequate and contradictory (as stated by 49% of companies) and with difficulties linked to the market, either because it implies excessively high prices (48%) or because of the difficulty in identifying suitable distribution channels (40%) or because of the distrust or lack of knowledge of consumers (37.3%).

The circular economy represents a brilliant opportunity for Italian companies, especially small and medium enterprises with strong innovative capacities to reposition themselves in increasingly complex and competitive markets. In order for these opportunities to become reality for the majority of companies, however, it is important to make various investments, both on the private and public front, to create greater awareness and specific skills.

The circular economy in Italy

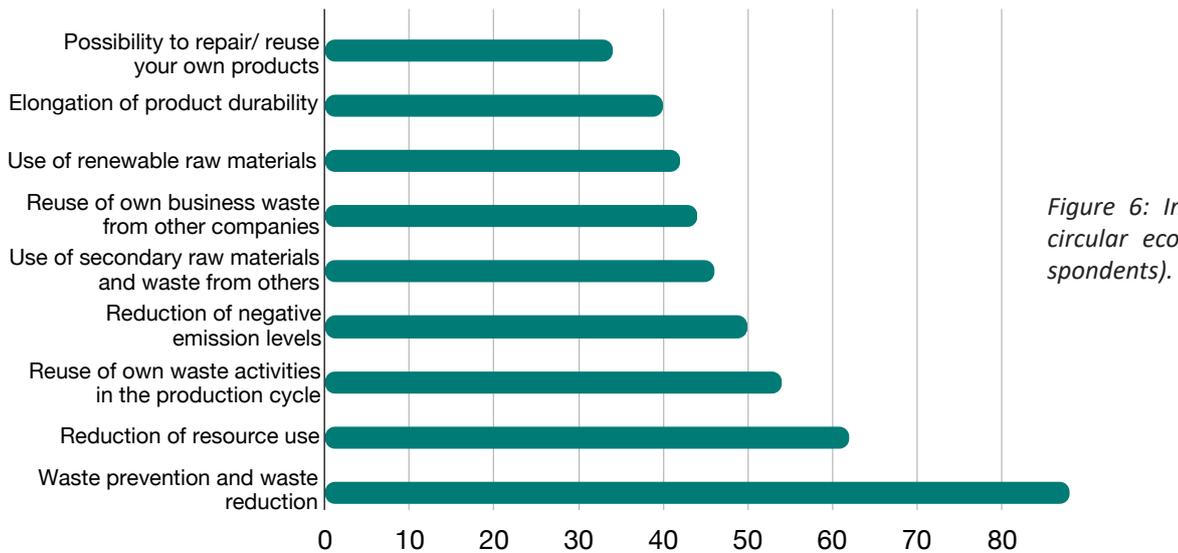


Figure 6: Implementing the circular economy (% of respondents).

Figure 7: The activities modified (% of respondents)

