Green Skills Roadmap Flanders

Final Report on Green Skills Need in Flanders (Deliverable 2)

REFORM/SC2021/111

Trinomics

This project is carried out with funding by the European Union via the Structural Reform Support Programme and in cooperation with the Directorate General for Structural Reform Support of the European Commission

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Date
Rotterdam, 11 October 2022

Version
Version 4.0 (this report) Final report 11 October 2022
Version 3.0 5 September 2022
Version 2.0 6 August 2022
Version 1.0 draft report 8 July 2022

Wettelijk depot
D/2022/3241/276

This project is funded by the EU via the Structural Reform Support Programme and implemented by Trinomics, in collaboration with the European Commission. The views expressed herein can in no way be taken to reflect the official opinion of the European Union.

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Executive Summary

E1. Introduction

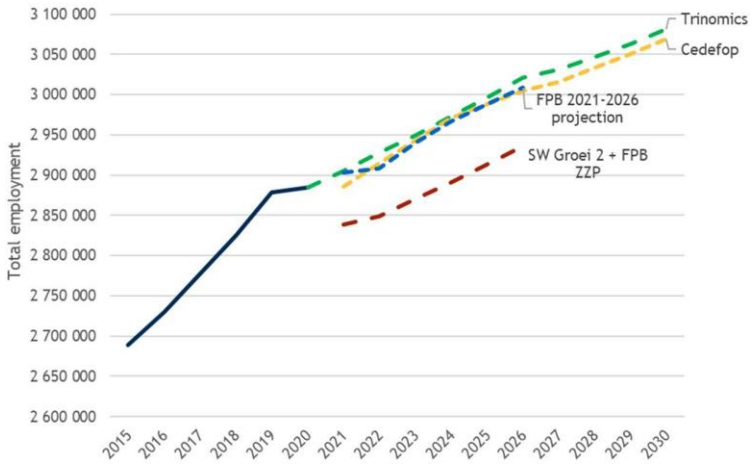
This report provides a situational analysis of the impact of the green transition on the Flemish labour market. This includes an assessment of the current and future green skills and jobs needs, and an overview of the Flemish stakeholders impacted by the skills development required for the green transition. It was developed as part of a contract commissioned by DG REFORM to support **Flanders in the development of a high-level strategy together with an implementation roadmap and a governance framework to guide and support skills development for the green transition**. The main beneficiary of the contract is the Flemish Department of Work and Social Economy (DWSE). This work is supported by DG REFORM.

In order to develop the report, several different data sources were utilised. First of all, a comprehensive **literature review** was undertaken, reviewing studies on the green transition, jobs and skills at Flemish as well as international and EU-level. Secondly, a set of **interviews** was carried out with relevant stakeholders in Flanders (Steunpunt Werk, Vlaanderen Circulair, VDAB, HIVA KU Leuven and Research Unit of the DWSE) and complemented by interviews with leading EU level stakeholders (e.g. DG Employment and Cedefop). In total 13 stakeholders were approached and 9 interviews were carried out. Third, a targeted stakeholder **survey** was developed. The purpose of the survey was to inquire what skills sector stakeholders and other feel will be needed to enable the green transition. In total 48 complete, and 134 partial responses were received, all of which have been considered. Finally, the last source of information that fed into the report was an excel-based '**forecasting tool**' developed by the Trinomics team in the course of the project. The tool provides an estimate for 2022-2030 of the evolution in employment per NACE 2 economic sector for Flanders, based on estimated sector growth in a green transition scenario. Additionally, it provides estimates of the need for new staff per sector based on estimates of expansion of the sector, job-switching and the need to replace retirees. It also provides an indication of the type of green jobs per sector.

E2. Situation analysis of the impact of the green transition

The **EU Green Deal (EGD)** is the European Commission's set of policy initiatives with an overarching aim of making the EU climate neutral by 2050. It provides specific policies and targets for the green transition many of which are directly relevant to Flemish sectors, especially the **industry, construction, transport and the agri-food sectors**. Forecasts expect employment in the EU and in Flanders will increase as a result of the EGD initiatives, if well implemented. As can be seen in Figure 0-1, overall growth in employment demand is anticipated in Flanders when accounting for the most important economic trends, including (but not only) the green transition. Negative impacts of the green transition on jobs are very limited. The reason for this is the high concentration of carbon-intensity in a limited number of sectors that account for only a small amount of employment In Flanders.

Figure 0-1 Comparison of long-term total employment projections for Flanders 2015-2030



Note: SW = Steunpunt Werk; FBP = Federal Planning Bureau; ZZP = self-employed

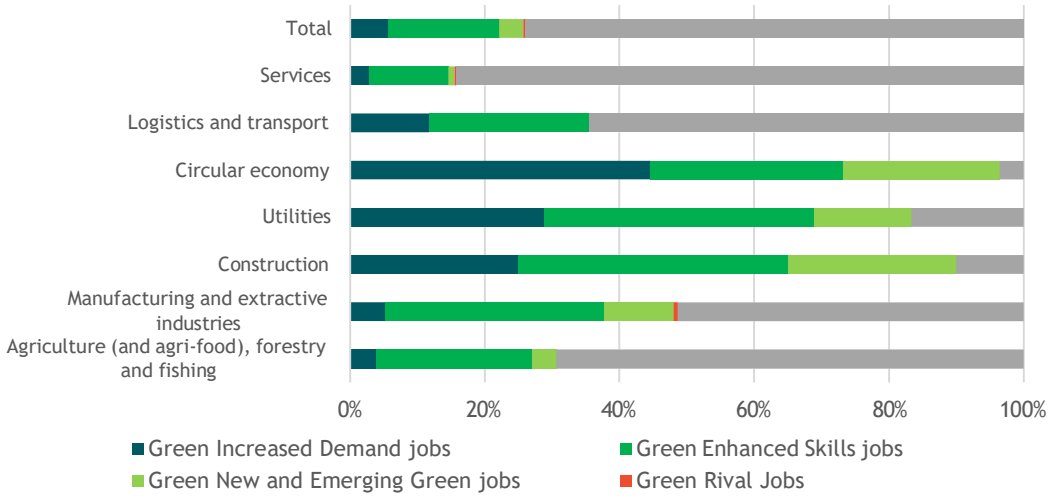
E3. Assessment of future green skills and jobs needs

Similar to most developed economies, employment in Flanders is concentrated (~80% of total) in the services sector. Manufacturing and energy (13%), construction (6%) and agriculture (2%) contribute much lower shares of employment. Total employment in Flanders is expected to grow until 2026 and likely to continue to grow until 2030. The growth is concentrated in the services sector, although the construction and circular economy sectors are also expected to grow. This growth would place continued, and additional, pressure on the labour market in Flanders. There is already significant pressure as every sector will need to replace around 25%-30% of its workforce due to retirement in the 2022-2030 period, this issue is particularly acute for the transport and logistics, and agriculture (and agri-food), forestry and fishing sectors. Furthermore, in addition to replacing retirees, replacing individuals that remain in the workforce but that switch jobs within and across sectors will remain an important challenge for sectors and companies.

In general, around 26% of 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%). These green jobs types are heavily concentrated in the circular economy, utilities (energy) and construction sectors, and to a lesser extent also in manufacturing. It is estimated around 74% of jobs are unlikely to be significantly affected by the green transition, this high share is driven by the services sector which is largely unaffected. Very few jobs in Flanders are thought to be in opposition (rival) to the green transition and at risk.

Figure 0-2 presents the estimated shares of (green) job types within each sector. This shows clearly that the expectations for increased green jobs are highest in the circular economy, utilities and construction sectors, and to a lesser extent in manufacturing. These sectors see needs for all types of green jobs and nearly all jobs in the sectors are likely to be affected in one way or another. Logistics and transport is notable as not anticipating new and emerging green jobs, but rather seeing greening through increased demand for existing jobs and enhanced skills needs within existing jobs. The services sector is among the least affected by the green transition proportionally, but it is still crucial to address as it is by far the most numerous in terms of jobs.

Figure 0-2 Split between green job types per sector



The following subsections present the conclusions on implications of the green transition on jobs and green skills need in each sector.

Agriculture (and agri-food), forestry and fishing sectors

This sector is the most directly connected to the environment of all sectors and is important to the green transition, where policy seeks to better manage the environmental impacts of food production. For the employees within the sector, more transversal skills will be needed in addition to the current skill set of farmers.

Even though the agri-food sector will experience significant impacts from climate change and will need to adapt due to the green transition, the relative size of sector employment is small, and therefore employments impacts will be limited. In 2020, this sector represented 2% of employment in Flanders. By 2030, employment in the sector is forecast to decrease by 1.7% compared to the 2020-level. Although the sector shows limited awareness of the expected changes in the employment levels under the green transition, the sector is particularly vulnerable to the impacts of climate change and will experience changes in skills demand. The agri-food sector is characterised by facilitating the employment of low-skilled workers. In this context, it is important to support enterprises in the training of their employees, as the jobs may become more complicated under the green transition (need to acquire more administrative, HR- and managerial competences, as well as more knowledge on climate change, relevant policies and their implications). Furthermore, there will be an increasing need for networking and team work skills, analytical skills, entrepreneurship, problem solving skills in addition to the current skillset of farmers.

Manufacturing and extractive industries

The manufacturing sector and related subsectors are energy and labour intensive, and therefore a critical focus point for both green policy and green skills challenges. Employment in this sector is highly sensitive to the impacts of the green transition, with risks to a number of sectors, support to improve the resilience of the sector will be important.

In accordance with the report, we consider in particular the energy-intensive, chemicals and automotive industry as important subsectors. The manufacturing sector represented 12% of Flemish employment in 2020. A significant decline in the share of employment of -6.8% is expected by 2030 in comparison to 2020. Especially the chemicals, primary metals, rubber & plastics and petrochemicals sectors, which are already facing labour shortages, will be severely impacted by the green transition. For the chemicals and related sectors, the chemical processes which are key for the sector are still heavily reliant on fossil fuels. The expectation is that with the continued innovation of the chemical processing industry, guided by increasingly stringent regulations, jobs will shift from fossil-fuel based chemicals to 'greener' chemicals – bio-based chemicals. For the automotive industry, besides potential resource shortages, the quantitative impact on jobs of the green transition is unclear. Through to 2030 continued manufacture of internal combustion engine vehicles will continue, but a rapid transition to battery electric vehicles will also be taking place, these require fewer, and different components, changing the jobs in the sector, but if the EU takes a leading role in electric vehicle manufacture the net impact on jobs in automotive manufacture is expected to be neutral or positive.

In terms of skills needed for the manufacturing sector, and particularly the energy-intensive industries, there will be a major challenge to attract sufficient employees with STEM (Science, Technology, Engineering and Mathematics) profiles. There will be a need for upskilling of a total of around 111 000 current employees in four main green themes (durable design and engineering, (renewable) energy, efficient and circular production, green business models). Furthermore, the chemical sector has identified a structural shortage of employees with a highly technical profile. Not only specialised skills, but also interdisciplinary skills are also increasingly necessary and difficult to find on the labour market. Finally, the automotive industry identified a need for several technical, as well as non-technical, competences.

Construction sector

The construction sector, as well as the manufacturing sector is energy intensive, and highly labour intensive. It is characterized mainly by SMEs. Due to the environmental impacts of construction itself and the importance of buildings and their energy use, employment in the construction sector is highly sensitive to the impacts of the green transition.

In consultations for this deliverable several stakeholders identified the construction sector as one of the sectors in Flanders which will be most significantly impacted by the green transition. The sector is understood to be very aware of the current and future green transition impacts and is trying to increase its resilience to be able to deal with the ongoing transition. The current share of employment (2020 data) in the construction sector reached 6% of total Flemish employment.

By 2030, the sector's labour demand is expected to expand by 2.7% in comparison to 2020. New green jobs will be created along with green specialised building techniques and materials such as insulation and ventilation systems. Additionally, there is also the trend of 'greening' current jobs. Considering the fact that this sector is already facing significant labour shortages and skills gaps, this will be an important challenge to address. Failure to do so could potentially hinder or slow the green transition. The green transition will also result in a need for upskilling and reskilling in the construction sector. The required level of skills has increased across all levels in the sector. All workers need more technical and complex skills than before.

Utilities

This sector is crucial to the energy part of the green transition. Whilst it does not employ the largest number of staff, those that are employed are amongst those most significantly affected by the green transition in terms of skills and job needs.

Studies show that on average more jobs are created per unit of energy produced in a renewable system than in a fossil-based system, thus the green transition could have an extensive impact on the energy labour market. Employment levels in the sector represent only approximately 1% of total Flemish employment in 2020. Compared to this 2020 level, a decline in labour demand of 0.7% by 2030 was calculated. Job growth in the sector will be expressed mainly in additional jobs in construction, installation and manufacturing of renewable energy sources and in a lesser degree jobs related to operations, maintenance and fuel processing. The energy and utilities sector is at the heart of the green transition, electricity and heating will require the most major overhaul of any sector, and this is clearly reflected in growth of needs for particular skills in renewable energy, and broader professional skills to effectively manage and implement the transition that will take place.

Circular economy

The circular economy sector[1] is amongst the sectors to be most affected by the green transition, but in contrast to some sectors the impact is expected to be positive, with a significant increase in employment in the sector being driven by green transition policies.

The circular economy transition can have a positive influence on the Flemish labour market if it is managed well. For instance, it can create additional job opportunities, raise the job standard and reduce inequality. This is due to several shifts and trends such as the increase in labour intensive activities (repairing, remanufacturing and recycling are more labour intensive than traditional manufacturing and disposal); the relocation of manufacturing activities (re-shoring manufacturing); and the creation of new markets (e.g. rental business models). However, risks that come along with not being prepared for the circular transition relate to job insecurity, labour shortages and skills gaps. Considering the fact that circular economy jobs exist across many sectors, the share of employment is difficult to calculate. However, a study by the *Koning Boudewijnstichting* (2022), estimates that there are approximately 148 000 circular jobs in Flanders, which represents 7.5% of all Flemish jobs. By 2030, an increase of 22.4% in labour demand is expected compared to 2020 levels. This is the biggest increase identified across all sectors analysed in this study. Circular economy requires upskilling of the workforce in several areas. Most importantly, workers need to have an increased understanding of and involvement in the steps occurring before and after them in the value chain. It will require new combinations of skills from workers: a combination of traditional skills (such as manual skills) and more novel skills (such as material sciences); and a combination of soft skills (such as service-related skills) and hard skills (such as programming, operating and repairing equipment).

[1] Transitioning to a circular economy is a change that should occur across all sectors to a greater or lesser extent. For the purposes of this work we have defined a circular economy sector to help capture the skills need from this part of the green transition, it encompasses the economic sectors (NACE codes) most heavily involved in this transition, namely: Repair and installation of machinery and equipment; Sewerage; Waste collection, treatment and disposal activities, materials recovery; remediation activities and other waste management activities; and, Repair of computers and personal and household goods.

Logistics and transport

The logistics and transport sector in Flanders is labour intensive and crucial to the modern economy. The green transition will have a significant impact on transport technologies with increasing electrification of vehicles and use of alternative fuels. Employment in the sector is regarded as very sensitive to the impacts of the green transition.

For the sector, the transition to clean mobility includes the electrification of the transport sector, modal shift, hydrogen applications, charging infrastructure, etc. To enable this transition, the ageing Flemish population is an issue, since it causes a shortage in truck and lorry drivers, as 70% of truckdrivers are older than 45. In addition, there is a low influx of new workers which lead to the categorization of many jobs in the sector as labour shortage occupations. In 2020, the logistics and transport sector represented 6% of total employment in Flanders. By 2030, a decline in labour demand of 2.7%, as compared to 2020, is expected. The majority of employees in the logistics and transport sector work as vehicle drivers and mobile installation operators; followed by administrative staff, and occupations such as warehousemen; and technicians and related occupations. As part of this sector, Flemish ports are considered one of the most important economic motors of the region and in total (maritime and non-maritime clusters and both direct and indirect jobs), they employ almost 9% of the Flemish working population. The Flemish Port Strategy (2022) recognises that additional efforts will be required to find and keep the necessary profiles to achieve the green transition within Flemish ports. The strategy focuses on jobs in clean energy (e.g. hydrogen), transport (modal shift) and circular economy. The green transition will not only require increased social skills such as team work, communication and networking; but also increased ICT skills, analytical skills and knowledge of environmental regulations. This will impact several types of jobs: managers, transport experts, planning experts and administrative staff. For truck drivers, environmental consciousness as well as sustainable driving skills can positively influence the emissions while driving and thus decrease the environmental impact of the sector. During the stakeholder survey, respondents considered all types of skills suggested (technical occupation specific skills, professional, cross-sectoral skills (STEM skills, analytical skills, management skills, soft skills etc.) and environmental literacy and awareness skills equally important.

Services sector

The services sector employs by far the largest part of the Flemish population. Many of the services sub-sectors are hardly affected by the green transition, however some important niches and sub-sectors will see large impacts on jobs and skills.

The services sector is by far the largest sector in Flanders in terms of employment share, representing around 80% of Flemish employment in 2020. By 2030, a further increase is expected in labour demand by 7.9%, compared to 2020. Whilst this growth is not driven by the green transition, i.e. there is significant growth in the healthcare sector to deal with an increasingly ageing population, there will be growth in some areas to support national level implementation of green policies. In these areas that will support the transition appropriate institutional capacity and preparedness will be needed. This ranges from planning, development of ‘green’ standards, to monitoring policy implementation and even green procurement. Many of the professional services in finance, law, architecture, science, technical and engineering services are likely to see important impacts from the green transition. There are also several emerging occupations in this field such as environmental consultants and auditors.

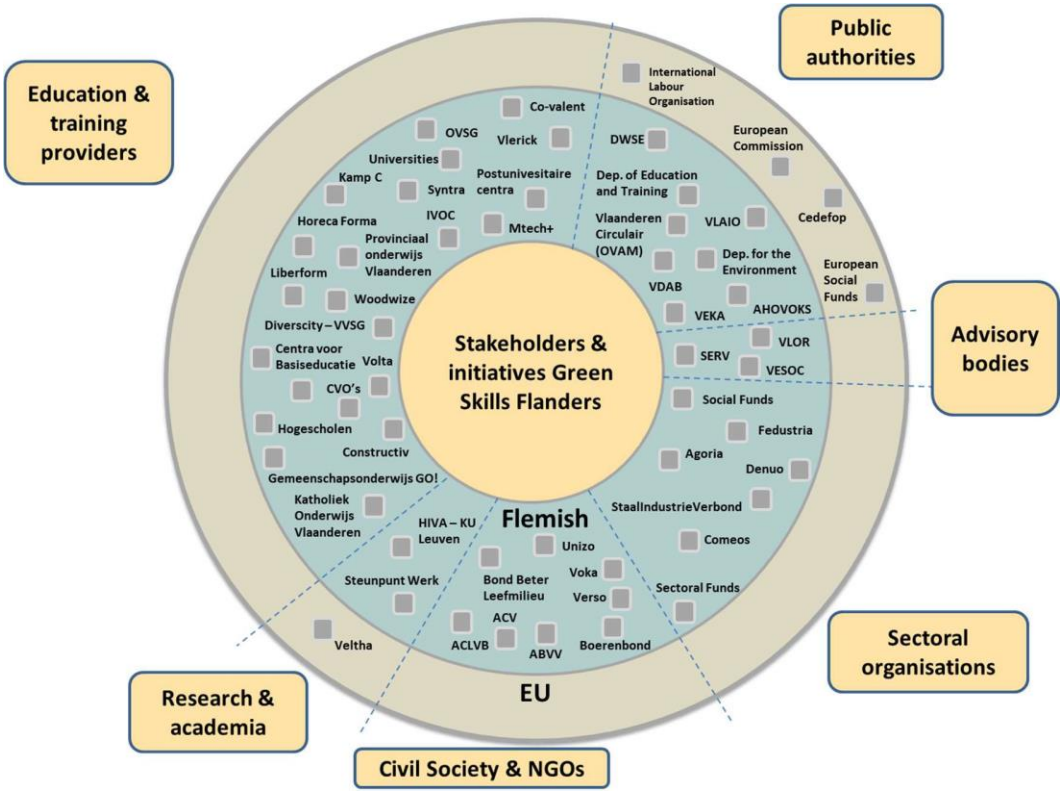
Across sectors

Total labour demand in Flanders is expected to increase by 5.3% by 2030, compared to 2020-levels. In terms of skills, there are several cross-sectoral trends which have emerged in this study. Across sectors the importance of both professional and cross-cutting competences[2] should be emphasised, these needs are high across sectors and are required by the highest number of workers. It will be crucial for employees to develop a balanced set of skills. General green skills (i.e. cross-cutting skills as identified above) are those needed by the highest share of the workforce, after generic skills.

E4. Overview of Flemish actors involved in the green transition

The stakeholder landscape for skills in Flanders covers multiple public, private and other stakeholders. In this study, in total 61 stakeholders from 6 stakeholder groups have been identified: Public authorities (including governmental departments and EU-level actors); Advisory bodies; Sectoral organisations; Education and training provides; Civil society & NGOs; and Research & academia. Some important organisations are shown in Figure 0-3.

Figure 0-3 Overview of Flemish and international actors and initiatives on green skills



These stakeholders have identified that there is already a profound shortage of employees. To bridge this gap some employers already have strategies in place. The main responses to these shortages are to hire under-qualified staff and train them on-the-job; and to increase training for existing employees. Although more than 1/3 of firms also address the problem by hiring from outside of Flanders. A large majority of employers indicated in the survey that they see a responsibility and are willing to offer

[2] Cross-cutting competences are personal skills, knowledge or attitudes that allow a person to act in an effective manner with others and that, beyond technical competences, are crucial to access and evolve in the world of work.

internal and external training to address skills gaps. At sector level, a role is seen for improved mapping of gaps and for developing a sector strategy to address these.

Skills are identified within the main Flemish economic strategies as an issue, albeit one of many issues. Within these and broader policies there is a focus especially on improving lifelong learning culture and practice, and also on promoting STEM skills, improving basic and digital literacy, and working with sectors (e.g. sector covenants, SCOPE studies) to better understand needs. There are multiple ongoing initiatives on green skills already active in Flanders led by various agencies including sectors, many of these tend to have a focus on manufacturing industries and STEM skills. Education and training programmes in Flanders are working on a number of small initiatives to better tailor frameworks and programmes towards the key issues for skills for the green transition, with lifelong learning and STEM skills among the main focal issues. At EU level, skills policy is established through initiatives such as GreenComp, the European Skills Agenda, Skills4Climate, BuildUp Skills and others supporting Member States to address the various issues.

E5. Conclusions

The key conclusions extracted from this report are the following:

- The green transition is necessary and likely to accelerate quickly in the coming years;
- The green transition is expected to have a positive overall impact on jobs and economic growth;
- The green transition will impact unevenly across sectors, services, the largest sector by far, will be largely unaffected, but energy, manufacturing, construction and circular economy will be much more impacted;
- Future projections for Flanders estimate job growth to 2026 and likely 2030;
- Around 26% of jobs in Flanders could all be categorised as green, however shares of green jobs are much higher in the circular economy, construction, utilities (energy), and manufacturing sectors;
- Around 25-30% of the existing workforce is likely to retire between 2022-2030;
- Skills gaps already exists in Flanders, the green transition could put even more pressure on certain sectors/skills;
- There are specific technical skills needs from the green transition, but a larger priority is given to generic STEM skills, Lifelong learning and professional and cross-cutting skills;
- Lifelong learning is emphasised as an issue as most of the 2030 workforce is already part of the workforce today;
- There are risks in not addressing skills needs for the green transition, such as insecurity, labour shortages and skills gaps;
- Flemish policy frameworks provide a good basis for action, but these need to be updated;
- Flemish institutions and stakeholders are active, and some initiatives are already ongoing – however, further mobilisation, particularly for the circular economy, construction, energy and manufacturing sectors, is needed to address the challenge; and
- The cross-sectoral nature of the key skills challenges lends itself to cross-sector cooperation.

