Industry and circularity. The example of the Flemish industry.

Edited by industriAll Europe.

Flanders stands out as one of the regions grappling with elevated pollution levels in Europe. The challenges facing this area include the prevalence of non-circular ETS industries, insufficient stakeholder involvement in the transition process, and the imperative to reskill and upskill workers in green technologies.

Acknowledging these challenges, Reset.Vlaanderen with the collaboration of industriAll Europe and Bond Beter Leefmilieu initiated a comprehensive joint project spanning 2021-2022. This initiative, funded by the European Social Fund, aimed to gain profound insights into the dynamics of engaging workers and trade unions in the transition towards a more circular economy. While the primary focus of the project centered on the metal and chemical industries in Flemish Belgium, with a keen emphasis on the integration of trade unions, it also extended its scope internationally to draw inspiration from exemplary practices. The project involved in-depth interviews and a thorough examination of circular transition processes, leading to the establishment of valuable recommendations.

The main takeaways of this project can be found attached below. It aims to answer four questions: how Flemish industry contributes to a solution to the climate problem, what the opportunities and dangers are for employees, how to combine a successful climate transition with long-term sustainable employment, and what role employees and trade unions can play in the transition.

To do so, different trade unions and Flemish environmental movements took a joint look at the Flemish Industrial Transition plan from March 2021 to November 2022 and exchanged information on the situation in different workplaces and industries. First, they wanted to obtain an overview of how far companies are today with the industrial transition and the concrete steps those companies have taken. Some companies, such as Arcelor Mittal, have recently announced transition plans, whereas the Port of Ghent aims to reduce more than half of its CO2 emissions by 2030.

Second, the organizations tried to assess the extent to which the industry's climate plans are feasible and offer the prospect of sustainable employment in a climate-neutral Europe. A Circular use of raw materials was seen as a key aspect of the industrial transition.

Third, it is analysed the role which trade unions can play as the most affected stakeholder in the transition. The study notices that there is less attention being paid to guaranteeing sustainable and quality employment in the long term in comparison to. In most cases, trade unions are only involved when the investment decisions have already been made. Some of the key conclusions are:

On the metal industry. It represents 8.8% of the workforce in Flanders. Those companies are key for the Green Transition as, among others, they produce steel and magnets for wind turbines, silicon for solar panels, aluminium, and copper for the expansion of the power grid, lithium for batteries for electric cars, and nickel for hydrogen technologies. Using circular economies to recycle these metals is a key aspect to reduce GHG emissions as the decarbonization of the primary production of these materials is difficult. To do so, value chains will have to change drastically. 85% of metals are being recycled already.

On the chemical industry. It represents 7% of the Flemish workforce. This sector has the highest energy need of all industries. On the one hand, the sector must restore the balance between the economy, the environment, and health, and on the other, it must neutralize its major climate impact. The main polluted product is plastic. There are many projects in the pipeline in Flanders to increase the circularity

of the use of plastic and other chemicals, and the potential to implement policies such as the taxation on non-recyclable packaging.

On skills, the Flemish labour market is still not prepared for a circular economy. Upskilling and lifelong learning are not structurally embedded. The tightness of the labour market is due to factors such as the aging of the population, and the fact that STEM studies are structurally undervalued.

On the Just Transition Framework, at Flemish level, there is the Permanent Consultative Body on the Industrial Climatic Leap. It thus benefits from active participation from the whole of civil society, including trade unions and environmental movements, in all aspects of industrial policy.

Industry on the road to **circularity**

Will the TRADE-UNIONS join in?

The example of the Flemish industry

Reset. Vlaanderen

BOND BETER LEEF MILIEU

Colophon

Industry on the road to circularity. Will the trade unions join in? The example of the Flemish industy

This brochure is part of the “Employees as a lever for a circular economy” project

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Vlaanderen is werk

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Trade Unions' forewords

Give employees a voice in the climate story

A just transition to a climate-friendly and circular industry is essential for us. This is only possible if employees have a voice in that story. As a trade union, the challenge today is to ensure that there is a thorough social dialogue on topics such as climate and transition, primarily in the companies themselves. In this dialogue, issues such as training, feasible work and job security are particularly important. This project has helped us see how we can work on that. Not only by sharing good practices with trade unions from Belgium and abroad, but also by defining a few levers with which we can actually start working.

