



Flanders
State of
the Art

PUB. N°

28

Weaving a circular workforce: competences in a circular textile industry in Flanders

CE CENTER
CIRCULAR ECONOMY
POLICY RESEARCH CENTER

WE MAKE
TOMORROW
BEAUTIFUL
OVAM

DEPARTMENT OF
ECONOMY
SCIENCE &
INNOVATION



VLAANDEREN
CIRCULAIR

CE CENTER

CIRCULAR ECONOMY
POLICY RESEARCH CENTER

PUB. N°

28

Weaving a circular workforce: competences in a circular textile industry in Flanders

Rosa Hofgärtner
Matthias Multani
Kris Bachus

Research Group Sustainable Development, HIVA, KU Leuven
Parkstraat 47 bus 5300, 3000 Leuven, Belgium

December 2023

CE Center publication N° 28

Contact information:

Luc Alaerts

manager Policy Research Center

✉ luc.alaerts@kuleuven.be

☎ +32 16 324 969

Gweny Thomassen

manager Policy Research Center

✉ gweny.thomassen@ugent.be

Karel Van Acker

promoter Policy Research Center

✉ karel.vanacker@kuleuven.be

☎ +32 16 321 271

Summary

This study offers insights into the jobs and competences deemed important in the circular economy (CE) transition of the textile industry in Flanders. It highlights the central role of management positions in driving the CE transition forward, underscoring the importance of CE competence development and fostering sustainability awareness among individuals in these roles. The textile industry's relatively slow uptake of CE practices reveals the need to raise a sense of urgency regarding emissions and material footprint reduction. The organisation of roundtable discussions, public events, and learning networks on this topic could possibly contribute to this, as well as revaluating and adjusting the current offerings of training and educational programmes. It is recommended to specifically encourage the exploration of alternative CE futures and higher R-strategies, while also fostering constructive dialogue with diverse stakeholders to ensure that all voices are heard.

This report explores how work and competences are expected to change in the transition towards a circular textile industry in Flanders. This study also reflects on how the concept of 'circularity' is taking shape in the textile industry and thereby possibly influencing expectations with regards to the (future) labour market. To conduct this research we employed a combination of desk research and semi-structured interviews with key voices and relevant stakeholders in the field (n=24). This study serves as a case study to explore more broadly the nexus between jobs and the circular economy (CE) transition of the manufacturing industry in Flanders.

After presenting the key statistics of the Belgian and Flemish textile industry, this report provides a contextual overview of the existing literature on the subject of jobs in the CE transition. Subsequently, eight 'CE competency profiles', created based on the findings from the interviews and literature, offer job-specific descriptions of the skills and knowledge deemed important in the CE transition of the industry. This reveals distinct expectations for various profiles. It places particular emphasis on the crucial role of management positions in driving the CE transition forward, requiring not only awareness about the need to transition coupled with the motivation to do so, but also a number of soft skills such as leadership and communication skills. On the other hand, the anticipated changes in more technical roles, such as machine operation, are not expected to be significant.

The typology of circularity discourses by Calisto Friant et al. (2020) helps us to contextualise these findings. The dominant vision for a circular textile industry in Flanders is, as of now, primarily focused on improving recycling rates and largely resembles the 'Technocentric Circular Economy' discourse. Given the relatively slow uptake of CE practices by the industry, it remains uncertain whether a purely technocentric CE approach can achieve the drastic changes necessary to meet the CE and climate targets. In order to further accelerate and deepen the CE

transition, as highlighted in the recommendations at the end, it could be meaningful to encourage the exploration of alternative CE futures and higher R-strategies, and (to continue) to foster constructive dialogue with diverse stakeholders.

Samenvatting

Deze studie biedt inzichten in de jobs en competenties die belangrijk geacht worden in de circulaire economie (CE) transitie van de textielindustrie in Vlaanderen. Het benadrukt de centrale rol van managementposities in het stimuleren van de CE-transitie, en onderstreept het belang van CE-competentieontwikkeling en het stimuleren van duurzaamheidsbewustzijn bij personen in deze functies. De relatief trage invoering van CE in de textielindustrie toont de noodzaak aan om een gevoel van urgentie te creëren met betrekking tot de reductie van emissies en materiaalvoetafdrukken. De organisatie van rondetafelgesprekken, openbare evenementen en leernetwerken over dit onderwerp kunnen hier mogelijk aan bijdragen, evenals het herwaarderen en aanpassen van het huidige aanbod van opleidings- en trainingsprogramma's. De aanmoediging van een verkenning van alternatieve CE-toekomst en hogere R-strategieën wordt aanbevolen, terwijl ook een constructieve dialoog met diverse belanghebbenden wordt gestimuleerd om ervoor te zorgen dat alle stemmen worden gehoord.

Dit rapport onderzoekt hoe werk en competenties in de transitie naar een circulaire textielindustrie in Vlaanderen zullen veranderen. Deze studie reflecteert ook op hoe de textielindustrie vorm geeft aan het concept 'circulariteit' en hoe deze invulling van het concept mogelijks invloed heeft op arbeidsmarktverwachtingen. Dit kwalitatieve onderzoek is uitgevoerd d.m.v. een combinatie van deskresearch en semigestructureerde interviews (n=24), en dient ook als case studie om breder het verband tussen werk en de CE transitie van de Vlaamse maakindustrie te verkennen.

Dit rapport presenteert eerst de belangrijkste statistieken en gegevens van de Belgische en Vlaamse textielindustrie, gevolgd door een overzicht van de bestaande literatuur met betrekking tot werk in de CE-transitie. Vervolgens geven acht 'CE-competentieprofielen', die zijn gebaseerd op de bevindingen uit de interviews en literatuur, specifieke beschrijvingen van de vaardigheden en kennis die als belangrijk worden beschouwd in de CE transitie van de industrie. Het onderzoek toont duidelijke verwachtingen voor verschillende profielen. Het wijst onder andere op de cruciale rol van management posities bij het bevorderen van de CE transitie, waarbij niet alleen bewustzijn over de nood voor een transitie en motivatie belangrijk zijn, maar ook *soft skills*, zoals leiderschap- en communicatievaardigheden.

De typologie van circulariteitsdiscoursen van Calisto Friant et al. (2020) helpt om deze bevindingen te contextualiseren. De dominante visie voor een circulaire textielindustrie in Vlaanderen is voornamelijk gericht op het verbeteren van recyclage en lijkt grotendeels overeen te komen met het 'Technocentrische Circulaire Economie' discours. Gezien de relatief trage vooruitgang van de CE in de industrie, rijst de vraag of een puur technocentrische CE-aanpak de drastische vermindering van emissies en materiaalvoetafdruk kan realiseren die nodig is om de klimaat- en CE-doelstellingen te behalen. De aanbevelingen aan het einde van het rapport benadrukken daarom het belang om alternatieve CE-toekomst en de mogelijkheden van

hogere R-strategieën verder te verkennen, en de dialoog aan te (blijven) gaan met diverse stakeholders.

Table of Contents

Summary.....	2
Samenvatting.....	4
Introduction.....	7
1. Diverse interpretations of the Circular Economy.....	9
1.1. Typology of circularity discourses.....	10
2. Textile manufacturing in Belgium.....	12
2.1. Belgium's textile industry.....	13
2.2. Work in the sector.....	15
3. Circularity of the textile industry.....	18
3.1. Companies' stances on circularity.....	20
3.2. Keyword analysis to estimate circularity.....	21
4. The labour market in the CE transition.....	23
4.1. Impact on the number of jobs.....	23
4.2. Impact on skills.....	24
4.3. Competences in the CE.....	24
4.4. Importance of employee engagement.....	26
5. CE competence profiles.....	28
5.1. The visionary CEO.....	28
5.2. The well-connected sustainability manager.....	29
5.3. The engaged employee as crucial support base.....	30
5.4. The supportive middle manager.....	30
5.5. The creative and innovative R&D professional and designer.....	31
5.6. The persuasive sales and marketing professional.....	31
5.7. The careful operator.....	31
5.8. The precise sorter.....	32
6. Discussion.....	33
6.1. Reflections on competence expectations.....	33
6.2. Transition in a tumultuous context.....	34
6.3. How 'circularity' is taking shape in the industry.....	37
6.4. Will this interpretation of CE be sufficient?.....	38
6.5. Imagining alternative CE futures.....	40
6.6. Recommendations.....	41
7. Conclusion.....	45
Appendix A: Overview of interviewees.....	46
Appendix B: Occupations in the textile industry.....	47
References.....	48

Introduction

As the global temperature is rising, biodiversity loss is accelerating and environments are being polluted and destroyed, scientists in the 2023 IPCC report sound the alarm that the window of opportunity ‘to secure a liveable and sustainable future for all’ is rapidly closing. To turn the tide, they urge ‘**rapid and far-reaching transitions across all sectors and systems**’ (IPCC, 2023).

This dire warning has implications for all sectors, including the textile industry. Given the high levels of greenhouse gas (GHG) emissions and material footprint associated with textile production and consumption (European Environmental Agency, 2019; National Inventory Report, 2022; Niinimäki et al., 2020), this sector deserves particular attention in the sustainability transition. In Belgium, this industry is still a relatively large player, employing nearly 20,000 people and generating around five billion euros in revenue each year (Fedustria, 2022).

In order to hamper the disastrous effects of global warming, the EU has committed to **reduce its GHG emissions by at least 55% by 2030** and to be carbon neutral by 2050¹. Belgium has to reduce its (non-ETS) emissions by at least 35% by 2030 (NECP, 2019), possibly up to 47%². The EU also reached an agreement to reform the EU’s Emissions Trading Scheme (ETS) meaning sectors covered by the ETS will have to cut their emissions by 62% by 2030³.

In policy work, the transition towards a circular economy (CE) is prominently put forward as an indispensable step to hamper GHG emissions and to reduce other negative repercussions for the environment. In 2020, the European Commission adopted a ‘New Circular Economy Action Plan’ and, two years after, an ‘EU Strategy for Sustainable & Circular Textiles’. Moreover, the Flemish government intends to **reduce the material footprint of consumption in Flanders by 30% by 2030** (Vlaamse Regering, 2020).

However, there is still a significant amount of work to be done. The CE is still in its ‘infancy’ (EEA, 2019). In its Circularity Gap Report, Circle Economy states that ‘the news is not just bad, it is worse’ (2020). Three years later, global circularity has shrunk from 9.1% in 2018 and 8.6% in 2020 to *only* 7.2% in 2023, mainly due to rising material extraction and use (Circle Economy, 2023). Meanwhile, the material footprint of the Flemish economy increased by 13% between 2010 and 2018 (CE Monitor, n.d.).

1 <https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/>

2 <https://diplomatie.belgium.be/nl/beleid/coordinatie-van-europese-zaken/het-beleid-van-belgie-binnen-de-eu/energie-en-klimaat>

3 <https://www.europarl.europa.eu/news/en/press-room/20221212IPR64527/climate-change-deal-on-a-more-ambitious-emissions-trading-system-ets>

Studying how the circularity concept is materialising in the textile industry can provide insights into the effectiveness of the CE in addressing the above challenges. While widely used, the understanding of the concept circular economy (CE) is still contested (Alizadeh et al., 2023; Blomsma & Brennan, 2017; Korhonen et al., 2018). Studying how the concept circularity is materializing can also help to improve future projections on work in the sector. Such forecasts have an influential role in shaping (Just Transition) policies and increasing the resilience of industry and those who work in it.

In this report, we aim to explore:

- how the **CE transition is expected to change competence needs** in the textile industry and;
- to reflect on **how the concept ‘circularity’ is taking shape in the textile industry** and thereby possibly influencing labour market forecasts;

We employed a combination of **desktop research and semi-structured interviews** to conduct this research. In total, we interviewed 24 stakeholders from diverse professional backgrounds (see Appendix A for more details), who were selected primarily through snowball sampling. This study serves as **a case study to explore more broadly the nexus between jobs and the CE transition of the manufacturing industry** in Flanders. In doing so, we aim to contribute to the thematic agenda on manufacturing drawn up under the public-private partnership Circular Flanders⁴. By focusing on the *manufacturing of home furnishing and technical textiles* in a case study, we hope to highlight more generally points of attention and dilemmas that can be relevant for those working on the circular transition of the manufacturing industry.

This report is structured as follows. First, we shortly discuss relevant CE literature reflecting on different interpretations of the concept circularity and a typology of circularity discourses. This is followed by a description of the current manufacturing and textile industry in Flanders, and a discussion of recent developments with regards its CE transition and policies. Next, we provide an overview of how the CE transition is expected to influence work and competences in the industry and reflect on our findings by returning to the CE literature.

⁴ The manufacturing industry is one of the six thematic working agendas along with construction, chemicals and plastics, water cycles, biobased economy and food chains. These strategic agendas are juxtaposed by seven so-called levers, one of which is ‘jobs and skills’. The purpose of this research is to study the lever ‘jobs and skills’ within the strategic agenda on the manufacturing industry.

1. Diverse interpretations of the Circular Economy

The circular economy (CE) is gaining momentum as an approach to addressing sustainability challenges among scholars as well as practitioners. In policy work, the circular economy (CE) paradigm is prominently put forward as an indispensable step to address this challenge (e.g. the EU Strategy for Sustainable & Circular Textiles). A shift towards circularity, and away from a linear ‘take-make-waste’ model, is increasingly seen as a solution to reduce emissions and environmental degradation. 45% of today’s total global GHG emissions can be attributed to the production of materials, products, food and the management of land (Ellen MacArthur Foundation, 2021). In Flanders, this number is even higher and estimated to be between 55% and 65% (Vlaanderen Circulair, n.d.). Reducing overall (virgin) resource use could significantly contribute to lowering GHG emissions.

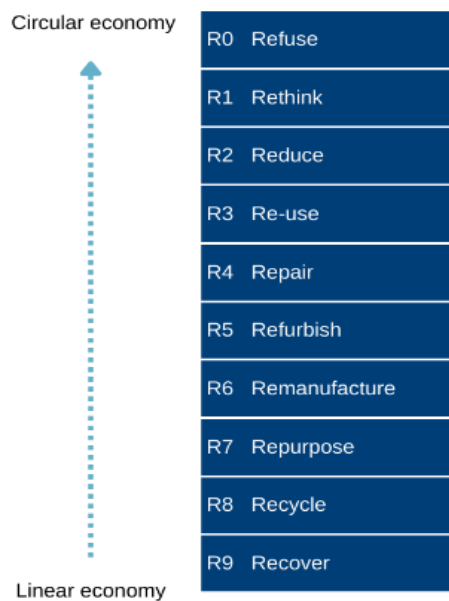


Figure 1: Example of an R-ladder (adapted version of Potting et al., 2017)

While widely used, the definition or understanding of the concept circular economy is still ambiguous and contested (Blomsma & Brennan, 2017; Korhonen et al., 2018; Alizadeh et al., 2023). CE is argued to be an umbrella concept (Blomsma & Brennan, 2017) or an ‘essentially contested concept’ (Korhonen, Nuur, et al., 2018). Analysing no fewer than 114 different definitions of the CE in their research, Kirchherr et al. (2017) indeed show that the circular economy means ‘many different things to different people’. Different actors seem to develop a specific vision of CE that matches their own organisation, interest or setting.

