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EMERGING INDICATIONS OF EMPLOYMENT IN A CIRCULAR ECONOMY

A synthesis of European case studies

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7.1 Introduction

Wedded to the principle that the route to raising standards of living globally is through economic growth, the United Nations (UN) adopted the idea of a green economy in 2012 as a means to provide investment and employment opportunities protective of the environment (UN, 2012). The link between green economic growth and assumed opportunities for employment has been further institutionalised via the UN Sustainable Development Goals (SDGs), with goal 8, for example, being 'decent work and economic growth'. The targets of that goal are firmly fixed within a growth paradigm (Bianco-Varela et al., 2021). The idea that the relationship to employment might be complex, or that the quality of work also needs some consideration, is relegated to two targets referring to the need for 'decent' work, as opposed to more opportunities, greater productivity and the protection of basic human rights (e.g. against modern slavery and human trafficking). While the latter is absolutely critical, one might say that the social benefits arising from the SDGs are secondary to economic benefits. In this sense little progress has been made between the framing of expectations for green employment in 2012 (Deutz, 2014) and the subsequent rolling out of the SDGs. This chapter uses Cresting research to address the relative lack of attention to social sustainability to consider the employment opportunities emerging from the implementation of circular economy (CE) strategies in the European context.

A CE has been defined as a 'regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops' (Geissdoerfer et al., 2017, p. 757). In origins and intention 'circular economy' is an umbrella term for a range of pre-existing strategies for promoting resource efficiencies (Blomsma and Brennan, 2017; Rieke

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et al., 2018). The European Union (EU) has been at the forefront of CE policy implementation, building on waste and pollution regulations since the 1970s, which at present continue to inform resource policies in the United Kingdom. In addition, the EU has begun to take a more holistic approach, at least in rhetoric, to acknowledge the scale and scope of the transformation required and at least pay lip service for this to be managed in a 'just' way (Calisto Friant et al., 2021). A number of authors and policymakers have proposed emerging employment opportunities as a benefit of the CE (Ghisellini et al., 2016; Webster, 2017; European Commission, 2018). As with the global-scale SDGs above, however, the empirical foundations of the social features of a developing CE in Europe are under-examined.

This chapter draws on a number of studies conducted with Cresting. These studies addressed a range of aspects of CE implementation: product design; industrial symbiosis; public sector implementation; repair; company understanding and reporting. Methods have comprised semi-structured interviews, surveys and document analysis in a range of geographic contexts. For most of these studies, employment was not the primary focus of the research, but emerged as a significant consideration. Thus, we are able to approach the issue of CE employment from a unique range of perspectives presented herein as case studies. With the overall aim of better understanding the implications of a CE for employment, we ask how CE-ready are European organisations and what type of changes to employment are underway and/or expected?

In the sections that follow, we offer a review of the literature on CE employment. We summarise the methods used as well as the approach to synthesis. Each case study is then presented, followed by discussion of the emerging themes. Finally, we offer some conclusions on the implications for employment in a CE and for the development of a CE itself.

7.2 Employment perspectives from the CE literature

This section focuses on literature attempting to address the issue of employment associated with a CE, which primarily relates to the quantity of jobs, as well as sectoral distribution, skills and training. Here we focus on the Global North, i.e. in an industrialised and developed country context, in keeping with the European case studies. The potential of CE jobs in the Global South has been estimated as substantial, given that most waste jobs are in the Global South(International Labour Organization 2023). Chapter 6 in this volume touched on ethical issues relating to the impact of a European CE in the Global South.

7.2.1 Delimiting and counting circular jobs

One of the challenges when considering CE employment is to define the scope of what constitutes a CE, and by extension what constitutes a circular job. One issue is the relationship between circular and green jobs, which have already attracted

attention (e.g. Deutz, 2014; Consoli et al., 2016; Cecere and Mazzanti, 2017). The clarification is important if quantitative estimates of 'new' circular jobs are to avoid relabelling ones that are already expected and also to better comprehend specifically circular skill sets which may have been previously overlooked. Green jobs can be defined most straightforwardly as those involving environmental protection or restoration (UNEP, 2008), similarly to the European Commission's (2013) definition that a green job involves activities that preserve, restore or environmental quality and/or the technology required to do that. More specifically, in their study of skills, Consoli et al.'s (2016) understanding of green jobs drew on the US government's definition of a green economy 'related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy' (Dierdorff et al., 2009, p. 3; Consoli et al., 2016, p. 1048). Although a CE can be very broadly defined, it may not be helpful for the concept to be so broad that it essentially embraces 'anything green' or even 'anything sustainable'. For example, although ideally a CE is based on the use of renewable energy, work on developing renewable energy technology is not circular as such, unless specifically relating to promoting the circularity of those technologies (e.g. recovery of materials at end-of-life; Jensen et al., 2020). By this consideration, circular jobs would be seen as a subset of green jobs (Horbach et al., 2015). The relative definition of green and circular jobs has not reached a consensus, though. Some authors propose that green jobs can also be considered circular jobs (Sulich and Sołoducho-Pelc, 2022; Niang et al., 2023). The scope of definition may be less critical than clarity regarding the types of roles included in a given study. In any case, we can take some principles on skills from Consoli et al. (2016), which we discuss below.