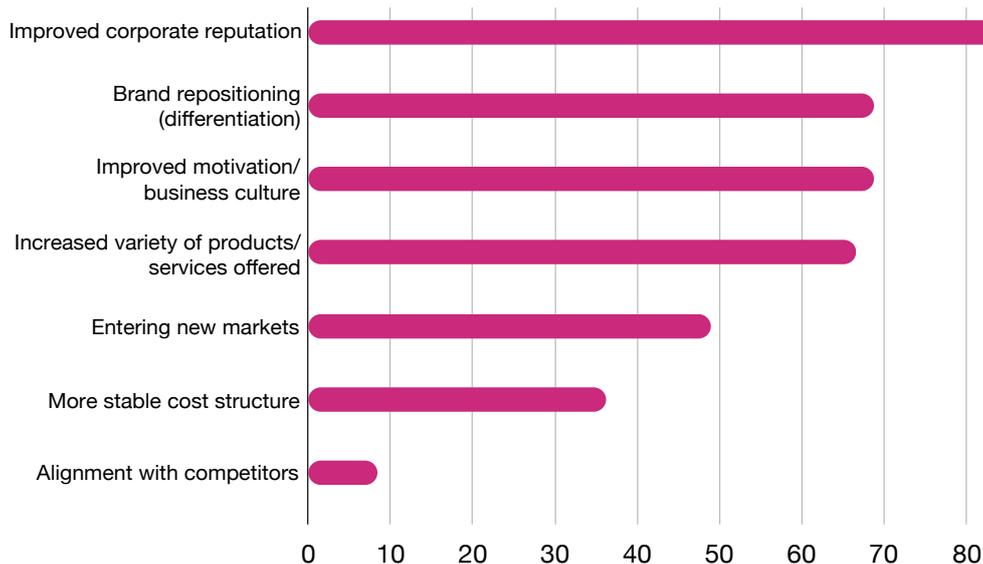
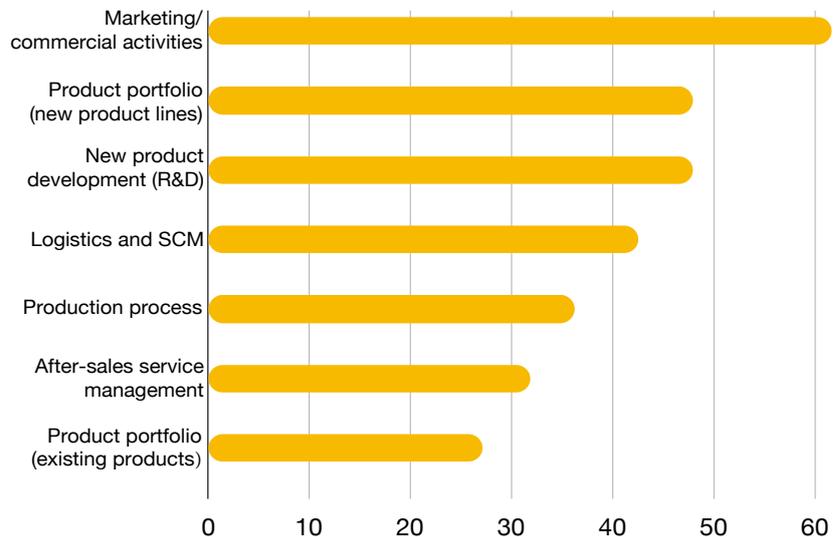


Figure 8: The benefits of the circular economy (% of respondents)

Common source for the three graphs above: *L'economia circolare nelle imprese italiane e il contributo di industria 4.0. 2015.*
https://www.economia.unipd.it/sites/economia.unipd.it/files/Rapporto_economicicircolare_industria4.0_Legambiente_LMD_2.pdf

Helping local administrators to support the transition towards circular economy

Luiqi Acquaviva



Since 2015 a group of neighbouring municipalities in the Vesuvian area discussed the possibility of creating a shared agency for sustainable development. In September 2016 the idea became reality with the Joint Office for Environmental Sustainability (UCSA) of which the municipalities of Palma Campania, San Gennaro Vesuviano and San Giuseppe Vesuviano became members, then followed by the municipality of Striano in May 2017. It serves a population of 61,000 inhabitants. UCSA is a planning office, shared by the city councils' members, whose aim is to organize and pool their interventions in energy, climate change and environmental areas. It is a totally public entity, managed and monitored by the City Councils themselves. Its mission consists in developing knowledges and specific skills for local administrators and technical staff in certain



areas and in demonstrating the potentialities and effectiveness of a joint municipal planning structure through the preparation of tender procedures and the participation to concerted calls for funding. It also prepares territorial studies and monitors the negative effects of anthropic pollution to support the political and technical choices in the operational areas. Finally, UCSA tries to create key partnerships able to interact in the local, regional, national and European

panorama and to implement the planned activities with the support of local stakeholders.

The continuous training of local technical staff and administrators, beside being an instrument to increase their knowledge, has been a necessary tool to enable them to understand the relationships between the different materials and their capacity to be reused and recycled, the need to reduce greenhouse gas emissions and the opportunity to move from individual to group actions. These three paradigms are the foundation used by UCSA to introduce circular economy.

However, despite the efforts of the EU to define circular economy as the missing link to sustainability, new job opportunities and increased competitiveness some professionals think there are still cultural and market barriers to overcome (Utrecht University and Deloitte, 2017). *

UCSA's staff strongly believe that market barriers are not the real problem, and whoever is still looking to adopt a market approach based on a cost-benefit ratio has to understand that. In this particular instance, the variable benefit also defines the planet's capacity to fight climate changes and costs need to be weighted accordingly.

Cultural barriers can also be demolished, but this needs to be a constant process rather than a mere profession of faith. The UCSA experience shows that it is possible to accomplish it, because the circular economy concept can be incorporated in almost any activity that prevents the world from defaulting. One of the first activities UCSA carried out to promote the circular economy was a communication and awareness campaign for residents about waste.