Of all those different definitions, the so-called R-strategies are perhaps the most frequently used and best-known framework to give meaning to the concept CE. This framework typically ranges from three to twelve distinct value retention strategies, often organized in a ‘waste

hierarchy' (also known as an 'R-ladder'). Figure 1 shows an example of such a ladder ranging from high circularity (such as 'Refuse') to low circularity (such as 'Recover') strategies.

While this ladder is useful in showing some diversity in different CE strategies, it does not take into account the broader system in which these strategies may be implemented. Some CE approaches have been criticised for their absence of social considerations - i.e. labour practices, human rights, and just transitions - or for contributing to greenwashing (Clube, 2022; Mies & Gold, 2021; Adamkiewicz et al., 2022). In recent years, the discourse on CE has slowly moved away from the R-framework towards a more systemic framework (Kirchherr et al., 2017) sparked by a believe that CE requires a fundamental shift instead of incremental changes of the current system. While there is an increasing group of scholars who criticise the lack of social and systemic concern in current CE theory and practice (Geissdoerfer et al., 2017; Hobson & Lynch, 2016; Padilla-Rivera et al., 2021), the dominant discourse on CE remains primarily focused on economic viability and efficiency (Clube & Tennant, 2020; Kirchherr et al., 2017).

1.1. Typology of circularity discourses

Aiming to gain a deeper understanding of the diversity in understandings of CE, Calisto Friant et al. (2020) developed a typology of circularity discourses: reformist circular society, technocentric circular economy, transformational circular society and fortress circular economy. By showing the diversity in possible circular futures, this typology can help to open up the conversation about CE futures and to have a more inclusive and comprehensive discussion on circularity. The four discourses mainly differ in their degree of optimism about technological innovation and trust in the current socio-political system. The four identified types of discourses are presented in Figure 2 on the two typological axes.

		Approach to social, economic, environmental and political considerations	
		Holistic	Segmented
Technological innovation and collapse	Optimist	Reformist Circular Society <ul style="list-style-type: none"> • <i>Assumptions:</i> reformed capitalism is compatible with sustainability and socio-technical innovations can enable eco-economic decoupling. • <i>Goal:</i> economic prosperity and human well-being within the biophysical boundaries of the earth. • <i>Means:</i> technological breakthroughs and social innovations that benefit humanity and natural ecosystems. 	Technocentric Circular Economy <ul style="list-style-type: none"> • <i>Assumptions:</i> capitalism is compatible with sustainability and technological innovation can enable eco-economic decoupling to prevent ecological collapse. • <i>Goal:</i> sustainable human progress and prosperity without negative environmental externalities. • <i>Means:</i> economic innovations, new business models and unprecedented breakthroughs in CE technologies.
	Sceptical	Transformational Circular Society <ul style="list-style-type: none"> • <i>Assumptions:</i> capitalism is incompatible with sustainability and socio-technical innovation cannot bring absolute eco-economic decoupling to prevent collapse • <i>Goal:</i> a world of conviviality and frugal abundance for all, while fairly distributing the biophysical resources of the earth. • <i>Means:</i> complete reconfiguration of the current socio-political system and a shift away from productivist and anthropocentric worldviews. 	Fortress Circular Economy <ul style="list-style-type: none"> • <i>Assumptions:</i> there is no alternative to capitalism and socio-technical innovation cannot bring absolute eco-economic decoupling to prevent collapse . • <i>Goal:</i> maintain geostrategic resource security in global conditions where widespread resource scarcity and human overpopulation cannot provide for all. • <i>Means:</i> innovative technologies and business models combined with rationalized resource use and strict migration and population controls.

Figure 2: Typology of circularity discourses (Calisto Friant et al., 2020)

The four types of discourses can be explained as follows:

- **Reformist circular society:** these discourses propose a deep reform of the current societal system towards circularity. It is based on a belief that “social and economic innovation can lead to a sufficient level of eco-economic decoupling to prevent a widespread ecological collapse” (Calisto Friant et al., 2020). These discourses do not see a fundamental contradiction between sustainability and capitalism, and deem social-cultural change and new ways of public participation necessary to attain sustainability.
- **Transformational circular society:** these discourses propose “an entirely transformed social system where individuals gain a renewed and harmonious connection with the Earth and their communities”. The thought is that simpler, slower and more meaningful lives can be created by a general economic downscaling and a philosophy of sufficiency. They emphasize local production through collaborative economic initiatives and using “open-source innovations and technologies that do not harm the biosphere nor deplete its limited resources” (Calisto Friant et al., 2020). This discourse type strongly focuses on ‘higher’ R-strategies (refuse, reduce, reuse, repair and refurbish).
- **Technocentric circular economy:** this discourse proposes “an era of ‘green growth’ and technological advancements” (Calisto Friant et al., 2020). This leads to prosperity growth while humanity’s ecological footprint is reduced. These discourses thus expect that circular innovations can achieve an absolute eco-economic decoupling to prevent ecological collapse. The focus of this discourse type is on the ‘lower’ R-strategies, such as remanufacturing, recycling, and recovering energy.
- **Fortress circular economy:** this discourse has “a vision of a future where scarce resources, overpopulation and biophysical limits require strong cohesive measures”. Among these measures are imposing sufficiency, population controls and resource efficiency from the top down to “rationally confront global scarcity and limits” (Calisto Friant et al., 2020). Questions of wealth distribution and social justice remain untouched.

Calisto Friant et al. (2020) distinguish between the terms ‘circular society’ and ‘circular economy’. The term circular society is used to describe discourses that go beyond market-based solutions and economic considerations, and view circularity as a holistic social transformation. The term defines discourses that have a vision of circularity ‘where not only resources are circulated in sustainable loops, but also wealth, knowledge, technology and power is circulated and redistributed throughout society’ (Calisto Friant et al., 2020). On the other hand, ‘circular economy’ is used to refer to discourses with a focus on circulating resources solely, largely dealing with circularity through a technical lens of ecological and material efficiency alone.

2. Textile manufacturing in Belgium

In the manufacturing or processing industry, materials and/or raw materials are made into new products. The result of this (industrial) processing is a finished product, which is ready for consumption, or a semi-finished product, which is used for further processing⁵. In 2020, the Belgian manufacturing industry consists of 39,630 enterprises with a total of 510,836 persons employed (Eurostat, 2022), and accounts for more than 10 per cent of total employment in the country (Statista, 2022).

Given its high GHG emissions and material footprint, the manufacturing industry plays a key role in achieving the climate targets set by the EU, Belgium, and Flanders. About 55-65% of GHG emissions in Flanders is material-based (Vlaanderen Circulair, n.d.), which is significantly more than countries like Germany (39%) or Slovenia (32%) (OECD, 2012). In 2019, Belgian manufacturing and construction accounted for 18 million tonnes of GHG emissions, representing approximately 12% of the country's total GHG emissions (Our World in Data, 2019). This share has not seen a substantial decline since 2012, as depicted in Figure 3 (EEA in Simões, 2021).

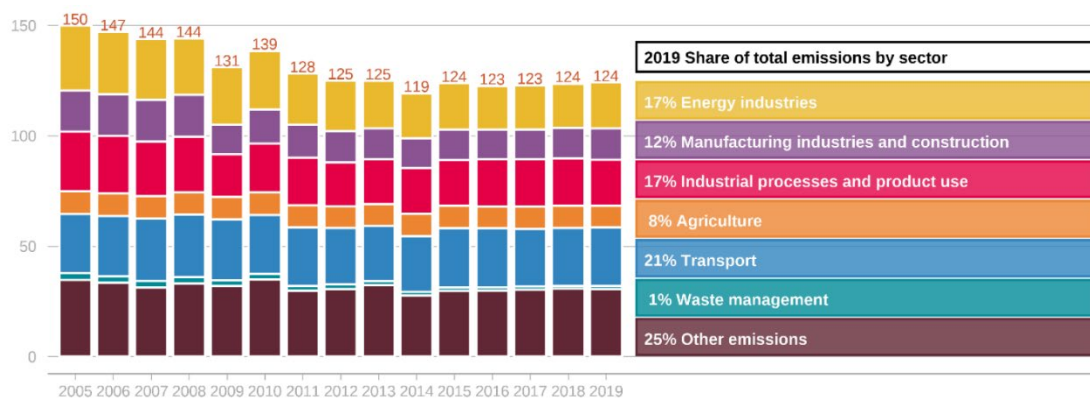


Figure 3: Total GHG emissions by sector in MtCO₂ (EEA in Simões, 2021)

When studying the circular transition of the manufacturing industry, it is insufficient to only focus on the manufacturing activities of a specific product. In the circular transition, the supply chain that is connected to these activities – the up- and downstream chains – are equally important to take into consideration: the design phase, the extraction of raw materials,

⁵ Typically, activities in the manufacturing industry fall under the NACE code C called 'Industry'. NACE codes C13 up to C15 represent the manufacturing of textiles, clothing and leather. Versluys et al. (2021) provide a clear overview of the NACE codes that fall under circular manufacturing (including up- and downstream chains).

distribution, use phase, maintenance, repair, reuse, waste management and so on, have to be well synchronised in order to ‘close the loop’ of production. This is what we refer to as a **‘value chain approach’**.

We will use a **case study on the textile industry** in Flanders to highlight relevant issues, points of attention and dilemmas that can provide important lessons for the CE transition, both for the textile sectors and for the whole manufacturing industry. The value chain of *home furnishing and technical textiles* was identified by Versluys et al. (2021) as a particularly important and promising value chain to further investigate, mainly because of its economic relevance in Flanders and because of the high material footprint linked to textile production and consumption.

2.1. Belgium’s textile industry

Textiles manufacturing is a human skill that finds its origins in ancient times: the word textile is derived from the Latin word ‘textilis’ which means ‘woven’. During the manufacturing process of textiles, fibres are converted into yarn, yarn into fabric, and fabric into a wide range of products. The wide variety of (natural and man-made) fibres, methods (weaving, knitting, felting, etc.) and treatments allow for the creation of an almost unlimited range of fabrics. The ‘textile sector’ can refer to a number of activities in different subsectors: generally, when speaking of the textile sector, a distinction is made between the manufacturing of textiles, the manufacturing of clothing & apparel, textile care & maintenance and, in some cases, textile waste management.

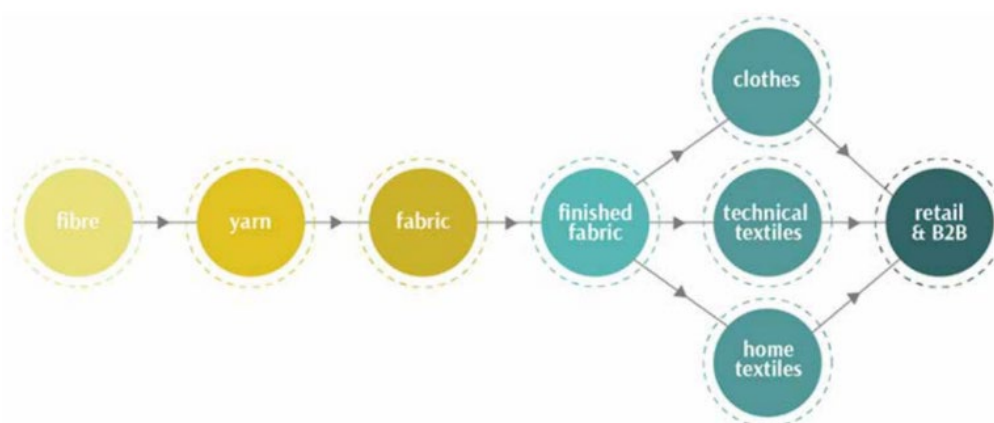


Figure 4: The manufacturing process of textiles (Euratex, 2020)

The Belgian textile industry, which dates back to the cloth industry in the Middle Ages, plays a significant economic role in the country. According to Fedustria (2022), the textile manufacturing industry in Belgium employed 18,362 people and achieved a turnover of 4.6

billion euros in 2021. According to data from Bel-First, the textile industry⁶ achieved a turnover of 4.8 billion euros in the same year, with 73% of that amount (3.5 billion euros) coming from Flanders. The Bel-First data show a slightly smaller workforce compared to the figures provided by Fedustria: according to Bel-First data, the industry employed a total of 14,731 people in 2021 with 12,574 people employed in Flanders, making up 85% of the workforce. According to Eurostat (2022) the industry employed 16,394 people in 2019.

The turnover of the industry can mostly be attributed to the subsectors technical textiles (43%), home furnishing textiles (41%) and clothing textiles (10%). In total, 576 enterprises were active in the industry of which small companies (<50 employees) constituted 87% (Fedustria, 2022). This is relatively low compared to the Belgian average, where 99% of companies in Belgium have fewer than 50 employees⁷. 80% of the Belgian textile industry is concentrated in the regions South-West Flanders and East Flanders (Sectorconvenant 2021-2022).

While the production of textiles was traditionally mainly supply driven, in recent years the sector has moved more towards demand-driven production in an attempt to cope with the global, highly competitive market. Now, the sector is characterised by its pluriformity, offering a large variety of the higher added value products which are often customized to meet the specific needs of their clients. Most enterprises work in a niche market and manufacture unique and technologically advanced products. The majority of manufactured products are exported (see table 1).

The **home furnishing textiles** (also referred to as interior textiles) sector produces, among others, textiles for carpets, furniture, curtains, mattresses and house linen. Belgium is especially known for its carpet production: the country is the largest producer of textile floor coverings of the EU and comes second, after the US, in the world (Fedustria, 2022). More than 27% of European carpets are produced in Belgium (Euratex, 2020a). 70 percent of the revenue of the Belgian home furnishing textiles sector can be attributed to textile floor covering with a 1.2 billion euros turnover from in total 70 companies (Fedustria, 2022).

The **technical textiles** sector produces textiles for a wide range of purposes. This includes *geotech* (for geotechnical engineering purposes, like separation, drainage or filtration), *indutech* (with diverse industrial applications, such as fabrics for conveyor belts), *medtech* (for medical and sanitary applications, varying from masks to diapers to bandages), *protech* (protection and safety textiles, for example used by fire fighters) and *sporttech* (from synthetic grass to sportswear) (Fedustria, 2022).

⁶ This only concerns companies with 13 (manufacturing of textiles) as a principle NACE code.