Regardless of the extent to which definitions of green and circular jobs coincide, it has been argued that a CE involves roles and skills that fall outside the scope of work directly engaging with environmental protection or restoration. Burger et al. (2019) distinguish between jobs relating to the core strategies of the CE and those in necessary enabling roles. The 'core' CE jobs relate to repair, reuse, refurbishment and the prioritisation of regenerative resources (e.g. promoting the use of renewable, reusable and non-hazardous materials/energy) and the redesign of business models (e.g. to incorporate servitisation, rental, sharing). This understanding corresponds to that of Wijkman and Skånberg (2015), who define CE activities as relating to the decoupling of economic growth from resource and energy use. Such jobs already encompass a wide range of skills from craft-work or mechanics, to materials science and business, but all could be considered 'green' if directly seeking environmentally beneficial alternatives to standard approaches. Conversely, the 'enabling' roles relate to collaboration (e.g. across sectors, along supply chains); 'design for the future' (Burger et al., 2019, p. 250) and the incorporation of digital technology to facilitate circular practices. The latter in particular relates to the broader challenges of what has been termed the fourth Industrial Revolution, i.e. a seemingly accelerating process of change in opportunities and experience of

employment as a result of emerging digital technologies, including artificial intelligence (Paucceanu et al., 2020). A further category of indirect CE jobs was identified in a study of experience in the Netherlands (Circle Economy, 2018). These include positions in the service sector, such as financial or legal services, which already do (or could) benefit from circular activity, but equally could engage with any other type of enterprise.

The idea of the CE as a generator of employment has been taken on board by policymakers including the EU (EC, 2015, 2020) and academic observers (e.g. Ghisellini et al., 2016). The EC estimates that 700,000 new jobs will be created by 2030 through the adoption of CE principles (Cambridge Econometrics, Trinomics and ICF cited in EC, 2020). Focusing on the United Kingdom, Morgan and Mitchell (2015) estimated that a total of 54,000 jobs could be created from CE activities by 2030. There have been limited opportunities to quantify job creation in practice (though isolating and quantifying the economic impacts of environmental policy is notoriously difficult; Jaffe et al., 1995; Fullerton, 2011). Recent studies have attempted to quantify the appearance of CE jobs. In a large-scale statistical study of CE jobs in European companies, Moreno-Mondéjar et al. (2021) surveyed 9,848 companies to examine the link between CE strategies and the creation of what they term 'green jobs'. CE strategies such as energy reduction, material reuse and product redesign were all found to be related to increasing numbers of jobs compared to companies not adopting such approaches. The authors were unable to assess causal relationships between strategies and jobs, but they concluded that economic and environmental benefits can be accompanied by social benefits in the form of employment opportunities. In a study of CE job creation in France from 2008 to 2015, Niang et al. (2023) found significant regional variations behind the overall growth, which nationally outstripped other types of employment. The regional distribution reflected local circumstances such as the actions of local authorities.

Practices widely recognised as relating to the CE include sharing and reuse that are in keeping with social sustainability visions of a green economy (e.g. Newton and Cantarello, 2014). Although a contested concept, the idea of a green economy is associated with an interest in social equity and shared improvements to quality of life that surpasses the (also contested) understanding of sustainable development (Newton and Cantarello, 2014; Horbach, 2015). Inspired by the social and economic challenges following the 2008–2009 global financial crisis, interest in green economy approaches as a route to economic rebuilding accelerated (Newton and Cantarello 2014). Ironically, the more idealistic social assumptions of a green economy are sometimes played down so that the term risks becoming simply a re-expression for sustainable development (e.g. Benson et al., 2021). Conversely, the early environmental and economically driven definition of the CE adopted by the EU (EC, 2015, and similar to the US government's definition of a green economy, Consoli et al., 2016) has given way to an approach referencing a 'just transition' (EC, 2020). The effectiveness of EU policies in place to promote the social benefits

and safeguard against the potential negative economic (employment) effects of a CE have been questioned (e.g. Calisto Friant et al., 2021). More in line with the ideals of a green economy, some CE scholars are promoting the concept of a circular society (Calisto Friant et al., 2020; Jaeger-Erben et al., 2021), where equitable outcomes and improvements to quality of life are considered part of CE implementation.

However, regardless of whether social ambitions are considered definitional for a CE, circular activities around reuse, redistribution and sharing can lend themselves to the ideals of more equitable outcomes such as bike sharing and similar green economy practices (albeit with mixed outcomes, e.g. Médard de Chardon, 2019). Sometimes organised by charitable organisations and social enterprises drawing on voluntary and state subsidised labour (Lekan et al., 2021), these practices can simultaneously open opportunities for people who sometimes are systematically excluded from the capitalist labour market, while potentially closing opportunities for employment in mainstream outlets for production and consumption. Likewise, 'repair' is a CE-adopted strategy for extending product life, which can be a mechanism for affordability (salvaging used items for people who otherwise could not afford new equivalents; e.g. Sharp and Luckin, 2006; Gregson et al., 2013). However, labour costs can contribute to putting repair costs above the price of a new item (Bovea et al., 2017), which calls into question the potential for employment generation on a significant scale (c.f. Morgan and Mitchell, 2015) at least without the financial incentives (Stahel, 2013) provided in Sweden, for example (Rreuse, 2017).