Marc Lenders, General Secretary ABVV Metaal

For quality jobs in the new economy

As ACV-CSC METEA, we consider it important to be involved in industrial policy. Today, climate transition and the circular economy define this agenda. But what about the enterprise and sector level? It soon became clear to us that we should go for a just climate transition. Employees must be central in this and, as a trade union, we must take on our role in social dialogue. In the new economy, we want to continue to work for jobs with high-quality wage and working conditions, with no employees left behind.

This project provides new insights and leads for the trade union work of tomorrow for the trade union of today.

Lieve De Preter, General Secretary ACV-CSC METEA

Let's turn threats into opportunities

The General Union – ABVV is responsible for various heavy industry sectors for which the issue of the transition is becoming increasingly important. Whether we want to or not, what is being proposed as a transition will be imposed on everyone and all sectors and will involve a very profound change in the way we produce and consume.

So this transition is certainly a trade union issue. Therefore, we need to develop expertise in order to anticipate this transition and to turn threats into opportunities.

For us, the main importance of this project is to share our respective expertise in order to come to a common social and environmental vision.

For a just transition

The chemical industry is an energy-intensive industry that will be greatly affected by the climate transition. The industry must thoroughly reinvent itself. As a trade union, we must ensure that we are also at the table so that the transition to a circular economy is also a just transition. To adequately support our employees and activists in this story, we have put our weight behind this project.

Andrea Della Vecchia, Federal Secretary AC-ABVV and spokesperson ABVV-Chemistry.

Koen De Kinder,Federal secretary ACV construction, industry & energy

Foreword

Sustainable employment in the climate-neutral industry of Flanders

"A code red for humanity". That is what Antonio Guterres, the UN Secretary-General, called the latest report in 2021 by the IPCC, the UN Climate Panel. The conclusions of that report are clear: global warming has never happened so fast, mankind is the cause and drastic measures are needed if we are to avoid a climate catastrophe. Over the next decade, we need to halve global greenhouse gas emissions.

Europe has set itself the ambition to become the world's first climate-neutral continent by 2050. The announcement of the European Green Deal in 2019, encourages companies and member states to move quickly towards the climate transition. As an interim target, Europe aims to reduce CO 2 emissions by 55% by 2030 (compared with 1990 levels). It translated this target into the very comprehensive Fit for 55 policy package. Our Flemish industry faces a major challenge in the coming decades. It too must urgently end its addiction to fossil fuels. The energy crisis of 2022 shows that once again. We must invest massively in the transition and redesign our Flemish industrial value chains thoroughly. We need a green industrial revolution.

Transition from the employees' perspective

In this brochure we approach the industrial transition from the perspective of the employees. How can Flemish industry contribute to a solution to the climate problem? What are the opportunities and dangers for employees? How can we combine a successful climate transition with long-term sustainable employment? What role can employees and trade unions play in the transition?

How can we combine a successful climate transition with sustainable long-term employment? What role can employees and trade unions play in the transition?

During the Employees as Lever for a Circular Economy project, Flemish environmental movements and trade unions took a joint look at the Flemish industrial transition from March 2021 to November 2022. We got to know each other well and exchanged a great deal of information during a series of workshops. The focus was on chemicals and met-

al, given the great importance of these sectors for the Flemish economy. We have also drawn inspiration from exchanges with trade unions in other European countries. This brochure can be seen as a guide for trade unions and as a summary of what we learned during the project.

Where do we stand?

Three themes formed the common thread of our joint project. First, we wanted to obtain a good overview of how far we are today with the industrial transition. It is striking how quickly the debate evolves, in Flanders and in the rest of Europe, and certainly also in the trade unions. During the course of the project, a publication with relevant new information appeared every month or interesting study days were held. We also see that today industrial companies in our country are taking concrete steps for the climate transition. Consider the climate plans and investments recently announced by BASF and Arcelor Mittal. North Sea Port released a study in early 2022 that describes how the Port of Ghent aims to reduce more than half of its CO 2 emissions by 2030. It is clear that the green industrial transition has also started in Flanders, although there is still a long way to go. To get the critical mass of companies on board, we need bold policy and a strategic vision for the future of our industry. Transition plans must be put in place at all levels: at the level of companies and industrial clusters, at sectoral level and at Flanders level.