List of acronyms and abbreviations

ABVV	Algemeen Belgisch Vakverbond
ACLVB	Algemene Centrale der Liberale Vakbonden van België
ACV	Algemeen Christelijk Vakverbond
AHOVOKS	Agentschap voor Hoger Onderwijs, Volwassenenonderwijs, Kwalificaties en Studietoelagen
CE	Circular Economy
CEO	Chief Executive Officer
CO2	Carbon dioxide
CVO	Centra voor volwassenenonderwijs
DG	Directorate General
DLV	Deliverable
DWSE	Departement Werke en Sociale Economie
EGD	European Green Deal
ESCO	European Skills, Competences, Qualifications and Occupations
ESF	European Social Funds
EU	European Union
EU ETS	European Union's Emission Trading System
EVC	Erkennening van Verworven Competenties
FPB	Federaal Planbureau
GDP	Gross Domestic Product
Green ES	Green Enhanced Skills (jobs)
Green ID	Green Increased Demand (jobs)
Green NE	Green New and Emerging (jobs)
GT-VET	Greening Technical Vocational Education and Training
GW	Giga Watt
GWh	Giga Watt hour
ICT	Information and communications technology
IEE	Intelligent Energy Europe
ISCO	International Standard Classification of Occupations
JTF	Just Transition Fund
KU Leuven	Katholieke Univesiteit Leuven
LUCUCF	Land Use, Land-Use Change and Forestry
MOOC	Massive Open Online Course
NACE	**Nomenclature** of Economic Activities
NBB	National Bank of Belgium
NFM	Non-Ferrous Metals
NGOs	Non-Governmental Organisations
NMM	Non-Metallic Minerals
OECD	Organisation for Economic Cooperation and Development
OVAM	Openbare Vlaamse Afvalstoffenmaatschappij
O&M	Operations & Maintenance
RES	Renewable Energy Sources

RRF	Recovery and Resilience Facility
R&D	Research & Development
SDGs	Sustainable Development Goals
SERV	Sociaal-Economische Raad van Vlaanderen
SMEs	Small and Medium Enterprises
STEM	Science, Technology, Engineering and Mathematics
SW	Steunpunt Werk
TWh	Terra Watt per hour
VDAB	Vlaamse Dienst voor Arbeidsbemiddeling en Beroepsopleiding
VEKP	Vlaams Energie en Klimaat Plan
VESOC	Vlaams Economisch Sociaal Overlegcomité
VET	Vocational Education and Training
VLAIO	Vlaams Agentschap Innoveren en Ondernemen
VLOR	Flemish Council for Education
ZZP	Zelfstandige zonder personeel – translation: Self-employed

1 Introduction

1.1 Objectives

The general objective of this service contract is **to support Flanders in the development of a high-level strategy together with an implementation roadmap and a governance framework to guide and support skills development for the green transition**. The project should identify the major opportunities to overcome the main skills bottlenecks holding back the green transition in Flanders. Attention should be given to the social effect on citizens and vulnerable groups in particular, to ensure that no one is left behind in the transition. The main beneficiary of the contract is the Flemish Department of Work and Social Economy (DWSE), with the support of DG REFORM.

The purpose of deliverable (DLV 2), and as such the report at hand, is to provide a situation analysis of the impact of the green transition on the Flemish labour market. This includes:

- mapping of available knowledge on the impact of green transition on the Flemish labour market;
- assessment of future green skills and job needs; and
- providing an overview of Flemish actors involved in, or implicated by, the skills development required for the green transition, and their initiatives.

The report is divided into three main chapters, each reflecting on one of three aspects of the situation analysis. The report ends with a chapter on conclusion and implications for the next steps in the study.

1.2 Methodology

In order to develop the report, a number of data sources have been utilised:

- Desk research and review of available literature;
- Interviews with relevant stakeholders;
- Targeted stakeholder survey; and
- Internally developed excel-based forecasting tool.

During the **literature review**, studies both from the Flemish as well as international and EU-level context were addressed. Studies that were considered focused on several topics relevant to the deliverable – definitions for the purpose of the study (see section below), impacts of the green transition on the labour market and on the skills needed as well as on the stakeholders involved and their initiatives for green skills. In total 66 studies were considered. The literature review was complemented by a number of **interviews** with relevant stakeholders, both from EU level context (e.g. DG Employment and Cedefop) as well as from the Flemish context (Steunpunt Werk, Vlaanderen Circulair, VDAB[3], HIVA KU Leuven[4] and Research Unit of the DWSE[5]). In total 13 stakeholders were approached and 9 interviews were carried out. Questions were prepared in such a way as to complement the findings of the literature review as well as the topics to be explored. Some interview guides were tailored to the area of expertise of individual stakeholders (e.g. Department of Education and Training). In the later part of the study, a targeted stakeholder **survey** was developed. The purpose of the survey was to reach out to sectoral stakeholders to inquire what skills they feel will be needed to

[3] Vlaamse Dienst voor Arbeidsbemiddeling en Beroepsopleiding
[4] Research Institute for Work and Society of KU Leuven
[5] Department of Work and Social Economy

enable the green transition. In total 48 complete, and 134 partial responses were received, all of which have been considered.

The last source of information that fed into the report at hand was an excel-based '**forecasting tool**' developed in the course of the project. This tool was originally intended to provide simple, but detailed modelling of skills needs in Flanders. However following discussions during inception the ambition of the forecasting was scaled back for a variety of reasons including: the difficulty of drawing robust forecasts from a rather simple Excel tool; larger, in-depth research of the same issue being carried out in parallel in Flanders[6]; and, a restatement that the main purpose of any quantitative estimates would be to highlight the most impacted sectors to raise overall awareness. Another reason was that the output of this deliverable is more focused on qualitative analysis of needs. However, a forecast was still developed, drawing upon key sources at European, national and Flanders level, as there remains a gap in estimates of the impact of the green transition in Flanders, and an indication on the size, direction and likely sectoral distribution of the impact, even if somewhat rough, would support the overall work and complement other research taking place in parallel. The tool therefore provides an estimate for 2022-2030 of the evolution in employment per NACE 2 sector for Flanders based on estimated sector growth in a green transition scenario. Additionally, it provides estimates of the need for new staff per sector based on estimates of expansion of the sector, job-switching and the need to replace retirees. Finally an indication of the type of green jobs per sector (see textbox 1-1) is provided. The tool is not based on economic or employment modelling carried out by the team, and it does not systematically quantify skills needs per sector or occupation – although qualitative indications are provided in the text wherever possible. The methodology of the projection and sources used are described further in section 3.1 of this report.

Definitions used

Following the review of available literature regarding the different definitions at international, EU and Flemish level, we have selected a number of definitions for the purpose of the study. In accordance with the EU-level definition used in the European Green Deal, **green transition** is defined as the '*transformation of the EU into a modern, resource-efficient and competitive economy, where (…) economic growth is decoupled from resource use*'.[7]

As to the definition of **green jobs**, no universal definition has been identified. Instead, a categorisation of five different types of jobs that contribute to the green transition (Green Increased Demand (Green ID) jobs, Green Enhanced Skills (Green ES) jobs, Green New and Emerging (Green NE) jobs, Green Rival Jobs and Other Non-Green Jobs) has been defined by DG Employment of the European Commission.[8] This categorisation has been used for the purpose of this report, although it should be noted that the categorisations are not strictly separated therefore jobs within sectors can comprise jobs in each category. The textbox below provides a description of the different types of green jobs.

Textbox 1-1 Categorisation of green jobs

[6] For example the LAMATRE project (https://www.spiral.uliege.be/cms/c_6502887/en/spiral-lamartra); the MICHELLE project: Modelleren van de impact van de circulaire holistische economie op de arbeidsmarkt en levenslang leren (https://researchportal.be/nl/project/michelle-modelleren-van-de-impact-van-de-circulaire-holistische-economie-op-de-arbeidsmarkt).
[7] The European Green Deal; Ibid Cedefop (2021). The green employment and skills transformation: insights from a European Green Deal skills forecast scenario.
[8] Griffen et al. (2019). Towards a greener future: employment and social impacts of climate change policies.

- **Green Increased Demand (Green ID) jobs** are existing jobs that are expected to be in high demand due to greening, but do not require significant changes in tasks, skills or knowledge. These jobs are considered green because they support green economic activity, some do not directly involve any specifically green tasks (e.g. bus drivers as key actors in public transport, counted in the occupational category - bus drivers, transit and intercity, renewable energy sales and marketing professionals), whilst for others the green nature of the jobs is quite direct, well established and for which demand is also expected to increase, e.g. renewable energy engineers, organic agriculture farmers, etc).
- **Green Enhanced Skills (Green ES) jobs** are existing jobs that require substantial changes in tasks, skills and knowledge as a result of greening (e.g. electric vehicle electricians, counted in the occupational category 'automotive speciality technicians', but also construction workers, architects, urban planners, teachers, human resource professionals, etc).
- **Green New and Emerging (Green NE) jobs** are unique jobs (as defined by worker requirements) created to meet the new needs of the green economy. (e.g. fuel cell engineers, counted in the occupational category 'engineering professionals' as well as e.g. sustainability auditors and sustainable finance experts).
- **Green Rival (GR) Jobs** are non-green jobs that are 'similar' to one of the three 'green' job categories, either because they involve very similar tasks or (in the case of new employees) because they require similar skills and other worker attributes. They are likely to be affected by the greening of the economy because of their similarity to existing green occupations (e.g. lorry drivers, industrial engineers in fossil-fuel-based production or investment managers concentrating on non-green economic sectors and criteria other than sustainability).
- **Other Non-Green (NG) Jobs** are non-green jobs that are less likely to be affected (at least in the short term) by the greening of the economy, because of their lack of similarity to green occupations (including perhaps occupations such as notaries, medical doctors and pharmacists or nurses).

Lastly, the definition of **green skills** selected for use in this study is aligned with those used by the European Commission (DG Employment), Cedefop and the OECD. Here, green skills are comprised of several types of skills, namely technical skills (specific to occupation), professional skills (these can be applied across occupations, for example analytical or management skills) and cross-cutting skills (these are to be adopted by society in a broad sense in order to enable the green transition, for example understanding of sustainability or lifelong learning). In addition to the three core definitions, in the course of DLV2 we also considered the distinction between green skills and **competences** as these are two are separate terms that should not be used interchangeably. For the purpose of the study we adopted a broader definition of competences, namely it being a combination of knowledge, skills and attitudes, while skills amount to only one aspect of competences[9]. This is also in line with the GreenComp framework for sustainability competences, which encompasses four different areas competencies (embodying sustainability values; embracing complexity in sustainability; envisioning sustainable futures; and acting for sustainability).[10] While both concepts (skills as well as competences) have been considered when preparing the DLV2 report, the main focus remains on skills.

[9] As addressed during one of the stakeholder interviews.
[10] For more details on the GreenComp framework please refer to Chapter 4 (4.2.1).

2 Situation analysis of the impact of the green transition

2.1 Ambition and targets of the EU Green Deal

Overview of key points in this section

- The **EU Green Deal** is the European Commission's set of policy initiatives with an overarching aim of making the EU climate neutral by 2050. It provides specific targets for a number of elements directly relevant to Flemish sectors, namely the industry, construction, transport and the agri-food sector.
- It aims to make the ***industry*** more sustainable and to strengthen decarbonisation. Relying on a number of strategies, schemes and mechanisms (Circular Economy Action Plan, Industrial Strategy or ETS scheme) it aims to reduce reliance on natural resources, develop markets for climate neutral and circular products, decrease industry emissions and address risk of carbon leakages.
- The ***construction*** sector is expected to become greener, with focus on cleaner buildings. Under a Renovation Wave strategy buildings are to be renovated to make them more energy efficient. Specific goals on GHG emissions reduction and energy consumptions have also been set.
- The ***transport*** sector is also to reduce its emissions (by 90% by 2050). This is to be achieved higher reliance on zero emission cars, higher reliance on European railways or by sustainable fuels for aviation and maritime transport.
- There are also ambitions for the ***agri-food*** sector (flowing from the Farm-to-Fork Strategy) on making the food systems more fair, healthy and environmentally friendly. There are also strategies in place to reduce methane emissions.
- The Fit-for-55 agenda and the various policies implemented under the EGD play a key role in shaping the green transition through to 2030, and the REPOWER initiative adds significant short-term impetus to the transition, especially (but not only) for the energy sector.

The European Union's (EU) Green Deal (EGD) is the EU's main new strategy to transition the EU economy to a sustainable economic model. The overarching objective of the EU Green Deal is for the EU to become the first climate neutral continent by 2050, resulting in a cleaner environment, more affordable energy, smarter transport, new jobs and an overall better quality of life. There are a number of elements of the Green Deal with specific targets that will have a direct impact on the sectors relevant to Flanders, namely:

- Sustainable industry;
- Buildings and renovations;
- Sustainable mobility; and
- Farm to Fork.

Sustainable industry

The EU Green Deal includes actions to strengthen the decarbonisation efforts, ranging from product sustainability to the supply of raw materials. The adopted **Circular Economy Action Plan**[11] presents initiatives to increase the duration of a product in order to alleviate pressure on natural resources. Furthermore, the **Industrial Strategy**[12] has also been adopted, which aims to develop markets for

[11] European Commission. Website: Circular Economy Action Plan.
[12] European Commission. Website: European Industrial Strategy.

climate neutral and circular products and to encourage the digital transition in the EU. These measures are necessary to ensure the supply of critical raw materials needed for clean technologies such as clean hydrogen, fuel cells and other alternative fuels, energy storage, and carbon capture, storage and utilisation. Industry will also be heavily affected by changes to the **EU Emissions Trading Scheme (ETS)**[13] introduced as part of the fit-for-55 package, this will see a decrease in the emissions cap so that industry will need to reduce emissions more quickly, and also the adoption of a **Carbon border adjustment mechanism (CBAM)** which will be phased in to replace existing compensations for firms at risk of carbon leakage.

Buildings and renovations

The objectives of the EU Green Deal require cleaner buildings and a greener construction sector. The **Renovation Wave**[14] is a strategy to renovate buildings to increase their energy efficiency. It prioritises the decarbonisation of heating and cooling, tackling the worst performing building stock and the renovation of public buildings such as schools and hospitals. To achieve the target of at least 55% emissions reduction target by2030, proposed by the Commission in September 2020, the EU must reduce buildings' greenhouse gas emissions by 60%, reduce their energy consumption by 14%, and reduce the energy consumption of heating and cooling by 18%. The impetus for a green transition in buildings is also increased by revisions to the **Energy Efficiency Directive** and **Energy Performance in Buildings Directives** under the Fit-for-55 package.

Sustainable mobility

The sustainable mobility policy area comprises initiatives to reduce transport emissions. The **Strategy for Sustainable and Smart Mobility**[15] lays the foundation for actions to transform the EU transport sector, with the aim of a 90 per cent cut in emissions by 2050, delivered by a smart, competitive, safe, accessible and affordable transport system. Increased capacity and decreased congestion and pollution could all be attained as a result of efforts to promote more sustainable means of transport. The Strategy sets a number of 2030 targets, including:

- At least 30 million zero-emission cars will be in operation on European roads – to be promoted by **revision of CO2 emission performance standards for cars and vans**;
- 100 European cities will be climate neutral;
- High-speed rail traffic will double across Europe;
- Scheduled collective travel for journeys under 500 km should be carbon neutral;
- Sustainable fuels for aviation and maritime sectors will be promoted via the **ReFuelEU Aviation** and **Fuel EU Maritime** legislation;
- Automated mobility will be deployed at large scale; and
- Zero-emission marine vessels will be market-ready, with further targets to 2035 and 2040.

Food systems

The **Farm to Fork Strategy**[16] aims to make food systems fair, healthy and environmentally-friendly. The Farm to Fork Strategy aims to accelerate our transition to a sustainable food system that should:

- Have a neutral or positive environmental impact;
- Help to mitigate climate change and adapt to its impacts – revisions to the **Regulation on LULUCF** also contribute to this

[13] European Commission. Website: EU Emissions Trading System.
[14] European Commission. Website: Renovation Wave.
[15] European Commission. Website: Sustainable and Smart Mobility Strategy.
[16] European Commission. Website: Farm to Fork Strategy.

- Reverse the loss of biodiversity;
- Ensure food security, nutrition and public health, making sure that everyone has access to sufficient, safe, nutritious, sustainable food; and
- Preserve affordability of food while generating fairer economic returns, fostering competitiveness of the EU supply sector and promoting fair trade.

The European Commission has also put forward a Strategy to reduce methane emissions (**Methane Strategy**). Reducing methane emissions requires a cross sector approach. The Methane Strategy focuses on adequate reporting and opportunities for biogas production, as well as specific measures in the energy, agriculture and waste sectors.

Other EU policies have also been overhauled as part of the **Fit-for-55** and EGD agenda. These include changes to:

- **The Renewable Energy Directive**[17] – with proposed increases in the renewable energy targets from 32% to 40% by 2030 and a range of other specific measures to promote renewable energy and green hydrogen in industry, transport and buildings.
- **The Energy Efficiency Directive**[18] – with proposed increases in targets from 32.5% to 39% (primary) / 36% (final) energy consumption. With a focus on heating and cooling, and efficiency in public buildings in particular.
- **Energy Taxation Directive**[19] – which will revise taxation rules to tax on the basis of the energy content and environmental impact of fuels rather than just the volume, and also remove various exemptions.
- **The EU Emissions Trading System** – as noted above, and additionally adjusting how aviation is included and the operation of the market stability reserve.

Additionally, recent events in Russia-Ukraine have led to the major **REPOWER EU initiative** being launched which will support Member States to decouple their energy use from Russian oil and gas, this will provide a major boost in the near future to the green transition in the energy sector, particularly in the promotion of renewable energy, energy efficiency and heat pumps. In Belgium REPOWER is expected to give priority to enhancing biomethane deployment, hydrogen deployments, onshore wind energy permitting and electricity market design.

More recently, on the 16th of June 2022, the European Council adopted a **recommendation to stimulate learning for the green transition and sustainable development**.[20] In is, the council issued the following recommendations:

- Establish learning for the green transition and sustainable development as one of the priority areas in education and training policies and programmes;
- Provide learning opportunities in formal, non-formal and informal settings;
- Support and enhance teaching and learning for the green transition and sustainable development by providing infrastructure, digital tools and resources and building in particular on the new European Competence Framework on Sustainability (GreenComp);

[17] European Commission. Website: Renewable Energy Directive.
[18] European Commission. Website: Energy Efficiency Directive.
[19] European Commission. Website: Revision of the Energy Taxation Directive.
[20] European Council. Website: Council adopts recommendation to stimulate learning for the green transition and sustainable development.

- Provide fact-based and accessible information on the climate, environmental and biodiversity crisis and its drivers; and
- Help educators to take part in professional development programmes related to sustainability.

These changes and others all provide a major impetus to the green transition in the EU and by extension Flanders.

2.2 Impacts on the labour market as a whole

Overview of key points in this section

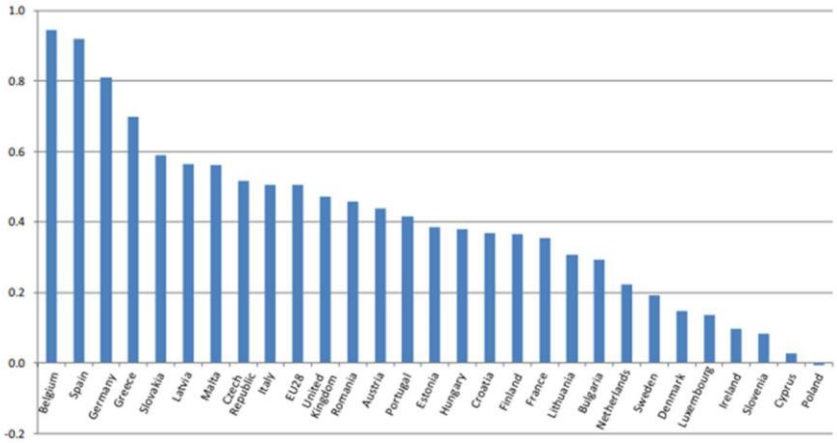
- The European Green Deal (EGD) is to have a direct impact on the labour market in the EU. It is forecasted that employment is expected to increase as a result of the EGD initiatives, if well implemented. The share of green jobs is also (slowly) increasing, however the rate of growth has slowed down and become more constant in the recent years. Adaptation to climate change in general is also expected to have a job creation potential. Very limited impacts are expected on job re-allocation.
- The green transition is also expected to lead to a slight growth of the Belgian and by extension of the Flemish GDP. Approximately 80 000 jobs will be created in Belgium by 2030. Despite changes in some existing jobs (job substitution and changes in tasks) there is an expected net increase in jobs. The most impacted (with regards to changes as well as growth) sectors are expected to be in the construction and energy sector, manufacturing industries, chemicals, transport and agri-food.
- Recent global events and policy developments are likely to accelerate and increase the impacts on the labour markets.

2.2.1 EU-level

According to a flagship Cedefop study into the impact of the European Green Deal (EGD) on skills[21] it is expected that between 2020 and 2030, as a result of the EGD, employment in the EU-27 will increase by around 3.7%. It estimates that the implementation of the EGD is likely to increase GDP in the EU by around 1.7% (in 2030, compared to the baseline) and lead to additional employment growth. In the entire forecast period, **employment with the implementation of the EGD is higher than without it**. Employment growth compared to the baseline appears to be larger in 2021-22, slows down in the middle of the decade and then accelerates from 2026 onwards. Furthermore, as can be shown in the figure below, Belgium has the highest projected growth in employment as a % difference compared to the baseline.[22]

[21] Cedefop (2021). The green employment and skills transformation: insights from a European Green Deal skills forecast scenario.
[22] The study does not provide an explanation for the highest projected growth in employment in Belgium.

Figure 2-1 Impact transition towards a low-carbon economy by 2030 on employment by country, 2030, percentage difference from baseline[23]



Source: *FOME energy scenario projections*

Zooming in specifically to individual Member States[24], studies also show that the **share of green jobs in the total employment share has been slowly increasing**. For example, in Germany, green jobs as a share of total employment rose from 4.8% in 2010 to 5.2% in 2012. In Denmark, green employment and production grew between 2012 and 2015, with production growing from 170 billion Danish kroner to 192 billion and employment from 60 000 to 67 000. At the same time, however, it appears that **the rate of growth of this share has slowed down and became more constant in the recent years**.[25]

An ILO report on employment impact of climate change adaptation[26] has also found that there could be a **job creation potential as a result of climate change adaptation**. Under a reference scenario, around 500,000 additional jobs (approximately 0.2% of the working population) could be directly and indirectly created in the EU by 2050. Some 136,000 jobs could be saved from the negative impacts of climate change. Projections from an ambitious scenario suggest that around 1 million jobs could be directly and indirectly created and around 330,000 jobs saved by 2050. Most of the jobs created under both the reference and the ambitious scenarios are in business, public services and the construction sector.