7.2.2 Skills implications of a CE

Some consideration of the skills impact of a CE can be taken from work relating to green jobs. In particular, Consoli et al. (2016) define three broad possibilities regarding changing employment skills. First, existing jobs could be in increasing demand as a result of a shift to green consumption; second, holders of existing jobs may need to re-skill to reflect changing priorities; and third, new kinds of jobs may emerge. The second category tends to comprise jobs involving formal qualifications, as well as experience and on the job training. New green jobs are likely to be in sectors where formal educational qualifications are less significant (putting more emphasis on training within a job) (Consoli et al., 2016). Likewise, the skills associated with CE jobs have been compared to those of the wider economy in the US context (Burger et al., 2019). Notably, this comparison is based on US government data relating to skills rather than responses of companies. It suggests that compared to the wider economy, CE core roles require lower education and lower skill than the rest of the economy, while enabling roles are more demanding in both education level and skills. Importantly, though, the CE offers opportunities across the entire range of educational levels – requiring as it does a diverse labour force. Specific training may be a requirement for certain jobs, but there are expected to

be opportunities across a wide range of occupations. Observing the potential for emerging low-skill CE jobs, Morgan and Mitchell (2015) offered the possibility for CE jobs to be widespread geographically (with local processing of recovered products/materials), potentially not only avoiding the risk of jobs being offshored (or clustered nationally), but potentially helping to fill employment gaps left by industries that have already moved (while noting the current labour shortage in the UK and elsewhere, we also note that there are still people out of work). It is noteworthy, though, that competition between companies and places exists so that CE/green jobs will not be immune from other trends in employment such as demands for higher productivity, cheaper labour (Deutz, 2014), or the implications of IT implementation. Notwithstanding ambitions for local CEs, researchers have noted the challenges of building an effective CE even at the European scale (Gregson et al., 2015) with regulations aimed at material recovery having perverse effects of incentivising the leaking of waste to countries with relatively lax environmental protection and lower wage costs (see Thapa et al., 2023 and Chapter 6 in this volume). Thus, the scale of circulation of both materials and money and the location of jobs (as well as their nature) are difficult to control.

In sum, while debates around the nature of the CE and the social implications of a developing CE have progressed apace, the employment opportunities arising therefrom are assumed with as yet rather limited empirical scrutiny. Recent research has examined potential skills implications and considered the statistical relationships between companies' self-reported activities and the number of jobs. Much remains to be understood – especially from a qualitative perspective and from the point of view of those undertaking CE roles.

7.3 Methods

This chapter draws on five distinct PhD projects carried out by early stage researchers within the Cresting project. They touched on employment within the CE following two approaches: first, as a specific topic of research taking a qualitative case study approach and second, as an issue emerging from investigation of other factors related to CE implementation. This section will address findings from both approaches. Our approach is steered by critical realism (Sayer, 2000), which treads a path between constructivist and objectivist research approaches – recognising that understandings of society are coloured by the subjective perspectives of both the researcher and the researched, but that nonetheless some perceptions are closer to an actually existing objective reality than others. Qualitative and quantitative methods equally have their place, to help to meet the goal of uncovering causal mechanisms influencing and constraining the empirical world. This philosophy is served well by the combining of insight from the different windows onto a CE offered by the multiple case studies.

Methods are summarised in Table 7.1. They include semi-structured interviews with representatives of companies and public sector bodies who are directly

TABLE 7.1 Information on the case studies and methods used for research relating to CE employment

Location	*Perspective and focus*	*Methods*	*Reference*
Germany/Austria	Company: design	15 interviewees with three years' experience of sustainable product design; large companies in high-income economies	Diaz et al., 2021
International, Dutch and Italian companies	Company: understandings and reporting	Survey and interviews with Dutch and Italian companies in CE vanguard; analysis of company reports and reporting requirements	Opferkuch et al. 2022 and Walker et al., 2021
Hull, Humberside, UK	Public body view of regional transformation	23 interviewees in the UK at the national to regional level (business and policymakers); including 21 specifically in Hull/East Riding; document analysis	Newsholme 2023, accepted
Lisbon, Portugal	Public sector – national government	Interviews, survey, documents	Klein et al., 2022a, 2022b
Hull, Humberside, UK	Public opinion and work in repair	Survey (n = 740), five interviews with self-employed repairers	Rogers et al. 2021, 2024

involved in roles with CE relevance (product design), or management roles (with oversight of CE activity implementation) or directly undertaking CE activity (repair sector). In addition, an online survey with follow-up interviews was undertaken of companies and a document analysis of international sustainability and CE reporting.

7.4 CE employment case studies

In this section we present a summary of each of the five case studies.

7.4.1 Case study 1: A business view of CE employment relating to circular product design

This case study concerns company engagement with circular product design. The findings comprise perspectives relating to the employment implications that emerged from semi-structured interviews with product designers and their

managers (the design aspect as discussed in Diaz et al. 2021; see Chapter 3 in this volume for business perspectives and Chapter 5 for CE assessment).

From these interviews it emerged that current product designers, even those with only a few years' experience, are still not trained to work with CE priorities. Despite having being selected for this study owing to their participation in sustainable product development as design engineers and product sustainability managers, the designers had a limited understanding of the sustainability implications of products designed for circularity during the design process. Notably, sustainability was primarily understood in terms of environmental impacts. Designers were unclear about the goals and principles of the CE, and consequently were not well prepared to translate them into their work practices and routines. For example, one option for implementing material recovery would be to institute a reverse logistics programme – but this seemed unheard of to at least one company, in this case a car manufacturer in Austria:

Interviewer: Do you think it would be viable to develop a take-back system for batteries?
Respondent: I don't know, has a company ever made that in the past?
Interviewer: Yes, some initiatives exist.
Respondent: Sure you know why is it very niche. … That is probably very expensive and not very profitable.