What about the climate plans?

Secondly, we tried to assess the extent to which the industry's climate plans are feasible and offer the prospect of sustainable employment in a climate-neutral Europe. The vision underlying the project is that the industrial transition must be accompanied by a more circular use of raw materials. The principle of a circular economy is that we use scarce raw materials as efficiently as possible in the economy and invariably put the used raw materials back into circulation, for example through recycling or reuse. In this way, we avoid a lot of greenhouse gas emissions in the short term and save a great deal of energy.

'It is clear that the green industrial transition has also started in Flanders, even though there is still a long way to go

According to our analysis, this leads to a better performing economy – which is particularly relevant in times of rising commodity and

energy prices – and thus also to sustainable employment.

However, we note that most long-term climate plans of large energy-intensive companies are based on a very high energy demand and take little account of the principles of the circular economy. After all, the essence of these companies' business models is the production of basic materials (such as steel and basic chemicals) based on newly extracted raw materials. Given the high energy demand, it is currently difficult to estimate the feasibility of such climate plans. We are also convinced that in order to achieve the circular transition, it is best to shift the focus to creating new circular value chains and that we need to look at the industrial transition more at the level of industrial clusters.

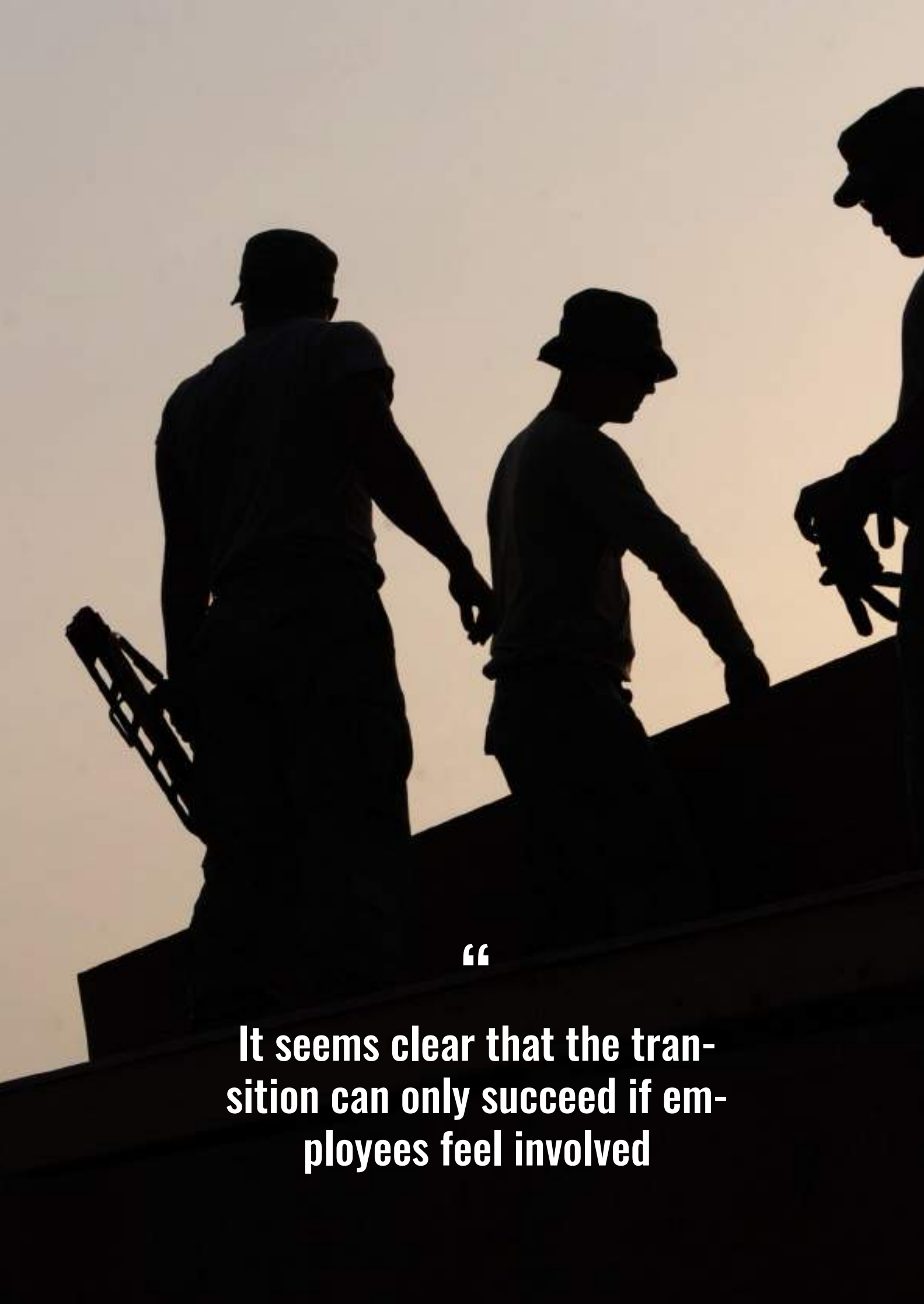
What role for trade-unions?