An OECD study[27] has also considered the impacts of climate mitigation policies on job re-allocation. **For OECD countries, only 0.3% of jobs would have to be reallocated** as a result of climate mitigation policies. That is because climate policies do not fundamentally reshape labour markets and the heavily impacted sectors (mainly energy) represent a small share of the total employment. Low skilled workers account for the majority of total reallocations (approx. 2/3 of total reallocations).

A similar conclusion has been reached by a JRC study[28], according to which. while the impact of the green transition will be substantial on some sectors, such as coal mining, the overall **effect on job reallocation will be limited.** The reason for this is the high concentration of carbon-intensity in a

[23] Eurofound (2019). Energy scenario: Employment implications of the Paris Climate Agreement.
[24] Belgium was not considered in this specific Cedefop report, which reports on the state of play in Denmark, Germany, Estonia, Spain, France and the UK.
[25] Cedefop (2019). Skills for green jobs: 2018 update - European synthesis report.
[26] ILO (2018). The employment impact of climate change adaptation: Input Document for the G20 Climate Sustainability Working Group International Labour Office.
[27] Chateau, et al. (2018). Impacts of Green Growth Policies on Labour Markets and Wage Income Distribution: A General Equilibrium Application to Climate and Energy Policies. *OECD Environment Working Papers*, No. 137.
[28] Bianchi et al. (2022). GreenComp: The European sustainability competence framework.

limited number of sectors that account for only a small amount of employment: 80 % of greenhouse gas emissions in OECD countries is emitted by sectors that account for 8 % of total employment.

2.2.2 Flanders

The green transition will impact the Flemish labour market through four channels. First, new jobs will be created in certain sectors (job creation). Second, there will be a shift between jobs within sectors (job substitution). Third, certain jobs or subsectors will disappear (job destruction). Lastly, the tasks and activities of existing jobs will change or expand, including the required skills. The impact of the green transition will not only differ across sectors, but also across regions. For instance, regions with a high concentration of energy-intensive industries will face greater losses than regions with a more diverse economy under more stringent climate regulations.[29] Several studies come to the conclusion that the green transition will lead to a net job creation (*Vlaamse Regering*, 2019[30]; *Federale Dienst Klimaatverandering*, 2016[31]; Willeghems & Bachus, 2018[32]; *Federale Dienst Klimaatverandering*, 2013[33]). Other studies such as the Roland Berger (2021) skills roadmap for the energy intensive industries in Flanders, focus on the impact of the green transition within specific sectors. These differing impacts are elaborated upon for each sector in Section 2.3.

The green (including the low-carbon) transition, according to a study by the *Federale Dienst Klimaatverandering* (2016), is expected to lead to a slight growth of the Belgian and by extension of the Flemish Gross Domestic Product (GDP). Approximately 80 000 jobs will be created in Belgium by 2030, the majority of which will be in the construction sector and processing industries (mainly intermediary goods). In the transport sector an asymmetric effect is predicted: certain jobs will be lost due to a lower demand for maintenance of private vehicles, while other activities such as communal transport services will expand. Another beneficial effect on labour could be caused by the added governmental revenues from a carbon tax which can be expected to reach 3.5 billion euro per year by 2030. If this was reinvested in lowering labour costs, even more jobs would be created.[34]

In general, studies expect a net increase in jobs due to the circular transition even though some existing jobs will be lost (job substitution) and some sectors will undergo job transformation (change in tasks). Additionally, the circular economy employment index is increasing faster than the general average Flemish employment index.[35] The economic benefits from the circular economy for Flanders have been estimated by combining sector-specific data and predictions about the development of the circular economy. An added value of 2.3 billion Euro (1.3% growth of Flemish GDP) or approximately 27 thousand jobs would be generated in Flanders by 2020 through well-implemented circular economy policies (Dubois and Christis, 2014).[36] Other studies reach similar conclusions with an expected job creation from the circular economy of more than thirty thousand jobs by 2030 (Willeghems and Bachus, 2019). The highest potential for increased employment are in machinery repair sectors (NACE_C - 33.1), rental and leasing (NACE_N - 77.2), and repair (NACE_S - 95.1 and 95.2). However, these are relatively small sectors, so the study mentions (lower) potential also exists in the following big sectors: NACE_E

[29] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 - De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.
[30] Vlaamse Overheid (2019). Vlaams Energie en Klimaat Plan.
[31] Federale Dienst Klimaatverandering (2016). De macro-economische impact van de koolstofarme transitie in België.
[32] Willeghems & Bachus (2018). Employment impact of the transition to a circular economy: literature study.
[33] Federale Dienst Klimaatverandering (2013). Scenario's voor een koolstofarm België tegen 2050.
[34] Federale Dienst Klimaatverandering (2016). De macro-economische impact van de koolstofarme transitie in België.
[35] Willeghems & Bachus (2019). Modelling job creation in the circular economy in Flanders.
[36] Dubois & Christis (2014). Een verkennende analyse van het economisch belang van afvalbeheer, recyclage en de circulaire economie voor Vlaanderen.

(sewerage, waste management and remediation activities) and NACE_G (motor vehicles, wholesale waste and scrap, and second-hand retailers).[37]

There are several sectors and professionals that are prospering, or expected to prosper, under the influence of the green transition. In 2010, green jobs were mainly found in the recycling sector, wastewater treatment, chemicals, construction and transport.[38] A study by the Federal Planning Bureau (2013) mentions the following professions which will be in high demand: construction, engineers (civil, mechanical and material), food and health (agriculture), informatics (software specialists and interface designers), biology, chemistry, spatial and land use planning, and architects. Strikingly, several of these occupations are already facing staffing problems and are often categorised as 'labour shortage occupations'.[39]

Under the Flemish long-term strategy 'Vision 2050', several industries were identified where Flanders already has strong competences and envisions specialising in even further in order to reach top global competitiveness. Some of these sectors, but not all, could be relevant for enhancing the green transition (most relevant in **bold**):[40]

- **Sustainable chemicals** (e.g. biobased materials: bioplastics and biopolymers for textile)
- **Specialised manufacturing solutions (e.g. smart textiles, urban mining, 3D printing)**
- Personalised medicine and tailor-made care
- Logistics with added value
- **Specialised agri-food** (e.g. healthy and sustainable food, sustainable packaging, etc.)
- **Specialised sub-sectors of construction, environment and energy industries (e.g. smart cities, smart grids, housing, recycling)**
- ICT specialisations both in hardware and software (e.g. smart and integrated electronic systems)
- European Key Enabling Technologies

In addition, there are several specialised fields which will enable the green transition and in which Flanders has a comparatively high competence and skills level: conversion technology, separation technology, predictive technology, energy storage, energy transport.[41]

[37] Willeghems & Bachus (2019). Modelling job creation in the circular economy in Flanders.
[38] Departement Werk en Sociale Economie (2011). Naar een groen arbeidsmarktbeleid: Een eerste beleidsverkenning.
[39] Federaal Planbureau (2013). Walking the green mile in Employment: Employment projections for a green future.
[40] Vlaamse Regering (2016). Visie 2050: Een langetermijn strategie voor Vlaanderen.
[41] Vlaamse Overheid (2019). Vlaams Energie en Klimaat Plan.

2.3 Impacts on specific sectors

Overview of key points in this section

- The **resilience** of sectors to the green transition depends on a number of factors (energy intensity, carbon emission intensity and labour intensity). By these criteria the electricity, petroleum refining, road transport, chemicals and metal sectors are most exposed to risks.
- For the ***agri-food*** sector no substantial new types of green jobs or skills are expected. Though the sector shows limited awareness of the need to prepare for the green transition while the sector is undergoing the major issue of dealing with the impacts of climate change.
- The green transition will be especially relevant and impactful for the ***manufacturing and extractive industries***, particularly the most energy-intensive industries (chemicals primary metals, rubber & plastics and petrochemistry). These sectors are currently facing a structural shortage in the labour force to enable the green transition, approximately 6 100 additional employees will be needed in the primary metal sector and approximately 6 700 in rubber & plastics manufacturing.
- Green regulations for the ***construction*** sector are expected to provide jobs for an additional 24 000 people by 2020. New green jobs will be created along with green specialised building techniques and materials such as insulation and ventilation systems. There is also a need to 'green' current jobs for the renovation of the current Flemish building stock.
- The green transition in the ***energy*** sector could lead to net job gains in Flanders. However, for these jobs to materialise, there is a need for targeted education (in collaboration with the industries), technical schooling, interest in science and enabling policies.
- Furthermore, the ***circular economy*** transition can have a positive influence on the Flemish labour market if it is managed well. For instance, it can create additional job opportunities, raise the job standard and reduce inequality. However, risks that come along with not being prepared for the circular transition relate to job insecurity, labour shortages and skills gaps.
- For the ***logistics and transport*** sector the ageing Flemish population is an issue, which mainly causes a shortage in truck and lorry drivers, as 70% of truckdrivers are older than 45. In addition, there is a low influx of new workers which makes this a labour shortage occupation.
- The ***services sector*** is least impact by the green transition, although many of the professional services in finance, law, architecture, science, technical and engineering services are likely to see important impacts from the green transition.

2.3.1 Resilience of (Flemish) sectors

The resilience or sensitivity of a sector to the green (and low-carbon) transition is dependent on the following factors (De Smet & Lamberts, 2012):[42]

- Energy intensity: The more energy intensive a sector is, the more vulnerable it is to rising energy prices and the more it needs to adapt, which can lead to changes in employment.
- Environmental damage intensity: The more damage a sector causes to the environment, the more adjustments will need to occur to comply with increasingly stringent regulations and costs (to internalise externalities). Greenhouse gas intensity is a part of this factor.
- International competition and forum shopping: Companies with strong international competitors may see their competitiveness reduced as a result of comparatively more stringent climate regulations.

[42] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 – De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.

- Size of companies within the sector: On the one hand, SMEs should be more adjustable than large corporations to the green transition considering their smaller scale. On the other hand, due to lacking advantages of scale, they have a decreased capacity to adjust given their low R&D budgets, constraints (time and budget) for employees to reskill and upskill, etc.
- Labour intensity: A higher labour intensity leads to a larger possible impact of emission regulations, e.g. an emissions intensive sector with high labour intensity could face significant employment implications from emissions reduction efforts, i.e. need for re-skilling large numbers of workers (for example in construction), potential size of job losses.

A study from HIVA – KU Leuven (2012), made a first analysis of the sensitivity of employment in several important Flemish sectors to the green transition. Figure 2-2, indicates the energy intensity, carbon emission intensity and labour intensity of these sectors. When combining the impacts of all these parameters, there appears to be a need for increased vigilance for the following sectors: electricity, petroleum refining, road transport, chemicals and metal.[43]

Figure 2-2 Sensitivity of employment in Flemish sectors to the impacts of the green transition (data for 2010).

Sector	Deelsector	Nace-belcode	Energiegebruik / VTE *	Energiegebruik / TW / VTE *	CO2-emissies / VTE *	CO2-emissies / TW / VTE *	Broeikasgasemissies / VTE *	Broeikasgasemissies / TW / VTE *	TW / VTE **
			PJ	PJ	kton	kton	kton CO2 eq	kton CO2 eq	€
industrie	chemie	20, 21	0,00796	0,00425	0,17154	0,09154	0,19781	0,10556	102.225
industrie	metaal (ijzer en staal, non-ferro)	24 t.e.m. 30, 32.5, 33	0,00081	0,00141	0,04120	0,07130	0,04134	0,07152	77.002
industrie	voeding	10, 11, 12	0,00070	0,00041	0,02877	0,01696	0,02877	0,01696	86.633
industrie	textiel	13, 14, 15	0,00043	0,00014	0,01280	0,00412	0,01280	0,00412	58.532
industrie	papier	17, 18, 58.1	0,00073	0,00020	0,01710	0,00464	0,01710	0,00464	85.208
industrie	overige industrie	7, 8, 9.9, 16, 22, 23, 31 t.e.m. 32.4, 32.9, 36, 41, 42, 43	0,00036	0,00073	0,01470	0,03015	0,02016	0,04133	69.337
energie	elektriciteit & warmte	35.1, 35.3	0,03562	0,00209	2,15379	0,12625	2,16036	0,12664	136.698
energie	petroleumraffinaderijen	19.2	0,02935	0,00094	1,59677	0,05106	1,62401	0,05193	94.112
energie	aardgas	35.2	0,01235	0,00002	0,62355	0,00116	1,64930	0,00308	147.411
landbouw	akkerbouw, tuinbouw en veeteelt	1.1 t.e.m. 1.3, 1.4, 1.5, 1.60, 1.61, 1.62, 1.63, 1.64	0,00277	0,00052	0,28766	0,05380	0,75437	0,14109	64.124
transport	wegtransport	49.3, 49.4	0,00376	0,00282	0,26015	0,19459	0,26535	0,19848	64.649
transport	spoorvervoer	49.1, 49.2	0,00033	0,00007	0,00595	0,00121	0,00598	0,00121	55.354
transport	binnenvaart	50.3, 50.4	0,00792	0,00002	0,58100	0,00160	0,58588	0,00162	135.763
handel & diensten	handel	45 t.e.m. 48, 52, 95	0,00011	0,00039	0,00360	0,01295	0,00364	0,01309	82.213
handel & diensten	hotels & restaurants	55, 56	0,00024	0,00018	0,00818	0,00606	0,00821	0,00608	46.773
handel & diensten	kantoren & administratie	53, 64 t.e.m. 74, 77 t.e.m. 84, 94	0,00011	0,00052	0,00348	0,01632	0,00349	0,01638	74.773
handel & diensten	onderwijs	85	0,00007	0,00011	0,00319	0,00512	0,00320	0,00514	113.286
handel & diensten	gezondheidszorg	75, 86, 87, 88	0,00005	0,00018	0,00197	0,00732	0,00248	0,00922	51.121
handel & diensten	overige diensten	58.2, 59 t.e.m. 63, 90 t.e.m. 93, 96 t.e.m.99	0,00019	0,00016	0,00727	0,00610	0,00749	0,00628	75.345

[1] Hoe groter de parameterwaarde hoe vatbaarder.
[2] Hoe kleiner de parameterwaarde hoe vatbaarder.
Bron RSZ gedecentraliseerde statistieken, VMM-MIRA en Belfirst

Source: De Smet, L. & Lamberts, M. (2012). De transitie van België naar een koolstofarme samenleving in 2050 - De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.

In the following sections an overview is provided of the impact of the green transition on employment in Flemish sectors, based on more recent data and following the sequence of their NACE-codes.

2.3.2 Agriculture (and agri-food)[44], forestry and fishing

Employment in the agricultural sector is less than 1% of total Flemish employment.[45] A study by the OECD (2017) found that the agri-food sector shows limited awareness of the need to prepare for the green transition. They do not anticipate substantial changes in the required skills to make the sector's activities green. However, many challenges remain such as limited corporate environmental awareness

[43] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 – De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.
[44] The agri-food sector expands the definition to include agriculture (NACE code 01) and also the manufacturing of food products and beverage sectors (NACE codes 10 and 11), this is useful as these sectors are very closely linked.
[45] Statistiek Vlaanderen. Database: Tewerkstelling per sector.

and the tendency to mainly think in terms of economies of scale (cheap before green). In 2011 several agri-food companies announced that there are no issues in finding employees with the required skills and predicted that no new types of green jobs or skills would be necessary.[46] More recently, the sector is undergoing the major issue of dealing with the impacts of climate change, as shown in the sector covenant. Extreme weather events such as drought and a general water shortage in Flanders need to be incorporated in the management and risk assessments of enterprises, since they pose a major threat to job security.[47]

The sector will inevitably be severely impacted by the green transition. With the rise of regenerative farming practices and the occasional negative framing of the agriculture sector in the media in cases such as the nitrogen agreement (*stikstof akkoord*) and animal rights, pressure for change is increasing. However, since the agricultural sector only employs a small share of the working population, the impact of the green transition in absolute numbers will be rather limited.[48]

2.3.3 Manufacturing and extractive industries

Energy-intensive industry

The green transition is especially relevant and impactful for energy-intensive industries. A selection of the most important energy intensive industries were analysed by Roland Berger (2021): chemicals primary metals, rubber & plastics and petrochemistry. In total, around 76 000 employees (direct employment) work in these four sectors, the majority of which are in the chemicals sector. The following challenges and trends will have implications for the energy-intensive industries: green transition, digitalisation & automation and the structural shortage in the labour force. Thus, to enable the green transition, approximately 6 100 additional employees will be needed in the primary metal sector and approximately 6 700 in rubber & plastics manufacturing by 2035. [49]

A second study by Deloitte et al. (2020) considered the energy-intensive industries of (petro-) chemicals refinery, steel and smaller industries (e.g. paper, glass, non-ferro, etc.). These represent a combined added economic value of 9.1% of the Flemish GDP and provide 343 000 jobs, which includes both direct and indirect jobs. Since they also emit about 35% of the Flemish CO_2 (excluding LUCUCF emissions), the green transition will profoundly impact these industries.[50]

Chemicals sector

The chemicals sector can be divided into basic chemicals, fine chemicals and life sciences (pharmaceuticals, biotechnology, etc.).. The chemical sector in Flanders is mainly focused in the Port of Antwerp where due to Flemish, Belgian and international investments, it has grown into a world-class petrochemical (and other chemical sub-sectors such as pharma and biotech) cluster.[51] In 2019, approximately 34 000 people were employed in the chemical sector[52]. The petrochemical sector on the other hand employs a significantly lower share of people, approximately 4 000. According to the Roland

[46] OECD (2017). Boosting Skills for Greener Jobs in Flanders, Belgium.
[47] Vlaamse Regering (2021). Sectorconvenant 2021 – 2022 afgesloten tussen de Vlaamse Regering en de sociale partners van Groene sectoren.
[48] Stakeholder interviews
[49] Roland Berger (2021). Skills roadmap voor de Vlaamse klimaattransitie – Focus op de energie-intensieve sectoren [2020-2035].
[50] Deloitte (2020). Leverbaarheden 4, 6 en 9: Transitiepotentieel van de Vlaamse industrie, Roadmapstudie en Ontwerp van transitiekader.
[51] Anton et al. (2018). De toekomst van de arbeidsmarkt in de haven van Antwerpen.
[52] The majority of jobs in the chemicals sector consist of technicians (8 232 jobs), closely followed by operators and administrative staff (respectively 6386 and 6 193 jobs). The remaining jobs are production staff (3 396 jobs), managers (2 914 jobs), scientists and engineers (2 579 jobs) and various other jobs (4 269 jobs).

Berger (2021) study, the green transition will require around 15 500 additional employees in the chemicals sector and around 1 100 in the petrochemical sector by 2035.[53]

The sector is aware of the difficulties that lie ahead with the green transition and has made some efforts to adapt. Initiatives such as Moonshot and BlueChem stimulate sustainable and green innovations.[54] However, the chemical processes which are key for the sector are still heavily reliant on fossil fuels. The expectation is that with the continued innovation of this processing industry, jobs will shift from fossil-fuel based chemicals to 'greener' chemicals – bio-based chemicals.[55] There will also be an increasing need, as carbon prices in the EU-ETS increase, to adopt innovative low-carbon and energy efficient technologies and processes, including potentially hydrogen, carbon capture, bio-refining each of which can require new skills and understanding in the workforce.

Automotive industry

The automotive sector in Flanders mainly consists of SMEs which employed a total of 67 793 people in 2018.[56] The green transition of the Flemish (and EU) automotive industry is heavily reliant on the critical raw materials needed for the electrification of the transportation sector. More specifically, shortages or disruptions of value chains can occur due to international conflicts, health crisis, etc.[57] Besides these potential shortages, the green transition is not expected to have a significant quantitative effect on the number of jobs in the automotive industry since the shift from traditional cars to electric cars will not likely decrease the labour demand. However, the demand for skills will change and thus the sector will have to adapt. The expected changes will be further developed under Section 3.2.2.

The green transition will reduce the number of jobs in the manufacturing of combustion engines. Especially, considering the European Commission's proposal under the EGD to reach zero-emission road mobility by 2035.[58] However, other employment opportunities will arise in the broader automotive value chain such as in the manufacturing and installation of charging infrastructure, the production of batteries, etc. Furthermore, a shift to a balanced mix of efficient hybrid cars and electric vehicles is needed to reach the 2030 climate targets. Here, some zero-emission vehicles are less complicated to produce, reducing jobs, while other low carbon cars such as hybrids are more complex to build, increasing employment; as such, these cancel each other out. Therefore, according to a study by Cambridge Econometrics (2018), the employment impacts by 2030 in the automotive sector will be relatively stable.[59] Similar conclusions are also reached by others, which note that if the EU can maintain its strong position in electric vehicle manufacture then the net jobs impact of the transition can be neutral or positive[60]. Others note that having a positive impact on employment in the automotive supply chain depends on the EU establishing a strong position in battery manufacturing, without this, there are increasing risks of employment loss in the sector in the 2030's[61].

[53] Roland Berger (2021). Skills roadmap voor de Vlaamse klimaattransitie – Focus op de energie-intensieve sectoren [2020-2035].
[54] Essenscia (2020). Website: Chemie-industrie loopt voorop in energie- en klimaattransitie.
[55] VITO. Website: Duurzame chemie.
[56] Vlaamse Regering (2021). Sectorconvenant 2021 – 2022 afgesloten tussen de Vlaamse Regering en de sociale partners van Autosector en aanverwante sectoren.
[57] Netwerk Duurzame Mobiliteit (2021). Impact van corona op verduurzaming van de auto-industrie.
[58] European Parliament (2022). Fit for 55: MEPs back objective of zero emissions for cars and vans in 2035.
[59] Harrison (2018). Fuelling Europe's Future: How the transition from oil strengthens the economy.
[60] Transport and Environment (2017) How will electric vehicle transition impact EU jobs?
[61] https://clepa.eu/mediaroom/an-electric-vehicle-only-approach-would-lead-to-the-loss-of-half-a-million-jobs-in-the-eu-study-finds/

2.3.4 Construction

The construction sector is important in the Flemish economy with 217 000 active employees across 29 000 companies.[62] This sector is very labour-intensive with the cost of personnel amounting to about 70% of the total cost versus 30% material cost. It is heavily reliant on manual labour, especially at construction sites. However, with the depletion of natural resources there are several EU-wide and national regulations which try to safeguard these resources as well as remaining natural areas (e.g. Flemish agreement on the '*betonstop*'). Not only can this increase the material cost, but it also encourages circular practices. In Flanders, construction companies are mainly Small and Medium Enterprises (SMEs) that are active on a local scale. Due to lacking advantages of scale, SMEs usually have a decreased capacity to adjust for the green transition given their low R&D budgets, constraints (time and budget) for employees to reskill and upskill, etc. The green transition is creating new jobs and a need for upskilling and reskilling. In total, green regulations were expected to provide jobs for an additional 24 000 people by 2020. New green jobs will be created along with green specialised building techniques and materials such as insulation and ventilation systems. Additionally, there is also the trend of 'greening' current jobs.[63] The need for the renovation of the Flemish building stock, especially in the context of energy efficiency, presents opportunities for creating additional jobs. However, since the sector is already facing issues in filling vacancies, this challenge will increase even more under the green transition.[64]

In consultations for this deliverable several stakeholders identified the construction sector as one of the sectors in Flanders which will be most significantly impacted by the green transition. According to them, the sector is very aware of these impacts and is trying to increase their resilience to be able to deal with the upcoming transition. However, major challenges remain. The SERV has calculated that to meet the 2030 climate target for Flanders and Belgium, the number of employees in the construction sector should increase by approximately a factor of ten. Considering the fact that this sector is already facing significant labour shortages and skills gaps, this will not be an easy process. Skills and labour shortages could potentially become significant inhibitors of the green transition.[65]

The Flemish construction sector is expected to expand its activities substantially under the green transition. The main influential strategic trends are higher renovation requirements and the necessary greening of construction materials and activities as prescribed in EU and governmental regulations. Additionally, sustainable and green construction practices should be stimulated by increasing energy prices, lower prices for green building materials, governmental financial incentives, etc.[66] In Flanders, the added value of the construction sector will increase between 5.6 and 8.6 billion euros by 2030. This will be accompanied by the creation of an additional 82 799 – 124 198 jobs between 2021 and 2030.[67] Additionally, the Flemish government is increasing their investments in especially renovation in order to achieve the green transition. This new wave of investments was established in their '*relance plan*'[68] to strengthen the Flemish economy after the covid crisis in a sustainable manner.[69]

[62] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 – De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.
[63] OECD (2017). Boosting Skills for Greener Jobs in Flanders, Belgium.
[64] Constructiv. Website: Competentiebeheer.
[65] Stakeholder interviews.
[66] Departement Werk en Sociale Economie (2011). Naar een groen arbeidsmarktbeleid: Een eerste beleidsverkenning.
[67] Vlaamse Overheid (2019). Vlaams Energie en Klimaat Plan.
[68] Vlaamse Regering. Website: Vlaamse veerkracht.
[69] Vlaamse Regering (2019). Vlaamse Veerkracht: Relanceplan Vlaamse Regering.