⁷ <https://economie.fgov.be/nl/themas/ondernemingen/kmos-en-zelfstandigen-cijfers/definities-en-bronnen#:~:text=Meer%20dan%2099%20%25%20van%20de,micro%20onderneming%20en%20kleine%20onderneming.>

Table 1: Important characteristics of home furnishing and technical textiles sectors (Fedustria, 2022)

	Home textiles	Technical textiles
Employees (#)	8,674	7,147
Companies (#)	152	79
Revenue (€)	1.865 billion	2.244 billion
Export (%)	94	70

2.2. Work in the sector

As mentioned before, the Belgian textile industry employs between ±15,000 and ±19,000 people, depending on the consulted data source. While the majority of companies in the sector are small enterprises (>50 employees), **40% of the people working in the sector are employed in companies with more than 250 employees** (Eurostat, 2022), as is shown in table 2. Three quarters of the employees are so-called blue collar workers (arbeider, referred to as PC 120) and a quarter white collar worker (bediende, referred to as PC 214). 70% of those who work in the sector are men (Sectorconvenant 2021-2022). In 2019, 43% of the employees in the textile industry were over-50s. This is significantly higher than the Flemish average at 30% (Sectorconvenant 2021-2022).

Table 2: Number of employees per company size in 2019 (Eurostat, 2022)

	Total	0-9 employees	10-19 employees	20-49 employees	50-249 employees	250+ employees
# of people employed	16,394	1,583	906	1,869	5,485	6,551
Percentage of total	100%	10%	6%	11%	33%	40%

According to a survey of EAK-Statbel, the most common professions in textile manufacturing (NACE code C13⁸) are operators of looms and knitting machines (26%), supervisory personnel (10%), administrative staff (6%), installers of industrial machinery (6%), managers in the field of policy and planning (6%), sales and marketing managers (4%) and operators of machines for preparing spinning fibres, spinning and winding (3%). The full list of professions can be found in the Appendix (B). Professions that are not included in this list, as they do not fall under the NACE category textile manufacturing, but naturally play a vital role in the transition to a circular economy, are activities such as maintenance and care of textiles, and textile waste processing.

The textile sector is a **declining sector in terms of employment**. In the past decade, employment in textile manufacturing in Belgium decreased significantly from around 45,000 in 2000 to 24,000 in 2010 and 18,000 in 2021 (Fedustria, 2022). This number has probably further declined in 2022 and 2023, due to the closure or restructuring of several large production sites: this includes the Berry Yarns division of Beaulieu International Group (resulting in 37 layoffs)⁹,

⁸ List of all NACE codes can be found here: https://ec.europa.eu/competition/mergers/cases/index/nace_all.html

⁹ <https://www.tijd.be/ondernemen/textiel/beaulieu-wil-belgische-garenafdeling-opdoeken/10409517.html>

the Balta Rugs factory in Avelgem (about 250 layoffs)¹⁰, Ideal Floor Coverings of Beaulieu International Group (176 layoffs)¹¹, and Balta in Sint-Baafs-Vijve (nearly 300 layoffs)¹². These closures and reorganizations have been prompted by a combination of factors, including high energy prices, high labour costs compared to other countries, and declining product demand, leading in some cases to relocation of their production to France, the UK, and Turkey.

Notwithstanding the declining employment, the Belgian textile industry is **heavily confronted with the problem of skills shortages**. While the textile industry is certainly not the only sector that is confronted with this issue (both in Belgium and across the EU), several factors contribute to a greater vulnerability to the general skills shortages that prevail in today's society. Many people that currently do work in the sector are **close to retirement age**. This means that soon a large group will leave the labour force, taking with them considerable amount of expertise and knowledge accumulated after years of experience.

Moreover, **educational programmes specifically aimed at employment in the textile sector are scarce in Belgium**, with only one secondary school (located in Kortrijk) offering such education. At the higher education level, the Hogeschool Gent offers a professional bachelor's programme in textile technology. Both the secondary and higher education programs have relatively low enrolment rates (Sectorconvenant 2021-2022). Due to the limited education and advanced specialisation of companies, the sector has increasingly taken the responsibility for the training of new and existing employees.

Finding solutions for the skills shortages in the textile sector seems to be particularly challenging. The industry is struggling with **an image problem** (such as misconceptions about the industry being 'old fashioned') and a general lack of awareness about the sector. Furthermore, **inflexible working hours, tough working conditions and lower salaries compared to some other industries**, make it difficult to attract new employees. Additionally, recent and ongoing closures and reorganizations in the sector have made it less appealing to those seeking job stability.

The term "bottleneck vacancies" (English translation of word "knelpuntvacatures") is used by the Flemish Service for Employment and Vocational Training (VDAB) to indicate occupations for which it is difficult to fill vacancies. In 2022, 207 occupations were listed as "bottleneck vacancies", which is an increase of 9% compared to the year before. In the textile industry, skills shortages were identified – mostly due to quantitative shortages¹³ – in the following occupations: operators of textile production machines, operators that prepare and supply

¹⁰ <https://www.tijd.be/ondernemen/textiel/sluiting-balta-rugs-fabriek-in-avelgem-slaat-in-als-een-bom/10412101.html>

¹¹ https://www.standaard.be/cnt/dmf20221111_97710998

¹² <https://trends.knack.be/ondernemen/295-banen-op-de-tocht-bij-tapijtenmaker-balta-in-sint-baafs-vijve/>

¹³ An occupation can be listed for three reasons: quantitative shortage of employees, qualitative shortage of employees or unfavourable working conditions.

weaving mills, and textile finishing operators¹⁴. In the period from December 2021 until November 2022, the VDAB received 619, 78 and 56 vacancies for these occupations respectively. The VDAB also identified skills shortages in textile care (laundry workers and industrial cleaners) and in the apparel industry (upholsterers and home decoration assembly operators). Besides these sector-specific occupations, a general shortage of technically trained personnel also impacts the sector: these include maintenance mechanics, industrial automation technicians, production managers and research and development experts in the industry¹⁵.

14 <https://www.vdab.be/sites/default/files/media/files/Knelpuntberoepen%202022.pdf>

15 <https://www.vdab.be/sites/default/files/media/files/Knelpuntberoepen%202022.pdf>

3. Circularity of the textile industry

While the need for more circularity becomes more pressing every year, global circularity is declining: from 9.1% in 2018, to 8.6% in 2020 and now 7.2% in 2023 (Circle Economy, 2023). Similarly, in Flanders, the material footprint of the economy is increasing (see Figure 4). Despite multiple attempts, we have not found any data concerning the current level and/or development of circularity attained by the textile industry in Flanders. However, it is known that the impact of the textile industry is high. Europeans consume on average about 26 kg of textiles per person per year and also throw away an average of 11 kg of textiles annually (European Environmental Agency, 2019). In 2019, the EU consumed about 10.7 million tonnes of textiles. In that same year, about 4 million tonnes of textiles largely disappeared in incinerators or landfill (Euratex, 2020b). According to the European Apparel and Textile Confederation, about 99% of the textile waste was made using virgin fibres¹⁶. An estimated 20% of industrial water pollution comes from textile dyeing and finishing (Kant, 2012). Moreover, the textile and leather industry in Belgium consumed 168.000 tonnes of oil equivalent in 2019 (National Inventory Report, 2022).

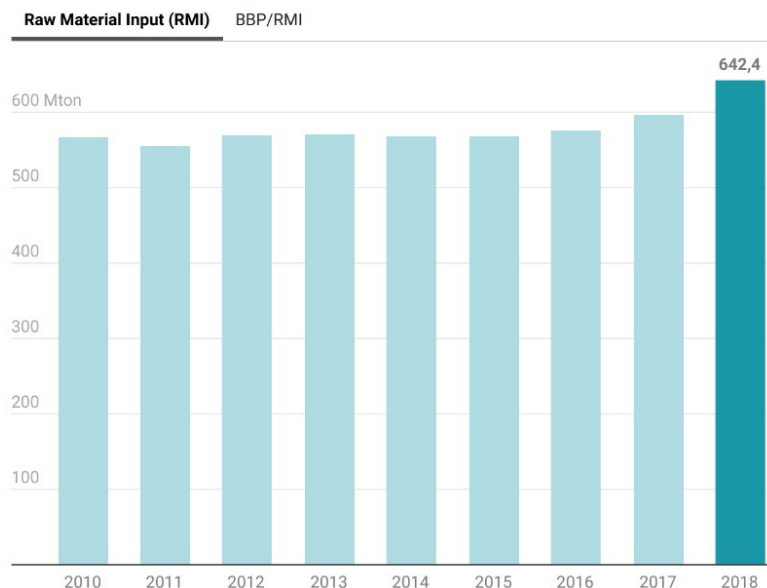


Figure 5: Material footprint of the Flemish economy (2010-2018), in million tonnes (CE Monitor, n.d.)

¹⁶ <https://euratex.eu/139/rehubs-2022-circulating-textile-waste-into-value/>

In order to reduce the textile industry's impact, the European Commission presented an **EU Strategy for Sustainable and Circular Textiles** in March 2022. The proposal calls for an end to fast fashion by 2030 and takes into account the entire lifecycle of textile products. It aims 'to create a greener, more competitive sector that is more resistant to global shocks'. The Commission's vision for textiles is that, by 2030, (1) all textile products placed on the EU market are durable, repairable and recyclable, to a great extent made of recycled fibres, free of hazardous substances, and made with respect for social rights and the environment. (2) "Fast fashion is out of fashion" and consumers benefit longer from high quality affordable textiles. (3) Profitable re-use and repair services are widely available. Finally, (4) the textiles sector is competitive, resilient and innovative with producers taking responsibility for their products along the value chain.

In order to achieve this, the strategy lays out a set of actions. One of the measures that is introduced in the proposal is **Extended Producer Responsibility** (EPR) for textile products: EPR schemes make producers responsible for the waste that their products create. The Commission also aims to increase transparency of textile products through the introduction of **digital labelling**. The purpose is to provide consumers with comparable, harmonized and trustworthy sustainability information on products. Furthermore, the Commission wants to introduce a **digital product passport** for textiles, which will make it easier to repair or recycle products and facilitate tracking specific substances along the supply chain.

EU's first country with EPR scheme for textiles

France is the first EU country to implement a mandatory EPR scheme for textiles. France's EPR policy was first introduced in 2007 and passed into law in 2020. It covers clothing, linen and shoes (Gerstmann, 2020). This law holds manufacturers and importers responsible for the entire life cycle of their products. They must either set up their own officially approved take-back system, or they must financially contribute to the accredited producer responsibility organisation for textiles, named ReFashion. In 2022, the destruction of unsold textile products was banned under French law, and the EPR policy was expanded to include home furnishing textiles (Gerstmann, 2020). Since 2006, textile collection rates in France have increased significantly faster than in other countries. However, the collection rates in France were initially at a much lower level compared to for example Denmark and the Netherlands (Christiansen et al., 2021).

Along with the EU strategy for textiles, a proposal for a **Regulation on Ecodesign for Sustainable Products** (ESPR) was presented. The ESPR creates a framework for setting eco-design requirements for different products, including textiles. While textile products already are subject to certain rules (such as the use of chemicals), there are no specific requirements yet

with regards to their durability, reparability and recyclability. The ESPR contains a set of eco-design requirements, such as a mandatory minimum for the inclusion of recycled fibres in textiles, and making them longer-lasting, and easier to repair and recycle. As part of the ESPR, the Commission also proposed a transparency obligation for large companies to publicly share information on how many products they discard and destroy, and how they reuse, recycle, incinerate, or landfill their products. The destruction of unsold or returned textiles will also be banned.

3.1. Companies' stances on circularity

Although it remains unclear how the EU strategies will exactly affect Flanders' textile industry, stricter regulations on the long term seem inevitable. In its strategy, the Commission states that it 'will prioritise products with the highest potential and impacts in terms of environmental sustainability. The initial assessment of the Commission shows that this should include for example personal and household textiles, carpets and mattresses.'¹⁷

Fedustria (2022) conducted a questionnaire among textile, wood and furniture companies to gain a better understanding of their stances regarding sustainability and the circular economy. It found that 56% of the participating companies see sustainability as a necessary basic condition, 39% view it as an extra asset to develop more turnover and 5% see sustainability as a threat to their business. Moreover, 15% of the companies indicate that they do not plan to undertake any specific actions regarding sustainability.

When asked specifically about CE, 57% of the companies view the CE as an opportunity for the company, 13% of the companies see no opportunities at all in CE and 33% has yet to develop an opinion on this. More specifically, 55% of the companies see opportunities in buying or using recycled raw materials or semi-finished products, and 50% of the participating companies would be willing to make arrangements with suppliers and customers for a 'supply chain approach'. Furthermore, 45% sees the CE as an opportunity to attract new customers and 43% sees opportunities in collecting their own end-of-life products and recycling them internally (Fedustria, 2022).

According to Euratex (2020), the European apparel and textile confederation, it is clear how to move CE in the industry forward: 'Textile Circularity starts with a *demand*, namely an order placed by a buyer, whether a fashion brand, retailer, a public procurer or another industry sector. The best way to stimulate circularity is, therefore, to stimulate a demand for circularity, from buyers and consumers.'

¹⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0141>

3.2. Keyword analysis to estimate circularity

The keyword analysis methodology used by Multani et al. (2022) is also helpful in estimating the current circular activity of textile manufacturing companies (with primary activities in NACE code C13). This methodology uses an algorithm to screen the online profile (website, social media,...) of companies for circular economy keywords. The researchers compiled a list of circular economy keywords and assigned a specific CE score to these keywords. This enabled the algorithm to determine an overall score for circularity and estimate a score for each separate R strategy based on the company's online profile. If a company's profile does not coincide with keywords corresponding to some of the strategies, the company will receive a score of 0 for those strategies.

As depicted in the graph below (Figure 6), we found that highest circular score among textile manufacturing companies is 18. **This circular score is significantly lower than the highest score of the overall manufacturing industry** (with primary activities in NACE code C), which is 33. Similarly, the mean and median scores for the textile industry are also lower compared to the overall manufacturing industry.