Figure 9: The UCSA awareness campaign aimed at promoting the circular economy among residents.

The campaign stated: the more you love, the less waste you create/ produce and it aimed to achieve a much broader impact than just waste reduction.

Likewise, the adoption of the minimum environmental criteria set up by the national government in the planning and execution of tenders for the reduction and/ or recovery of urban and industrial waste is providing the opportunity for public administrators and staff to work together with the business community in the field of civil works, of building maintenance and of textile waste.

Last but not least, with the support of a Public University Institute, UCSA coordinated the drafting of a feasibility study for the production of biomethane from organic waste to cover part of the energy transportation needs. The study, which included visits to existing plants and the possibility to share and overcome uncertainties with peers, represented an ulterior step to a more comprehensive understanding of circular economy.

The same path has been used on energy efficiency and energy production from renewable sources, as well as sustainable mobility. Seeing how the underlying philosophy behind the reduction of energy consumption, increasing energy efficiency and the production from renewable sources is the same as that behind the circular economy, it has been easy to produce a sustainable energy action plan (SEAP) and commit the local administrators and staff to the objectives to achieve and to outline the activities to carry out.

Lately, we have started working on sustainable mobility and are developing a joint sustainable urban mobility plan that includes four other city councils, in addition to the existing ones.

Last year, UCSA was engaged in an awareness campaign to prevent new fires in the Vesuvius National Park after the tragic events of 2017, in an effort to promote climate change adaptation. In 2019, the municipalities will work on the shift from SEAP to SECAP (sustainable energy and climate action plan) elbow to elbow.

The figures for continuous training approved every year in the UCSA budget demonstrate a strong commitment towards the stated objectives. For the first three years, UCSA training was focused mainly on peer exchange, but nowadays doors can be opened to other professionals and politicians who could positively engage and help gain traction. Moreover, the interactions between city councils achieved savings through the tenders concluded for urban and special waste collection and disposal and through the shared developed projects. The latter covered both the cost of training events and of some of the planned activities, helping, at the same time, to overcome market barriers as well.

The role of local authorities in boosting entrepreneurship education and circular economy

Francesco Lembo



Thirty years ago, Alexander Langer introduced the theme of ecological conversion, evoking a transformation that had to intertwine economic conversion with a deeper transformation of our relationship with nature, the planet and the unjust distribution of wealth.

Like all sustainable development policies, the circular economy also needs a unified and effective communication and educational strategy, using all the communication, training, educational and participatory tools available (or to be reinvented) in an appropriate and synergic way and differentiated with respect to the different objectives and targets. The learning objectives of circular economy education underlie some key concepts: the limit of resources and their origin, the resilience of natural, anthropogenic and social ecosystems; production processes and product innovation (recycling, regeneration and reuse processes), conscious and sustainable consumption also through useful tools to analyse the degree of sustainability of products and services.



In other words: circularity as the key to interpreting the sustainability of our way of producing and using goods and services by polluting and dissipating as little as possible, the degree of resilience, reuse and sharing of resources and objects of our daily lives. The process of circular economy education is still far to be exactly defined. We now know for sure that it is not a one-off and episodic one, it requires continuity, quality, methodologies and tools, to be implemented through appropriate programmes. Because there is no knowledge and skills acquired once and for all in a rapidly changing world. The role of the education system, which is arguably more than to produce future workers, and should support students to prepare and adapt to a circular economy. The length of the process for transition towards a circular economy calls for a further definition of **key competencies as a cornerstone for the development of a long-term vision for curricula based on understanding current and future changes of circular economy models.**¹

The role of lifelong learning for the reach of those general objectives is still being investigated², but main evidence highlights the need of educational policies addressing different areas: (1) **new ways of working** and types of professional skills needed to accompany the transition to a low carbon and circular economy³; (2) **social innovation** in fields like sharing, reuse, eco-design, up-cycle and remanufacture, which are expected to result in more sustainable consumer/citizen behaviours; (3) **business model innovation**, intended as incorporation of circular thinking concepts throughout business models.⁴

1 The implications of greening industries on education systems and training policies in developing and advanced economies. UNESCO Global Education Monitoring Report (2016).

2 Education for people and for planet, creating sustainable futures for all. UNESCO Publishing, 2016

3 A New Skills Agenda for Europe. Working together to strengthen human capital, employability and competitiveness {SWD(2016) 195 final}.