If such take-back operations were initiated within the company, it is likely that a drastic jump in knowledge and understanding would be achieved. Having take-back operations in place would help designers to gain invaluable insight into the design for disassembly as well as operational information such as the geographic dispersal of their products and their condition during the end-of-life cycle. At present acquiring such information would require external collaboration.

There were two areas where additional competences were considered to be needed. First, digital competencies were identified to manage the infrastructure supporting new streams of information exchanged among parties to proposed new material flows. Second, competences relating to making decisions between available options were highlighted. Designers had familiarity with life cycle assessment (LCA) as a process, but did not carry it out themselves:

> This [activity] would go through a partner that can really do an LCA, and really understand it, but we do not do it ourselves. And most of the time, we are too early in the concept phase to actually want to do an LCA.
>
> *Circular design engineer, the Netherlands*

Additionally, there was a lack of understanding of the potential of a LCA as a predictive model of potential future impacts (as opposed to measured or

estimated current impacts). Although there are inherent uncertainties to predicting future impacts (for example, how and where products might be used), the LCA is actually needed during the early stages of design, because decisions at that point can fix impacts in place by constraining the more detailed decisions at later stages of design.

In addition to the new skill sets for designers, issues emerged that need a different approach at a managerial level, assuming that a company has made the strategic decision at the top level to implement CE approaches. This requires not just additional knowledge and a willingness to implement, but also the ability to redefine strategic goals of the company. These revised goals then need to be communicated and incorporated into the ethos and activities of the company. Addressing this at a higher level might help the designers to overcome hesitation around the risks associated with innovation:

> Circular product design is innovation … and if it is an innovation, you cannot really know what is on the other side … Otherwise it would not be innovation. So that is what we see, there is a part which is about risk. But there is also a part that is also risky not to redo your product design these days, because it takes time and if you do not start now, you might be outdated soon.
>
> *(Circular design engineer, the Netherlands)*

Circular and other environmental design considerations are competing with other criteria for the attention of designers, who are seemingly predisposed to familiar solutions to problems in order to meet cost and time constraints (Diaz et al., 2021). Thus, change requires appropriate messaging and support from management. Management were more confident of their abilities to meet the necessities of change than their staff. Nonetheless, the impression is given that sustainability is more a burden, or at least challenge, rather than an opportunity. Companies were fond of detailing their achievements, even if in reality these were quite modest.

One can infer the following design-related roles are needed to implement a CE:

- Sustainability and circularity designer: to embed CE principles into design guidelines and engineer the physical features into the products
- Manager of circular operations: to organise reverse logistics
- Circular economy adviser: strategy implementation tools, but also management of culture change

7.4.2 Case study 2: company implementation and reporting of a CE

This case study is drawing on projects examining how familiar companies are with the CE, where it fits into their understanding of sustainability, and how their

practices are monitored and reported (Walker et al., 2021; Opferkuch et al., 2022). Although a step removed from hands-on CE implementation, without an appreciation of CE embedded at company level, such implementation is unlikely. Furthermore, this study addressed the companies' awareness of the social dimensions of a CE, from which the reflections on employment emerged.

The Dutch and Italian companies responding to the survey see the CE as relating to sustainability – some expressing exasperation about the need to take on something new with connotations that they did not necessarily appreciate (Walker et al., 2021). When asked about the social aspects of the CE, employment tended to be the one thing that came to mind. This may indicate a limited knowledge of the potential ramifications/aspirations of a CE, potentially confined to emerging regulatory requirements. Or alternatively, they may have been aware of more socially focused definitions of a CE, but chose not to take that approach. In a separate pan-European study of company reports, only two out of 94 companies had a target relating to employment (Opferkuch et al., 2022, p. 446), which concerned retraining existing, rather than hiring new staff. Only one out of 94 companies mentioned an indicator relating to employment. Currently, CE reporting is largely confined to environmental aspects (e.g. waste management). It is starting to expand beyond manufacturing, albeit that so far it has not reached the financial sector (Opferkuch et al., 2022).

A specialised and potentially complex form of monitoring circularity is LCA and more specifically social LCA (S-LCA) in order to capture social dimensions. While the companies responding had some familiarity with LCA, the inclusion of social (as opposed to environmental and economic) issues is rare (only 6% of respondents, according to Roos Lindgreen et al., 2022), notwithstanding the fact that companies claimed to see a need to assess social aspects. Further expansion of LCA and especially S-LCA may depend on external pressure, be that regulatory or derived from stakeholder expectations. Achieving such an expansion will create opportunities for people with the relevant expertise. Filling such positions may be difficult, though, as S-LCA is in its infancy even in academia. The implication is that additional data, potentially different types of data, will be required compared to LCA. This will open up new opportunities for graduates or others emerging with the required expertise – but not necessarily as direct employees, possibly more likely within specialised consultancy roles.