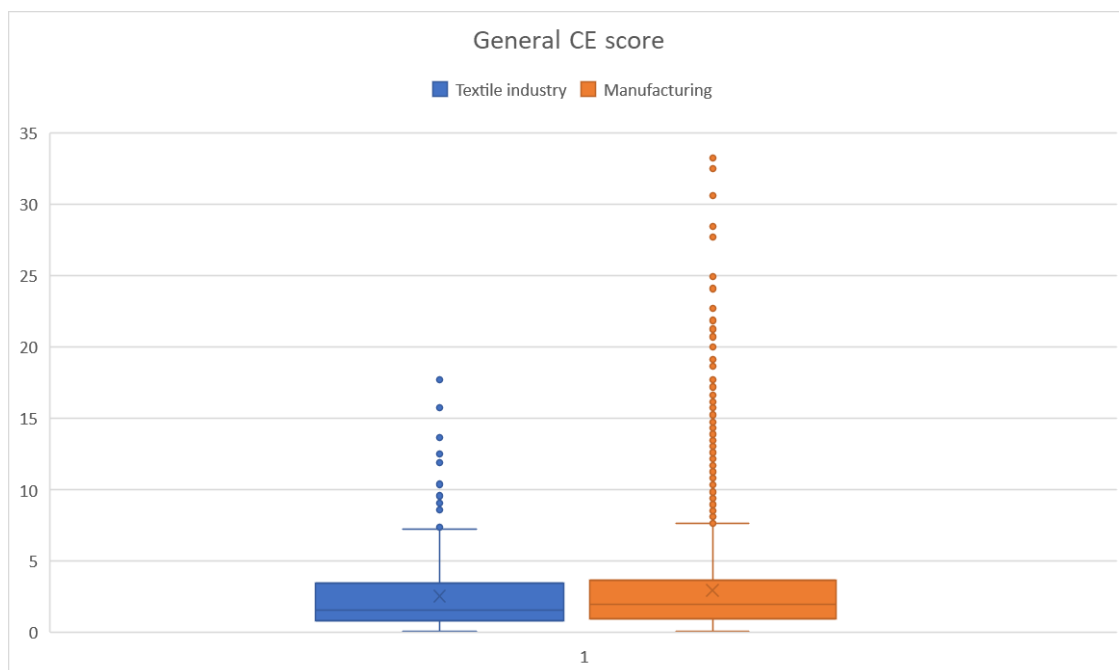


Figure 6: The general CE score of the textile industry and the manufacturing industry

When comparing the CE scores of the textile industry per R-strategy, we find that R-strategies such as Repair, Refurbish and Reuse have a very low frequency and weighted score. This is substantially higher for Renew, Recycle and Recover, and to some extent for Refuse and Reduce as shown in Figure 7.

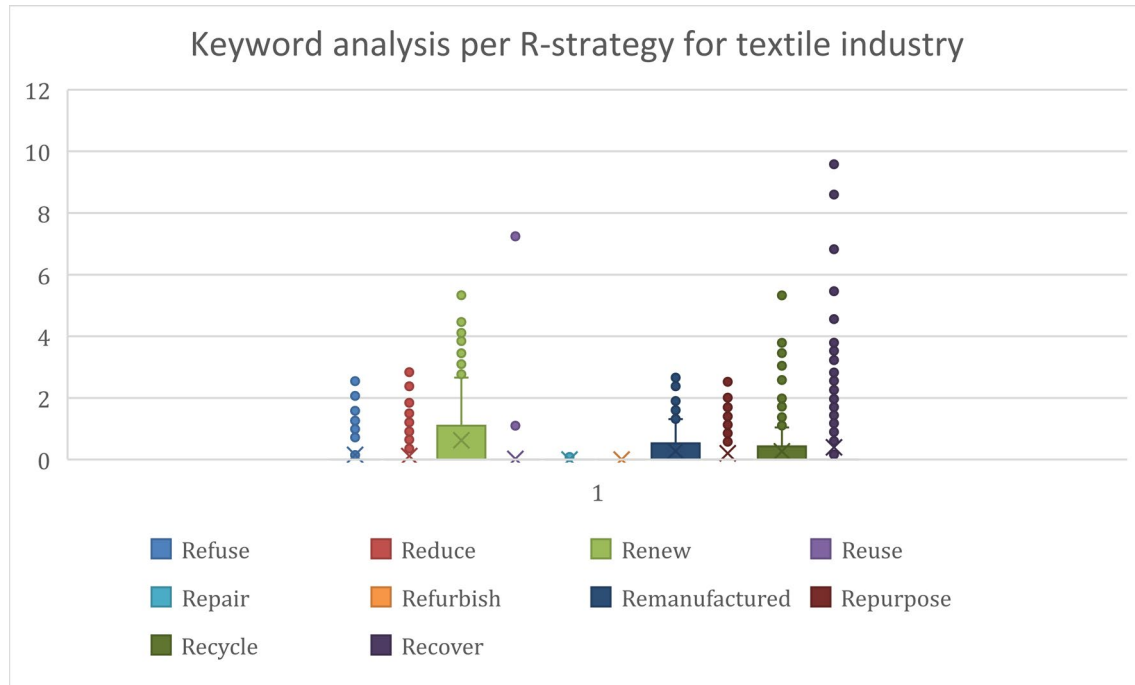


Figure 7: The textile industry CE scores per R-strategy

4. The labour market in the CE transition

Labour market forecasts are important because they provide insights into the future demand and supply of labour. This does not only help individuals, companies, educational institutions and organizations to make informed decisions and plan for the future, but these forecasts also guide policymakers in designing and implementing (Just Transition) policies.

Anticipating possible future changes in work is vital, because (1) a sufficiently skilled and knowledgeable workforce does not only contribute to the acceleration of the CE transition, but (2) the timely up- and reskilling of workers can also help to keep unemployment levels low in line with the Just Transition and Leave No One Behind principles. In this chapter, we will provide a summary, based on the literature, of how work is anticipated to transform in the CE transition. This includes changes in both the quantity and nature of jobs.

4.1. Impact on the number of jobs

On top of environmental motives, job creation is often emphasized to be a reason to stimulate a CE transition. The potential impact of CE on employment has been modelled at multiple levels (regional, national, international) for multiple time horizons (i.e. 2030 & 2050). Most studies show insignificant or slightly positive impacts on employment of a circular economy transition (Aguilar-Hernandez et al., 2021; Laubinger et al., 2020). The effects in Europe are predicted to be relatively more positive. By moving towards more CE, the European Commission (2018) anticipates a creation of **approximately 700,000 jobs in the EU** by 2030. The employment gains of a transition to a carbon-neutral economy are slightly more pronounced for medium- and low-skilled occupations (Cedefop, 2021).

In Flanders, Dubois & Christis (2014) estimated that a circular economy would create around **27,000 jobs**, equal to 1% of the total Flemish employment. Willeghems & Bachus (2018) came to a similar conclusion and expect an increase of 30,000 workers by 2030, in particular in repair, waste processing and reuse. The ‘Putting Circular Textiles to Work’-project (Carrone et al., 2021), with a scope limited to the Netherlands, shows an even higher employment potential of the circular economy for the clothing value chain: for different scenarios that were developed, the potential to increase total jobs was estimated to be between 14% and 25%. However, it remains important to be cautious when drawing conclusions about employment effects, as outcomes depend on model specification and studies may not consider all possible impacts or pathways of a transition (Stavropoulos & Burger, 2020).

4.2. Impact on skills

The transition to a CE will not affect all sectors and workers homogeneously. Economic activity and employment are expected to shift from materials-intensive activities towards sectors with less materials use, such as services and activities such as recycling and secondary metal production (Laubinger et al., 2020). The activities that are expected to boost in the CE, such as reuse, repair and remanufacturing, tend to be more labour-intensive in comparison with primary processes: the majority of activities will likely be smaller and more heterogeneous with less potential for economies of scale and automation (Laubinger et al., 2020).

While the CE can lead to the creation of new jobs, other jobs may be substituted, destructed or have to be redefined (European Commission, 2018; Laubinger et al., 2020). In order to avoid skills gaps and mismatches, the CE transition will require the ‘topping-up’ or ‘upskilling’ of workers (Chateau & Mavroeidi, 2020; Herlevi et al., 2021; ILO, 2019; World Economic Forum, 2020). A complete reskilling of employees is in most cases not necessary, according to a report focused on green jobs by Cedefop (2010). Most employees already have a relevant skills’ base, which can be used and applied to different activities, sectors or functions that serve decarbonization or the CE.

This is in line with the research by Smith et al. (2022) demonstrating that 74% of jobs are unlikely to be *significantly* affected by the green transition. On the other hand, a quarter of the jobs are expected to see significant impacts from the green transition, requiring either enhanced skills (16%), new and emerging skills (4%) or the green transition leading to increased demand for these jobs (6%).

Moreover, a report by the European Commission (2018) on the impacts of circular economy policies on the labour market also highlights that, compared to other transitions or drivers of change (such as digitalisation), the skills needs for a circular economy take-up are relatively small. In the report by the CESCYP project (2022), the researchers argue that many competencies that are needed in a CE are also useful in a linear economy and thus not substantially different. It is the context rather than the competency itself that changes: i.e. one respondent in the study stressed that it is more about knowing one’s competencies and using them in a circular context.

4.3. Competences in the CE

As described by the OECD (2005), ‘a competency is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context.’ In line with the European Commission's (2019) approach, we understand competences to be **a combination of the knowledge, attitudes and skills**. Knowledge refers to the background and understanding of a certain topic, skills to the ability to carry out processes and apply the existing knowledge to

achieve results, and attitudes describe the mindset to act or react to ideas, persons or situations.

There are some general trends in competence forecasts that apply across sectors in the CE transition. The CE transition can impact every facet of a business – from product design, choice of manufacturing processes, logistics decisions to waste management considerations – and thus requires engaging various stakeholders across the supply chain (Veleva et al., 2017). Previous research has established that green jobs require higher levels of formal education, work experience, and on-the-job training: green jobs imply a high degree of proficiency in design, production, management, and monitoring. Compared to traditional employment, green jobs require a greater demand for cognitive and interpersonal skills (Consoli et al., 2016; Vona et al., 2015)

While knowledge and awareness of the circular economy is naturally vital, what stands out is **the importance of soft skills**. In the circular economy, good communication and collaboration will be important both within a company and across the supply chain. Moreover, flexibility and adaptation are valued attitudes. This is consistent with Bertassini's et al. (2021) statement that the CE transition is 'a continuous state of adaptation, breaking paradigms and reviewing actions and operations', which includes 'redesigning structures and procedures, and reinventing mindsets' (Bertassini et al., 2021).

The research by Janssens et al. (2021) also highlights the importance of traits in the CE such as being 'innovative and open-minded', 'visionary', 'flexible' and a 'creative thinker', and having 'the competence to collaborate'. Moreover, in the study, economic challenges, such as coming up with customized business models, are identified as more pressing than technical challenges (Janssens et al., 2021). Burger et al. (2019) distinguish between people who carry out and people who enable 'core circular activities' and found that the former usually require more technological and manual skills, whilst the latter require more complex cognitive skills. On average, core CE sectors require lower education levels, while enabling sectors require higher levels than the rest of the economy.

Furthermore, Burger et al. (2019) point out that, similar to the rest of the economy, the CE requires a diverse and heterogeneous labour market 'with disparate education levels and skill requirements'. This means that it is not useful to invest in a single particular level of education or single specific set of skills, but rather to aim for a high degree of diversity in labour supply, both in terms of education and skills (Burger et al., 2019). In addition to the formal, higher education, Herlevi et al. (2021) highlight the importance of vocational education and training in driving the uptake of circular strategies, promoting equity and closing the skills gap. Moreover, the report by Adecco Group (2021) encourages employees to internalise 'a mindset of lifelong learning', as innovation and megatrends accelerate the expiration of skills and employability.

Moratis et al. (2022), who conducted a study across various sectors in the Netherlands and Flanders, demonstrate the necessity to **improve understanding about the principles of circular economy** and the significance of adopting these principles (as opposed to the current, linear system). The study also highlights the importance of possessing skills such as the **ability to collaborate** within the supply chain and **systemic thinking**, and having a **courageous** and **explorative** attitude. Specifically, the ability to discover CE business opportunities and models is important. In addition to general knowledge about the circular economy, the study reveals a need for knowledge about materials, circular design processes, about subsidies, and (new) laws and regulations.

The above findings are affirmed by the research of the CESC project (2022) exploring the elements of competences that are crucial in the CE. An overview of the competence needs can be found in table 3 below, which is largely based on the overview created by the CESC project (2022). It is worth observing that a significant number of the highlighted transversal skills can be considered more generally important ‘transition competences’ that are not only valuable in the context of the CE transition, but could be beneficial in other scenarios too (i.e. digital transition). For example, there is a significant overlap between the ‘**21st century competences**’ identified by the World Economic Forum¹⁸ and the below CE competences.

Table 3: Overview of general competence needs in the CE transition

Knowledge	Attitudes	Skills
Circular economy principles Circular business models	Adaptation & flexibility Creativity & explorative Motivation & mindset Ethics Vision Courage	Leadership Collaboration & team work Communication Critical thinking Systems thinking Design thinking

4.4. Importance of employee engagement

Next to the reskilling and upskilling of employees, a growing body of literature is pointing to the crucial role of employee engagement and empowerment in accelerating the CE transition (Bertassini et al., 2021; Veleva et al., 2017). Employees can initially face difficulties in the CE transition: this includes increased time and work pressure, there is the risk of failure, and waste reduction can go against production goals which may determine employees’ compensation. Increasing employee engagement in the CE transition could reduce the negative impact of these challenges on employees.

¹⁸ https://www3.weforum.org/docs/WEF_Defining_Education_4.0_2023.pdf

Moreover, research has confirmed that engagement is linked to, among others, improved job satisfaction, employee retention, profitability and productivity (Markos & Sridevi, 2010). Leaders play an important role in encouraging and engaging employees (Bertassini et al., 2021), as well as developing and nurturing (open) communication between employees (Ahuja et al., 2019). Kirsch & Connell (2018) identify employee involvement and the provision of sufficient resources (i.e. time, space and budget) as key drivers of success of sustainability initiatives within a company. This requires both sustainable leadership and Green HRM (Kirsch & Connell, 2018). Sustainability initiatives could very well be driven from the 'bottom-up' if employees are allowed the time and resources and given sufficient autonomy and authority to make the required changes. Furthermore, their research highlights that employees need to feel a sense of accountability in achieving sustainability targets, otherwise 'the day-to-day operation and the 'need to get the job done' will dominate managers' and employees' agendas' (Kirsch & Connell, 2018).

5. CE competence profiles

In this chapter, we aim to examine more concretely the impact of a CE transition on the labour market in the textile industry in Flanders. In transitions, Van Barneveld-Biersma et al. (2020) found that companies in Flanders tend to prioritise implementation over strategic issues, including future competence needs. Even when strategic issues are addressed, future competence needs are often not immediately considered. A questionnaire among Flemish companies found that (Moratis & De Vrieze, 2022) respondents rate their own level of competence in the area of circular economy with an average score of 5.3 on a scale of 1 to 10.

To stimulate thinking in this regard, **our objective in this chapter is to provide insights into the types of employees** that will be required to facilitate a successful transition towards the CE in the textile sector. To achieve this, we have created several descriptions of key **‘circular economy competence profiles’**. While certain profiles may correspond to distinct positions, others may represent entire departments or specific tasks within a role that includes multiple responsibilities. This can vary depending on the size of the company and its organisational structure.