2.3.5 Utilities

Renewable energy

Renewable energy is a very labour intensive sector with a high degree of investment in R&D. International, Belgian and Flemish environmental regulations such as the Renewable Energy Directive, EU ETS and many others (see section 2.1) have a significant effect on the energy market in Flanders. The Russia-Ukraine crisis is also having a significant impact on Belgium which imports the majority of its fossil fuels, of which a sizeable quantity comes from Russia. For electricity sources around 30% of its electricity from natural gas and is strongly interconnected to neighbouring markets, it has therefore experienced significant electricity price increases in the last 6 months. The REPOWER initiative (see 2.1) at EU level is shaping a short term policy response to this crisis that will boost the green energy transition, with onshore wind power, hydrogen and biomethane among the main sectors expected to benefit.

Under the Flemish Energy and Climate Plan (VEKP), the government has set the target of generating 28 512 GWh of renewable energy by 2030 as well as energy savings of 84 TWh. More specifically, some energy related measures under the VEKP include increasing wind energy capacity from 1.4 to 2.5 GW by 2030; increasing solar energy capacity from 3.6 to 6.7 GW by 2030; and increasing energy efficiency in buildings. All of these targets will determine which jobs in the energy sector will likely disappear, transform or be created.[70]

In 2015, the number of people employed in the renewable energy sector (RES) in Belgium was 22 550. Under a scenario of 100% renewable energy, an additional 20 000 to 60 000 full time jobs would be created by 2030 (compared to 2015). Primarily solar panels have an important impact on local employment.

The renewable energy transition could lead to net job gains in Flanders. However, for these jobs to materialise, there is a need for targeted education (in collaboration with the industries), technical schooling, interest in science and enabling policies. As calculated by the Federal Planning Bureau (FPB, 2013), the biggest job growth for Belgium will be in construction, installation and manufacturing of RES (between a minimum of 700 and a maximum of 5 500 jobs annually by 2030). For jobs related to operations, maintenance and fuel processing (generally called O&M jobs) there is an expected job creation of minimum 500 and maximum 3 300 jobs every year.[71]

An alternative study by the FPB (2013) calculated that in total between 21 000 and 65 000 jobs in the energy sector will be created by 2030. This is under the assumption that the energy system will be completely renewable by 2050. Considering on average more jobs are created per unit of energy produced in a renewable system than in a fossil-based system, the green transition could have an extensive impact on the energy labour market.[72] Flanders has the ambition of becoming a hydrogen economy as proclaimed in their '*Relance plan*'[73] to cope with the impact of the Covid crisis. Therefore, they will invest heavily in the developing hydrogen sub-sector in addition to general investments in renewables, which they predict will enable additional job creation.

[70] Vlaamse Overheid (2019). Vlaams Energie en Klimaat Plan.
[71] Federaal Planbureau (2013). Walking the green mile in Employment: Employment projections for a green future.
[72] Federaal Planbureau (2013). Hernieuwbare jobs: werk aan de winkel.
[73] Vlaamse Regering (2019). Vlaamse Veerkracht: Relanceplan Vlaamse Regering.

2.3.6 Circular economy[74]

As calculated by a study of the *Koning Boudewijnstichting* (2022), there are approximately 148 000 circular jobs in Flanders, which represents 7.5% of all Flemish jobs. Most of these are indirectly circular (44% of all circular jobs) or core jobs (35%), with the remaining share representing enabling jobs.[75] Antwerp and Ghent are the most important clusters for circular economy employment.[76] The circular transition can have a positive influence on the Flemish labour market if it is managed well. For instance, it can create additional job opportunities, raise the job standard and reduce inequality. However, risks that come along with not being prepared for the circular transition relate to job insecurity, labour shortages and skills gaps. The expectation is for the circular transition to create about 30 000 jobs in Flanders across different economic sectors. This net increase in jobs is due to several shifts and trends such as the increase in labour intensive activities (repairing, remanufacturing and recycling are more labour intensive than traditional manufacturing and disposal); the relocation of manufacturing activities (re-shoring manufacturing); and the creation of new markets (e.g. rental business models).[77]

The circular economy aspect of the green transition will lead to different impacts, varying for levels of skilled labour (low, medium or high-skilled) and geographical location (local, regional or global):[78]

- Reduce: Refusal and dematerialisation activities are expected to have a negative influence on labour in the manufacturing industry, since demand for new products will decline.
- Repair and maintenance: Might have a slight negative employment impact in the manufacturing industry.
- Reuse: Will have a positive impact on the construction sector given that deconstruction is more labour intensive than demolition. Reuse can stimulate local job creation significantly when accompanied by adequate policies. Increased waste collection rates will stimulate job creation in reuse activities.
- Recycle: Creates more jobs at higher income levels, compared to landfilling or waste incineration since recycling is more labour-intensive (mainly beneficial for low-skilled labour). Increased waste collection targets and the following collection rates will stimulate job creation in recycling activities.
- Sharing economy: Generates jobs mainly for low-skilled workers and stimulates entrepreneurship. However, jobs will be lost in traditional companies due to decreasing prices and demand, offshoring.

The circular economy is becoming an increasingly important focal point for the Flemish government. As discussed in their post-Covid crisis '*relance plan*', they want to accelerate the circular transition and through their investments also increase the job opportunities in the circular economy.[79]

[74] Transitioning to a circular economy is a change that should occur across all sectors to a greater or lesser extent. For the purposes of this work we have defined a circular economy sector to help capture the skills need from this part of the green transition, it encompasses the economic sectors (NACE codes) most heavily involved in this transition, namely: Repair and installation of machinery and equipment; Sewerage; Waste collection, treatment and disposal activities, materials recovery; remediation activities and other waste management activities; and, Repair of computers and personal and household goods.
[75] The study defines core, enabling and indirect circular jobs. Core jobs ensure that raw material cycles are closed, activities include renewable energy, recycling and repair. Enabling jobs support the acceleration and upscaling of core activities, activities include leasing, engineering and digital technology. Indirectly circular jobs provide services to core and enabling activities, activities include education, logistics and public administration.
[76] Koning Boudewijnstichting (2022). Werken in een meer circulaire economie: Horizon 2035.
[77] Willeghems & Bachus (2019). Modelling job creation in the circular economy in Flanders.
[78] Willeghems & Bachus (2018). Employment impact of the transition to a circular economy: literature study.
[79] Vlaamse Regering (2019). Vlaamse Veerkracht: Relanceplan Vlaamse Regering.

Waste management and recycling

The waste management and recycling sector and wholesale trade in waste and scrap provide employment for approximately 12 000 people in Flanders (2014) which is about 0.5% of total employment and the sector has a turnover of approximately 3.7 billion euros. The waste management and recycling sector has grown by more than 5% per year in recent decades. The circular transition has created an additional 27 000 new jobs in the waste, recycling and circular economy sector by 2020 which equals 1% of total employment.[80]

2.3.7 Logistics and transport

In 2019, the logistics sector in the Flemish region employed approximately 126 000 people, representing 4.4% of total employment in Flanders.[81] The majority of employees in the logistics and transport sector work as vehicle drivers and mobile installation operators; followed by administrative staff, elementary occupations such as warehousemen; and technicians and related occupations. Of these employees most have an average level of education, with the second most common level of education being low, and the with the least number of workers have a high level of education.[82] The transition to clean mobility includes the electrification of the transport sector, modal shift, hydrogen applications, charging infrastructure, etc. On an EU-wide level, the shift to zero/low emission vehicles will create, 206 000 net additional jobs by 2030.[83]

The transport sector and logistics sector will[84] experience the low-carbon transition particularly through a shift to electric transport by 2050. Additionally, the volumes of goods that will be transported will decline due to a lower transportation demand per person and an expected 'modal shift' from cars towards public transportation or soft mobility (walking, cycling, etc.). For the transportation of goods, trains and ships will be increasingly popular and higher utilisation percentages will be increasingly targeted, leading to lower total vehicle requirements.[85] However, the increase of transportation coming from e-trade and home deliveries must be taken into account. The Flemish government under its post-covid '*Relance Plan'*, will increase investments in all low-carbon transport modalities and in the modal shift. All these trends could have an influence on the evolution in the types of jobs of the sector.[86]

A major issue for the transport sector is the ageing Flemish population. This mainly causes a shortage in truck and lorry drivers, as 70% of truckdrivers are older than 45. In addition, there is a low influx of new workers which makes this a labour shortage occupation. Another influential trend could be truck platooning where a group of vehicles drive in an automated formation under constant coordination of one driver in the first truck. This will change the tasks of truck drivers and most likely require them to get additional education for a special driver's license.[87] Another influential trend which has gained importance due to the covid lockdowns, is the decrease in commuting because of remote working.[88]

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[80] Dubois & Christis (2014).Verkennende analyse van het economisch belang van afvalbeheer, recyclage en de circulaire economie voor Vlaanderen.
[81] Statistiek Vlaanderen (2021). Website: Werkgelegenheid in de logistieke sector.
[82] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 - De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.
[83] Harrison (2018). Fuelling Europe's Future: How the transition from oil strengthens the economy.
[84] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 - De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.
[85] Federale Dienst Klimaatverandering (2013). Scenario's voor een koolstofarm België tegen 2050.
[86] Vlaamse Regering (2019). Vlaamse Veerkracht: Relanceplan Vlaamse Regering.
[87] Anton et al. (2018). De toekomst van de arbeidsmarkt in de haven van Antwerpen.
[88] Polling (2018). Kerncijfers telewerk België.

Flemish ports

The Flemish Port areas of Antwerp, Ghent and Bruges are considered as economic motors for the region. They stimulate direct and indirect employment through suppliers and purchasers/customers in the broad region.[89] In 2018, the Flemish ports employed a total of 224 865 people, which includes both the maritime and non-maritime clusters and both direct and indirect jobs. This number represents almost 9% of the Flemish working population. When only focusing on direct jobs in the maritime cluster, the number of employed people amounts to 39 640.[90]

The Flemish port strategy (2022), mentions the policies under the European Green Deal and associated targets which the Flemish economy needs to achieve as one of the enablers of thriving Ports. However, the strategy also recognises that additional efforts will be required to find and keep the necessary profiles to realise the green transition within the ports. The strategy focuses on jobs in clean energy (e.g. hydrogen), transport (modal shift) and circular economy.[91]

Several types of jobs are dominant in the Port areas of Flanders, namely chauffeurs, shippers, port logistics staff, ICT staff, welders, operators, planners and technicians. Furthermore, several sub-sectors are of importance for the transitions that the Port areas will undergo[92]:

- Transition to wind energy in the energy sector
- Digitalisation and automation in the logistics-maritime sector
- Transition from a processing industry to a circular economy – Large parts of the manufacturing industry
- Social innovation of the Port's industrial complex: in all the above sectors

2.3.8 Services

Employment in **administrative activities (EU-wide) is forecast to grow by 8.4% until the end of this decade**, 1.2% more than in the baseline projections. According to the available literature, this likely reflects the fact that national level implementation of green policies requires appropriate institutional capacity and preparedness. This ranges from planning, development of 'green' standards, to monitoring policy implementation and even green procurement. Employment growth in **legal, accounting and consulting activities** in 2020-30 is forecast to be 1.3% higher (8.7% against 7.4% in the baseline), while in **architecture and engineering** it is 2.7% higher (7.7% versus 5%). This reflects increased demand for professionals supporting the implementation of EGD policies, such as architects for the renovation wave, engineers for designing circular economy processes and environmental lawyers. The forecast employment increase in computer programming (+1.8%) is likely to reflect automation/robotics trends. This is an important note, that multiple trends are affecting the labour market at the same time, with automation and digital transformation among the most powerful.[93]

Similar aspects were mentioned by Flemish stakeholders during the interviews, who highlighted the likelihood of an increased need of **professionals focused on environmental justice and law** when industry is in the future to be held accountable for pollution caused.

[89] Anton et al. (2018). De toekomst van de arbeidsmarkt in de haven van Antwerpen.
[90] Mobiliteitsraad van Vlaanderen. Website: Vlaamse havens – Werkgelegenheid.
[91] Vlaamse Overheid (2021). Vlaamse Havenstrategie.
[92] Van den Broeck (2019). 21st century skills voor de havengebieden: Verkennend vacatureonderzoek naar actuele 21st century skills in de havengebieden.
[93] Cedefop (2021). The green employment and skills transformation: insights from a European Green Deal skills forecast scenario.

3 Assessment of future green skills and jobs need

As noted in the introduction, the specific assessment of future green skills and jobs needs in Flanders fits within a comprehensive skills forecasting approach in Flanders. This approach consists of a micro, meso and macro level. At the macro level Flanders is aiming for a structurally integrated labour market projection model that brings together different datasets and allows Flanders to estimate future jobs and skills. This long-term tool is complemented by ad hoc analyses for important social transitions such as digitalisation and, in the case of this study, the green transition. Through partnerships at the meso level sponsored by the European Social Funds (ESF), Flanders has qualitative insights on competence changes in various sectors. At the micro level, Flanders aims to have flexible and agile enterprises by promoting a strategic and proactive HR policy that pays sufficient attention to future changes in competences.

3.1 Specific jobs needs estimates

Overview of key points in this section

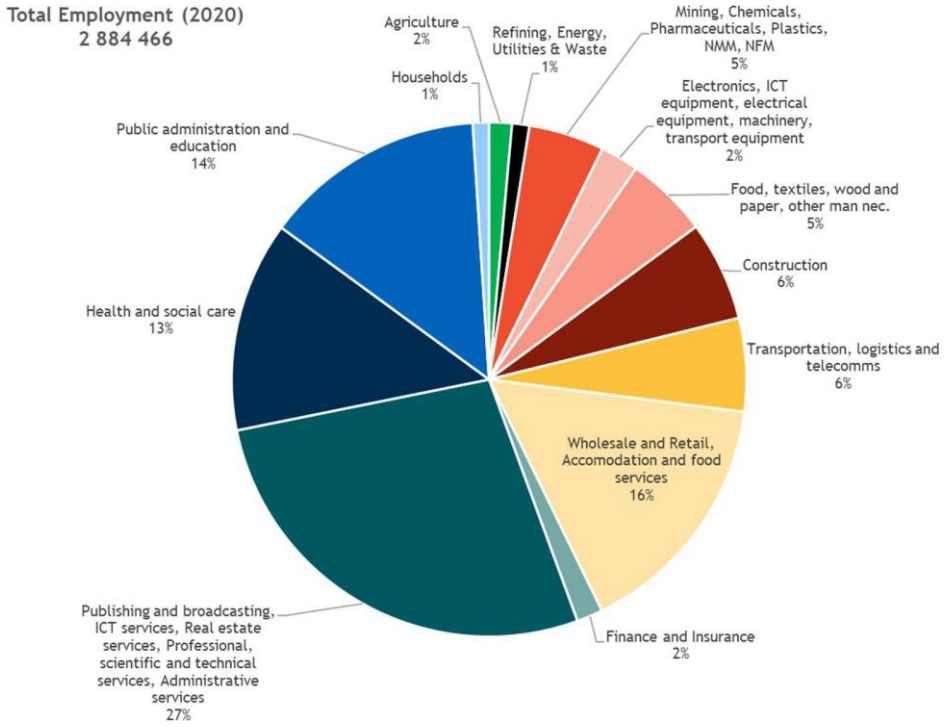
- Similar to most developed economies, employment in Flanders is concentrated (~80% of total) in the services sector. Manufacturing and energy (13%), construction (6%) and agriculture (2%) contribute much lower shares of employment.
- Total employment in Flanders is expected to grow until 2026 and likely to continue to grow until 2030. The growth is concentrated in the services sector, although construction and circular economy sectors also grow. This continued growth would place continued, and additional pressure on the labour market in Flanders.
- Every sector will need to replace around 25%-30% of its workforce due to retirement in the 2022-2030 period, this issue is particularly acute for the transport and logistics and agriculture (and agri-food), forestry and fishing sectors. However, replacing individuals that remain in the workforce but that switch jobs within and across sectors will remain an important challenge.
- Despite a projected decline in manufacturing sector employment the demand for workers qualified with STEM skills will continue to be high, with 95 000 set to retire from this sector in the 2022-2030 period.
- It is estimated around 74% of jobs are unlikely to be significantly affected by the green transition, this high share is driven by the services sector which is largely unaffected. Very few jobs in Flanders are thought to be in opposition (rival) to the green transition and at risk.
- Around 26% of 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%). These green jobs types are heavily concentrated in the circular economy, utilities (energy) and construction sectors, and to a lesser extent also in manufacturing.

Current employment

The current state of the labour force in Flanders is typical of most developed economies, with employment heavily concentrated in the service sectors, as shown in Figure 3-1 below. This shows only 2% employment in the agriculture sector; manufacturing and energy and utilities only 13%; construction 6%; and the remaining 80% or so of employment spread across the various service sectors, with the

share, and absolute employment, in agricultural and manufacturing employment continuing a slow decline since 2010.

Figure 3-1 Breakdown of total employment (salaried + self-employed) in Flanders in 2020



Source: Trinomics figure based on data from NBB.stat

Projections to 2030

Various employment projections have been made for Flanders, including the regional economic projections of the FPB and sector level projections of Steunpunt Werk. These have been key sources for understanding the baseline of employment changes in the coming decade. The challenge for this deliverable has been to build upon these projections and to integrate into a simple forecasting tool the impact of the green transition, which is not explicitly integrated in these baseline projections, although some trends are implicitly included. A key source for estimating the impact of the green transition on employment in Flanders has been the Green Skills projection scenarios developed by Cedefop[94]. These provide scenarios of employment per EU member state, per sector for 2018-2030 which provide very useful insights into the most impacted sectors per country. Cedefop data for Belgium has been used, adapted to Flanders based on the known Flemish share in total national employment per sector.

In summary the projections presented in the remainder of this section provide an estimate of changes in employment built upon these three key statistical sources and projections. As noted at the start of this chapter the estimates here fit within a broader macro, meso, micro landscape of employment and skills assessments being carried out. Amongst the key ways in which data has been used are:

- Historical data (up to 2020) is based directly on published total employment statistics of the NBB;

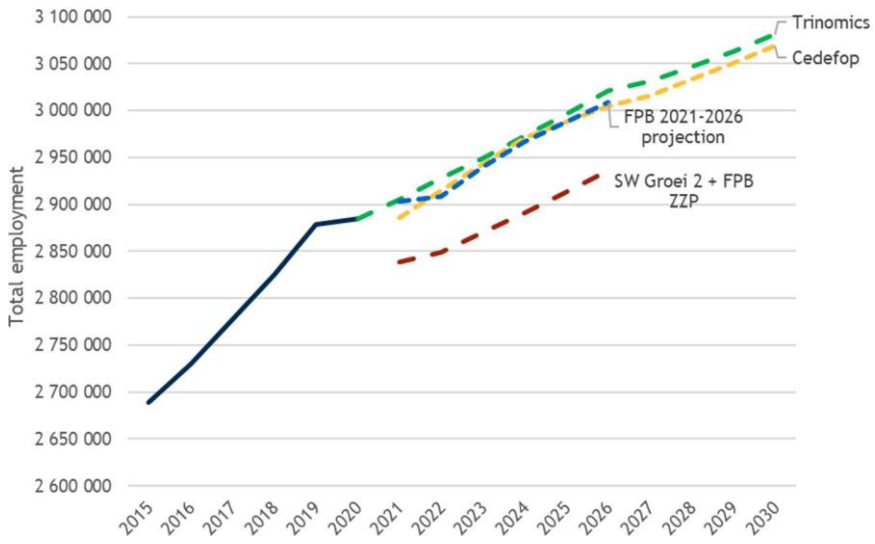
[94] https://www.cedefop.europa.eu/en/publications/4201

- Projections for 2021-2026 are based on a mix of the Steunpunt Werk (SW), Cedefop and FPB projections, the specific assumptions varying per sector, with some general rules applied:
    - A simple average of projected growth rates per sector from the Steunpunt Werk (Groei 2) and Cedefop is taken – on the basis that the Steunpunt Werk data provides a strong dataset and continuity with existing sectoral projections, but that complementing this with the Cedefop projections for Belgium provides insight into the impact of the green transition on sectoral employment.
    - In some cases, where the spread of growth projections was high between SW and Cedefop, then the FPB projected growth was also included in the average.
    - In cases where SW projections for a sector were unavailable then an average of Cedefop and FPB projected growth was used.
- Projections for 2027-2030 are based almost entirely on the Cedefop sector-level projections as these are understood to best represent the time period when the green transition is fully underway.

The following figure 3-2 presents a comparison of the total employment projections, showing the projections resulting from the assumptions above (Trinomics) alongside the other projections. These show a few important points: (1) **all projections anticipate growth in total employment at least until 2026, and likely to 2030**; (2) growth rates are very similar across all projections, although SW has a slightly higher growth rate than the other projections; (3) the Trinomics projection, based largely on an average of the Cedefop and SW growth rates has higher growth than Cedefop, but lower (rate) than SW; (4) differences between the SW dataset and other sources lead to a lower starting point for total employment. This comparison helps to validate the robustness of the projections and their alignment with estimated employment growth rates of SW and Cedefop.

The employment growth in the Trinomics projection totals 94 000 additional jobs between 2022-2026, or a 3.2% growth in employment, whilst between 2022-2030 the figures are 154 200 and 5.3% growth. This is consistent with earlier findings that the green transition is likely to lead to increased employment. However, these growth rates are higher than the projected population and workforce growth in the same period as projected by the FPB which are +1.8% (+123 000 population) and +0.4% (+17 000 working age population) respectively. Therefore, if employment growth did follow the projection then this would be likely to put additional pressure on the labour market in Flanders. Various potential impacts are possible such as: a slower green transition as shortages hinder key sectors; lower unemployment as growth creates more jobs; a possible reduction in the inactive working age population as low unemployment leads to a greater focus on engaging this inactive group; and potentially slower economic growth if additional workers cannot be found. Various measures can also be used to address these impacts, including: prioritisation of green transition and/or skills development in particular sectors; extending working ages; active policies to engage the inactive working age population; increased immigration; skills policy to bring more people into the sectors with highest needs, increased use of automation in some sectors.