Thirdly, we discussed a possible role of the trade unions in the industrial transition. In a transition of this magnitude, there is a lot at stake for all stakeholders, not least workers in the industrial sectors. It seems clear that the transition can only succeed if employees feel involved. Today, we note that companies are fully engaged in the transition debates. The focus is on the investments that companies must make in new climate-neutral production processes, while less attention is paid, for example, to guaranteeing sustainable and quality employment in the long term. In most cases, trade unions are only involved when the investment decisions have already been made. In this way, we miss opportunities to create support for the complex transition that is coming our way.

How can trade unions change this? Based on, among other things, the discussions with trade unions that we conducted during the project, we make suggestions in this brochure about how a trade union can get started with the industrial transition. An example that appeals most to our imagination is the Dutch trade union FNV which, in the file on the greening of the steel factory Tata Steel, took the initiative and drafted a social contract around the transition. A KU Leuven study on this theme discusses a number of other specific examples, but also indicates that the context must be right before a trade union can have a significant influence on the decarbonisation processes at sectoral and company level. So, to put these suggestions into practice, there is still a long way to go. We are hopeful that this project will make an important contribution to the debate on the just industrial transition in Flanders.

Jeroen Fonteyn, Bond Beter Leefmilieu

Han Van Noten, Reset.Vlaanderen



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It seems clear that the transition can only succeed if employees feel involved

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A climate-neutral and circular basic industry in Flanders

How do we leverage our region's strengths for the industry of the future?

1. Flemish industry today

Flemish industry, source of prosperity and jobs

Flanders has been a highly industrialised region for decades and industry remains an important driver of our prosperity today. Flanders lies at the heart of Europe's largest industrial cluster, which stretches across the Netherlands and western Germany, with connections to northern France and the south of the United Kingdom. We are talking primarily about energy-intensive basic industry, which processes imported raw materials into the basic materials of our economy, such as steel, chemicals, non-ferrous metals or oil products and derivatives.