The information presented in this chapter is primarily **based on the 24 interviews** that were conducted as part of this research. We complement the findings from the interviews with the results of a broader competence forecast of the sector ‘Scope Your Textile Skills’ by (Vanderplanken et al., 2022), which does not specifically focus on the CE transition, but does have a relevant section on sustainability and environment.

The purpose of this chapter is **to encourage thought rather than offering a comprehensive account of all occupations and necessary competences** in a circular textile industry. In practice, companies may have more specific requirements and expectations, depending on the nature of their work and job offerings. The scope of **this chapter** is limited merely **to occupations in the manufacturing sector**.

5.1. The visionary CEO

CEOs play a crucial role in driving the transition towards sustainability and CE. As leaders of their companies, CEOs have the responsibility to identify potential opportunities and risks related to sustainability on time, and to demonstrate ‘sustainability leadership’ (Vanderplanken et al., 2022). A visionary CEO who is determined to promote and accelerate the CE transition, can positively influence employees throughout the organization - especially when specific goals or targets are set. The CE transition requires time and resources. The CEO has the means to free these up in the organisation, and should be willing to take (calculated) risks in developing a new

CE strategy for the company. More important is perhaps the CEO's role in communicating about the need for a CE transition and what the company has already done to achieve the goals. This can significantly contribute to the engagement of employees in the transition. Moreover, propagation about the CE mission to the outside world can be an extra motivation to attain the targets and can increase pride among employees. This is supported by the literature: i.e. Bertassini et al. (2021) emphasize that leaders need to define and/or update a clear and unified vision towards the CE to foster the commitment of employees.

5.2. The well-connected sustainability manager

There are still numerous CE knowledge gaps in the sector, relating to a wide range of issues, including technical developments, (new) regulations and policies, and environmental impacts assessments of companies. One way for companies to address this, is to hire a sustainability, CE or environmental coordinator. This coordinator would be responsible for gaining an understanding of the company's needs regarding the transition, for following the latest developments, and delegating tasks to other employees or departments when necessary. This approach could help streamline the transition process and ensure that all necessary tasks are addressed in a timely and effective manner. Moreover, this person could help to develop a clear CE vision for the company. It is very important that this sustainability coordinator or manager is well connected to other departments, including the top management: this enables the person to have a good understanding of the specific needs and potential barriers at play within the organisation, but more importantly helps to increase departments' engagement in the transition. Achieving the acceleration of the transition is impossible with only a single individual in the company is focused on this. To enable informed and constructive decision-making towards a CE, an organisation must have a clear understanding of its material impact and carbon footprint along its supply chain. Such a mapping can help to identify the most pressing steps to take in the CE transition.

The work of the sustainability manager could possibly be supported by a **change manager**. This person is specialized in managing and facilitating organizational change and can help in bridging the potential gap between the insights and vision of the sustainability manager and the practical aspects of the company. This involvement can include a range of tasks, such as assisting in strategic planning, engaging employees, navigating challenges, and helping to overcome practical and/or technical barriers.

5.3. The engaged employee as crucial support base

While both the CEO and the sustainability manager play an important role in guiding the transition, a broader support base for the CE transition is crucial. Employees need to be made aware of the importance of the transition. Throughout the sector, the awareness with regards to CE can still be significantly improved. This cannot only help employees to more easily accept new developments, new ways of working, or new targets, employees may feel encouraged to take up an active role in the transition in their respective departments or roles. For many employees the concept CE is still too abstract. They do not always see the full picture and understand why the CE transition is of such importance and what it entails for the company they work for. Everyone should be involved in the CE story to prevent losing them: this information has to be tailored towards the function and education level of the employees. A helpful approach for companies aiming to achieve their CE objectives could be to create a step-by-step plan that maps out the process from their current to their desired future state. This plan should identify decision makers throughout the process to ensure the right bottlenecks are addressed in the transition. Additionally, it's important to take the time to address the emotions and concerns of staff who may be affected by or have to be engaged in these changes (see step 2 and 3 of the Close the Loop Rollout¹⁹).

5.4. The supportive middle manager

Although engagement in the CE among all employees is important, interviewees placed particular emphasis on the involvement of middle management. These persons serve as a **critical link** between the visionary CEO and the rest of the staff, and are hence often referred to as the 'hourglass'. Their role is important in driving the transition towards the CE, as they have significant power to either facilitate or hinder the process. Not only can they contribute to **creating a positive culture** that supports the CE in their respective departments. They have the means to offer practical support, such as **allocating time and resources** for experimentation or creating opportunities for training and development of new skills among employees. Furthermore, they are in a position to take (calculated) risks in experimenting with viable steps towards a CE and new business models. By providing the necessary support and resources, middle management can play a crucial role in driving the organisation towards a more circular future.

¹⁹ <https://www.close-the-loop.be/nl/aan-de-slag/rollout>

5.5. The creative and innovative R&D professional and designer

Both R&D managers and designers have a significant impact on the environmental sustainability of products that a company manufactures, and therefore play an important role in driving the CE transition. It is estimated that approximately 80% of a product's environmental impact is determined during the design phase (European Commission, 2012). To achieve this, both R&D managers and designers need to possess a **thorough understanding of the principles of the CE and knowledge of the materials used**, and they need to be able to think **creatively**. This also requires awareness of the standards and regulations that new products must comply with. They should aim to optimize current production processes, support circular business models, and **invent new products that promote product life extension** and are easy to repair, reuse, refurbish, recycle, etc. This requires training, experimentation, time, and resources. Assessing the feasibility of designs in terms of finances, technology, and other factors requires collaboration with other departments. Close cooperation with sourcing or purchasing managers is crucial to ensure that the materials selected for products and processes meet the company's sustainability and circularity standards.

5.6. The persuasive sales and marketing professional

The responsibility of **convincing customers** to purchase the more sustainable products or business models (i.e. 'using' instead of 'owning' a product) lies with the sales and marketing team. Usually, sustainable alternatives are priced higher, and hence customers need compelling reasons to opt for them. To achieve this, it is beneficial to create a sustainable sales pitch or focus on selling 'a concept' rather than just the product, as was advised by one of the interviewees. To do so, marketing and sales staff must grasp the significance of the transition well, be aware of the company's efforts towards promoting sustainability and have a strong knowledge of circular business models. Communicating the company's efforts and commitments towards sustainability and circularity is crucial to leverage it as a competitive advantage. However, this is only possible if customers are aware of the company's commitments in this regard. Moreover, when a company communicates its sustainability/CE commitments to the public, it can contribute to a sense of pride among employees and serve as an extra motivator to work towards achieving these goals.

5.7. The careful operator

The CE transition is not expected to have a significant impact on the work of technical or operational staff working in manufacturing, such as production operators, weavers, turfters,

and finishers of textile products. The use of recycled fibres or yarn does not change the operation of machines to a great extent. The fundamental nature of the job remains largely the same: the virgin materials are just substituted by recycled ones. However, employees may need to handle the machines **more delicately** and have a good understanding of how they work, as recycled materials can be more **fragile**. Consequently, it appears that these profiles do **not need entirely new hard skills**. However, **certain tasks may take longer**, such as conducting quality checks, adjusting machines to handle the more sensitive recycled material, repairing yarn breaks, and recording malfunctions or incidents. Operational staff also play an important role in **minimising waste**, sorting, and reusing leftover materials during the production process.

5.8. The precise sorter

It was highlighted that employees working in textile care have an important function in closing the loop of textile production. These employees are responsible for the maintenance of textile products, which can significantly extend the lifetime of a product if done adequately. This process will not require substantial changes in skills in a CE, as these are already present in the sector. Naturally, the sustainability of textile cleaning processes need to be continuously improved in order to limit water, energy use, and environmentally-harmful substances. Such changes however require similar competences as described in the profiles above (see Visionary CEO, Sustainability manager, R&D, etc). More important is that these employees need to **carefully examine if the quality of the products** is still sufficient for further (re)use. If this is not the case, it is important that the products are **sorted properly** and that they find the right destination for end-of-life textiles. As such, textile care companies can function as an important hub in the recycling of textiles.

Other textile companies could also collect the end-of-life textiles themselves (such as carpets), and set up a sorting hub in their own company. In other cases, this could potentially be done in collaboration with the social economy. These options are further analysed in the discussion section below.

6. Discussion

In this chapter we will first reflect on the most **notable and recurring patterns** that emerged during the interviews and that eventually resulted in the CE competence descriptions in the previous chapter. Following that, we will provide some more contextual background gathered from our research and interviews that we deemed relevant for this research.

6.1. Reflections on competence expectations

In their research, Burger et al. (2019) follow the approach of Van Oort et al. (2018) and differentiate between *core* circular strategies and *enabling* circular strategies. **Core circular activities** ensure the closure of resource loops and include jobs that (1) preserve and extend what's already made, (2) prioritize regenerative resources, and (3) use waste as a resource (Burger et al., 2019). **Enabling circular work** directly support the core CE activities: it enables the acceleration and scaling of the core circular activities, thus forming the supportive structure of the CE. Examples of enabling CE activities are 'designing for the future' and facilitating collaboration 'to create joint value' (Burger et al., 2019).

Burger et al. (2019) take a sectoral approach, and speak of 'core CE sectors' and 'enabling CE sectors'. We found a similar distinction in activities *within* the textile sector and *within* textile companies. Generally, the expectations with regards to core CE activities and enabling CE activities in the textile vary greatly. While it is imperative to keep all employees informed and engaged in the transition, it appears that mainly those who '*enable* core circular activities' hold the most critical roles in accelerating the transition, according to the interviewees. The majority of the interviewees emphasized the **pivotal role that CEOs, managers, designers and other 'enablers' play in the CE transition**. Their guidance, knowledge and vision can set the tone for the organisation and help to facilitate a smooth and successful CE transition.

According to the interviewees, people in **these positions must undergo the most significant changes** in their work in terms of competences. To achieve this, they must educate themselves on CE principles and be able to translate this knowledge to their own day-to-day work – whether this entails exploring new business models, finding alternative materials for production, improving communication or developing a clear vision. This requires a set of soft skills and a mindset shift focused on sustainability. Freeing up time and resources to create space for experimentation and development seems vital. The traits that were discussed in the literature review (i.a. flexibility, being visionary, system thinking, communication, etc.) seem to apply mainly to the *enablers* of circular activities.

In contrast, operational or technical staff, those who will eventually contribute to core CE activities, are expected to **require only minimal upskilling**. Given the fact that 75% of employees in the industry are blue collar ('arbeider', according to the Sectorconvenant 2021-2022), this is an important finding. One of the interviewees formulated it as follows: 'The most difficult part is making a wick for spinning. Once you have that, everything proceeds in a fairly normal way.' Another interviewee said: 'Activities remain similar. [...] Whether the fabric is circular or non-circular, it doesn't matter when you have to remove it from the machine and roll it up. The task remains the same.' This is in line with the observation of Burger et al. (2019) who found that people in enabling CE sectors, compared to those in core CE sectors, require more complex cognitive skills and display a higher demand across the whole range of skills.

While some operational activities may not change significantly in a circular economy, it remains crucial to **involve all employees in the transition**. This allows for a better comprehension and adjustment to any (minor) modifications in production processes and provides them the opportunity to contribute their practical knowledge to enhance the process. One way to achieve this is by educating employees about the principles of the CE, explaining the reasoning behind the forthcoming changes, and keeping them updated on how these changes will impact their work.

The **quality of future jobs** is another factor that should be considered. The literature warns that focussing too narrowly on environmental aspects of CE could jeopardise occupational health and safety (Héry & Malenfer, 2020). The current expectations suggest that the **quality and working conditions of the core CE jobs will not be significantly affected** by the CE, as the predicted changes are not substantial. Some interviewees suggested that the CE could potentially **boost job satisfaction**, as the employees become more invested and proud of their company's commitment to sustainability. Other than that, the working conditions of core CE jobs are not expected to improve due to a CE transition: this is quite a noteworthy discovery since the industry is already encountering challenges in attracting and retaining workers, in part because of the challenging working conditions highlighted in chapter 2.2.

6.2. Transition in a tumultuous context

During the interviews, we did not only inquire about the expectations with regards to the future labour market in a CE. We also discussed potential obstacles that now impede the progress of the CE transition and to what extent a lack of CE competences contribute to these barriers. **The interviewees did not perceive a lack of CE competences as a significant hindrance in the transition** at the moment. There are other factors that hold more significant weight in the current transition process, according to the interviewees. Our analysis of the interviews revealed three major recurring obstacles: (1) a *general* lack of skills/employees in the sector,

(2) high costs of production in a highly globalized market, and (3) the relatively small size of most companies in the sector.

As we have seen in chapter 2, the textile sector is confronted with a substantial outflow of personnel due to retirement. Additionally, the limited offer in secondary and higher education in textile, and relatively low enrolment in these programmes, restricts the possibility of recruiting a new generation of employees to fill these positions. The industry is *already* facing challenges to find skilled personnel to undertake current production activities (see “bottleneck vacancies” in chapter 2) and this is expected to exacerbate in the (near) future. The interviewees pointed out that it is very difficult to think about future competences needs in a CE transition, given that the skills shortages are already affecting ongoing operations. **A general lack of skilled employees** is thus a major perceived obstacle to redirect focus towards (competences in) the CE transition.

The high energy prices and the connected inflation is another major struggle for the industry. Rising costs for energy and raw materials have resulted in increased production costs for textile manufacturers, and eventually in wage indexations as well. This, in turn, has led to higher prices for clients, making it more difficult for companies to compete in the global market. In chapter 2, we already discussed closures and reorganizations of several companies. In the media, the situation is referred to as a ‘battlefield’ and describes the developments as follows: “Flanders’ historic textile industry is in serious danger of being wiped out as a consequence of soaring energy costs and government-mandated wage indexations.”²⁰ These increased financial burdens have affected the industry's sustainability goals, according to the interviewees, since the companies lacked the financial means for new investments in sustainability and/or did not prioritize these investments in the current challenging context.

Finally, according to the interviewees, **SMEs generally face significant resource constraints** when it comes to transitioning to a CE. This is particularly relevant given that SMEs represent 87% of the companies in the sector. SMEs have limited availability of time and money for research and development, for strategizing, for investing in training programmes, and so on. It seems that the lack of time and resources is coupled with a perceived lack of relevance: since they do not prioritize the transition, or do not think the available trainings are sufficiently useful for the specificities of their production (see also Moratis & De Vrieze, 2022), they often choose not to spend their limited time and resources on the CE. **Collaborating within a learning network** consisting of other textile companies to address common challenges related to CE could potentially be a feasible approach for SMEs to enhance their capabilities and exchange knowledge. The research by Moratis & De Vrieze (2022) among a variety of SMEs in the Netherlands and Belgium reveals that learning in networks is a preferred method of CE competence development. As much as 73% of the companies expressed a preference for this

²⁰ <https://www.brusselstimes.com/349896/its-a-battlefield-flanders-historic-textile-industry-on-verge-of-extinction>

method, more than company visits (53%), classroom learning (46%) and online learning (41%). One approach to achieve this is through “challenge-based learning”: a learning method which is based on finding solutions *together* for practical problems. The network Ellie.Connect²¹ offers a platform for challenge-based learning for textile companies in the CE transition. However, organizing network events can still be challenging due to the **closed nature of the textile sector** (in part due to concerns about intellectual property and competitive intelligence) and, again, the limited amount of time and resources, as highlighted during the interviews. **Fostering a culture of collaboration and knowledge-sharing** would be necessary to overcome this challenge and promote joint learning among textile companies. Another point that was made is that smaller companies in the textile industry typically operate within a single step in the supply chain, which puts them at a disadvantage compared to larger, vertically integrated companies. Effective communication and trust across the supply chain is critical for advancing CE activities, and this can be more challenging for SMEs.