Figure 3-2 Comparison of long term total employment projections for Flanders 2015-2030



Note: the Cedefop projection is based on an aggregate of sector level projections for Belgium adjusted to Flanders on the basis of the average Flemish share of total national employment per sector (2014-2019) as per NBB data. The SW Groei 2 projection is based on an aggregation of sector level projection data from SW, however as this data is only for those employed, the self-employed (ZZP) projection of the FPB is added to the SW totals to produce a total employment projection.

Growth and replacement demand projections

The previous sub-section highlighted the overall growth in employment demand anticipated in Flanders, taking into account the most important economic trends, including (but not only) the green transition. This leads to demand for skilled workers in the affected sectors. However, in addition to this two other important factors are at work: (1) retirees, leaving the workforce each year; and, (2) job switching within the workforce, particularly people moving across sectors. Both Cedefop and SW provide estimations of these effects. This work uses the % estimations of these effects per sector from the SW sector projections to estimate the aggregate employment impact relevant for the green transition.

A summary of the main changes at sector level is presented below in Table 3-1, these show that employment growth (expansion demand) is especially concentrated in the service sector and to a smaller extent in the circular economy sector and construction. As shown in section 2.3, most service sectors are not strongly impacted by the green transition, for example a major part of the growth in services employment is found in the health and social care sectors, which is driven by the long term demographic trend of an increasing aged population. Construction and circular economy on the other hand are significantly affected by the green transition, and in relatively speaking the circular economy sector sees the highest growth (+22% compared to 2020 employment). Other sectors that will be heavily affected by the green transition such as utilities (including energy) and manufacturing see a decline in overall employment. However, all sectors to varying extents require new people to join their sector to fill the gaps caused by people retiring in the coming years. This effect far outweighs the expansion demand, ranging from 23%-31% of 2020 employment across the sectors, and is particularly acute for agriculture and the logistics and transport sectors. Replacement demand due to switching between sectors is by far the largest effect, with large movements within and between sectors, totalling nearly 4 million in replacement demand. There are significant differences between the speed of this movement,

it is estimated to be particularly high for the agriculture, services and construction sectors, and much lower for utilities and manufacturing.

Table 3-1 Estimated breakdown of employment demand per major sector, 2022-2030

	Estimated expansion demand 2022-2030	Estimated replacement demand (retirees) 2022-2030	Total change (expansion + retiree) 2022-2030	Estimated replacement demand (non-retirees [sector switching]) 2022-2030	2020 employment	Estimated expansion demand 2022-2030 (As % of 2020 employment)	Estimated replacement demand (retirees) 2022-2030 (As % of 2020 employment)	Estimated replacement demand (non-retirees [sector switching]) 2022-2030 (As % of 2020 employment)
Agriculture (and agri-food), forestry and fishing	-1 880	32 232	30 352	205 687	111 963	-1.7%	28.8%	183.7%
Manufacturing and extractive industries	-18 429	62 768	44 339	158 688	270 735	-6.8%	23.2%	58.6%
Construction	4 923	44 519	49 442	251 096	184 462	2.7%	24.1%	136.1%
Utilities	-84	3 206	3 123	3 622	12 620	-0.7%	25.4%	28.7%
Circular economy*	8 091	9 183	17 274	35 822	36 094	22.4%	25.4%	99.2%
Logistics and transport	-4 294	49 256	44 961	171 682	161 649	-2.7%	30.5%	106.2%
Services	165 902	540 065	705 968	3 123 613	2 106 923	7.9%	25.6%	148.3%
Total	154 230	741 228	895 458	3 950 210	2 884 446	5.3%	25.7%	136.9%

* Defined as NACE sectors Repair and installation of machinery and equipment; Sewerage; waste collection, treatment and disposal activities, materials recovery; remediation activities and other waste management activities; and, Repair of computers and personal and household goods for the purposes of this table.

Looking beyond these high level sectors a few projected changes of importance to the green transition can be highlighted:

- Forestry: a relatively high expected demand (expansion and both types of replacement) in the sector
- Repair and installation of machinery and equipment: this sector is project to see the highest expansion in employment (+37%) in the 2022-2030 period, representing an additional 6 500 jobs in the sector. Similar, albeit lower relative growth is observed in the Repair of computers and personal and household goods sector, adding around 650 jobs in the same period.
- Land and water transport: relatively high numbers of retirees in these sectors requiring significant new influxes of skilled people.
- Professional services: expected growth in jobs (expansion demand) in relevant branches such as architecture and engineering, scientific research and development.
- Other sectors less impacted by the green transition but which see large changes, due to other effects or transitions (e.g. digital) include:
    - Manufacture of textiles, accommodation, food and beverages (Horeca): a relatively high number of retirees to be replaced in these sectors

- Manufacture of pharmaceuticals: one of the few manufacturing sectors with an expected growth in employment to satisfy.
- Computer programming and services, ICT services: a high growth in jobs (expansion demand), nearly 18 000 more jobs (+28%) between 2022-2030.
- Professional services: significant growth in jobs across almost all sub-sectors.
- Residential care activities, social work: recording the highest absolute numbers of new jobs and expansion demand (+58 000 jobs).

Focusing on the sectors for which STEM skills are most relevant for the green transition and in highest demand, i.e. manufacturing, energy and specific professional services, then around 95 000 people working in these sectors are projected to retire in the 2022-2030 period. Whilst in aggregate jobs in these sectors may decline (-7 500 jobs), there remains a highly significant employment gap to fill. This is particularly relevant when there is competition for staff from other sectors less relevant to the green transition but which also demand STEM skills, i.e. financial services, and also when the average movement within a sector is quite high.

Full sector level data can be found in the accompanying forecasting tool Excel file.

Projections split by green jobs type

Returning to the definition of green jobs introduced in section 1.2 it is possible to also provide insight into the number and type of jobs that will emerge in the main sectors. Some work has been carried out to match occupations to the categories[95], and this has been used to inform the distribution within the forecasting tool. However, it should be noted that the assumptions used in the tool are from Trinomics, based on the various desk research carried out in this work, the interviews with key stakeholders and existing work on this topic highlighted previously and finally the expert judgement of the team. Therefore, whilst the results are based on a range of information they should also be treated with a little caution and used more as an indication than for precise estimations.

Applying the green job type categorisation to the sectors which are the focus of this report the forecasting tool outputs are presented in Table 3-2 and Figure 3-3. The table shows that around 74% of all jobs are expected to remain non-green, with minimal impacts from the green transition. This highlights limited needs for new technical skills in this sector, although professional and cross cutting skills remain relevant across many jobs in services. It also shows that the number of green rival jobs for Flanders are expected to be very small, only around 0.2%, and concentrated in the manufacturing and extractive industries and the services sectors that support these. The remaining 26% of jobs are estimated to be green jobs of one sort or another, although the largest type are the Green enhanced skills jobs. The largest numbers are estimated in services, mostly due to sheer size of the sector, large totals are also found in the manufacturing and construction sectors. The latter also contributing some of the highest numbers of Green increased demand and Green new and emerging skills jobs.

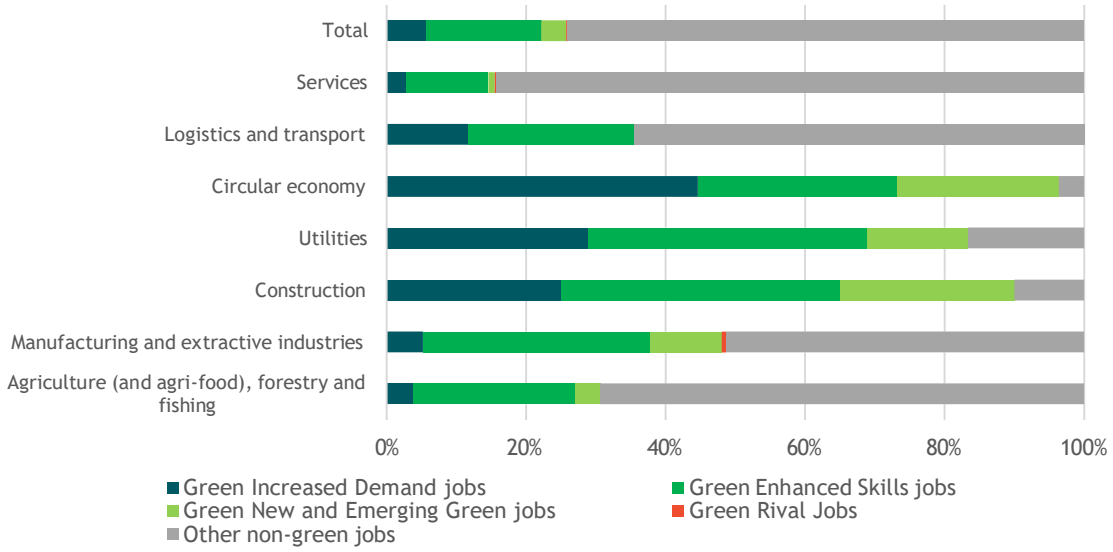
[95] For example: Valero A, Li J, Muller S, Riom C, Nguyen-Tien V and Draca M (2021) Are 'green' jobs good jobs? How lessons from the experience to-date can inform labour market transitions of the future. London: Grantham Research Institute on Climate Change and the Environment and Centre for Economic Performance, London School of Economics and Political Science, available at https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2021/10/Are-Green-Jobs-Good-Jobs_Full-report.pdf

Table 3-2 Estimated employment per sector, per green job type in 2030

	Estimated 2030 employment	Green Increased Demand jobs	Green Enhanced Skills jobs	Green New and Emerging Green jobs	Rival Jobs	Other non-green jobs
Agriculture (and agri-food), forestry and fishing	109 997	4 225	25 460	3 976	0	76 337
Manufacturing and extractive industries	246 169	12 825	80 162	25 270	1 535	126 378
Construction	191 198	47 799	76 479	47 799	0	19 120
Utilities	12 367	3 574	4 947	1 787	0	2 059
Circular economy	45 702	20 396	13 062	10 607	0	1 637
Logistics and transport	156 767	18 443	37 133	0	0	101 192
Services	2 319 364	66 639	271 771	20 823	6 100	1 954 031
Total	**3 081 564**	**173 901**	**509 014**	**110 262**	**7 635**	**2 280 752**
As % of total		5.6%	16.5%	3.6%	0.2%	74.0%

In Figure 3-3 the numbers above are presented as shares of job types within each sector. This shows more clearly the most interesting sectors from a green jobs (and skills) perspective. This shows clearly that the expectations around green jobs are highest in the circular economy, utilities and construction sectors, and to a lesser extent in manufacturing. These sectors see needs for all types of green jobs and nearly all jobs in the sectors are likely to be affected in one way or another. Logistics and transport is notable as not anticipating new and emerging green jobs, but rather seeing greening through increased demand for existing jobs and enhanced skills jobs. As noted previously the services sector although the most numerous in terms of jobs, is among the least affected by the green transition.

Figure 3-3 Split between green job types per sector



3.2 Sector-level skills assessment

Overview of key points in this section

- The ***agri-food*** sector is characterised by facilitating the employment of low-skilled workers. In this context, it is important to support enterprises in the training of their employees, as the jobs may become more complicated under the green transition (need to acquire more administrative, HR- and managerial competences, as well as more knowledge on increasingly stringent climate policies and their implications). Furthermore, there will be an increase in networking and team work skills, analytical skills, entrepreneurship, problem solving skills in addition to the currently standard skillset of farmers.
- In ***Manufacturing, and particularly the energy-intensive industries***, there will be a major challenge to attract employees with sufficient STEM profiles. There will be a need of upskilling of a total 111 000 current employees in four main green themes (durable design and engineering, (renewable) energy, efficient and circular production, green business models). The ***chemical*** sector has identified a structural shortage of employees with a highly technical profile. The ***automotive*** industry will require technical as well as non-technical competences.
- The green transition will also result in a need for upskilling and reskilling in the ***construction*** sector. The required level of skills has increased across all levels in the sector. All workers need more technical and complex skills than before, though the sector is facing issues in finding staff with the adequate skills.
- The ***energy and utilities sector*** is at the heat of the green transition, electricity and heating will require the most major overhaul of any sector, and this is clearly reflected in growth of needs for particular skills in renewable energy, and broader professional skills to effectively manage and implement the transition that will take place.
- ***Circular economy*** requires upskilling of the workforce in several areas. Most importantly, workers need to have an increased understanding of and involvement in the steps occurring before and after them in the value chain. It will require new combinations of skills from workers: a combination of traditional skills (such as manual skills) and more novel skills (such as material sciences); and a combination of soft skills (such as service-related skills) and hard skills (such as programming, operating and repairing equipment).
- For ***logistics and transport*** the green transition will reemphasise many of the ongoing skills challenges in the sector, increasing demand for existing skills profiles. The need for technical skills is highest amongst vehicle operators, whilst professional and cross-cutting skills are most necessary across the sector.
- The ***services sector*** is the least impacted of all the sectors by the green transition, although particular niches, such as architects and engineers, those working in finance, and other linked professional services will also see significant skills impacts from the green transition.
- ***Across sectors*** the importance of both professional and cross-cutting skills should be emphasised, these needs are high across sectors and are required by the highest number of workers. There also appears to be a common difficulty of finding skilled workers who have obtained a formal vocational qualification.

This section builds upon the jobs needs estimates to highlight the main types of skills that will be needed in the most affected sectors in Flanders.

3.2.1 Agriculture (and agri-food)[96], forestry and fishing

The agricultural sector is characterised by facilitating the employment of low-skilled and low-experienced people. This is due to the fact that the required competences of employees are often limited and recruitment is highly focused on the willingness of employees to learn on the job. In this context, it is important to support enterprises in the training of their employees, as the jobs may become more complicated under the green transition. Another major trend in the sector is the upscaling of SMEs. Between 2005 and 2019, the number of agricultural enterprises has declined by about 10 000, while the average surface area of their plots has increased by about half. This leads to significant challenges in the skills requirements of employers and a need for acquiring more administrative, HR- and managerial competences, as well as more knowledge on increasingly stringent climate policies and their implications for their enterprise (e.g. limitations to water usage in a drought). The employees, will also need to acquire more digital competences, need to carry out more complex tasks and will be in charge of relatively larger surfaces. This requires significant upskilling and/or reskilling of both employers and employees in the agri-food sector.[97]

Under the green and low-carbon transition, the surroundings and activities of an agricultural company will become more complex with the combination of agriculture and renewable energy for instance. To adapt to this, technical skills of farm personnel for the optimisation of existing and development of new processes and activities will need to be enhanced. This will require increased networking and team work skills, analytical skills, entrepreneurship, problem solving skills in addition to the currently standard skillset of farmers. Many farmers might seek employees with technical skills in greener technologies to enlarge their activities and help with adapting to the green transition.[98]

3.2.2 Manufacturing and extractive industries

Energy-intensive industries

A major issue will be to attract employees with sufficient STEM profiles, considering the growing gap between STEM graduates and STEM hired employees. A recent study by Roland Berger suggests upskilling of in total 111 000 current employees in four main green themes is necessary to ensure there is adequate knowledge present for the green transition in the energy-intensive sectors, broken down as:[99]

- Durable / ecological design: in 7 000 jobs of scientists, engineers and technicians
- (Renewable) energy: in 34 000 jobs of managers, scientists, engineers, technicians, operators, electricians and electronics
- Efficient & circular production: in 58 000 jobs of managers, scientists, engineers, technicians, operators, production workers, administrative staff, operators of mobile installations, electricians and environment, labour and safety inspectors
- Green business models: in 12 000 jobs of managers, scientists, engineers, sales and support staff in legal, societal and cultural affairs

[96] The agri-food sector expands the definition to include agriculture (NACE code 01) and also the manufacturing of food products and beverage sectors (NACE codes 10 and 11), this is useful as these sectors are very closely linked.
[97] Vlaamse Regering (2021). Sectorconvenant 2021 – 2022 afgesloten tussen de Vlaamse Regering en de sociale partners van Groene sectoren.
[98] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 - De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.
[99] Roland Berger (2021). Skills roadmap voor de Vlaamse klimaattransitie – Focus op de energie-intensieve sectoren [2020-2035].

To enable the upskilling in the aforementioned green skills, but additionally in digital and soft skills, there is a need for an increase in the sector-specific training capacity. This also entails a need for a bigger focus on green themes in education and trainings and the establishment of a lifelong learning culture.[100]

Chemical sector

The chemical sector has identified a structural shortage of employees with a highly technical profile. This is partly caused by the increasing demand for specialised skills which cannot be trained (upskilling). An additional factor is that interdisciplinary skills are increasingly necessary and difficult to find on the labour market. The sector has tried to address these issues through collaborations with universities and higher education for building a talent pipeline and increasing the chemical sector's attractiveness. The sector also indirectly benefits from investments into STEM profiles from the government.

Automotive industry

Training of employees was identified as an essential element to achieve the sector's 2030 targets in the automotive sectoral covenant.[101] To this end, the following technical competences are highlighted which serve to optimise the functioning of vehicles and could contribute to decreasing their carbon emissions:

- Knowledge of vehicle-specific characteristics;
- Knowledge of infotainment, ICT and telecom technology (Bluetooth, internet connection, ...);
- Diagnosis of vehicle defects;
- Maintenance and repair of electrical systems;
- Calibration of driver assistance systems.

Furthermore, the following non-technical competences will be essential, especially in the context of the modal shift:

- Using digital marketing channels;
- Organising mobility services;
- Negotiating with strategic partners.

Survey results

According to the stakeholder survey, industry representatives[102] are rather concerned about the gaps in skills within their sector. Stakeholders were asked to rate the extent of the gaps in skills (from 1 to 5, 5 being the highest). Out of the 9 responses received the average response was 3.8. They also provided feedback on whether have a difficulty in finding skilled workers to fill jobs in your company and/or sector. For jobs where no formal qualification or degree is required the difficulty was rated as 3.7; **for jobs where employees are required to have obtained a formal vocational qualification the difficulty to find worked was rated much higher at 4.7**. The last group (jobs where employees are required to have obtained a university degree) was rated as least difficult (3.5). They were also asked about the difficulties these skills gaps lead to for their sector/organisation. Out of the 9 responses received from the industry the following were mentioned:

- We need to turn down work we could otherwise do (n=6);
- Our work is compromised due to delays (n=8);

[100] Ibid.
[101] Vlaamse Regering (2021). Sectorconvenant 2021 – 2022 afgesloten tussen de Vlaamse Regering en de sociale partners van Autosector en aanverwante sectoren.
[102] Further unspecified.

- Our work is compromised due to reduced quality (n=6);
- Our growth and profitability is hampered (n=6);
- Our company is more reluctant to invest in Flanders(n=2); and
- We have less time and resources to invest in innovation, research and/or training (n=2).

When asked to estimate the extent of the impact that the green transition will have on their respective company / organisation, industry stakeholders mainly responded that they indeed have an estimate (n=6). In 4 cases they are expecting significant impact on our company / organisation and in 2 cases only a minor impact. Stakeholders also provided input about the types of green skills that will be most important in their sector. All types of skills suggested (technical occupation specific skills, professional, cross-sectoral skills (STEM skills, analytical skills, management skills, soft skills etc.) and environmental literacy and awareness skills were considered approximately equally important – rating between 3.4 and 3.7 out of 5.

3.2.3 Construction

In Flanders, the green transition is creating a need for upskilling and reskilling in the construction sector. In total, 57% of all Flemish companies are predicting an increasing need for training in new techniques and adaptation of building practices under new green regulations. In general, the required level of skills has increased across all levels in the sector. All workers need more technical and complex skills than before. However, the majority of construction companies in Flanders are SMEs, which are particularly sensitive to issues in finding staff with the adequate skills.[103] Additionally, cooperation between different teams with separate specialisations is increasing. The job transformation due to new techniques and regulations will require additional knowledge of workers on for example energy efficiency, water management and renewables in construction of buildings.[104]

According to the reno-VLAMT study (2021) on competence predictions for the Flemish construction sector, the greening and circular economy trends will have a significant impact on the necessary competences in the sector. In general, construction workers will be required to have increased knowledge of green and sustainable materials and technologies. One of the biggest impacts will come and is already coming from the need for increased energy efficiency. This will require the upskilling of a large number of employees and specifically for the following professions: electricians; plumbers (including installers of heat pump boilers, biogas systems central heating, sanitary and thermal equipment); carpenters and joiners; bricklayers; and technicians (including heating, ventilation and air conditioning). Furthermore, some broader skills are needed in the construction sector: flexibility, assessment of risks, creativity, problem-solving and asking for help or support. A change in mindset or attitude will be needed to incorporate lifelong learning in the sector's culture and to ensure employees are resilient and can adapt to the changing skills needs. The knowledge requested for jobs in the construction and renovation sector will become increasingly complex and more employees will need a more complex set of skills.[105]

Survey results

Representatives of the construction sector also responded to the stakeholder survey. Unfortunately only 2 responses were received in this case, so the representativeness of the results remains limited.

[103] OECD (2017). Boosting Skills for Greener Jobs in Flanders, Belgium.
[104] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 - De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.
[105] Constructiv. Website: Competentiebeheer.

Regarding the extent of gaps in skills in their sector, which was rated 3.5 (from 1 to 5, 5 being the highest). They also provided feedback on whether have a difficulty in finding skilled workers to fill jobs in your company and/or sector. For jobs where no formal qualification or degree is required the difficulty was rated as 4; for jobs where employees are required to have obtained a formal vocational qualification the difficulty to find worked was rated much higher (5). The last group (jobs where employees are required to have obtained a university degree) was also rated as difficult (4.5). regarding the impacts of these skills gaps stakeholders mentioned was hiring workers from abroad or other sectors. It was also mentioned that work needs to be tuned down, there are delays and hampered growth.

All types of green skills suggested (technical occupation specific skills, professional, cross-sectoral skills (STEM skills, analytical skills, management skills, soft skills etc.) and environmental literacy and awareness skills were considered approximately equally important – rating between 4 and 5 out of 5. technical occupation specific skills were rated as most important.

3.2.4 Utilities

Renewable energy

The main sought after skills and knowledge for dealing with the green transition differ according to the type of job within the energy sector. In general, these skills relate to the need for ecological awareness and system thinking to apply green practices in all parts of the value chain and business processes.[106]

- Managers: social skills (communication and networking), financial skills, problem solving skills, creativity, sense for action, leadership, flexibility, entrepreneurship, regulatory knowledge, commercial knowledge and knowledge of the environment and climate.
- Engineers: specific technical skills for new (renewable) technologies, communication skills, broader social skills, team work.
- ICT specialists: programming and ICT skills, energy network management, social skills.
- Installation and maintenance jobs: specific new skills related to renewable energy such as installation and maintenance of smart meters, maintenance of wind turbines, pre-treatment of biomass, etc.

The renewable energy and energy efficiency industries usually require higher-skilled employees such as technicians, scientists and engineers. Job growth as a result of the green energy transition will occur mostly for high-skilled labour. Nonetheless, many lower-skilled jobs, especially installations, remain essential for the expansion of RES.[107] Indications from REPOWER suggest that a few skills types will become increasingly important in Flanders in the coming years, especially technical skills in hydrogen, onshore wind permitting and biomethane production.