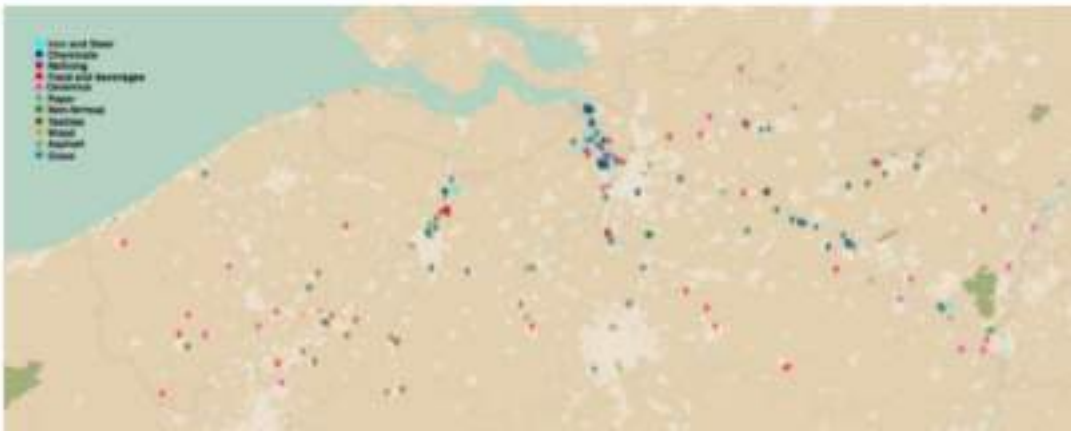

Figure 1: mapping of industrial EU ETS locations in Flanders. (Source: Wyns et al. , 2018b; Flemish Government, Department of the Environment, division EKG, 2017)

Industry is of strategic importance for the Flemish economy. A whole ecosystem has developed around the basic industry: producers of derived products, manufacturing industry and services sectors. The relative weight of the basic industry in total employment and economic added value has indeed decreased in recent years. In 2017, the basic industry accounted for 9.1% of Flemish economic added value and 6.2% of the employment, a decrease compared with 2005 (10.7% with regard to economic added value and 8.5% with regard to employment). In 2017, the basic industry accounted for 176,300 direct jobs, while in 2005 it still accounted for 207,600.

The Flemish basic industry, large emitter of greenhouse gases

Compared with some other European countries, the concentration of energy-intensive industrial companies in our region is very high. Industry is responsible for 28% of total emissions in Flanders, while the energy-intensive sectors account for 80% of these industrial emissions. Within this group, the refining, chemical and iron and steel sectors together have a share of almost 90%. During the Employees as Lever for a Circular Economy project, we have therefore focused on the metal and chemical sectors, which we also discuss in this brochure.

The CO_2 emissions of the Flemish basic industry are mainly regulated at European level. Energy-intensive companies are covered by the European Emissions Trading System (ETS), whereby companies must in principle purchase emission allowances in order to be able to emit, even though 95% of industrial emissions today are still covered by free emission allowances (80-85% for Flanders/Belgium). The total number of emission allowances available is limited and is decreasing annually. The complete list of Flemish ETS companies can be found on the website of the Flemish government. The ten largest emitters account for 72% of all Flemish industrial ETS emissions: these are ArcelorMittal, the two refineries of Total and ExxonMobil and a number of major chemical companies. Together, these ten are responsible for more than 20% of all Flemish emissions.

To achieve climate neutrality, the major industrial clusters in Flanders offer the greatest potential

In relation to the economy as a whole, the energy consumption of the industrial sectors is particularly high. When we take energy as a raw material and energy use into account, the industry is responsible for 55% of Flemish final energy use. Today, this energy comes mostly from fossil fuels.

Flemish ETS companies are mainly concentrated in a few clusters, such as in the Antwerp and Ghent seaports and along the Albert Canal. To achieve climate neutrality, these clusters have the greatest potential: they offer economies of scale for the roll-out of new infrastructure, for example for CO_2 transport and hydrogen production. Strategic infrastructure planning is a better scenario than individual companies and installations having to plan their climate transitions individually.

To reduce emissions quickly, a radical transformation is needed in which new processes are applied and scaled up

2. Towards 2050: what is the challenge for Flemish industry?

The European Green Deal and the Flemish industrial transition

In December 2019, the European Commission, led by Ursula von der Leyen, launched the EU Green Deal, with the aim of making Europe the world's first climate-neutral continent by 2050. This ambition has since been enshrined in a European climate law.

How can we translate this to Flemish industry? We will discuss this in the rest of this chapter. It is a fact that the emissions of Flemish industry have hardly decreased in the past ten years. Easy targets, such as energy efficiency improvements, have been largely met. In order to take further steps, a radical transformation is needed, in which new processes are applied and scaled up, so that emissions can be rapidly reduced and climate neutrality achieved. And it has to be fast: for industry, 28 years represents only one investment cycle. This means that all investment decisions taken today must be in line with climate neutrality by 2050.