The literature confirms that Flemish companies’ **motivation or perceived priority in training employees in CE competences is rather limited**. The above observations align with the findings of Van Barneveld-Biersma et al. (2020), who discovered that companies in Flanders generally do not prioritize addressing future competency requirements. Similarly, Borms et al. (2023) found that education and training to acquire new skills were among the least requested policy measures by the start-ups in Flanders. As a possible explanation, Borms et al. (2023) suggest that the start-ups **prioritize their daily business operations and monetary incentives** over the acquisition of new skills, and thus postpone the skills dilemma to the future. Moreover, the study results of Moratis et al. (2022) show that SMEs beginning to explore CE experience hardly see any need for following education or training.

This lack of motivation to prioritize CE competence development could possibly be attributed to the perception that the projected changes are deemed minor, particularly among operational staff, as established in the preceding subchapter. However, it remains unclear whether the lack of attention given to CE competence development is due to the *perception* that the changes are insignificant or whether insufficient attention has led to the *underestimation* of their significance. Another possibility is that the changes are only minimal *within the prevailing discourse on CE*, but would be more significant in the case other interpretations of CE shape the industry. We will provide further details on this train of thought in the following chapter.

²¹ <https://ellieconnect.com/challenges/>

6.3. How ‘circularity’ is taking shape in the industry

In chapter 1 we saw that CE is a contested concept that ‘means many different things to different actors’. Here we reflect on how industry is giving shape to the concept. Calisto Friant et al. (2020)’s typology of circularity discourses and the ladder of ‘R’-strategies help us to contextualise these findings and to open up the debate about possible CE futures for the industry.

We find that the dominant vision for a circular textile industry in Flanders largely resembles the ‘Technocentric Circular Economy’ discourse. The industry heavily relies on technological progress to transition towards a CE: efforts to stimulate circularity are principally directed towards **technological improvement and innovation**. Nearly all efforts are focused on **improving recyclability** of the manufactured products and to **increase recycled content** in these products through technological development. More fundamental questions related to systemic changes in our socio-technical system of production and consumption, as mentioned in the literature on sustainability transitions, are hardly raised. While interviewees acknowledged the challenges of advancing CE in a highly competitive and globalized market, they did not appear to explore alternative socio-political systems or business models (such as cooperatives) as potential solutions.

Most interviewees **did not explicitly mention waste hierarchies or the prioritization of refuse, rethink and reduce over all other ‘R’s**. Repair equally receive very little serious attention. Repair activities are considered labour intensive and expensive, hence unprofitable and unrealistic. Interestingly, ‘reuse’ has historically been a more widely implemented strategy, especially for professional textiles and linen (i.e. for use in hospitals or hotels). For other textiles, however, this appears less common. *Refusing* certain manufacturing activities completely, because their purpose are simply not deemed useful or valuable enough, has not been discussed.

This is in line with the finding of Moratis et al. (2022) that companies generally have a **very limited conception of circularity** based primarily on recycling and selecting the right materials. This is also consistent with Kirchherr et al.’s (2017) observation that practitioners frequently neglect ‘reduce’ in their CE definitions, assumingly because this may imply reducing consumption and economic growth. They also found that practitioners hardly feature waste hierarchies, meaning the prioritization of reducing over all other Rs, in their definition. Possibly, because this results in a CE concept ‘that is less of a feel-good concept everybody naturally agrees with’ (Kirchherr et al., 2017).

The technocentric discourse also appears to influence the expectations around the future of work in the sector. The potential impact of other strategies than recycling on the labour market remains underexplored in the Flemish textile industry. Upscaling recycling is a capital-intensive and highly automated activity, in contrast to repair and reuse, which are very labour-intensive. Moreover, as observed by Bozkurt & Stowell (2016) **the relatively more skill-intensive processes**, such as reuse and repair, **are substantially less profitable than recycling.** The highest circular strategy, refuse, is moderating consumption, which is demand reduction. This can be expected to be followed by lower production, lower GDP, and lower employment. Under the current technocentric paradigm, we have seen that jobs and skills, especially among operational personnel, for people do not change substantially.

6.4. Will this interpretation of CE be sufficient?

The science shows that **substantially more effort is needed** to stay within the planetary boundaries (Rockström et al., 2009) in order to avoid hitting a tipping point (Lenton et al., 2019): global carbon emissions from 2010 until 2019 have never been higher in human history (UNEP, 2022a). The UN Secretary-General Antonio Guterres has warned that the world is on ‘fast track’ to disaster without urgent action (UNEP, 2022b). IPCC scientists say that it is ‘now or never’ (Harvey, 2022 in The Guardian) to limit global warming to 1.5 degrees Celsius. The need for a transition is becoming increasingly clear and pressing.

As of now, however, **Flanders is not on track to reach its sustainability targets.** The material footprint in Flanders has increased from 2010 until 2018 (see Figure 5) and total GHG emissions in Belgium have hardly decreased since 2011 (as shown in Figure 3). This is also the case for the sector ‘manufacturing industries and construction’. Today most textile waste is incinerated. According to Euratex (2020b): most *recycled* textiles waste (0.42 mln tons in 2019) is downcycled: textiles are shredded into low value applications for the automotive industry, insulation materials, cleaning cloths, etc. Only a relatively small part is successfully recycled into higher value applications as textile fibres to make new garments (Euratex, 2020b): globally, less than 1% of clothes are recycled as clothing (European Parliament, 2022).

Our observations in this study do not differ from these findings. While we did not find any specific documentation concerning the progress of the Flemish textile industry with regards to their carbon and material footprint, from the interviews and field visits it has become clear that **the CE in the Flemish textile industry is still a niche, with only limited signs of upscaling.** Progress has been made through a number of pilot projects. However, these experimental initiatives represent only a very **small fraction** of total production and have primarily focused

on improving recycling rates. It seems that the industry as a whole has not yet fully embraced and implemented the concept of the circular economy.

Despite the limited success achieved thus far in implementing CE pilot projects in the industry, the literature raises additional concerns regarding the effectiveness of a Technocentric Circular Economy in enhancing the industry's sustainability. First of all, it remains unclear whether a sole focus on recycling efforts will be sufficient. An unresolved matter is the possibility of a **rebound effect**, also known as Jevon's Paradox, in which gains in efficiency due to technological advancements are countered by an increase in usage (Schröder et al., 2019). Furthermore, there are questions concerning entropy and the laws of thermodynamics in the context of CE: **materials cannot be circulated indefinitely**, as they degrade in quantity and quality each time they are cycled or used (Korhonen et al., 2018). To achieve a CE that relies solely on recovered or renewable materials, **a substantial decrease in overall material demand and economic throughput** is likely necessary (Giampietro, 2019; Korhonen et al., 2018).

This raises the **fundamental question whether a CE can operate in a context of continued growth** or, put differently, whether it is feasible to fully decouple GDP growth from resource use and carbon emissions, as scholars such as Hickel & Kallis (2020), Jackson (2016), Parrique et al. (2019) and Ward et al. (2016) touch upon in their work. In this context, a growing group of CE scholars advocates for the adoption of higher 'R' strategies and the slowing down of resource loops (i.e. Hobson & Lynch, 2016; Reike et al., 2018). Justifiably, Calisto Friant et al. (2020) call the issue of growth '**perhaps the largest elephant in the room for the CE**'. An analysis by Calisto Friant et al. (2021) shows that the EU's CE policy also takes on a Technocentric CE perspective. It remains mainly focused on recycling and will not significantly contribute to the shrinking, slowing, redistributing and democratizing of resource cycles. According to this research, the EU interpretation of CE prioritises growth and competitiveness over human well-being and ecosystem health. Thereby, as stated by Calisto Friant et al. (2021), 'the EU might be creating new business opportunities for some, while doing little towards addressing the core socio-ecological challenges of the 21st century'.

In this we follow the argumentation of Hobson & Lynch (2016), who stress not having the intention to disregard the importance of technological, material, and business progress in advancing the CE. However, focussing narrowly on technological improvements, as Hobson & Lynch (2016) put it, 'arguably enable us all to keep side-stepping the actual roots and origins of the *resource crunch*'. If the goal is to substantially decrease resource use and carbon emissions, *then* CE debates must also include more systemic questions. In most of the EU member states, including Belgium and Flanders, the technocentric paradigm is the dominant one: the focus seems to be as much on creating economic growth as on closing material loops and reducing environmental pressure. In this context, it will be interesting to see how the Flemish government will treat its recently decided Flemish target of reducing the Flemish material

footprint of consumption by 30% by 2030. **Given the (lack of) progress shown in this regards²², it seems unlikely that this target is achievable within the current Flemish policy paradigm, which is primarily aimed at recycling.** This point naturally surpasses the limited scope of this study on the Flemish textile industry: this reasoning applies to the whole of society in which the Technocentric CE discourse prevails.

6.5. Imagining alternative CE futures

In order to reduce its GHG emissions and material footprint, and to meet (possibly additional) sustainability targets, it seems vital for the Flemish textile industry to further accelerate, scale up and systematise the transition to a CE. The words of the UN secretary general Guterres about the sustainability transition seem applicable in this context: ‘The sustainability train has left the station. **Get on board or get left behind.**’²³

As the policy targets and scientific research call for the rapid decline of both GHG-emissions as well as the material footprint, the question remains whether a purely technocentric CE approach can achieve this. **Exploring and imagining other CE routes**, such as Transformational Circular Society, for the textile industry and beyond, could help to open up the conversation on CE futures. Our intention is not to present the Transformational Circular Society as the perfect solution. However, considering the above, we do think it is important to **expand the future perspective of the industry and those who work in it**. Increasing ambitions regarding the CE transition inevitably implies shifting focus towards higher R-strategies such as reuse and repair – according to the R-hierarchy. Giving more importance to the R-ladder could also spark a more fundamental conversation around ‘refuse’ and the added value to society of certain products/activities.

While many interviewees aligned with the Technocentric Circular Economy approach, not all respondents were consistent with this discourse. In some cases, interviewees expressed viewpoints that were more in line with the Transformational Circular Society discourse: topics such as **social justice and participatory governance** were touched upon by social economy and civil society stakeholders, who also specifically referred to CE strategies in a hierarchy, and by labour union representatives. In line with expanding the future perspectives on the industry and those who work in it, **we encourage dialogue and interaction between these actors and incumbent industry actors.**

The social economy in Flanders is already very active in the sorting and reusing of consumer textiles. It remains underexplored how the social economy could contribute to the CE transition of the manufacturing industry. **Strengthening ties between the social economy and the**

²² See: <https://cemonitor.be/en/indicator/effects/materials/material-footprint-of-flemish-consumption-rmc/>

²³ <https://www.climatechangenews.com/2017/05/30/un-secretary-general-get-board-climate-train-get-left-behind/>

(textile) manufacturing industry deserves more attention if we want to fully imagine alternative CE futures to the dominant discourse of the Technocentric CE approach: for example, some of the more labour-intensive work required by high R-strategies could be very suitable tasks to be carried out by the social economy.

In chapter 4, we highlighted two reasons why anticipating possible future changes in work is vital: (1) a sufficiently skilled and knowledgeable workforce contributes to the acceleration of the CE transition and (2) the timely up- and reskilling of workers can also help to keep unemployment levels low. The CE competence profiles drawn up in chapter 5 suggest that the expected changes among operational and technical staff in the CE transition are minimal, but these expectations have likely been influenced by the dominant technocentric discourse. If the aim is to meet the sustainability targets and drastically reduce emissions and environmental impacts, labour-intensive activities in ‘reuse’ and ‘repair’ will very likely need to scale up. The insights from this report underscore **the importance of further imagining the potential implications of shifting focus towards higher R-strategies**.

Since its emergence in the Middle Ages, the textile industry in Flanders has continuously adapted and reinvented itself as a response of the ongoing challenges of that time. The need to substantially decrease its emissions and material footprint is yet another challenge that will become increasingly pressing in the upcoming decades and important. Exploring and imagining other CE routes the textile industry and beyond, could help to open up the conversation on CE futures and to broaden the expectations regarding the future labour market. Drawing on the rich and eventful history of the textile industry, the next few years present an opportunity for the industry to jump on the ‘sustainability train’, to rethink and reinvent itself, and setting an example for others to follow.

6.6. Recommendations

In 2019, the EEA noted that the CE is still in its ‘infancy’ (EEA, 2019). This study further confirms these observations: despite ongoing efforts from various actors working in- and outside the textile sector in Flanders, the CE has yet to fully gain ground. Given the severity of the current environmental and climate crisis, and the fast changing (climate) policy landscape, **it is important to enhance and accelerate efforts in order to progress the development of CE**. To foster this process, we formulated the following recommendations, each of which directly or indirectly relates to the topic of work and competences.

Up until now, insufficient attention or priority has been dedicated to the advancement of a circular economy in the textile sector. Companies in the sector are currently grappling with numerous complex challenges simultaneously, including skills shortages and high energy prices.

The required shift towards a circular economy represents yet another complex hurdle adding to an already burdened plate. For SMEs, their smaller size adds an extra layer of difficulty in undertaking investments for the CE transition. Despite these challenging circumstances, it is essential for companies and other relevant actors in the sector to realise that **prioritising sustainability is not just a moral imperative, but *also* a prerequisite for staying a relevant and competitive player in the medium to long run.**

This requires cultivating a mindset that can act as a driving force behind the transition. This could start with enhancing knowledge and awareness about the importance of this transition. This further calls for embracing qualities such as flexibility, open-mindedness and creativity. More specifically, **the role of management is pivotal** in steering companies towards increasing their ambitions regarding CE and sustainability. They possess significant influence and power to accelerate this process, but need to educate themselves about the principles of CE and develop a clear vision to work coherently towards more circularity. This requires **allocating time to explore ways to enhance sustainability and CE ambitions**, and making these efforts an integral part of the daily or weekly routine. Engagement could start by attending trainings and seminars on the topic, such as those offered by Centexbel²⁴ and Cobot. Centexbel and Fedustria also publish a monthly magazine, Milieufacts, with articles on CE, the environment and environmental legislation, specifically targeted towards Flemish textile, plastic, and textile care companies.²⁵ This could be a valuable (first) source of information and inspiration, allowing for easy access to become familiar with the multitude of environmental issues and developments in this field.