3.2.5 Circular economy

The circular economy requires upskilling of the workforce in several areas. Most importantly, workers need to have an increased understanding of and involvement in the steps occurring before and after them in the value chain (i.e. vertical integration). As mentioned in the study by the Koning Boudewijnstichting (2022), “It will moreover likely require new combinations of skills from workers: a combination of traditional skills (such as manual skills) and more novel skills (such as material

[106] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 - De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo’s.
[107] Federaal Planbureau (2013). Walking the green mile in Employment: Employment projections for a green future.

sciences); and a combination of soft skills (such as service-related skills) and hard skills (such as programming, operating and repairing equipment)." The circular economy has a need for workers with both academic and practical education, across all fields of knowledge.[108]

Waste management and recycling

Regarding waste management, the general pattern is that the level of qualification in the waste management sector is likely to increase in the context of a transition to a Circular Economy, because the **least qualified jobs** (landfilling) **will tend to disappear**.[109] As such there will be a need for **new skills for** existing jobs within the sector, specifically for **waste collectors.** They include separating organic waste so that it can be used for composting. At the same time, there will be **many new occupations** in the sector, such as waste prevention managers, recyclers of electronic waste, process engineers and technical staff.[110]

3.2.6 Logistics and transport

Transport and logistics sector

Under the green transition, the transport and logistics sector will need to ameliorate the management of transportation streams for example to avoid trips with empty or partly empty vehicles. This will not only require increased social skills such as team work, communication and networking; but also increased ICT skills, analytical skills and knowledge of environmental regulations. This will impact several types of jobs: managers, transport experts, planning experts and administrative staff. For truck drivers, environmental consciousness as well as sustainable driving skills can positively influence the emissions while driving and thus decrease the environmental impact of the sector.[111]

Survey results

Representatives of the transport sector (n=9) also responded to the stakeholder survey about the extent of gaps in skills in their sector, which was rated 3.55 (from 1 to 5, 5 being the highest). They also provided feedback on whether have a difficulty in finding skilled workers to fill jobs in your company and/or sector. For jobs where no formal qualification or degree is required the difficulty was rated as 2.5; for jobs where employees are required to have obtained a formal vocational qualification the difficulty to find worked was rated much higher at 4.3. The last group (jobs where employees are required to have obtained a university degree) was rated as less difficult (2.8). As to the difficulties the shortages lead to stakeholders mention turning down work or compromises due to delays. Stakeholders also provided input about types of green skills that will be most important in their sector. All types of skills suggested (technical occupation specific skills, professional, cross-sectoral skills (STEM skills, analytical skills, management skills, soft skills etc.) and environmental literacy and awareness skills were considered approximately equally important – rating between 3.4 and 3.7 out of 5.

Flemish ports

According to a study (Van den Broeck, 2019) focused on the Flemish port sectors, there are several key 21st century skills: global awareness, financial and economic consciousness, ecological consciousness and attention for sustainability (also called environmental literacy). These are often accompanied by other skills such as the ability to learn, ICT skills and career-wide skills such as cooperation,

[108] Koning Boudewijnstichting (2022). Werken in een meer circulaire economie: Horizon 2035.
[109] Trinomics (2021). EU Social Partners' Project on Circular Economy – Final Report.
[110] Strietska-Ilina et al. (2011). Skills for green jobs: A global view: synthesis report based on 21 country.
[111] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 - De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.

communication, flexibility and productivity. The main skills needed for the green transition are ecological consciousness and attention for sustainability. This entails the ability to take the impact of our behaviour on the environment and climate into account. However, the study demonstrates that this is not a skill which is frequently required when applying for job vacancies and only appears for chauffeurs and operators. On the other hand, being conscious of relevant societal trends and transitions (global awareness) and how these will influence your job and company, is regarded as a very important skill. Approximately one fifth of job vacancies in the Flemish Ports and surrounding sectors mention it as a requirement.[112]

Another study by Sys & Vanelslander (2018) does not specifically mention any green skills which will need to be increased for the green transition. The major trends that will have a substantial impact are automation and digitalisation. Jobs at risk of automation are primarily administrative jobs and jobs with routine cognitive tasks. Further, employees will be required to be multi-skilled, possessing several general skills such as flexibility, communication, language skills, ICT, organisation, etc. This will lead to a higher educational requirements for many future port employees.[113]

3.2.7 Services

Business consulting services and the finance sector are also undergoing change in skills requirements. Existing occupations in this sector are becoming greener, and a number of new occupations are emerging. Change is driven by regulation and by emerging market opportunities, for example in areas such as carbon trading. The most prominent and widely referred to **emerging occupations** in this field are **environmental consultants and auditors**. **Established occupations in the finance and banking sector will also undergo changes** as a result of climate change mitigation and adaptation needs. Managers, loan officers, investment bankers and venture capitalists need to factor in and assess the climate risk attached to their credit portfolio**. Commercial lawyers need new competences** to offer legal advice on projects with an environmental focus, and **technical and financial back-office clerks** need additional skills to comply with new regulations.[114] There are also number of emerging occupations, such as monitoring compliance with legislation or experts working on eco-design. Existing occupations will also be expanded, for example in relation to energy audits and energy consultants, in order to adhere to the EU energy requirements for buildings.[115]

3.2.8 Intersectoral skills needs

As identified in chapter 1, skills needs encompass technical skills (specific to occupation), professional skills (applied across occupations) and cross-cutting skills (adopted more broadly by workers and society). The previous sections have focused primarily on the first two of these categories, and professional skills remain important across all sectors. However, it is important not to neglect the cross-cutting skills also highlighted. Indeed, previous work for Cedefop (see Figure 3-4) has highlighted that it will be crucial for employees to develop a balanced set of skills containing both general green skills and technical skill. General green skills (i.e. cross-cutting skills as identified above) are those needed by the highest share of the workforce, after generic skills.

[112] Van den Broeck (2019). 21st century skills voor de havengebieden: Verkennend vacatureonderzoek naar actuele 21st century skills in de havengebieden.
[113] Anton et al. (2018). De toekomst van de arbeidsmarkt in de haven van Antwerpen.
[114] Strietska-Ilina et al. (2011). Skills for green jobs: A global view: synthesis report based on 21 country.
[115] Ibid.

Figure 3-4 Skills matrix for green jobs

Bron: Cedefop Briefing Note Skills for green jobs, blz 2

Source image: Cedefop (2010), 'Skills for green jobs: European synthesis report'

Overall, the biggest developments are projected to be in the redefinition of skills in existing (traditional) sectors. In additional to industry specific (technical) skills, and essential need for the green transition will be transversal skills such as: management skills and knowledge on necessary techniques; skills on innovation and management for change; communication skills; and generic skills.[116] A current shortage is experienced for many of these skills for the green transition can be explained by (1) an underestimation of growth in green sectors; (2) overall shortage of STEM profiles such as scientists and engineers; (3) low attractiveness of some sectors such as waste management; and (4) the lack of a structure for facilitation of skill creation / upskilling.[117]

In order for Flanders to stimulate these, and all skills mentioned in the previous sub-sections, there are three main types of possible interventions. First, investments to strengthen the skills level of the working population though upskilling. Governmental regulations can provide incentives for employers, but education and trainings need to comply more with the needs of the labour market. Second, anticipatory labour market policies which are more capable of dealing with the changing labour market and can avoid labour shortage occupations. Third, the reorientation of employees to green jobs though a skills-based matching system.[118] The responsibilities, policies and activities to address skills needs are addressed in chapter 4.

[116] https://www.oecd-ilibrary.org/employment/boosting-skills-for-greener-jobs-in-flanders-belgium_9789264265264-en
[117] International Labour Organisation (2011). Skills for Green Jobs: A Global View.
[118] https://publicaties.vlaanderen.be/view-file/8770

4 Overview of Flemish actors involved in green transition

4.1 Overview of stakeholders and competences

Overview of key points in this section

- Employers are already facing staff shortages in Flanders, the main responses to these shortages are to hire under-qualified staff and train them on-the-job; and to increase training for existing employees. Although more than 1/3 of firms also address the problem by hiring from outside of the region.
- A large majority of employers indicated in the survey that they see a responsibility and are willing to offer internal and external training to address skills gaps. At sector level, a role is seen for improved mapping of gaps and in developing a sector strategy to address these.
- The stakeholder landscape for skills in Flanders covers multiple public, private and other stakeholders, including government departments, employment advisory services, education and training institutions, employers and sector organisations, unions, research institutions, agencies and others.

The following section presents some of the main stakeholders for skills development in Flanders and how they work together or are responsible for similar topics. It also indicates any relations to skills for the green transition as relevant in the context of this study.

4.1.1 Overview of all stakeholders and their readiness to support up- and re-skilling

As part of the exercise under DLV2 an overview of Flemish stakeholders involved in the green transition was carried out. In total 61 stakeholders from 6 stakeholder groups have been identified:

- Public authorities (including governmental departments and EU-level actors);
- Advisory bodies;
- Sectoral organisations;
- Education and training provides;
- Civil society & NGOs; and
- Research & academia.

For a detailed overview of all the stakeholders identified and approached in the course of DLV2, please refer to Annex III. The identified (as well as additional[119]) stakeholders have been approached for feedback to the stakeholder survey, the responses to which have been considered to reflect on stakeholder willingness to support the changes in the changes in the labour market resulting from the green transition as well as up- and re-skilling.

Strategies of employers to fill gaps in the job market

It has been identified that employers are currently facing a challenge of employee shortages. To bridge this gap some stakeholders already have strategies in place. The most common approach (70% of respondents) is to hire employees that are not yet fully qualified for the specific job and to train them on-the-job, followed by a more intense / increased training of the existing employees (54%). Other strategies deployed by stakeholders are, for example, to look further away, including outside Flanders /

[119] In addition to the stakeholder mapping (included in Annex III) 99 additional stakeholders have been identified and approached when disseminating the stakeholder survey.

Belgium, for skilled staff (34%) or to offer internal job mobility (36%). The focus on increased training of existing employees is crucial as most of the 2030 workforce are also the 2022 workforce. Enhancing training and encouraging a lifelong learning culture is essential to deal with the green transition in the most affected sectors.

Actions stakeholders are prepared to take to adapt to the green transition

From the stakeholders that have responded to the targeted survey, many of those are already taking action and/or are prepared to do so in the future to support the green transition and the need for up- and re-skilling of workers. Most commonly employers are willing to provide either internal (69%) or external (69%) trainings for employees. Other actions that stakeholders are willing to take include preparing an inventory of missing skills / competences with their respective organisations and/or sectors (61%) or development of a strategy for their respective sector and/or organisation to adapt to the green transition (61%).

The following sections provides a more detailed description and the role of the main stakeholders identified.

4.1.2 Flemish governmental departments

Department Werk en Sociale Economie (DWSE)

The department for work and social economy is responsible for the preparation, implementation and monitoring of policies related to the labour market and social economy. Additionally, they manage the European Social Funds (ESF) in Flanders. DWSE has a knowledge platform that gathers new developments, research, webinars, etc. on six different topics: wellbeing and organisation; learning; inclusive society; economy; environment; and governance. In line with the general areas of interest of the department, skills development, lifelong learning and the green transition are key topics on this platform.[120]

Department Omgeving

The Flemish department for environment is highly involved in stimulating the green transition. Some challenges to this end relate to the labour market and skills mismatch, but also a lack of general ecological awareness. To broaden the knowledge of the general public on the green transition, the department established the '*Duurzaam Educatiepunt*' where assistance is given to education providers that want to increase the focus on the green transition and all related topics in the curricula of their courses and training offerings.[121]

Department Onderwijs en Vorming

The Flemish department of education is, naturally, one of the main stakeholders in the skills development related to the green transition. They are responsible for the funding, support and guidance of all Flemish educational organisations and the functioning of the entire education system. The department also coordinates the activities of institutions such as AHOVOKS, which is also considered as a stakeholder in the context of this study.[122]

[120] Vlaamse Regering. Website: Kennisplatform Departement Werk en Sociale Economie.
[121] Vlaamse Regering. Website: Duurzaam Educatiepunt.
[122] Vlaamse Regering. Website: Onderwijs en Vorming.

AHOVOKS

This is the Flemish agency for higher education, adult education, qualifications and study grants with their main goal being to stimulate a culture of lifelong learning for every citizen. They work in close collaboration with education partners, VDAB, SERV, Syntra, VLOR, etc. One of their projects is generalise and facilitate the recognition/qualification of skills (*Erkennen van Competenties* EVC). Furthermore, they develop the curricula and redesign the so-called learning outcomes (eindtermen) of educational programmes based on European core competencies, in cooperation with educational institutions. Therefore, they have an influence over the incorporation of green transition related themes in the curricula of the Flemish education system.

4.1.3 Vlaamse Dienst voor Arbeidsbemiddeling en Beroepsopleiding (VDAB)

VDAB is the Flemish public service for employment and is responsible for implementing policies on employment mediation and professional trainings. They work on all sides of the labour market through efficient matching to provide perspective on jobs for each citizen and provide talents for each employer. The aim is to increase the employment rate and activation of the non-active working population. The VDAB ensures that job-seekers in Flanders find the most suitable jobs and develop a skillset to complete their task in an efficient manner. To this end, several key activities of the VDAB are related to skills development and can be extended to the green transition and the skills necessary to achieve the transition.

First of all, VDAB manages the Flemish skills database 'Competent'. Here a so-called professional skills profile is established for a broad range of jobs in Flanders. It includes the name of the profession (and similar professions), a description of the job and an overview of the skills required for this job. These skills include the essential skills which should be present in each employee of this profession; optional skills that are often present but can depend on the context (e.g. large or small firm); and soft skills that show what is needed for an employee to excel in the profession. The database also includes references to international databases such as ESCO and ISCO[123]. The labour market is continuously monitored and the database is updated according to the disappearance or creation of jobs and skills. The dynamic nature allows for the content to be updated rapidly with labour market information and new developments such as the green transition. For instance, one can rapidly identify which new activities and associated skills have been generated as a result of the use of renewable energy sources.[124]

The VDAB organises training courses. The VDAB uses for instance the information from the 'Competent' database not only to match jobseekers based on their skills, but also to organise training activities. These are aimed at increasing the preparation of jobseekers for the labour market or assisting employees in a change of career. The green transition is very much a topic of importance in several training courses they provide. Some examples of green-skills specific training are: modules of installing solar panels and solar water heaters, training plans on insulating building shells and roofs and on wood frame building, etc. However, also in the general existing training such as for stonemasons, carpenters, auto mechanics and professional cleaners, green skills are increasingly being incorporated. More

[123] ESCO = European Skills, Competences, Qualifications and Occupations; ISCO = International Standard Classification of Occupations
[124] VDAB. Website: Beroependatabank Competent.

specifically, during the training, attention is paid to the combination of the various disciplines with environmental, safety and sustainability topics.[125]

4.1.4 Steunpunt Werk

Steunpunt Werk is a research centre at the KU Leuven which aims to support the Flemish labour market on the basis of research, analysis, data and advice. They work at the behest of several federal and regional authorities and are financed by the Department of Work and Social Economy of the Flemish government. The research centre focuses mainly on data collection, analysis and management. This can be in the form of labour market indicators, labour market projections and data from both the supply and demand side of the labour market. Furthermore, they support the VDAB and DWSE with specific analysis such as the monitoring of the labour market and lifelong learning and the impact of the Covid-19 crisis on the labour market.[126]

One of the most relevant projects in the context of green skills of *Steunpunt Werk* is the competence prognose model they are currently establishing. Their aim is to model the evolution and predict the future demand and supply of labour on a sectoral, profession and competence level. Based on this projection, they want to map the future mismatches on the Flemish labour market. This exercise is an essential part of the bigger "learning and career offensive"[127] which was put forward to stimulate the recovery of the Flemish labour market. Naturally, the modelling of future competences in the Flemish labour market will also include green skills, although not necessarily as one of the main categories.[128]

4.1.5 Sociaal Economische Raad van Vlaanderen (SERV)

The Social Economic Council of Flanders is where the social dialogue between all social partners happens. It brings together the Flemish employer's organisations (Voka, Unizo, Boerenbond en Verso) and the employees' organisations (ACV, ABVV and ACLVB). Together they give advice to the Flemish authorities and set up agreements on important socio-economic issues. They try to draw the authorities' attention to topics such as the labour market, circular economy, digitalisation and climate change. To facilitate their activities, the SERV is responsible for organising (secretariat) the bipartite discussion between the employers' and employees' organisations and the tripartite discussion which also includes the Flemish government and is called the *Vlaams Economisch Sociaal Overlegcomité* (VESOC). Furthermore, the SERV was involved in creating the 'Competent' database, of which the activities are explained above.[129]

4.1.6 Vlaanderen Circulair (OVAM)

Vlaanderen Circulair is part of the Flemish Public Waste Agency (OVAM) and considered as the hub, inspiration and matchmaker for the circular economy in Flanders. One of the levers they identified which could accelerate the circular transition is jobs and skills. By investments in qualified, well-trained employees will direct innovations to the circular domain. Through this lever, they aim to inspire the various work agendas (e.g. bio-economy, circular construction, circular manufacturing, etc.) with current initiatives that are part of a broader transition to a low-carbon economy: the competence forecasts, actions from the action network on energy-intensive industry, opportunities for cooperation

[125] Van Humbeeck & Van Peer (2012). Promoting Green Skills in Flanders: Joined-up Initiatives of Social Partners and Government.
[126] Steunpunt Werk. Website: Over Steunpunt Werk.
[127] De Vos et al. (2021). Naar een leer- en loopbaanoffensief. Tweede advies arbeidsmarktexperten.
[128] Steunpunt Werk. Website: Competentieprognoses.
[129] SERV. Website: Wat doet de SERV?.

with the social economy, initiatives from other sectors (e.g. textile sectors) and innovation actors (e.g. pilot projects on industry 4.0, spearhead clusters) and involve the partners of Flanders Circular in the creation of the green skills roadmap.

4.1.7 VLAIO

VLAIO is the Flemish Agency for Innovation and Entrepreneurship with several key related responsibilities. First of all, to stimulate growth, transformation and innovation they financially support companies through grants. Second, they promote entrepreneurship by guiding companies from a start-up stage to acquisition as well as stimulate networking. Third, they support organisations that initiate cooperation and dynamics within clusters. Lastly, they promote environmental aspects such as improving a company's facilities. In the context of green jobs and competences, they play an important role in directing Flemish innovation and entrepreneurship toward sustainability. For instance, they provide a subsidy called the '*Ecologiepremie+*' which provides financial compensation for companies that make ecologically sound investments. The main goal here is to encourage companies to organise their production process in an environmentally friendly and energy-saving way and thus cover part of the extra investment costs that such an investment entails.[130]

4.1.8 Other actors

There are several additional actors that play an important role in the development of competences and the labour market. The full list of actors who were identified in this study, can be consulted in Annex III. This section includes some more general categories of actors.

Trade unions

The trade unions represent the interests of the employees that are affiliated with them. The three Flemish trade unions ABVV, ACV and ACLVB and their units have ongoing projects and campaigns on green jobs and green skills. Some examples of such campaigns and actions are: '*12 engagementen in het syndicaal klimaatakkoord*', '*Verander mee de wereld*', '*Loop storm voor het klimaat*', '*Waardig werk tegen de crisis*', etc. The trade unions also provide internal training where topics such as the environment, economy and sustainability are addressed. Importantly, it will not be easy for employees to embrace a greener economy when in some sectors, since they could be the very people who fear that it will bring job losses.[131]

Training providers

There are several actors which provide trainings, both public and private. So-called centres for adult education (*Centra voor volwassenenonderwijs – CVO's*) are responsible for providing part-time training courses, at the level of secondary education and higher vocational education, often aimed at adults. For instance, SYNTRA is a network of training centres (5 in particular) in Flanders and Brussels, that offers programmes in dual learning, full-time educational courses, professional part-time education and shorter training courses. Private training providers can be found embedded in sectoral organisations and sector funds (see below for more information). All training providers are an essential component in the development of skills for the green transition. They can direct applicants towards trainings in these skills and ensure a varied and large enough supply of trainings in green skills and green jobs.

[130] VLAIO. Website: Agentschap Innoveren en Ondernemen.
[131] Van Humbeeck & Van Peer (2012). Promoting Green Skills in Flanders: Joined-up Initiatives of Social Partners and Government.

Sectoral funds

The main responsibility of sectoral funds is to ensure that there are sufficient and well-trained employees within their sectors. Their activities are aimed towards students from regular education, employees and job-seekers, as well as employers for the provision of guidance. Within the framework of the sector covenants that sectors conclude with the Flemish Government via the sectoral funds, actions are also provided to promote diversity and proportional labour participation within sectors. On the one hand, they can provide a clear overview of the needs from employers, related to green skills and pass this information on to the responsible actors. On the other hand, they can undertake actions themselves such as: providing free trainings, sector-specific subsidies or premium systems to finance competence development; providing information and advice (on training, quality control, financing opportunities for training, etc.); providing instruments (for the development of training plans, for the detection of training needs, etc.); and developing databases, didactic material, etc.

Some examples of sectoral funds are: Educam for the automotive sector; Constructiv for the construction sector; EduPlus for, amongst others, the agricultural sector; FRB-FRI for the shipping sector; Co-valent for the chemicals, plastics and life sciences sectors. A full overview of the Flemish sectoral funds is available on the website of VLAIO (Overzicht Sectorfondsen).

4.2 Inventory of current initiatives on skills for green transition

Overview of key points in this section

- Skills are identified within the main Flemish economic strategies as an issue, albeit one of many issues. Within these and broader policies there is a focus especially on improving lifelong learning culture and practice, and also on promoting STEM skills, improving basic and digital literacy, and working with sectors (e.g. sector covenants, SCOPE studies) to better understand needs.
- The green transition in Flanders is primarily planned through the energy and climate plan (VEKP) but this needs to be updated to better reflect the policy developments of the last few years, including the European Green Deal and Fit-for-55.
- At EU level the Green Deal and Fit-for-55 and the various policies and Directives under these are the main drivers of the green transition. In addition to these the Green Employment Initiative, European Council recommendations on a fair and green climate neutral transition as well as on learning for the green transition and sustainable development, and the EU industrial strategy each contribute to shaping EU and MS responses to the green transition. In addition EU skills policy is active with initiatives such as GreenComp, the European Skills Agenda, Skills4Climate, BuildUp Skills and others supporting MS to address the various issues.
- There are multiple ongoing initiatives on green skills already active in Flanders led by various agencies including sectors, many of these tend to have a focus on manufacturing industries and STEM skills.
- Education and training programmes in Flanders are working on a number of small initiatives to better tailor frameworks and programmes towards the key issues for skills for the green transition, with lifelong learning and STEM skills among the main focal issues.

This section provides an overview of what the different stakeholders are doing to meet the challenges on the Flemish labour market concerning jobs and skills for the green transition.

4.2.1 General labour market and green transition initiatives and policies

Flemish policies related to the labour market contain an increasing awareness of a need to be resilient and to have the ability to adapt to the ongoing major transitions that will affect all areas of society and the economy. Topics that are addressed by the Flemish government and can be linked to the green transition and green skills include lifelong learning, upskilling, reskilling, knowledge and attitudes, skills mismatches, Science Technology Engineering and Mathematics (STEM)-skills, digital skills, non-cognitive skills and the capacity to learn and adapt. The following Flemish policies can be relevant for understanding the broader skills transition.