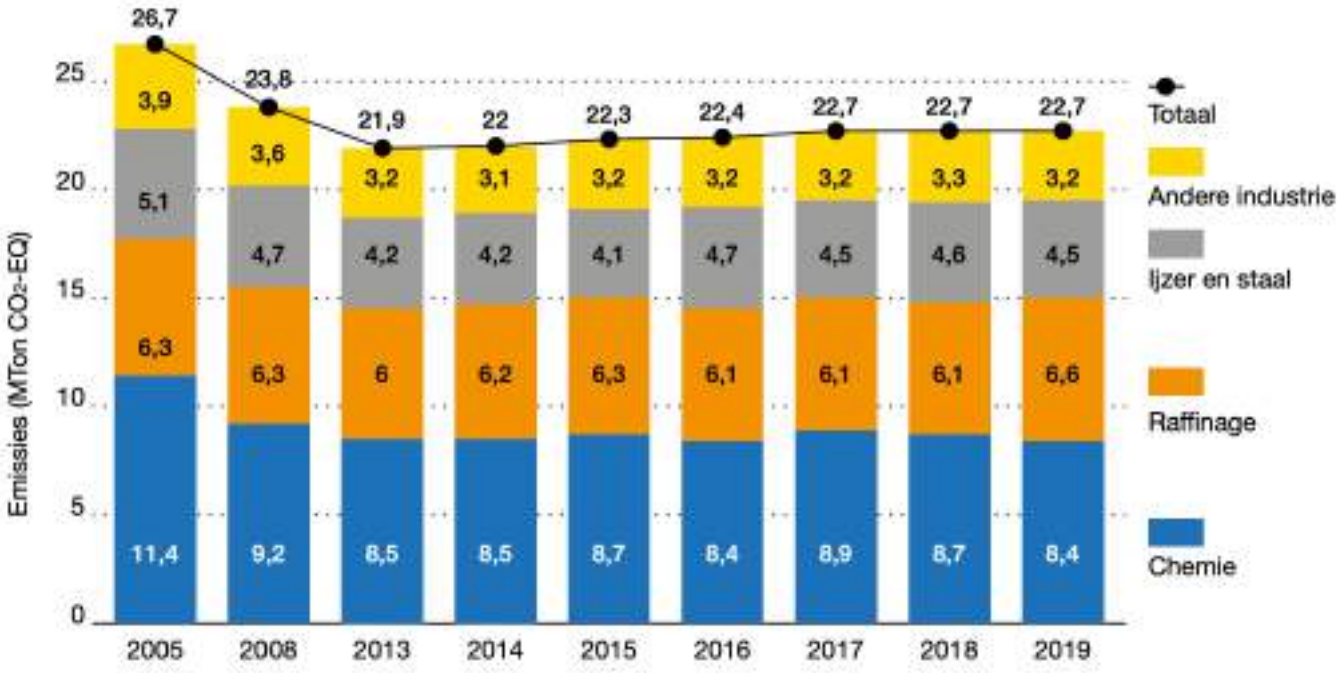

Figure 2: Emissions from industrial ETS sectors in Flanders between 2005 and 2019 (in millions of tonnes of CO_2). Emissions have not been reduced for over a decade, and have even increased slightly in recent years. (Source: Bollen, Y., Beys, O. (2020). Van een defensief naar een offensief industrieel klimaatbeleid (From a defensive to an offensive industrial climate policy).

The energy-intensive industry: a hard-to-abate sector

Heavy industry is described in the literature as "hard-to-abate". This means that complete decarbonisation of this sector is a major challenge because of three hard-to-reduce emission sources – specific to the sector – which together account for 84% of the total CO_2 emissions (see Figure 3):

- Process emissions, through the use of carbon in the production process, for example in the production of steel and plastics.
- High temperature heat (1100 to 1600 °C), for example, for steam crackers in the chemical industry and blast furnaces in the steel sector. Replacing fossil fuels to generate these high temperatures is a challenge.
- Emissions during the waste phase, in particular for plastics (waste incineration or landfill).