In terms of employment, companies saw reporting on CE activity as beneficial for attracting new talent to the company. Respondents assumed that an enhanced environmental reputation would help especially with the generation starting work now, as they are assumed to be more enthusiastic for sustainability than their predecessors. If this assumption is well-founded, then using CE activity to attract new staff should reinforce and strengthen that activity by helping to build a critical mass of engaged staff. Notably, though, the discussion is not around recruiting more staff to implement a CE, but seeking a certain quality of staff who are being recruited anyway.

If incentivising CE activity through emerging reporting requirements is effective, this study suggests that the following types of roles will be necessary:

- Strategic roles to initiate activities to be reported
- Staff to both undertake and report on CE activities
  - Material use
  - Social implications: S-LCA
- CE-specialists to prepare and analyse reports.

7.4.3 Case study 3: regional policy perspectives on CE transformation

The third case study concerns the perspective of local government bodies trying to establish a CE for the benefit of their locality. As with the previous case studies, this project did not set out with employment/skills as an overt object of research, but it emerged as a strong theme.

The idea of a place-based CE follows on from earlier ideas relating to industrial symbiosis, whereby residues from one entity becomes inputs for another (Chertow, 2000). Cities and regions have aspired to circularity as part of both undertaking, and being seen to undertake, a sustainability transition (Prendeville, et al., 2018). The activities and intentions of the City of Hull, together with its neighbouring authority of the East Riding of Yorkshire along with other public bodies and companies in the region were studied to analyse issues facing public-private place-based cooperation for a CE (Newsholme et al., 2022; see also Chapter 6 in this volume). Local authorities and other public bodies see themselves as trying to influence a CE, but view companies as the primary drivers. Interviewees considered the needs of both employers and the local population as potential employees in a CE.

Humberside is one of the most carbon-intensive regions in the UK, and so needs a substantial change in economic focus. It also contains a substantial element of deprivation. There is a need for more employment opportunities with either low skill requirements, or more ideally the opportunity to upskill the population. There is indeed already a scheme in place (Hull City Council, 2023) to help local adults to overcome barriers to engage in training with a view to future employment. The 2019 Humber Clean Growth Local White Paper (Humber Local Enterprise Partnership, 2019, p. 25) refers to 'strengthening the local skills base to support plans for clean growth and decarbonisation', referring on the same page to the 'new and better paid jobs' it is hoped will emerge from a CE. Hull City Council in its 2018 City Plan for Hull stated that it aims to 'create and sustain jobs for local people' through strategies including CE (p. 13). Thus, the expectation is not just additional (or different) employment opportunities from a CE but jobs that are financially more rewarding than (at least some) existing ones.

As regards training for CE roles, it is not yet well understood what that might consist of. A representative of one local authority in Humberside saw a role for their organisation in supporting businesses to predict what might be needed in order to protect the livelihoods of those already in employment:

> Employees will be left behind. And so we need to get ahead of the curve in that sense and make sure that businesses understand what the changes are that are coming. How they need to evolve and change. How their staff need to be skilled to do that.
>
> *Interview with a Regional Climate Change Manager, North Humberside, UK*

Thus, although the CE is viewed by the public bodies as something to be brought about by companies, there is a concern that companies might not have the vision to manage the process in a way that is supportive of their workforce. It is notable that none of the companies interviewed, or company documents reviewed, raised the issue of jobs, employment or skills, which supports the idea that the public bodies may need to drive this aspect of a CE transition. While there is an identified (if non-specific) need for training for the local population to engage with the CE, there was also a reflection on the training and experience of those who are leading the initiative for the public agencies.

The approach taken by a local authority to develop a CE is likely to reflect not only the nature of the place, but also the training and experience of those involved in planning and coordinating CE activity, as noted by the representative of one public authority. For Humberside, the CE agenda was very much about protecting the regional economy through a transition from a high- to low-carbon economy but without any fundamental change from current business or lifestyle practices. This is also indicated by the 2019 White Paper, with the CE referred to in the context of the offshore wind industry that has taken off in the region over the past decade and as an option for the food industry, which is also prominent locally. By contrast, other authorities in the wider region are taking a more explicit CE-oriented approach, e.g. the promotion of circular towns by the York and North Yorkshire Local Enterprise Partnership (n.d.). The Local Enterprise Partnership staff have the training and experience to undertake this approach, but also (whether cause or effect) North Yorkshire has a very different economic profile, with far less heavy industry to accommodate in a vision for the future than Humberside.

The following roles would need to be filled to bring about the vision of the local authorities studied:

- CE-qualified adviser for economic development/sustainability roles
- Training specialists for companies
- Bespoke support programmes reflecting the regional economy, potentially including CE facilitation

7.4.4 Case study 4: organisational change in a national public sector body

This case study concerns public sector bodies trying to transform their own operations to incorporate circular approaches. The role of the public sector can be seen in the other cases as driving change, or constraining choices, through regulation or as trying to be proactive in encouraging companies to go beyond regulatory requirements. Very much less research attention has been paid to public sector operations than private sector, and yet the public sector is a major element of the economy (Klein et al., 2020). The case study is based on interviews with the public sector employees who would be responsible for driving and implementing change in the central public administration in Portugal. Significantly, this affords an employee outlook with a focus on the functional or technical elements of change, not on personal experience (which is considered in the final case study below).