Vision 2050 - long-term strategy for Flanders

This is the long-term strategy for how Flanders can respond to opportunities and challenges brought forward by the ongoing and future transitions. The strategy describes the major trends that will affect Flemish and international markets[132]:

- Demographic trends: population growth, aging population and increasing migration
- Scientific and technological trends: disruptive technological changes (internet of things, artificial intelligence, genomics, 3D printing, etc.)
- Ecological trends: climate change and resource depletion
- Economic trends: disruptions because of technological breakthroughs, shift of the global economic centre to the East, industrial revolution, new relations between producers and consumers, circular economy and renewable energy
- Political trends: geopolitical relations
- Societal trends: diversity and individualism

One of Flanders' priorities under the strategy in order to respond to these transitions is to establish a lifelong learning culture and stimulate dynamic and resilient employees through a prioritisation of adult learning, upskilling and reskilling.[133]

Vision 2030

This strategy interconnects the Flemish Vision 2050 and the United Nations' Sustainable Development Goals (SDGs). Of importance for the context of this study is mainly SDG 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". Related to SDG 4, one of the aims is to enhance lifelong and life broad learning by offering trainings and courses that provide a solid basis of knowledge, skills and attitudes which, besides increasing competences, strengthen resilience and societal participation.[134] However, other SDGs can also be considered relevant such as SDG 8: "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all".[135]

STEM agenda 2030

This is a strategy to stimulate young people to choose STEM education, professions and careers to address the mismatch in demand & supply for technical occupations. In addition, it aims to strengthen the skills needed for STEM in broader society by focusing on so-called STEM-literacy. The agenda

[132] Vlaamse Regering (2016). Visie 2050 – Een langetermijnstrategie voor Vlaanderen.
[133] The Policy Note 2019-2024 provides the motivations behind the strategic choices of the Flemish minister for Economy, Innovation, Work, Social Economy and Agriculture. The green and circular transitions will create new jobs and initiate shifts within and between sectors. Several competences will be essential to fill these jobs and the note mentions STEM-skills, digital skills, non-cognitive skills and the capacity to learn and adapt.
[134] Vlaamse Regering (2019). Vizier 2030 – Een 2030-doestellingenkader voor Vlaanderen.
[135] United Nations (2021). Goal 8.

mentions that STEM competences are important to reach the EU Green Deal ambitions and especially to enlarging the Flemish circular economy.[136]

Strategic literacy plan

The strategy for 2017-2024 addresses the weak literacy and digital skills of sub-groups in society. The interconnection of digital and green skills is mentioned extensively. Additionally, the strategy highlights the importance of ensuring that all sub-groups of society can partake in the job market and contribute to the green transition. This includes young people in secondary school, underprivileged people and job seekers. (Digital) literacy is an important building block to acquire other skills. The plan contains five main goals namely, (1) increase the number of young people leaving secondary school with sufficient literacy competences; (2) break cycles of generational illiteracy in families; (3) strengthen literacy competences of job seekers and employees; (4) enhance literacy competences of people in poverty; and, (5) Increase digital literacy of the entire society.[137]

'Alle hens aan dek'

This plan is part of the "*VESOC-akkoord*" between the Flemish government and the Flemish social partners to relaunch the labour market for the post-Covid crisis recovery. To address the shortage of available workers, skills mismatches and the lack of lifelong learning a budget of €190 million was allocated. Three priorities are introduced namely: (1) developing lifelong learning; (2) realising the digital transformation; and, (3) employing as many workers as possible in sustainable (long-term) jobs.[138]

Action plan on lifelong learning

Flanders is lagging behind on developing a lifelong learning culture which is essential to create resilient employees that are able to cope with the far-reaching consequences of the current and upcoming major transitions. The plan contains the following actions which are meant to achieve the lifelong learning goals: (1) building knowhow; (2) raising awareness and mobilising people; (3) giving competences a central place in the economy and society; (4) increasing support and guidance; and, (5) stimulating collaboration and partnerships. It is difficult to predict which jobs and sectors will grow in importance during the coming decade which shows the crucial role of lifelong learning. An essential element will be to develop 'transversal skills' which can be used in diverse contexts.[139]

Other relevant initiatives related to the labour market

Sector covenants - These are collaboration agreements between the Flemish government (e.g. DWSE) and the sectoral social partners with in this instance, the aim of aligning the educational system and the labour market, with particular emphasis on lifelong learning and diversity. These exist for several large sectors in Flanders such as construction, industry, services, sales and logistics. The Flemish government monitors and evaluates all sector covenants annually. The covenants are negotiated between sectoral social partners and the government (e.g. Minister of Work and Social Economy; Minister of Education and Training). Other stakeholders such as VDAB, SYNTRA Flanders, VLOR and SERV are involved, but do not co-sign the agreement. One of the addenda to these sector covenants concerns dual learning, where the government provides financial support for the sectors to establish a dual learning framework (combined training in secondary school and at a work place). This should increase

[136] Departement Werk en Sociale Economie (2021). STEM-agenda 2030.
[137] Departement Onderwijs en Vorming (2016). Strategisch Plan Geletterdheid.
[138] Vlaams Departement Werk en Sociale Economie (2021). Alle hens aan dek.
[139] Vlaamse Overheid (2021). Actieplan levenslang leren – Koers zetten naar een lerend Vlaanderen.

the alignment between the needs of the sectors and the provided trainings or education by the educational system.[140]

SCOPE - A programme from the Flemish government in cooperation with the European Social Fund to assist recognised organisations (representing sectors or a cluster of companies) with strategic forecasting of competences. This led to eleven so-called focus studies (2017-2019) from innovative business networks and spearhead clusters where they established the impact of digitalisation, automation and other trends on competences and jobs specific for their sectors and activities.[141]

'Competentieversterkende trajecten' - These competence enhancing trajectories of the VDAB are aimed at providing lower-skilled adults with reaching a minimum level of literacy, numeric and digital skills as well as improving their broad skillset. This trajectory has been established as a component of the European Skills Agenda – Upskilling Pathways: new opportunities for adults. The project trains job seekers while participating in the labour market through for instance temporary employment and district-working.[142]

Flemish policies related to the green transition

To prepare for and accelerate the green transition, the Flemish government has established several policies some of which were influenced by the European Green Deal. In 2019 a Flemish Energy and Climate Plan (*VEKP*) for 2021-2030 was adopted. Its main goals are a 35% reduction of greenhouse gas emissions for non-ETS sectors by 2030, committing to the "no debit" rule for the LULUCF-sector, significant energy savings and to invest in renewable energy production of 28 512 GWh by 2030 which is an additional increase of 60% as opposed to the renewable energy production of 17200 GWh in 2018. A revision of the VEKP is planned in the coming years to incorporate the European Green Deal ambitions and targets. More specifically, concerning the labour market and education, the plan foresees that a taskforce on climate and education will be established to enhance the knowledge and competences on climate. In the framework of the VEKP, the initiative '*1000 klimaatjobs*' was established with the aim of creating more jobs in the social-circular economy, with a specific focus on second hand shops. Currently, 450 jobs of the 1000 planned have already been created because of financial support from the government.[143] Additionally, a budget from the Climate Fund has been made available to achieve the climate engagements by the ministry of education (e.g. climate trajectories in school curricula and a STEM-climate project for students).[144]

For the energy intensive manufacturing and energy sectors the policy context is dominated by the European Emission Trading System (EU ETS), where a reduction of the ETS cap of 61% by 2030 was introduced in the Fit-for-55 package.[145] Alternatively, jobs and competences also function as accelerators for the circular transition as mentioned in the "*Roadmap Circulaire Economie 2020-2030*". The government announced plans to train people in eco-design, sharing economy and new business models. Some of the circular economy activities are compatible with employment opportunities for

[140] Vlaamse Regering. Website: Sectorconvenants.
[141] Vlaamse Regering. Website: Kennisplatform Departement Werk en Sociale Economie.
[142] VDAB (2018). Jaarlijkse beleidsmatige planning.
[143] Vlaams Parlement (2022). Verslag vergadering Commissie voor Economie, Werk, Sociale Economie, Wetenschap en Innovatie.
[144] Vlaamse Regering (2019). Vlaamse Energie- en klimaatplan 2021-2030.
[145] This is an increase from the 43% reduction by 2030 of the existing measure, therefore representing a significant increase in climate action.

vulnerable groups in the social economy. They also emphasises a need to stimulate young people through challenges, awards and bootcamps.[146]

EU-level policies, strategies and initiatives

In addition to the Green Deal (presented under chapter 2), other relevant EU policies, strategies and initiatives have been identified. First of all, the **Green Employment Initiative** Communication[147] presents an integrated framework to allow labour market and skill policies to play an active role to support the transition to a green, low carbon, resource-efficient economy. It focuses on the importance of;

- Anticipating and establishing adequate skills policies to support workers in coping with structural change;
- Securing labour market transitions, and
- Strengthening governance and partnership-based initiatives.

The initiative complements the EU Circular Economy Action Plan and the Green Action Plan for SMEs, by putting the promotion of green jobs at the core of the envisaged integrated approach which links green growth and employment. It sets out policy actions to be taken at European and national levels, such as bridging existing skills gaps by fostering skills developments and better forecasting skills needs across sectors and industries, Increasing data quality and monitoring of labour market developments or promoting social dialogue and cooperation.

In addition, the European Council also adopted two relevant recommendations. Firstly, there is **recommendation on ensuring a fair transition towards climate neutrality**.[148] Member States are invited to adopt measures which address the employment and social aspects of climate, energy and environmental policies. The recommendation encourages certain actions to support people most affected by the green transition for instance by stimulating the creation of quality jobs and facilitating access to safe working conditions protecting health and safety in the context of this green transition. It also puts a focus on education and training measures and invites Member States to integrate the employment and social aspects of the green transition in the development and implementation of relevant national strategies. The other **recommendation** is **to stimulate learning for the green transition and sustainable development**.[149] It suggests that Member States should stimulate and support policies and programmes about learning for the green transition and sustainable development. This is crucial to ensure learners of all ages acquire the knowledge to live more sustainably, obtain the skills needed in a changing labour market and take action for a sustainable future.

The EU's new **Industrial Strategy**, adopted in March 2020, outlines the pillars of action for Europe's green and digital transitions, with an emphasis on a more circular economy. As well as boosting innovation and ensuring a regulatory framework fit to address the challenges of this transformation, the strategy emphasises the need for skilling and reskilling to meet the targets set and to capitalise on the employment creation potential within the context of a changing economy.[150]

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[146] Vlaamse regering (2020). Een transversale werking voor de circulaire economie van Vlaanderen.
[147] EC Communication on the Green Employment Initiative: Tapping into the job creation potential of the green economy (COM(2014) 446 final)
[148] European Council (2022). Website: Council takes action to ensure green transition is fair and inclusive.
[149] European Council (2022). Website: Council adopts recommendation to stimulate learning for the green transition and sustainable development.
[150] Eurofound (2021). Tackling labour shortages in EU Member States.

More specifically on skills the EU is highly active, with initiatives including:

GreenComp[151] (the European sustainability competence framework) is a reference framework for sustainability competences. It provides a common ground to learners and guidance to educators, providing a consensual definition of what sustainability as a competence entails. It is designed to support education and training programmes for lifelong learning. GreenComp consists of 12 competences organised in four areas:

- Embodying sustainability values, including the competences:
  - valuing sustainability; and
  - supporting fairness promoting nature.
- Embracing complexity in sustainability, including the competences:
  - systems thinking;
  - critical thinking; and
  - problem framing.
- Envisioning sustainable futures, including the competences:
  - futures literacy;
  - adaptability; and
  - exploratory thinking.
- Acting for sustainability, including the competences:
  - political agency;
  - collective action; and
  - individual initiative.

The broader strategic objectives set through the European Green Deal and the Industrial Strategy are operationalised in the new **European Skills Agenda**, launched by the Commission in July 2020. This agenda calls for a 'paradigm shift on skills' and includes a number of key targets and actions, which are summarised in the textbox below.[152]

Textbox 4-1 European Skills Agenda

The strategy sets out the following **quantitative objectives for upskilling and reskilling** to be achieved within the next five years:

- increase in the participation of adults aged 25-64 years in learning during the last 12 months to 60% (from 38% in 2016);
- increase in the participation of low-qualified adults aged 25-64 years in learning during the last 12 months to 30% (from 16% in 2016);
- increase in the proportion of unemployed adults aged 25-64 years with a recent learning experience to 20% (from 11% in 2019);
- increase in the proportion of adults aged 16-74 years having at least basic digital skills to 70% (from 56% in 2019).

Of the 12 **actions** included in the European Skills Agenda, the following are of particular relevance in **helping to address labour shortages**:

[151] Bianchi et al. (2020). GreenComp The European sustainability competence framework.
[152] Eurofound (2021). Tackling labour shortages in EU Member States.

- Strengthening skills intelligence, highlighting the need for online 'real-time' information on skills demand, including at regional and sectoral levels, using big data analysis of job vacancies and making it widely available;
- The Pact for Skills, which should lead to the concerted implementation of a one-stop shop to provide jobseekers with the best possible guidance, with a strong sectoral approach in areas such as health, construction and transport;
- Developing skills to support the green and digital transitions, including the development of a set of core green skills to increase the number of professionals who build and master green technologies and boosting digital skills through a digital education action plan;
- Increasing the number of science, technology, engineering and mathematics (STEM) graduates and fostering entrepreneurial and transversal skills.

In addition to the overarching initiatives, some sector-specific initiatives have been identified, namely for the construction sector, the steel industry and the electrical industry. In the construction sector, there are major efforts needed to improve the skills of building workers to be able to deliver renovations offering a high energy performance and new 'nearly zero-energy buildings'. As such, under the Intelligent Energy Europe (IEE) programme, a **'build up skills initiative'** was carried out **to increase the number of qualified workers in the building workforce in Europe**. It focused on the continuing education and training of craftsmen and other on-site workers in energy efficiency and renewable energy in buildings. It had three components: i) national qualification platforms and roadmaps, ii) qualifications and training schemes and iii) EU-wide activities on sharing best practices.[153]

Similarly to the construction sector, the steel industry technical workforce needs to be provided with the appropriate green awareness and technical skills in order to 'green' the industry. In order to do so the '**Greening Technical Vocational Education and Training'** (GT-VET) project has used the example of the steel industry. The project **aims to explore how vocational education and training (VET) pathways meet environment and health and safety skill needs**, which are key for the global competitiveness and sustainability of all European industries.[154]

The electrical contractor association (Europe-On) also put forward its own initiative '**Skills4Climate**', with the aim to raise decision-makers' attention on the need to intertwine skills and climate policies, with the support of other fellow associations from the energy, construction, digitalisation and mobility spectrum.

4.2.2 Flemish green skills initiatives

There are several initiatives ongoing in Flanders to promote green skills or skills related to the green transition as well as initiatives that try to address the skills mismatches and shortages on the labour market. An overview of some important ones is given here:

- **STEM-platform and STEM-steering group**: Established to ensure the coherent and correct implementation and follow-up of the STEM-action plan and functions as an advisory body to the Flemish government for all matters concerning STEM skills.[155]

[153] Cedefop & OECD (2015). Green skills and innovation for inclusive growth.
[154] OECD & Cedefop (2014). Greener Skills and Jobs. (Chapter on Greening technical vocational education and training in the European steel industry)
[155] Departement Onderwijs en Vorming. Website: STEM-platform en -stuurgroep.

- **Brightlab**: This initiative is organised around a 'teach the teacher' approach. By focusing on providing the necessary skills and knowledge related to STEM topics to teachers which can implement these in their classes. The initiative hopes to reach indirectly as many students and motivate them to pursue STEM-trainings and futures.[156]
- **Moonshot**: This is an innovation programme from the Flemish government to achieve a carbon neutral industry by 2050. The programme (financially) supports research and innovation initiatives in cooperation with some spearhead clusters to make Flanders' industry so-called carbon circular and CO_2 poor by 2050. They identified four research pathways/themes which will be essential to stimulate with governmental support. These pathways in turn can be supported by five competences (enablers) for which top-expertise is present in Flanders: conversion technology, separation technology, predictive technology, energy storage, energy transport.[157]
- **Young Talent Lab**: An initiative to foster a conversation between Flemish youth (between 17 and 30 years old) and chemical/pharmaceutical managers and CEOs about climate and sustainability. Not only is this initiative directed towards awareness raising, but it also hopes to stimulate young talents to choose a career in the STEM-domain.[158]
- ***Talentenfabriek***: Tries to increase the influx of employees in shortage occupations of the industrial sector with a special focus on vulnerable groups. First, they provide education and training in several shortage occupations from the industrial sector (e.g. welder, maintenance mechanic, industrial designer). Second, they stimulate students in choosing educations directed towards these industrial shortage occupations though assistance for education and training providers. Third, they help employers with the screening of vacancies and applicants, provide information and strengthening the image of the industrial jobs.[159]
- ***Industrie 4.0 Proeftuinen***: This platform of the Flemish government uses demonstration videos to show how companies in diverse sectors can optimise their processes with innovative technologies. These also enable employees to accept and implement these technologies and provide them with the necessary skills. The main focus here are digital technologies, however, they can be implemented in green fields and green transition topics.[160]
- ***Competent***: This is a database established by the SERV and managed by the VDAB that includes, among other things, professional competency profiles, describing which activities are performed in professional contexts and what someone needs to know and be able to do in order to adequately carry out the activities. Employees and job seekers can use the information in Competent to gain an initial idea of the possibilities on the job market. It is used by VDAB to match jobseekers with vacancies based on skills requirements, in addition to the traditional qualification and work experience requirements.[161]
- **Green jobs project**: An initiative of Arbeid & Milieu that encourages the transition towards new green jobs and the greening of existing jobs, primarily through awareness raising campaigns.[162]

[156] Brightlab. Website: Over Brightlab.
[157] VLAIO (2020). Website: Moonshot: Vlaanderen CO2-arm in 2050. & Vlaamse Overheid (2019). Vlaams Energie en Klimaat Plan.
[158] Essenscia. Website: Young Talent Lab: jongeren in dialoog met ceo's over klimaat en duurzaamheid.
[159] Talentenfabriek. Website: Over Talentenfabriek.
[160] Vlaamse Regering. Website: Ontdek de industrie 4.0-proeftuinen in Vlaanderen.
[161] VDAB. Website: Beroependatabank Competent.
[162] MVO Vlaanderen. Website: Arbeid & Milieu vzw.

4.2.3 Flemish educational and training initiatives

Green topics in education are being recognised as a necessity to prepare citizens for the green transition. The Flemish minister for education has announced increased financial investments to achieve the climate engagements for the entire society under the Flemish Energy and Climate Plan 2021-2030 (VEKP). One focal point is to strengthen the climate knowledge and green skills. This will be done by establishing a taskforce 'climate and education' which will provide educational actors and practices with streamlined material on climate and the environment. The taskforce will give educational tools to schools, establish a training course for teachers concerning climate and create an educational working package on climate for specific courses in the secondary education system. Additionally, studying climate and environmental topics in relation to education will be further stimulated in the Flemish higher education system. This can include analysing the operations of higher education institutions and how to include green topics in curricula.[163]

Specifically for skills, the Flemish government introduced several education and training related policies. The main focus has been on strengthening adult education to facilitate the upskilling and reskilling of the working population. One example is the reform (2019) to make higher vocational education completely part of higher education by transferring the responsibility for it from Centres for Adult Education towards university colleges. Another key tool was the entry into force of the Workable Work law in 2019. This replaced the legal obligation for employers to spend a share of the wage cost on training with the obligation to provide an average of five days for trainings per year instead. An overview of the most relevant introduced reforms or new policies:[164]

- Towards an individual learning account in Flanders (2022)
- "*Duaal leren in volwassenenonderwijs*" (2022)
- Decree on "*Erkenning van verworven competenties – EVC*" (2019)
- Financing decree for adult education (2019)
- Emergency ordinance on adult education and higher vocational education (2019)
- Decree on the elaboration of the associate degree programmes within university colleges (2019)
- Decree on dual learning in secondary education (2019)
- Reform of the system for validation of competences and integrated quality framework (2018)
- Update and optimisation of the "competent" database (2018)
- Reform of individual vocational training in enterprises (2018)
- Act on Workable Work (2017)
- Reform of the Flemish training incentives for workers including Flemish paid education leave and training vouchers (2017)

Many sources, as shown in previous sections, mention the lack of a lifelong learning culture in Flanders. From the education and training perspective, lifelong learning can help the working-age population through an increase in their productivity and personal growth; becoming more flexible and more broadly employable; managing their skills and mobility; and (re)introduction into the labour market. In this way, green skills and knowledge can continuously be added to employees' basic knowhow. This will facilitate the mobility of employees from sectors that are hit the hardest by the green transition to sectors with more opportunities.[165] Developing a harmonised system for certifying skills could lead to

[163] Vlaamse Overheid (2019). Vlaams Energie en Klimaat Plan.
[164] OECD (2019). OECD Skills Strategy Flanders: Assessment and Recommendations.
[165] CNT-NAR (2020). Advies 1727.

increased recognition of the efforts done to learn the skill and thus increase the attractiveness of learning in general, but also increase the potential mobility between jobs. To facilitate adult learning and combining a job with an education, hybrid learning, e-learning and dual learning could be further explored.[166] Other innovative approaches could make learning more attractive and accessible using cutting-edge technologies such as augmented reality, virtual reality and artificial intelligence.

The provision of training and education as well as parts of their curricula should be reviewed to include more green and circular topics according to the STEM-agenda 2030 (2021). When this is done from an early stage, this can increase the interest in STEM and more technical education and career paths as well as the general interest in the green and circular transitions. To achieve this, teachers need to be equipped with the adequate information and tools and receive increased support from their educational institutions as well as from the government.[167] There is a general need for training in all sectors to cope with the impact of the green transition. Training could focus on regulations (e.g. Energy Performance of Buildings Directive); new techniques and applications (e.g. wind energy or passive buildings); and new products (e.g. roofing with integrated solar panels). In general, training should aim to provide a combination of sector-specific green skills and knowledge on the one hand, and more generic skills on the other hand. Continued training should focus on all groups in the labour market, namely job seekers, graduates and currently employed workers. In addition, teachers and trainers themselves need to receive training and support to be able to adequately diffuse the new information they receive.[168]

According to a study by De Smet & Lamberts (2012) in order to provide employees with flexibility and resilience to adapt rapidly to a changing environment, short tailor-made training is the preferred instrument. These training offerings can help employees increase the level of their so-called core skills. The initial level is determined by the education they receive in their youth and is highly related to the stimulating measures provided by the government.[169]

Several education-specific initiatives are being developed to stimulate the development of skills for the green transition.

- **Circular Ambassador Program**: a training programme that combines knowledge with skills to train participants to become Circular Ambassadors. This project is currently being developed and expected to start in 2022 in Flanders and in 2023 in Belgium and in 2024 in the EU as a whole.[170]
- **MOOC for education professionals**: to teach teachers of all levels about circularity and the green transition by means of self-paced education. This is to provide them with knowledge and to enable them to translate this knowledge into the courses and trainings they give to students. This project will be rolled out in 2022.[171]

[166] DWSE (2021). Kennisagenda Departement Werk en Sociale Economie.
[167] Vlaamse Regering (n.d.). STEM-agenda 2020: STEM-competenties voor een toekomst- en missiegericht beleid.
[168] DWSE (2011). Naar een groen arbeidsmarktbeleid: Een eerste beleidsverkenning.
[169] De Smet & Lamberts (2012). De transitie van België naar een koolstofarme samenleving in 2050 – De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's.
[170] Vlaanderen Circulair. Website: Circular Ambassador Program.
[171] Stakeholder interviews.

5 Conclusions and implications for the next steps of the study

Conclusions

The previous chapters provided a comprehensive review of the green transition, its impact and drivers, and the implications this will have on jobs and skills needs across the sectors of the Flemish economy.