The upcoming challenges can be difficult for small organisations to tackle on their own. Particularly for SMEs, the transition to a circular economy necessitates a **cultural transformation from a closed mindset to an open one**, promoting collaboration to address the complex stages of the transition. **Joining a learning network** focused on the circular economy transition can be an effective approach to acquire knowledge and insights that are specific and relevant to the company's operating context. Ellie.Connect is such a platform that facilitates learning networks.

Moreover, **training centres could tailor their offerings with this need in mind**. The sustainability courses that are currently on offer, facilitate internal environmental auditing and inform participants about upcoming environmental legislation. These appear to have a practical and hands-on nature, which is naturally of great importance. Courses contributing to the further deepening of knowledge on sustainability and on design for circularity, to developing a sustainability vision, and to improving sustainability leadership could complement this. Moreover, courses that are on first sight not directly related to sustainability or circularity, such

²⁴ <https://www.centexbel.be/nl/agenda>

²⁵ <https://www.centexbel.be/nl/kennisoverdracht/milieufacts>

as ‘textile dyeing’, ‘innovation lab’, ‘assertive communication’, ‘effective communication’, ‘social media’ and ‘motivational leadership’, could incorporate elements of sustainability as well. This could lead to the trickle-down of knowledge and awareness to various roles with different responsibilities within a company.

As mentioned before, to deepen the CE transition, **it is necessary to go beyond mere recycling and recovery efforts**. It is important to consider scaling up higher R-strategies, such as **refuse, reuse and repair**, and gaining a deeper understanding of the (labour market) impacts of these strategies. Adopting alternative business models, such as leasing, could facilitate the implementation of these strategies. This exploration can be done within the company itself or through collaborations with external companies/organisations that can provide the necessary expertise and skill set. Moreover, a participatory networking event (series) or round table could be organised bringing together multiple stakeholders, such as the industry, researchers, policy makers and NGOs specifically to investigate how alternative forms of CE and higher R-strategies could gain ground. Vlaanderen Circulair and Fedustria could potentially lead such events.

Furthermore, it could be a viable opportunity to collaborate with the social economy sector when exploring the potential of implementing higher-level R-strategies, which are often more labour intensive. This collaboration could take place within the framework of a pilot project bringing together different, relevant stakeholders. Against this background, it could be interesting to study the competence profiles developed by the S-Circel project²⁶. These profiles include the circular repairer, sorter, transporter, warehouseman and controller, and provide a comprehensive insight into the required competences for these circular roles within the social economy. In this context, we enthusiastically support initiatives like the Living Lab Carpet²⁷, which unite diverse stakeholders from the industry, social economy, and more, to explore avenues for enhancing reuse, repair, and refurbishment in carpet manufacturing. This could be a source of inspiration for other type of textile products too.

Additionally, to ensure active engagement and consider diverse perspectives and concerns during the CE transition, it is vital for the industry to **foster dialogue with labour unions about the CE transition**. Engaging in continuous conversations with labour unions and workers allows for the inclusion of different viewpoints and concerns related to the transition, ensuring that the transition will be equitable and just. It is crucial to involve employees in the transition process, as their active participation and input are essential for successful implementation and acceleration of the transition. At the company level, the ‘Rollout methodology’²⁸ to enhance employee engagement developed by Thomas More Academy, Flanders DC and Studio D could possibly help to assist this process.

²⁶ These will soon appear on their website: <https://s-circel.be/>

²⁷ <https://www.vlaio.be/nl/projecten/circulaire-economie/carpet-reuse-repair-refurbish-van-end-life-tapijt>

²⁸ <https://www.close-the-loop.be/nl/aan-de-slag/rollout>

Finally, there is a strong need to bolster the demand for circular textiles, thereby providing valuable support to ongoing efforts into this direction. While this final recommendation is not directly linked to the topic of competences or work, it is included here due to its recurrent mention and significance throughout the research. Given that public authorities are a significant purchaser of textile products - such as work wear, office carpets and geotech materials for engineering projects - they hold the potential to play a vital role in promoting the CE. **Incorporating or strengthening circularity requirements in public procurement** could successfully contribute to fostering the CE. Emphasising higher R-strategies in these requirements would be of particular importance.

7. Conclusion

This report explores how work is anticipated to change in the CE transition of the Flemish textile industry. Many of the insights gained from this case study are likely applicable to other (manufacturing) sectors. Based on our findings from 24 semi-structured interviews with a variety of stakeholders, we created eight CE competency profiles: these profiles offer job-specific descriptions of the skills and knowledge that are deemed important in the CE transition.

During our research, we noticed a clear differentiation in expectations for what we refer to as 'core' and 'enabling' circular work (following Burger et al., 2019). According to the interviewees, the development of new competencies is particularly critical for those occupying 'enabling' roles (e.g., CEOs, managers, designers, R&D personnel) in order to accelerate the transition, such as acquiring relevant soft skills and learning about the CE principles. The anticipated changes for the technical or operational staff are minor.

In the last part of this study, we establish that these projections are likely influenced by how the CE is taking shape in the industry. We use the typology of circularity discourses by Calisto Friant et al. (2020) to reflect on this and find that the dominant vision for a circular textile industry in Flanders largely resembles the 'Technocentric Circular Economy' discourse. Bearing in mind the relatively slow uptake and progress of CE in the industry, the question remains whether a purely technocentric CE approach can achieve the drastic decrease in emissions and material footprint that is necessary in the upcoming decades.

Shifting focus towards other circularity discourses, such as Transformational Circular Society, and higher R-strategies, such as refuse, reuse and repair, could become inevitable to meet those targets. To expand the future perspective of the industry and those who work in it, it could be meaningful to further explore and imagine alternative CE futures and their potential implications.

Acknowledgements

We would like to thank the interviewees for contributing their time and knowledge to this research. We extend a special thank you to the companies who invited us for a visit, providing us with particularly interesting insights. We would also like to acknowledge the valuable feedback and comments provided by the Sounding Board of the CE Center, Allison Dunne (HIVA KU Leuven), and Kasper Ampe (UGent).

Appendix A: Overview of interviewees

Nr	Interviewee	Type of organisations
1	Managing director	Textile manufacturing company (1)
2	Innovation director	Textile manufacturing company (2)
3	Business unit manager	Textile manufacturing company (3)
4	CSR manager	Textile manufacturing company (4)
5	Recycling manager	Textile manufacturing company (4)
6	Designer	Textile manufacturing company (4)
7	Specialist education & training	Federation of i.a. textile industry
8	Advisor	Federation of i.a. textile industry
9	Advisor	Federation of textile care
10	Federal representative textile	Labour union
11	Regional representative textile	Labour union
12	Manager logistics & production	Social economy enterprise
13	Business development	Collective of social economy enterprises
14	Advisor	Federation of waste and recycling sector
15	Consultant	Textile technological innovation centre
16	Manager	Digital platform for sustainable textile & fashion
17	New materials expert	Provincial development agency
18	Director	Training centre for the fashion industry
19	Director	Training centre for the textile industry
20	Project coordinator	Textile repair café
21	Raw materials policy officer	Network of environmental citizens' organisations
22	Expert monitoring	Public employment service
23	Textile policy advisor	Public waste agency
24	Researcher sustainable business	Business academy

Appendix B: Occupations in the textile industry

Type of work	Total amount (#)	Percentage (%)
Operators of looms and knitting machines	3,478	26.20
Supervisory personnel in the industry	1,373	10.34
Administrative staff, general	848	6.39
Installers of industrial machinery	808	6.09
Managers in the field of policy and planning	759	5.72
Sales and marketing manager	518	3.91
Operators of machines for preparing spinning fibres, spinning and winding	460	3.47
Trade representatives	451	3.40
Warehousemen	407	3.06
Loaders and unloaders	394	2.97
Craftsmen who work with textiles, leather and similar materials	317	2.40
Sewing machine operators	300	2.26
Accountants	279	2.10
Logistics employees: transport	278	2.09
Forklift drivers	250	1.89
Specialists in the field of environmental and occupational hygiene	220	1.66
Sorters and testers (excluding food and beverages)	191	1.44
Industrial engineers and product engineers	168	1.27
Buyers	163	1.23
Financial managers	141	1.06
Seamstresses, embroiderers and the like	141	1.06
Directors of large companies	137	1.04
Civil engineering technicians	137	1.04
Operators of machines for bleaching, dyeing and cleaning fabrics	119	0.89
Operators of machines for the manufacture of plastic products	117	0.88
Product and clothing designers	114	0.86
Letter painters, decorative painters, engravers and etchers	109	0.82
Operators of machines for the manufacture of textile, fur and leather products	104	0.78
Assemblers, not elsewhere classified	98	0.74
Human resource managers	93	0.70
Engineers, not elsewhere classified	85	0.64
Accountants and accounting executives	81	0.61
Administrative staff: accounting	67	0.51
Technicians in the field of natural and technical sciences, not elsewhere classified	63	0.47

References

- Aguilar-Hernandez, G. A., Dias Rodrigues, J. F., & Tukker, A. (2021). Macroeconomic, social and environmental impacts of a circular economy up to 2050: A meta-analysis of prospective studies. *Journal of Cleaner Production*, 278, 123421. <https://doi.org/10.1016/j.jclepro.2020.123421>
- Ahuja, J., Panda, T. K., Luthra, S., Kumar, A., Choudhary, S., & Garza-Reyes, J. A. (2019). Do human critical success factors matter in adoption of sustainable manufacturing practices? An influential mapping analysis of multi-company perspective. *Journal of Cleaner Production*, 239, 117981. <https://doi.org/10.1016/j.jclepro.2019.117981>
- Alizadeh, M., Kashef, A., Wang, Y., Wang, J., Okudan Kremer, G. E., & Ma, J. (2023a). Circular economy conceptualization using text mining analysis. *Sustainable Production and Consumption*, 35, 643–654. <https://doi.org/10.1016/j.spc.2022.12.016>
- Alizadeh, M., Kashef, A., Wang, Y., Wang, J., Okudan Kremer, G. E., & Ma, J. (2023b). Circular economy conceptualization using text mining analysis. *Sustainable Production and Consumption*, 35, 643–654. <https://doi.org/10.1016/j.spc.2022.12.016>
- Bertassini, A. C., Ometto, A. R., Severengiz, S., & Gerolamo, M. C. (2021). Circular economy and sustainability: The role of organizational behaviour in the transition journey. *Business Strategy and the Environment*, 30(7), 3160–3193. <https://doi.org/10.1002/bse.2796>
- Blomsma, F., & Brennan, G. (2017). The Emergence of Circular Economy: A New Framing Around Prolonging Resource Productivity: The Emergence of Circular Economy. *Journal of Industrial Ecology*, 21(3), 603–614. <https://doi.org/10.1111/jiec.12603>
- Blomsma, F., Pieroni, M., Kravchenko, M., Pigosso, D. C. A., Hildenbrand, J., Kristinsdottir, A. R., Kristoffersen, E., Shahbazi, S., Nielsen, K. D., Jönbrink, A.-K., Li, J., Wiik, C., & McAloone, T. C. (2019). Developing a circular strategies framework for manufacturing companies to support circular economy-oriented innovation. *Journal of Cleaner Production*, 241, 118271. <https://doi.org/10.1016/j.jclepro.2019.118271>
- Borms, L., Van Opstal, W., Brusselaers, J., & Van Passel, S. (2023). The Working Future: An Analysis of Skills Needed by Circular Startups. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4338377>
- Bozkurt, Ö., & Stowell, A. (2016). Skills in the green economy: Recycling promises in the UK e-waste management sector. *New Technology, Work and Employment*, 31(2), 146–160. <https://doi.org/10.1111/ntwe.12066>
- Burger, M., Stavropoulos, S., Ramkumar, S., Dufourmont, J., & van Oort, F. (2019). The heterogeneous skill-base of circular economy employment. *Research Policy*, 48(1), 248–261. <https://doi.org/10.1016/j.respol.2018.08.015>
- Calisto Friant, M., Vermeulen, W. J. V., & Salomone, R. (2020). A typology of circular economy discourses: Navigating the diverse visions of a contested paradigm. *Resources, Conservation and Recycling*, 161, 104917. <https://doi.org/10.1016/j.resconrec.2020.104917>
- Calisto Friant, M., Vermeulen, W. J. V., & Salomone, R. (2021). Analysing European Union circular economy policies: Words versus actions. *Sustainable Production and Consumption*, 27, 337–353. <https://doi.org/10.1016/j.spc.2020.11.001>
- Carrone, N. P., Lagunes, L. S., Van Duijn, H., Wilting, J., Metta, J., Goesaert, T., & Bachus, K. (2021). *Putting circular textile into work—The employment potential of circular clothing in the Netherlands*.
- CE Monitor. (n.d.). *Materialenvoetafdruk van de Vlaamse economie (RMI)*. Vlaanderen Circulair. <https://cemonitor.be/indicator/effecten/materialen/materialenvoetafdruk-van-de-vlaamse-economie-rmi/>
- Cedefop. (2010). *Skills for green jobs: European synthesis report*. https://www.cedefop.europa.eu/files/3057_en.pdf
- Cedefop. (2021). *THE GREEN EMPLOYMENT AND SKILLS TRANSFORMATION: Insights from a European Green Deal skills forecast scenario*. https://www.cedefop.europa.eu/files/4206_en.pdf
- CESCY project. (2022). *Youth competencies in the circular economy labour market: A taxonomy of competencies*. https://circulareconomy.europa.eu/platform/sites/default/files/youth_competencies_in_the_circular_economy_labour_market._a_taxonomy_of_competencies._cescy_io2.pdf
- Chateau, J., & Mavroeidi, E. (2020). *The jobs potential of a transition towards a resource efficient and circular economy*.