The central public administration in Portugal is seeking to adopt circular practices within its own operations (Portuguese Ministry of Environment and Energy Transition, 2017). The policy at the time of the interviews/survey was in the early stages of implementation. And notably only one out of three organisations surveyed already included the CE in their employee training (Klein et al., 2022b). The data collection captured people working through a CE transition in their place of work and the results indicate that this looks set to involve some changes to the experience of work, e.g. training for skills they might have assumed to be irrelevant, alongside a change in the culture of the workplace to implement those skills. Some activities will be reduced (e.g. the purchasing of new items, disposal of waste) as work is either dematerialised or items are recirculated internally. This might involve some loss of jobs or changing of roles (such as a requirement for a sustainability assessment in public procurement). For other staff there may be more subtle changes to their responsibilities (such as how and where office waste is disposed of, or permissions to purchase items). These additional duties and the exercise of environmental decision-making may be outside of the comfort zone for office workers, whose role is fundamentally to make plans for others to implement and to judge their success in doing so. One example of this would be the suggestion of a digital platform to organise sharing between different departments (within and/or between ministries) – requiring certain skills, as well as changing the culture of the workplace at a very mundane level (such as using reusable cups, reducing the use of printing). The triviality of these tasks can make it difficult to enforce change because they are treated by people as something taken for granted, as opposed to other aspects of their job that are more commonly subject to reflection. Additionally, the need to assess the extent and impact of CE implementation would impose new activities (Droege et al., 2021 and Chapter 5 in this volume), not to mention introduce a likely new area of performance management.

Respondents reported that a barrier to CE implementation was finance, with one symptom of that being a shortage of staff to organise and/or implement changes

(Klein et al., 2022a). Overcoming that barrier may involve increasing CE awareness at a political level, as suggested by this interviewee: 'the public servants, the politicians, should have CE training and education so it's another vector that strategically is defined for public administration, to have awareness and skills' (Marine Litter, Portuguese ministerial expert, Klein et al., 2022a, p. 516). Assuming that the financial barrier could be overcome, interviewees emphasised the usefulness of hiring CE experts who would be able to train and incentivise others. Significantly, the suggestion is to have CE champions at both the management and staff level to drive strategy and day-to-day activities; this route has been recommended in other contexts (Davis and Coan, 2015). A further suggestion is to improve collaboration between ministries to capture any synergies or simply exchange notes on experiences.

The following roles can be identified to support the issues raised by respondents:

- Staff training (procurement, waste)
- Management role: coordination between departments; (potential) redefinition of existing roles
- IT system design and implementation

7.4.5 Case study 5: public perspective and the experience of work in a CE

The final case study relates to a particular CE activity in a specific place – the City of Hull, which is the major urban area within North Humberside (see Chapter 6 in this volume for contextual information). We decided to focus on repair as an example of an activity deeply relevant to CE, yet one that already existed and had another duality as both a thrifty and eco-friendly option, which furthermore might be done by the individual, by friends/family, or as a service. There are two distinct aspects to this case study: one is the public perception of repair based on an online survey and the second the experience of working in repair.

For repair to emerge as an opportunity for paid work there needs to be a market for repair as a service, and/or for re-sold repaired goods. An online survey of Hull residents was conducted in cooperation with Hull City Council. As shown in Rogers et al. (2021), respondents indicated that in Hull there is an acceptance of repaired goods (more than three-quarters of respondents had used a repair service or repaired something themselves) and willingness to purchase used (or second-hand) goods (more than two-thirds of respondents said that they sometimes or often buy second-hand goods). Levels of distrust in repaired items or in repair services were lower than recorded in previous studies (e.g. Bovea et al., 2017), possibly reflecting the disadvantaged nature of the city. However, the second most cited barrier to repair as an activity was lack of skills (given by 59% of respondents). This suggests an identification with repair as something one would do oneself. Those shopping for second-hand goods were significantly more likely than others to self-repair – but not to use a repair service. Having one's likelihood to engage with repair contingent on the ability to do it oneself reduces the potential of creating paid work as

a corollary of (an eventual) reduction in demand for new goods. Those shopping for second-hand goods had a significant relationship with the urge to effect repairs themselves, but not so much the use of professional repair services. Unlike other studies, age was not a significant factor in the relationship to repair, but gender did emerge as an influential factor.

Respondents were also asked if they would consider working in repair: ironically, those with higher qualifications were more interested at least as a hypothetical proposition – especially in clothing repair (which might reflect a gender bias – female respondents were more likely to repair textiles and also perhaps were more likely to imagine a career in repair). Those less qualified were the least likely to see themselves working in this field in any way. This might reflect an assumption that the opportunity did not apply to them owing to their assumed lack of qualification (but see below). In either case, some careful communication might be needed to target individuals who might otherwise miss out on an opportunity. Men were more likely to work in small/large appliance repair than women; women were more likely to work in clothing repair than men.