Amongst the key conclusions are:

- **The green transition is necessary and likely to accelerate quickly in the coming years** – EU policies (Green Deal, Fit-for-55) and the Russia-Ukraine conflict (and REPOWER initiative) are driving the low carbon transition, with the latter problem accelerating the timeline much more at present. The changes coming from these policies will have significant implications for Flanders.
- **The green transition is expected to have a positive overall impact on jobs and growth** – the transition is expected to create jobs in total.
- **The green transition will impact unevenly across sectors, services, the largest sector by far, will be largely unaffected, but energy, manufacturing, construction and circular economy will be much more impacted** – this mirrors the environmental impact of the economy, with around 25% of the economy responsible for around 90% of GHG emissions. Addressing technical and other skills needs in these most affected sectors will be crucial to driving the green transition forward and achieving the social, economic and environmental benefits.
- **Future projections for Flanders estimate job growth to 2026 and likely 2030** – taking into account various projections and the impacts of the green transition, the total number of jobs is expected to grow, putting pressure on the labour market.
- **Around 26% of jobs all could be categorised as green, however shares of green jobs are much higher in the circular economy, construction, utilities (energy), and manufacturing sectors** – up to 80-90% of jobs in some of these sectors. These jobs entail those with increased demand due to the green transition, those that require enhance skills and those that require new and emerging skills.
- **Around 25-30% of the existing workforce is likely to retire between 2022-2030** – it is normal to need to replace retirees but these rates are relatively high due to the demographics (baby-boom generation), and particularly acute for the agriculture and logistics and transport sectors.
- **Skills gaps already exists in Flanders, the green transition could put even more pressure on certain sectors/skills** - there is a general acknowledgement of a skills gap in the Flemish working population. Many of the stakeholders consulted under this study expect the green transition to have a significant impact of on their skills needs.
- **There are specific technical skills needs from the green transition, but a larger priority is given to STEM skills, Lifelong learning and professional and cross-cutting skills** – some specific technical skills, i.e. solar PV and heat pump installers, sustainable architecture, sustainable chemicals, repair and engineering skills, are identified as in demand. However, more attention is given to the pipeline of STEM qualified workers, as these can then be specialised in many different technical disciplines, but without a grounding in STEM this would

not be possible. Professional and cross-cutting skills are also emphasised, these more generic skills are required by a broader share of the workforce than technical skills.

- **Lifelong learning is emphasised as an issue** – although far from unique to Flanders this issue is one that hinders the possibilities to enhance the skills of existing workers to adapt to the green transition, or to learn the new and emerging green skills also necessary. This is crucial as most of the 2030 workforce are already working in 2022. Employees are often not sufficiently inherently or externally incentivised to attend training courses or redirect their careers (upskilling / reskilling). Improving lifelong learning culture, provision and support is seen as crucial to address skills issues arising in the green transition. More effort will be needed to increase resilience to the impacts of the green transition, this will require both employees and employers to increase their awareness and knowledge of the green transition and what this means for their skills needs.
- **There are risks in not addressing skills needs for the green transition** – these include not only lagging behind in the achievement of policy goals and targets but also the tangible social and economic impacts of this. For example failing to take action could lead to some sections of the labour force not having the required skills, possibly getting left-behind and exacerbating social inequality; economically it could place a constraint on firms expanding and investing in Flanders; a slow transition would also slow progress on renewable energy, with higher prices and pollution among the likely results.
- **Flemish policy frameworks provide a good basis for action, but these need to be updated** – Flemish economic visions include skills, at least partially, but these may need updating following the major green policy developments at EU. In any case the Flemish Energy and Climate Plan (VEKP) should be updated as soon as possible to help understand some of the key changes and policies that are anticipated, e.g. can the energy sector expect to install much more wind energy, and/or heat pumps, what role is expected for hydrogen and what is needed?
- **Flemish institutions and stakeholders are active, and some initiatives are already ongoing – however, further mobilisation, particularly for the circular economy, construction, energy and manufacturing sectors, is needed to address the challenge** – existing initiatives on STEM and other skills have engaged various key stakeholders both public and private, however the green transition will pose greater challenges and efforts will need to be stepped up to reduce risks.
- **The cross-sectoral nature of the key skills challenges lends itself to cross-sector cooperation** – whilst sector specific technical skills will remain an issue, the largest needs are identified in lifelong learning and STEM skills, alongside upskilling on professional and cross-cutting skills for the green transition will be needed. These are broadly applicable across all sectors.

Implications for other deliverables in the project

The results of this deliverable were prepared using a diverse set of methodologies: a literature review, statistical analysis (forecasting tool) and stakeholder consultations (interviews and survey). Therefore, it provides a good basis for the following steps of the study. In terms of the implications of this deliverable on the next deliverables[172]:

[172] These are: Deliverable 3 – International best practices; Deliverable 4 – Stakeholder consultation on priority strategic actions; Deliverable 5 – High level strategy in support of the Flemish green skills transition; Deliverable 6 – Governance framework for the implementation of the strategy; and, Deliverable 7 – Proposal for an implementation roadmap.

- **Deliverable 3 – International best practices** – this task is already underway, but the findings of this deliverable point to a need to learn from others how they are promoting lifelong learning, STEM skills, and professional and cross-cutting skills. Additionally, understanding how specific technical skills needs are addressed in the key sectors identified above should also be a priority.
- **Deliverable 4 – Stakeholder consultation on priority strategic actions** – the stakeholder mapping carried out for this task will support the engagement of stakeholders in this consultation step. The outputs of this deliverable can also be used to shape the discussion, to help identify, discuss and agree priorities for action. This work can be used to highlight the most important issues and to solicit views from the stakeholders as to how these can best be addressed.
- **Deliverable 5 – High level strategy in support of the Flemish green skills transition** – this deliverable highlights the key issues, these should inform the structure, objectives and actions outlined in the strategy.
- **Deliverable 6 – Governance framework for the implementation of the strategy** – this deliverable has not specifically focused on governance but the stakeholder overview in 4.1 may inform the understanding of the governance landscape.
- **Deliverable 7 – Proposal for an implementation roadmap** – the outputs of the this deliverable can be used to help scale and target the actions planned in the implementation roadmap, and the identification of existing initiatives can be used to understand where gaps are and which initiatives might be scaled up.

Annex I: Forecasting tool

Annex II: Inventory of currently available knowledge

#	Title	Author	Year
International / EU-level context			
1	Skills for green jobs. 2018 update. European synthesis report	Cedefop	2019
2	THE GREEN EMPLOYMENT AND SKILLS TRANSFORMATION . Insights from a European Green Deal skills forecast scenario	Cedefop	2021
3	Employment Implications of Green Growth: Linking jobs, growth, and green policies.	OECD	2017
4	DIGITAL, GREENER AND MORE RESILIENT. Insights from Cedefop's European skills forecast.	Cedefop	2021
5	Green skills and innovation for inclusive growth	Cedefop, OECD, Leed	2015
6	Greener Skill and Jobs (& Highlights)	OECD	2014
7	Key Competencies in Sustainability	Arizona State University - School of Sustainability	n/a
8	SKILLS FOR GREEN JOBS. A GLOBAL VIEW	ILO, Cedefop	2011
9	The Future of Jobs Report 2020	World Economic Forum	2020
10	SKILLS, INNOVATION AND THE PROVISION OF, AND ACCESS TO, TRAINING	BusinessEurope, SGI Europe, SMEunited and ETUC	2021
11	Employment Implications of Green Growth: Linking jobs, growth, and green policies.	BusinessEurope, SGI Europe, SMEunited and ETUC	2021
12	The Future of Work: Baseline Employment Analysis and Skills Pathways for the Circular Economy in Scotland	Zero Waste Scotland & Circle Economy	2020
13	Training in Enterprises. New Evidence from 100 Case Studies	OECD	2021
14	GreenComp: The European sustainability competence framework	European Commission (JRC)	2022
15	Taxonomy Report: Technical Annex	EU Technical Expert Group on Sustainable Finance	2020
16	The employment impact of climate change adaptation	ILO	2018
18	Impacts of Green Growth Policies on Labour Markets and Wage Income Distribution. A General Equilibrium Application to Climate and Energy Policies	OECD	2018
19	Groundswell Part 2 : Acting on Internal Climate Migration	World Bank Group	2021
20	Promoting green jobs for youth through national employment policies and programmes	ILO	n/a
21	Energy scenario: Employment implications of the Paris Climate Agreement	Eurofound	2019
22	Towards a greener future: employment and social impacts of climate change policies	Griffen et al.	2019
23	Combining labour market and unemployment policies with environmental sustainability? A cross-national study on eco-social innovations	Stamm et al.	2020
24	The jobs potential of a shift towards a low-carbon economy	OECD	2012

25	Greening of the labour market. Impacts for the Public Employment Services	European Network of Public Employment Services	2021
26	The future of jobs is green	European Commission (JRC)	2021
27	Employment and Social Developments in Europe. Sustainable growth for all: choices for the future of social Europe	European Commission	2019
28	Employment and labour shortages. Tackling labour shortages in EU Member States	Eurofound	2021
Flemish context			
29	Skills roadmap voor de Vlaamse klimaattransitie - Focus op de energie-intensieve sectoren [2020-2035]	Roland Berger	2021
30	Modelling job creation in the circular economy in Flanders	CE Center	2019
31	Promoting Green Skills in Flanders: Joined-up Initiatives of Social Partners and Government	SERV	2012
32	Walking the green mile in Employment	Federaal Plan Bureau	2013
33	VEKP-VOORTGANGSRAPPORT 2021 over de evolutie van de Vlaamse broeikasgasemissies, en de voortgang van doelstellingen en maatregelen	Vlaamse Regering	2021
34	Vlaams Energie- en Klimaatplan 2021-2030	Vlaamse Regering	2019
35	Regionale economische vooruitzichten 2021-2026	Federaal Plan Bureau	2021
36	Curriculum Circulaire Economie	Vlaanderen Circulair	/
37	Klenpuntberoepen in Vlaanderen	VDAB	2021
38	Dual learning in Flanders: professionalisation of teachers	Ockham IPS	2020
39	Skills Strategy Flanders	OECD	2019
40	Boosting skills for greener jobs in Flanders	OECD	2016
41	21st Century Skills voor de Havengebieden in de Vlaams-Nederlandse Delta	Skills Navigator	2018
42	Verkennende analyse van het economisch belang van afvalbeheer, recyclage en de circulaire economie voor Vlaanderen	CE Center	2014
43	Employment impact of the transition to a circular economy: literature study	CE Center, OVAM	2018
44	Een geslaagde overgang naar een koolstofarme economie – tweede advies over de thematiek van de groene jobs	NAR, CRB	2010
45	De macro-economische impact van de koolstofarme transitie in België	Federale Dienst Klimaatverandering	2016
46	Scenario's voor een koolstofarm België tegen 2050	Climact, VITO	2013
47	De toekomst van de arbeidsmarkt in de haven van Antwerpen	University of Antwerp	2017
48	Naar een leer- en loopbaanoffensief. Tweede advies arbeidsmarktexperten	Flemish government	2021
49	Trendrapport 2021: kwetsbare groepen op de Vlaamse arbeidsmarkt	Flemish government	2021
50	Actieplan levenslang leren	Flemish government	2021
51	STEM agenda 2030	Flemish government	2021
52	Beleidsnota 2019-2024	Flemish government	2019
53	Naar een groen arbeidsmarktbeleid: een eerste beleidsverkenning	DWSE	2011
54	Kennisagenda Department Werk en Sociale Economie	DWSE	2021

55	De transitie van België naar een koolstofarme samenleving in 2050: De uitdagingen voor tewerkstelling, vorming en opportuniteiten voor kmo's	De Smet, L. & Lamberts, M.	2012
56	Hernieuwbare jobs: werk aan de winkel	Federaal Plan Bureau	2013
57	Vlaamse Veerkracht: Relanceplan Vlaamse Regering	Vlaamse Regering	2020
58	Gevolgen van Klimaatbeleid voor de Vlaamse arbeidsmarkt	Bilsen et al.	2010
59	Evaluatie van de socio-economische impact van klimaatverandering in België – Samenvatting voor beleidsmakers	De Ridder et al.	2020
60	De Index voor Duurzame Economische Welvaart (ISEW) voor Vlaanderen, 1990-2018	Bleys, B. & Van der Slycken, J.	2020
61	De bijdrage van de circulaire economie aan het klimaatbeleid	OVAM	2018
62	Flankerend beleid voor een koolstofcirculaire en CO2 arme industrie in Vlaanderen	VLAIO	2020
63	Nota Circulaire Economie - een transversale werking voor de circulaire economie van Vlaanderen	Vlaamse Regering	2020
64	Reno-VLAMT - Een strategische competentieprognose in de bouwsector	IDEA Consult	2021
65	Werken in een meer circulaire economie – Horizon 2035	Koning Boudewijnstichting	2022
66	OECD Skills Strategy Implementation Guidance for Flanders, Belgium	OECD	2022

Annex III: Stakeholder mapping

As referred to in chapter 4, one part of the exercise under Deliverable 2 was to provide an overview of the different Flemish actors involved in the green transition. The table below provides such overview of relevant stakeholders per different stakeholder groups.

Stakeholder group	Organisation name
Public authority / governmental department	Flemish Government
	Province of Antwerp
	Department of Work and Social Economy (DSWE)
	Department of Work and Social Economy - Studiedienst
	Department of Work and Social Economy - Dual learning & sectors
	Department of Education and Training
	Steunpunt Werk
	Flanders Innovation & Entrepreneurship (VLAIO)
	VDAB
	European Social Fund
	Department for the Environment
	VEKA
	European Commission (DG REFORM)
	European Commission (DG JRC)
	Cedefop
	European Commission (DG EMPL B3)
	Department of Agriculture and Fisheries
	AHOVOKS
Advisory bodies	SERV (House of Flemish Social dialogue)
	Flemish Education Council (VLOR)
Sectoral organisations	Denuo (Federation of the waste and recycling sector)
	Social Fund of the Stage Arts (Sociaal Fonds Podiumkunsten)
	Steel Industry Alliance (Staal Industrie Verbond)
	Agoria
	Comeos
	Fedustria
	Corporation Inland Tanker Barge Owners
	Vlaanderen Circulair/ OVAM - facilitator CE
	Social Fund Bus&Car
Education and training providers	Co-valent
	Horeca Forma (Hospitality)
	Syntra Brussels
	IVOC (Fashion)
	WOODWIZE (Wood)
	Postuniversitair Centrum KU Leuven
	Diverscity - VVSG
	mtech+ vzw

	Catholic Education Flanders - Team adult education
	Syntra PXL
	Liberform (Liberal professions)
	Volta (Electricity)
	Kamp C (Buildings)
	Constructiv (Buildings)
	Verso (Social businesses)
	Communal Education (Gemeenschapsonderwijs GO!)
	Provincial Education Flanders
	Centra voor Basiseducatie vzw
	University of Ghent (VLIR)
	College of UCLL (Hogeschool UCLL - VHLORA)
	OVSG
	Syntra
	Vlerick
Civil society & NGO	Bond Beter Leefmilieu (Alliance for an improved living environment)
	ACV
Research & academia	Veltha
	HIVA - KU LEUVEN

Annex IV: High-level survey results

As mentioned under section 1.2, a targeted stakeholder survey was also sent to a list of selected stakeholders. The survey was open for the month of June and received a total of 48 full replies and 134 partial replies. Due to the short timeline between the closing of the survey and the delivery of the draft report, the project team has not yet been unable to incorporate the results directly into the sector level assessments. As such, in order to reflect on the responses to some extent at this stage, the section at hand will provide an overview of some high-level results. For the final version of the report we will disaggregate the results per specific sectors and incorporate those into relevant sections.

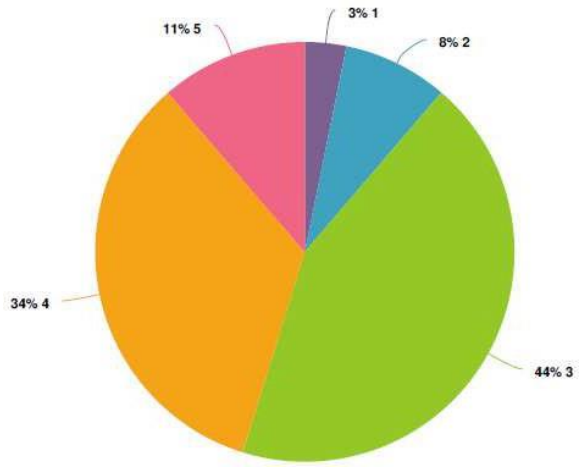
Respondents

As mentioned above, a total of 48 complete responses were received. Additionally, 134 of partial responses were received, which are also included in the analysis. Hence a total of 182 responses were considered. Out of these, 119 stakeholders specified the **stakeholder group** they are representing. 24% (n=28) of the responses came from business and business organisations, another 24% (n=28) from government institutions and 34% (n=40) from 'others', which often specified as representing 'sectorfonds', 'vormingsfonds' or 'Fonds voor Bestaanzekerheid'. 8% (n=10) of the responses also came from business associations. The remaining responses came from academia and NGOs. As to the **sectors** that stakeholders represented, they commonly mentioned manufacturing, education, transport and construction. Within manufacturing, most commonly stakeholders specified metals, IT products, electronic appliances.

Questions on current situation

As to the gaps in skills, stakeholders were asked to rate **gaps in skills** in their respective sector / Flanders as a whole. The figure below shows that the majority (89%; n=55) of stakeholders rated 3 and above and recognise the existence of gaps. Only 11% of stakeholders (n=7) were of the opinion that there are no or small gaps.

Figure 0-1 To what extent are there currently gaps in skills in your sector / Flanders as a whole (where a specific sector is not represented)? [rate 1 to 5, 5 being the highest] (n=62)



As to the **level of qualification for jobs where workers are missing**, the highest demand is in jobs where employees are required to have obtained a formal vocational qualification (46%; n=26) and for

jobs where no formal qualification or degree is required (35%; n=20). The least demand is for works in jobs where a university degree is required.

Figure 0-2 To what extent do you have difficulty in finding skilled workers to fill jobs in your company / sector / Flanders as a whole (where a specific sector is not represented) [rate 1 to 5, 5 being the highest]? (n=166)

	1	2	3	4	5
Voor jobs waarvoor geen formele kwalificatie of diploma vereist is. Count Row %	10 17.5%	8 14.0%	13 22.8%	20 35.1%	6 10.5%
Voor jobs waarvoor werknemers een formele beroepskwalificatie moeten hebben behaald. Count Row %	5 8.8%	1 1.8%	9 15.8%	16 28.1%	26 45.6%
Voor jobs waarvoor een universitair diploma vereist is. Count Row %	10 19.2%	6 11.5%	13 25.0%	12 23.1%	11 21.2%

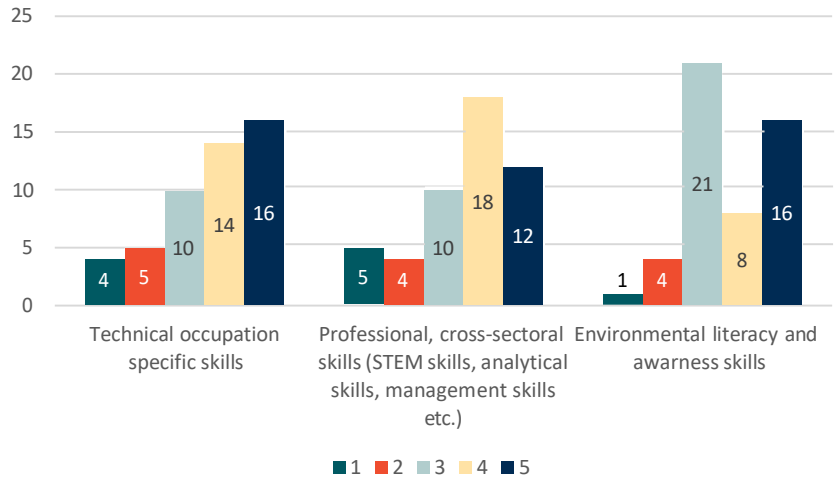
As to the **strategies that are currently in place to fill the gaps**, the most commonly mentioned approach was 'taking on those not fully qualified and training them on-the-job'[173] (70%, n=43), followed by increased training of existing staff (54%, n=33). Other strategies mentioned more commonly were reallocation of work (33%, n=20), offering internal job mobility (36%, n=22) or looking further away (outside of Flanders/Belgium) for qualified staff (34%, n=21). Strategies that do not often take place are 'implementation of domestic or foreign outsourcing'. As to the impacts that skills gaps have on a company, stakeholders most commonly mention are turning down work that could otherwise be done (54%, n=33), less time available to invest in research and innovation and/or training (36%, n=22) or hamper of growth and profitability (44%, n=27).

Future needs

When asked whether stakeholders have an **estimate of the impact that the green transition** will have on their company, those stakeholders who had an opinion[174] were able to provide an answer were mostly expecting significant impacts (39%, 19 responses). As to the **type of green skills** that will be most important, the responses of stakeholders are summarized in the figure below.

Figure 0-3 Which types of green skills will be most important in your sector? [scale 1-5 from 1=not important, 5=most important] (n=149)

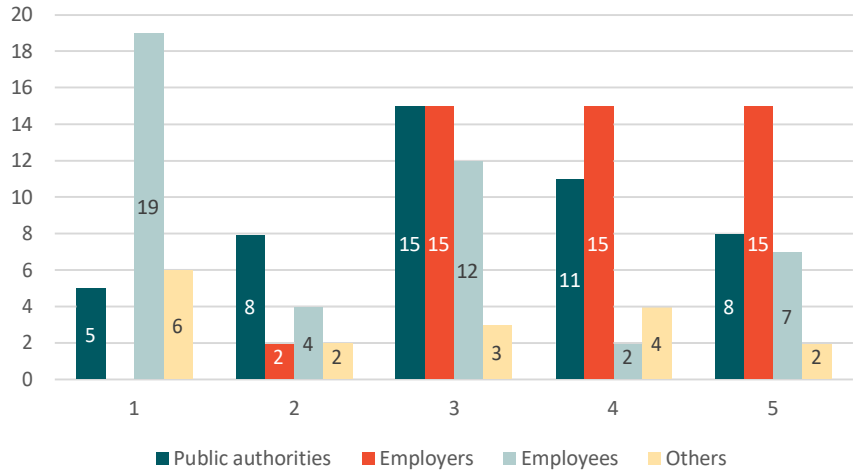
[173] This is in line with findings from VOKA in their recent study: VOKA (2022). Naar een ondernemend onderwijs. Flanders scores relatively well compared to the OECD average in addressing skills matches with 28.7% of employees having a job not related to their field of study. A trend can be observed where employers are more open to hiring unqualified employees and training them in-house.
[174] 31%; n=15 stakeholders had no opinion



Actors involved in the green transition

When asked **which actors should support to fill the gaps in the job market**, all proposed stakeholders[175] received the support of 50% and above respondents, the most important being business associations (86%, n=43), public authorities (78%, n=39) and educational providers (78%, n=39). When asked **what actions should be taken by public authorities**, the highest support was for long term strategies (86%, n=43), improving education and initial VET (76%, n=38) and re-skilling initiatives (70%, n=35**). Financial responsibility for re-skilling and up-skilling** of the workforce should mainly lie with public authorities and employers and not with employees. A large of stakeholders (n=37, 67%) thought that public authorities should be to a large extent[176] financially responsible. Similar opinion was expressed regarding employers, 96% (n=45) of stakeholders thought they should be financially responsible. The summary of all responses to this question is shown in the figure below.

Figure 0-4 Who should be financially responsible for re- and up-skilling of workforce? [matrix, rate each on scale 1-5] (n=155)



[175] Public authorities, Sectoral organisations / business associations, Trade unions / Employee representatives, Companies, Social partners / NGOs, Academia / research, Educational providers
[176] Rated as 3 and above