- Christiansen, A. T., Hasse, G., & Tonder, R. A. (2021). *Extended Producer Responsibility in the Danish textile sector: Assessing the optimal development and implementation*. <https://usercontent.one/wp/www.tekstilrevolutionen.dk/wp-content/uploads/2021/11/Extended-Producer-Responsibility.pdf>
- Circle Economy. (2020). *The Circularity Gap Report 2020*. <https://www.circle-economy.com/resources/circularity-gap-report-2020#:~:text=The%20Circularity%20Gap%20Report%202020,was%20first%20launched%20in%202018.>
- Circle Economy. (2023). *Circularity Gap Report 2023*. <https://www.circularity-gap.world/2023#download>
- Clube, R. (2022). Is job creation a legitimate social benefit of the circular economy? *Resources, Conservation and Recycling*, 181, 106220. <https://doi.org/10.1016/j.resconrec.2022.106220>
- Clube, R. K. M., & Tennant, M. (2020). The Circular Economy and human needs satisfaction: Promising the radical, delivering the familiar. *Ecological Economics*, 177, 106772. <https://doi.org/10.1016/j.ecolecon.2020.106772>
- Consoli, D., Marin, G., Marzucchi, A., & Vona, F. (2016). Do green jobs differ from non-green jobs in terms of skills and human capital? *Research Policy*, 45(5), 1046–1060. <https://doi.org/10.1016/j.respol.2016.02.007>
- Dubois, M., & Christis, M. (2014). *Verkennde analyse van het economisch belang van afvalbeheer, recyclage en de circulaire economie voor Vlaanderen*. [https://ce-center.vlaanderen-circulair.be/src/Frontend/Files/userfiles/files/summa_economisch_belang_8%20\(1\).pdf](https://ce-center.vlaanderen-circulair.be/src/Frontend/Files/userfiles/files/summa_economisch_belang_8%20(1).pdf)
- EEA. (2019). *Paving the way for a circular economy insights on status and potentials*. European Environment Agency.
- Ellen MacArthur Foundation. (2021). *Completing the picture: How the circular economy tackles climate change*. <https://ellenmacarthurfoundation.org/completing-the-picture>
- Euratex. (2020a). *Circular textiles: Prospering in the circular economy*. <https://euratex.eu/wp-content/uploads/EURATEX-Prospering-in-the-Circular-Economy-2020.pdf>
- Euratex. (2020b). *ReHubs: A joint initiative for industrial upcycling of textile waste streams & circular materials*. <https://euratex.eu/wp-content/uploads/Recycling-Hubs-FIN-LQ.pdf>
- European Commission. (2018). *Impacts of circular economy policies on the labour market*.
- European Commission. (2019). *Key competences for lifelong learning*. <file:///C:/Users/u0145287/Downloads/key%20competences%20for%20lifelong%20learning-NC0219150ENN.pdf>
- European Commission. Directorate General for Enterprise and Industry. (2012). *Ecodesign your future :how ecodesign can help the environment by making products smarter*. Publications Office. <https://data.europa.eu/doi/10.2769/38512>
- European Environmental Agency. (2019). *Textiles in Europe's circular economy*. <https://www.eea.europa.eu/publications/textiles-in-europes-circular-economy/textiles-in-europe-s-circular-economy>
- European Parliament. (2022). *The impact of textile production and waste on the environment (infographic)*. <https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic>
- Eurostat. (2022). *Annual enterprise statistics by size class for special aggregates of activities (NACE Rev. 2)*. https://ec.europa.eu/eurostat/databrowser/view/SBS_SC_SCA_R2__custom_4359056/default/table?lang=en
- Fedustria. (2022). *Jaarverslag 2021 2022*. <https://issuu.com/fedustriapub/docs/jvn12022>
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768. <https://doi.org/10.1016/j.jclepro.2016.12.048>
- Gerstmann, B. S. (2020). *Towards circular resource use: The potential of extended producer responsibility for textile circularity in the EU*. https://web.archive.org/web/20200726133224id_/https://repositum.tuwien.at/retrieve/30111
- Giampietro, M. (2019). On the Circular Bioeconomy and Decoupling: Implications for Sustainable Growth. *Ecological Economics*, 162, 143–156. <https://doi.org/10.1016/j.ecolecon.2019.05.001>
- Harvey, F. (2022, April 4). IPCC report: 'Now or never' if world is to stave off climate disaster. *The Guardian*. <https://www.theguardian.com/environment/2022/apr/04/ipcc-report-now-or-never-if-world-stave-off-climate-disaster>
- Herlevi, K., Goodwin Brown, E., Schroder, A., Bozkurt, Ö., & Bachus, K. (2021). Closing the skills gap: Vocational education & training for the circular economy. *Vocational Education*, 16.

- Héry, M., & Malenfer, M. (2020). Development of a circular economy and evolution of working conditions and occupational risks—A strategic foresight study. *European Journal of Futures Research*, 8(1), 8. <https://doi.org/10.1186/s40309-020-00168-7>
- Hickel, J., & Kallis, G. (2020). Is Green Growth Possible? *New Political Economy*, 25(4), 469–486. <https://doi.org/10.1080/13563467.2019.1598964>
- Hobson, K., & Lynch, N. (2016). Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world. *Futures*, 82, 15–25. <https://doi.org/10.1016/j.futures.2016.05.012>
- ILO. (2019). Skills for a greener future: A global view. *International Labor Office - Geneva*, 226.
- IPCC. (2023). *AR6 Synthesis Report: Climate Change 2023*. <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>
- Jackson, T. (2016). *Prosperity without Growth* (0 ed.). Routledge. <https://doi.org/10.4324/9781315677453>
- Janssens, L., Kuppens, T., & Van Schoubroeck, S. (2021). Competences of the professional of the future in the circular economy: Evidence from the case of Limburg, Belgium. *Journal of Cleaner Production*, 281, 125365. <https://doi.org/10.1016/j.jclepro.2020.125365>
- Kant, R. (2012). Textile dyeing industry an environmental hazard. *Natural Science*, 04(01), 22–26. <https://doi.org/10.4236/ns.2012.41004>
- Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221–232. <https://doi.org/10.1016/j.resconrec.2017.09.005>
- Kirsch, C., & Connell, J. (2018). Organizational Sustainability—Why the Need for Green HRM? In J. Connell, R. Agarwal, Sushil, & S. Dhir (Eds.), *Global Value Chains, Flexibility and Sustainability* (pp. 223–239). Springer Singapore. https://doi.org/10.1007/978-981-10-8929-9_15
- Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular Economy: The Concept and its Limitations. *Ecological Economics*, 143, 37–46. <https://doi.org/10.1016/j.ecolecon.2017.06.041>
- Korhonen, J., Nuur, C., Feldmann, A., & Birkie, S. E. (2018). Circular economy as an essentially contested concept. *Journal of Cleaner Production*, 175, 544–552. <https://doi.org/10.1016/j.jclepro.2017.12.111>
- Laubinger, F., Lanzi, J., & Chateau, J. (2020). *Labour market consequences of a transition to a circular economy: A review paper* (OECD Environment Working Papers 162; OECD Environment Working Papers, Vol. 162). <https://doi.org/10.1787/e57a300a-en>
- Lenton, T. M., Rockström, J., Gaffney, O., Rahmstorf, S., Richardson, K., Steffen, W., & Schellnhuber, H. J. (2019). Climate tipping points—Too risky to bet against. *Nature*, 575(7784), 592–595. <https://doi.org/10.1038/d41586-019-03595-0>
- Markos, S., & Sridevi, M. S. (2010). Employee Engagement: The Key to Improving Performance. *International Journal of Business and Management*. https://d1wqtxts1xzle7.cloudfront.net/77045834/6332-libre.pdf?1640167805=&response-content-disposition=inline%3B+filename%3DEmployee_Engagement_The_Key_to_Improving.pdf&Expires=1678117841&Signature=B3oJtnGYR5aZ-u2J2BbUD4bmbemF33sWPmUlydWLY3zE~dFoGu4DemJPBA89PcsS5q18FpVctPYFycWxp9tbCbWQvVcMEJ2B-d2oUTgYLGoslvMo7o3JToH4GoPZ8AQImaluTUOjTaSR6385Eu35g7G-Db4389bDpEOUoEQvo~YcbGfpPJYoaB4Pp6NrsLLVGpffWBwlgg6EYTVg9AvH-rBPKnTpDOWlq4rQUPlKzOinqGYGQq68JmPmMTZ2JLZegTochtBrh6qUiainlOowbg0Yo1crB~f0ytksxjDLxOhAvDmmZ1loNSbbUC3Nlws6vF3Gp3yDm46M-kUOiMGg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA
- Mies, A., & Gold, S. (2021). Mapping the social dimension of the circular economy. *Journal of Cleaner Production*, 321, 128960. <https://doi.org/10.1016/j.jclepro.2021.128960>
- Moratis, L., & De Vrieze, S. (2022). *COMPETENTIES VOOR DE CIRCULAIRE ECONOMIE (C-4CE): Verslag van het kwantitatieve onderzoeksdeel*.
- Moratis, L., De Vrieze, S., & Kersten, E. (2022). *COMPETENTIES VOOR DE CIRCULAIRE ECONOMIE (C-4CE): Verslag van het kwalitatieve onderzoeksdeel*.
- Multani, M., Bachus, K., Ampe, K., Novak, M., Sosa, L., Dams, Y., Borms, L., Charlier, D., & Dierckx, R. (2022). *MEASURING CIRCULAR EMPLOYMENT: AN EXPLORATION OF INNOVATIVE METHODOLOGIES AND INDICATORS*. <https://hiva.kuleuven.be/nl/onderzoek/thema/klimaatendo/p/themas/Documents/michelle-wp1-methods-1.pdf>
- National Inventory Report. (2022). *Belgium's greenhouse gas inventory (1990-2020)*. <https://climat.be/doc/nir-2022-03-15.pdf>

- NECP. (2019). *Belgian Integrated National Energy and Climate Plan 2021-2030*. https://energy.ec.europa.eu/system/files/2020-09/be_final_necp_parta_en_0.pdf
- Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., & Gwilt, A. (2020). The environmental price of fast fashion. *Nature Reviews Earth & Environment*, 1(4), 189–200. <https://doi.org/10.1038/s43017-020-0039-9>
- OECD. (2005). *THE DEFINITION AND SELECTION OF KEY COMPETENCIES*. <https://www.oecd.org/pisa/definition-selection-key-competencies-summary.pdf>
- OECD. (2012). *GREENHOUSE GAS EMISSIONS AND THE POTENTIAL FOR MITIGATION FROM MATERIALS MANAGEMENT WITHIN OECD COUNTRIES*. <https://www.oecd.org/env/waste/50034735.pdf>
- Our World in Data. (2019). *Greenhouse gas emissions by sector, Belgium*. <https://ourworldindata.org/grapher/ghg-emissions-by-sector?time=latest&country=~BEL>
- Padilla-Rivera, A., do Carmo, B. B. T., Arcese, G., & Merveille, N. (2021). Social circular economy indicators: Selection through fuzzy delphi method. *Sustainable Production and Consumption*, 26, 101–110. <https://doi.org/10.1016/j.spc.2020.09.015>
- Parrique, T., Barth, J., Briens, F., Kerschner, C., Kraus-Polk, A., Kuokkanen, A., & Spangenberg, J. H. (2019). *Decoupling debunked. Evidence and arguments against green growth as a sole strategy for sustainability*. European Environmental Bureau.
- Reike, D., Vermeulen, W. J. V., & Witjes, S. (2018). The circular economy: New or Refurbished as CE 3.0? — Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options. *Resources, Conservation and Recycling*, 135, 246–264. <https://doi.org/10.1016/j.resconrec.2017.08.027>
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S. I., Lambin, E., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., ... Foley, J. (2009). Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecology and Society*, 14(2), art32. <https://doi.org/10.5751/ES-03180-140232>
- Schröder, P., Bengtsson, M., Cohen, M., Dewick, P., Hofstetter, J., & Sarkis, J. (2019). Degrowth within – Aligning circular economy and strong sustainability narratives. *Resources, Conservation and Recycling*, 146, 190–191. <https://doi.org/10.1016/j.resconrec.2019.03.038>
- Sectorconvenant 2021-2022 afgesloten tussen de Vlaamse regering en de social partners van sector Textiel (PC 120 en PC 214)*. (2021).
- Simões, H. M. (2021). *Climate action in Belgium: Latest state of play*. European Parliament. [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690578/EPRS_BRI\(2021\)690578_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690578/EPRS_BRI(2021)690578_EN.pdf)
- Statista. (2022, May 6). *Employed people in Belgium 2008-2021*. <https://www.statista.com/statistics/527684/employed-population-in-belgium/>
- Stavropoulos, S., & Burger, M. J. (2020). Modelling strategy and net employment effects of renewable energy and energy efficiency: A meta-regression. *Energy Policy*, 136, 111047. <https://doi.org/10.1016/j.enpol.2019.111047>
- UNEP. (2022a). *Emissions Gap Report 2022: The Closing Window—Climate crisis calls for rapid transformation of societies*. <https://www.unep.org/resources/emissions-gap-report-2022>
- UNEP. (2022b, October 27). *World headed for climate catastrophe without urgent action: UN Secretary-General*. <https://www.unep.org/news-and-stories/story/world-headed-climate-catastrophe-without-urgent-action-un-secretary-general>
- Van Oort, F. G., Ramkumar, S., Stavropoulos, S., Burger, M. J., Dufourmont, J., & Thissen, M. (2018). *Putting the Circular Economy to Work: Measuring Gross Employment Effects in the Netherlands*.
- Vanderplanken, K., Henzen, R., & De Prins, P. (2022). *Scope Your Textile Skills. Finaal rapport: Resultaten interviews, opleidingsaanbod en actieplan*. <https://publicaties.vlaanderen.be/view-file/51960>
- Veleva, V., Bodkin, G., & Todorova, S. (2017). The need for better measurement and employee engagement to advance a circular economy: Lessons from Biogen's "zero waste" journey. *Journal of Cleaner Production*, 154, 517–529. <https://doi.org/10.1016/j.jclepro.2017.03.177>
- Versluys, H., Fahy, M., Dewickere, D., Van Opstal, W., & Bachus, K. (2021). *Voorstudie Werkagenda circulaire maakindustrie*.
- Vlaamse Regering. (2020). *MEDEDELINGAAN DE VLAAMSE REGERING*. <https://beslissingenvlaamse-regering.vlaanderen.be/document-view/5F073D89FA87E000080006EF>
- Vlaanderen Circulair. (n.d.). *Materialen en klimaat*. <https://vlaanderen-circulair.be/nl/kennis/wat-is-het/materialen-en-klimaat>

- Vona, F., Marin, G., Consoli, D., & Popp, D. (2015). *GREEN SKILLS*.
- Ward, J. D., Sutton, P. C., Werner, A. D., Costanza, R., Mohr, S. H., & Simmons, C. T. (2016). Is Decoupling GDP Growth from Environmental Impact Possible? *PLOS ONE*, 11(10), e0164733. <https://doi.org/10.1371/journal.pone.0164733>
- Willeghems, G., & Bachus, K. (2018). *Impact van de circulaire economie in Vlaanderen op de sociale economie en de tewerkstelling van kansengroepen*. <https://lirias.kuleuven.be/2791133?limo=0>
- World Economic Forum. (2020). *The Future of Jobs Report 2020*. https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

CE CENTER

CIRCULAR ECONOMY
POLICY RESEARCH CENTER

Disclaimer:

This publication reflects the views only of the authors, and the Flemish Government cannot be held responsible for any use which may be made of the information contained therein.