Hitherto the CE literature has been rather silent on the experience and perspective of those expected to carry out such work. Here we draw on Rogers et al. (2024) to present the perspectives of individuals working in the repair sector in Hull. Also of interest to this study is that the individuals interviewed were self-employed, working either as sole traders or running micro-scale companies (i.e. fewer than 10 employees – in practice only one to four at most). For these individuals, the concept of a CE was not a driving force in their work. They had been in their present occupations for between four and 27 years. Two women were working as seamstresses/tailors and three men in the repair of various electronic goods (specialising variously in mobile phones, televisions and appliances). The gender division matches that found for likelihood to self-repair, suggesting deeply entrenched gendered roles in society. Attitudes to the work varied between the interviewees, partly according to their time in the trade. While the flexibility afforded by self-employment was widely noted (e.g. the ability to schedule working hours around childcare obligations), establishing a new business is stressful. Respondents referred to working long hours under considerable time pressures as they were nervous to turn away any job. In some cases, the pressure of work interfered with customer interactions, while for others the sense of being helpful to individuals was the chief source of job satisfaction. Respondents were enjoying or seeking a secure livelihood; only one was looking to grow their business, albeit that they were not in a position to do so at that time. Regulations and administration around employment were seen as a disincentive to expand. Notably, though, when recruiting staff the main requirement was experience rather than formal qualification. Another barrier to business development was the lack of access to instructions and spare parts needed for repair of some items – illustrating that even self-employment only brings limited levels of self-control over one's workplace and business.

Based on this discussion, two roles emerge:

- Independent repairer
- Business advice/support tailored for small companies

7.5 Discussion

Collectively, the five case studies shed light on the employment implications of a CE. Several themes emerge which are analysed in this section under the subheadings of our research questions: what type of changes to employment are underway and/or expected; how CE-ready are European organisations and what are the emerging social implications of those changes?

7.5.1 Changes to employment

The case studies illustrate that CE activities are becoming normalised across a range of employment settings. There are people with experience of working with CE activities across a range of contexts, albeit that in all these cases are interwoven in the 'less than circular' economy.

Seemingly, very few roles would not be impacted in some way by a flourishing CE. A category of work not considered in the previous classifications (Consoli et al., 2016; Burger et al., 2019) is the office worker populating public and private sector organisations. With parallels to the experience of domestic resource retention activities (notably recycling, but also energy efficiency and ideally sourcing reuse and shared options for consumption), all work experience is likely to involve an extra level of reflection (what, why, how) as well as some basic knowledge of things such as the suitability of different plastics for different activities, or identifying different types of materials for correct disposal. These are not technically complex issues necessarily, but may be well outside of the traditional skill set expected of people in office roles. The need for some form of monitoring of outcomes may also be new, i.e. performance targets (potentially collective) that do not relate to one's primary role.

Repair is an example of a job that pre-dates the CE, but demand for it should increase (see Consoli et al., 2016 regarding the first category of 'green' employment). The self-employed repair workers interviewed in this study have the relevant skills, but lack the ambition or experience needed to develop a structure to make their services available on a wider scale. This structure may emerge with 'right to repair' requirements (e.g. British Ecodesign for Energy-Related Products and Energy Information Regulations, 2021), which should provide some economic support to these micro-businesses by broadening the range of products they can service. However, such requirements might also incentivise changing business models for companies in a way that might out-compete independent operators.

Some existing roles (such as public sector purchasing, product design, or waste management in almost any context) will need additional skills and expertise to engage with circular practices. These relate to Consoli et al.'s (2016) second category (existing jobs requiring employees to reskill). As discussed in the second case study, the product designers were aware of their limitations, which is an important change threshold to cross, but had limited knowledge about what areas they might need to reskill into. This chimes with earlier research (Deutz et al., 2013) that product designers typically were not following a well-developed design process, let alone applying a design process with sustainability criteria in mind. These are highly skilled technical roles that would benefit from changes to formal qualifications, but while that is necessary to achieve change, it is not sufficient in itself. Other structural and organisational barriers to implementing circular design would remain (Diaz et al., 2021).

As in previous studies, CE development requires roles and corresponding skills aside from the directly hands-on (Burger et al., 2019). These include CE coordination roles such as sharing information within and between departments (or teams) in large organisations, or along a supply chain. Networking and communication skills are likely to be essential here, but IT skills can be important too (as mentioned in the fourth case study). As was the case in the Portuguese central administration, existing staff may need to acquire such skills or to apply existing skills to different fields (such as managing internal performance alongside, or alternatively to, managing external service delivery). Greater knowledge of the CE, its options and ramifications, is needed to determine exactly what needs to be done. At a higher level of management, strategic and leadership skills may be needed to drive change (Mumford et al., 2007). The challenge here is also to envisage the change, and communicate this to people able to attract and organise the financing needed. In the public sector, there is a need for people with both a knowledge of the CE and an ability to communicate to private sector bodies, even if the latter are then in the best position to consider their own specific needs. And, indeed, company needs may be best served by CE strategies that do not best serve the location (Newsholme et al., accepted).

One of the most innovative areas of activity around CE research and development may be the measurement of circularity and, more importantly, sustainability (Roos Lindgren et al., 2022). This is a necessary safeguard to avoid unintended consequences of product changes as well as to measure organisational progress. However, although a comprehensive S-LCA might reduce unintended consequences, LCA appears to be used more often to benchmark existing products rather than as a tool for comparing options for products in the design. So wider changes in practice, as well as new skills, are required. Furthermore, for social dimensions of an LCA, the skills required are uncertain. This is a much more novel procedure and requires research, e.g. what are the relevant data and how can they be sourced, as well as translated into an operational form not requiring research-level time

and skill? How to judge acceptable outcomes is also to be determined. Similar considerations apply in terms of company reporting, i.e. staff involved in reporting will need to adjust to different issues, learn to collect and present different forms of data. But, again, companies need first to decide that they are going to engage (assuming that reporting is voluntary) and how (if it is not). Some additional roles are likely in this area for large corporations, potentially also within organisations who attempt to interpret such reports (such as investors), and in bodies setting the requirements (such as the European Commission).