4 Circular Advantage. Accenture Strategy. 2014.

Entrepreneurship education as a lever in the 'Future lifestyles vs waste generation' dynamics

Entrepreneurship education can have a bigger role on creating a **common interest towards sustainable development together with a proactive culture of innovation**, and offering the necessary skills. Nevertheless, this role relies on some necessary steps:

- a stronger connection between **creativity** competence, **curiosity and openness to new things and ideas**⁵;
- **systems thinking literacy**, going hand to hand to financial literacy;
- **a broader definition of self-efficacy**, which stimulates more inclusive reflections about quality of life (thus integrating considerations about the impact of environmental, social, community elements);
- **a systemic view of innovation**, taking into consideration advantages connected with resource efficiency.

In 2017, the EC Joint Research Centre developed the EntreComp Framework (Figure 10), in order to provide common guidance for the development of entrepreneurial education pathways. It relies on a broad definition of entrepreneurship, characterised by the ability to “act upon opportunities and ideas and transform them into value for others. The value that is created” can be financial, cultural, or social”. The flexible approach of the model struggles to embrace different kinds of entrepreneurship, but further investigations are needed to understand concrete connections among skills, social and green entrepreneurship. Whilst the EntreComp Framework does not have a taxonomic rigour, its visual representation calls for a slight polarisation between *mobilising resources and sustainable thinking* skills areas. **Circular economy overwhelmingly demands a systemic approach, using skills, knowledge and experience from many disciplines.** Some recent modeling of pedagogy for the circular economy argues that education for sustainable development and entrepreneurial education should both be fundamental pillars. The more we promote **a stronger link between a systemic view on resources and value generation**, the more waste will be viewed as a form of bad management that adds costs and affects profits. Webster and Johns (2008) called for a paradigmatic shift in sustainable development education, **from a ‘use less, waste less and recycle’ model, towards a ‘cradle-to-cradle model’**⁶. A similar shift may be necessary to improving EntreComp learning outcomes definition by integrating systems thinking into entrepreneurship education.

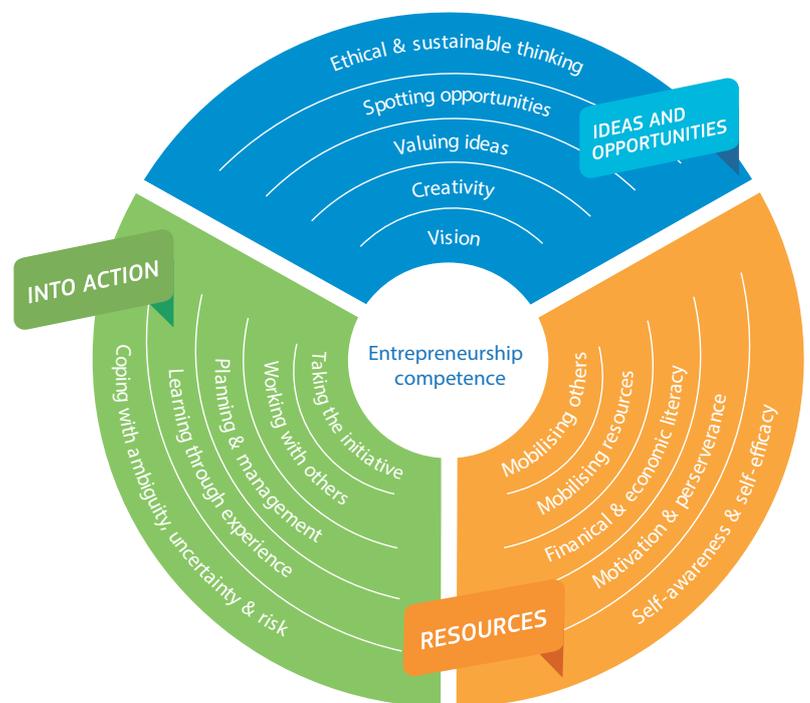


Figure 10: The EntreComp Framework, JRC Science Hub.
<https://ec.europa.eu/jrc/entrecomp>

The expected impact of entrepreneurship education is not only related to business start/scale-up, but it should increasingly deal with the introduction of a successful mechanism to help learners to “**reinvent**” **new active citizenship behaviours and new modes of work based on the spirit of personal initiative**. EC already identified a trend towards an improved coordination between education and innovation policies, giving the education sector a key role in the drive for increased innovation.

5 Buzás, N. – Lukovics, M. (eds) 2014: Responsible Innovation. SZTE GTK, Szeged, pp. 73-83.

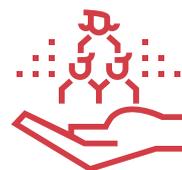
6 K. Webster, C. Johns, Sense & Sustainability, Educating for a circular economy, 2010, TerraPreta in association with the Ellen MacArthur Foundation

The role of local and regional authorities in promoting sustainable and innovative behaviours

When it comes to sustainable participative behaviours, schools and training centres can't rely on their sole forces. If entrepreneurship education assumes a collaborative dimension, **a wide range of stakeholder can cooperate to unlock the potential of local communities**. Many local authorities have sought to combine the positive aspects of individual, private and public initiatives to increase efficiency in the delivery of public services. A deeper cooperation between local authorities, educational institutions and private stakeholders is one of the most effective levers to promote sustainable innovations and entrepreneurial mindsets.

Entrepreneurship education programs can interact and support broader policies focusing on innovation, raising social and environmental impact at different levels. We will name only main trends on circular economy policies implemented by ACR+ members with a special focus on innovation:

- sharing tools and methodologies to promote active citizenship and **structured dialogue between individuals and public authorities**;
- promoting **eco-consumption and sustainable behaviours** (tackling food waste, building awareness on eco-labels);
- supporting bottom up processes leading to **sharing economy business models**;
- supporting local production processes, enhancing **makerspaces and social innovation coworking hubs**;
- supporting **repair cafés, reuse and recycling organisations**⁷;
- creating **permanent tables including schools, local authorities and private stakeholders** to promote awareness on social and environmental sustainability⁸;
- creating new spaces for experimentation, **innovation and entrepreneurship in the cultural and creative sector**⁹.



7 EMPOWERING REPAIR, Ellen MacArthur Foundation, 2016.

8 We mention, as an example, the DON'T WASTE OUR FUTURE CHARTER 2015 – A joint Europe a Manifesto of Young People and Local Authorities to promote Food Waste Reduction and the global Right to Food. <http://www.dontwaste.eu/>

9 Brussels, 27.4.2010 COM(2010) 183 final GREEN PAPER Unlocking the potential of cultural and creative industries.

About the authors

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Sander Bos works for the regional government of Fryslân. He enhances the circular economy in the region by bringing together governmental organizations, companies and knowledge institutes. His focus is on connecting the region to international opportunities and collaboration.

Lorenzo Barucca graduated in Business Economics and started his career at the school and training office of Legambiente. He now coordinates the national office for civilian economics, as well as the environmental education centres. He is also responsible for the GreenStations projects, which involve the Italian State Railways.

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Nora Clinton wrote this article while she was Higher Education Network Manager at the Ellen MacArthur Foundation. The network consists of institutions developing pioneering and innovative circular economy-orientated research or teaching programmes. A graduate of Applied Languages, Nora previously worked in multilingual roles in international business in both FMCG and tech sectors. She holds an MSc in Sustainable Development with SOAS, University of London. She is passionate about stimulating and giving visibility to the role of education in transitioning to a circular economy.

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Francesco Lembo is a project manager at ACR+. He seeks and finds people and ideas, and connects them to carry out international projects on capacity building facilitating implementation of local circular economy action plans. He wrote about inclusive pedagogy and recognition of prior learnings, and he worked for the Italian Ministry of Education and Confindustria, designing training programs for schools and VET organizations.

Marco Mancini holds a degree in Environmental Sciences from Sapienza University in Rome and a PhD in Forest Ecology from Tuscia University in Viterbo. He has been working working on circular economy, waste, green public procurement, environmental monitoring and citizen science at the Legambiente national scientific office since 2011.

Sarah Miller is the Rediscovery Centre's Company Secretary and is a PhD qualified environmental scientist with a Degree in biotechnology and a Masters in Business Administration. She has over 15 years private sector experience in the UK, Ireland and Australia, primarily in the area of operational waste and energy management. Sarah established the Rediscovery Centre as a small research and education centre in 2005 and has overseen its development ever since.

Heleentje Swart is a specialist in education for sustainable development. She is project leader for Spark the Movement (under the umbrella of Association Circular Fryslân), involving all the schools in the region to work towards and to study for a circular economy and a sustainable society. Spark the Movement focuses on a whole school approach to sustainable development.