7.5.2 Readiness for change

One can infer from the above discussion that although there are few entirely new circular roles, an important emerging area of CE-related employment will be to offer training for existing employees, for those that might seek to go into CE employment, and also training in business development. The ability of companies to support their employees through a circular transition is called into question by the third case study (local to regional public bodies seeking to build a place-based CE). The concern of the local authorities is to create/retain jobs for the local workforce. They therefore have a concern for skills upgrading that might not be precisely shared by companies. Companies may greatly value experienced and capable staff in whom they may have invested significantly, but nonetheless their loyalty to their host location is contingent upon economic benefits (Newsholme, 2023). Additionally, the local authorities are concerned with upskilling the local population to access future jobs (against a backdrop of the likely disappearance of carbon-intensive jobs). This is complicated by the challenge of trying to predict quite what skills may be needed, compounded by the uncertainty of actually attracting organisations requiring those skills. The fourth case study is based in the same location (in north-east England). It illustrates on a small scale that individuals have managed to forge CE-related positions for themselves, which lends support to the idea that formal qualifications are not necessarily required for some CE jobs. However, the survey respondents interested in related CE work tended not to be from the low-education end of the spectrum.

In each case study a tension emerges comprising the (relatively straightforward) need for people with relevant skills, but also a need for people with the skills and expertise to both identify those skills and to put in place the changes required to actually generate the need for them. This can be seen most explicitly in the examples provided of the Portuguese national government, the product designers and local governmental bodies trying to implement a CE. A further element to the picture is the need for structured decision-making processes, i.e. to model the likely impacts of CE-related changes (via LCA, S-LCA or other sustainability appraisals for either internal or external procedures); here, too, although there may be an awareness of the need for such steps related to products and organisational change (this was not explicitly addressed in all the case studies), there is a lack of in-house ability to

implement such mechanisms. So people are needed to establish operations that we do not know exactly what they consist of, which will involve people with skills we are not specifically certain of, but we think the performance of the people and/or the organisation as a whole will need measuring against standards that we are also do not know what they are, or (unsurprisingly) how to measure them – or who will know how to interpret the results.

Seemingly, the interest in change appears to exceed the preparedness in these case studies. Notably, organisations were selected for study based on having expressed some interest/involvement with the CE. By implication, other (public or private sector) organisations are likely to be less well placed – still in a situation of contemplating 'unknown unknowns', if they have even got as far as contemplating a shift to a CE.

7.5.3 Social implications

The social dimension of the CE is seemingly an afterthought in both public and private sector contexts. When asked for a social aspect, companies offer employment as an example. Clearly jobs will evolve, or will need to, to take on more circular aspects – a level of on-the-job and pre-job training will be needed. But more attention needs to be paid to the quality of that employment. As seen from the fifth case study, having a socially beneficial job that brings help and satisfaction to individual customers does not preclude the stresses and concern of earning a living. Along with some of the responses around S-LCA, we can see that new, or newly significant, CE roles may not be in a company context. The level of uncertainty around what is needed may breed opportunities in consultancy, which can be lucrative, but carries uncertainties of continuously looking for the next role, with consequent pressures for planning one's life. There are gender dimensions which are touched on, but need more consideration.

The types of jobs emerging, and disappearing, will vary according to the context of the place, with no guarantee of a good geographic match. Or that those who have not done well out of previous economic changes, will do any better this time (see also Chapter 6 in this volume).

7.6 Conclusions

This chapter has examined the employment implications emerging from five case studies of different aspects of a CE. We note that although there may not be many entirely new roles (just as a CE itself is a concept drawing on many pre-existing ideas and activities), very few roles will be entirely untouched by a CE transition. There are roles to be had which involve 'doing' CE activities (from repairing old products to designing new ones), also measuring/assessing, communicating, championing CE activities, or training others to do any of those things, or indeed in human resources to recruiting others for CE roles.

However, although on a generic level one can identify areas of activity, the precise knowledge and skills involved are more difficult to specify. They are also likely to be variable according to the economic and geographic context, and furthermore they are contingent on decisions made about how to implement CE initiatives. A further complication is the lack of knowledge and indeed the lack of control among those trying to, or contemplating trying to, implement a CE. A major point to emerge from this research is the interdependence of different roles. The situation is not so much that a CE will generate new jobs, but that people who know about a CE are needed to be in position to bring about the changes that might create those roles. What emerges will depend on the decisions of those at the top level in organisations; what we see as CE will be influenced by actions of those people as well as those hired to undertake the implementation thereof. A critical role is likely to be the coordination of CE and non-CE activities. Transformation will be intimately connected with employees – those doing the work of the CE at different levels. This will produce and reproduce the CE. It is not that CE leads to opportunities, there will be no well-developed CE ahead of these positions being in place. Furthermore, some critical roles may emerge outside of organisations in a consulting capacity. It might well be that if you want a job in the CE, you need to be in a position to create a role for yourself.

There is much further research to be done in this field, for example addressing different industrial sectors, and different locations to those included here, notably outside the Global North. The experience of work and gender dimensions in particular need further examination. More generally, there is the question of where future CE employment fits within wider and constantly evolving social (and spatial) divisions of labour.

Note

An earlier version of this chapter was presented at ISDRS 2023 in Malaysia.

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