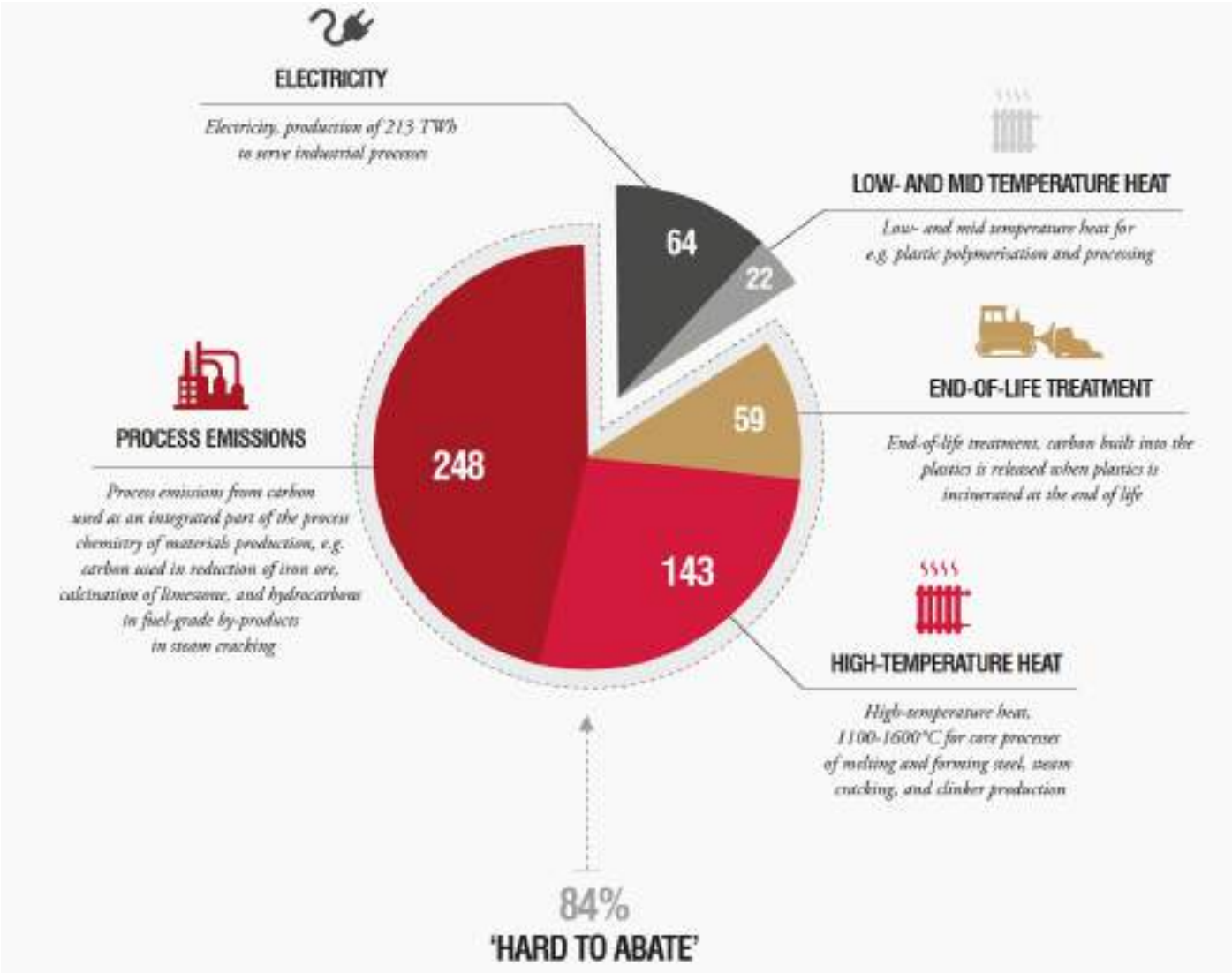

Figure 3: an overview of the hard-to-abate emission sources.
Source: Material Economics (2019). Industrial Transformation 2050 - Pathways to Net-Zero Emissions from EU Heavy Industry.

The Flemish material footprint and the importance of scope 3 emissions

It is not enough to look only at the local emissions of our own industrial value chains if we want to make our economy climate neutral. In an open, globalised economy such as in Flanders, materials and finished products are constantly being transported across borders: both the transport and production of these materials are accompanied by high CO_2 emissions.

The Greenhouse Gas Protocol is a commonly used international standard to quantify an organisation's greenhouse gas emissions. Under this Protocol, the emissions from companies are divided into:

- Scope 1: direct emissions resulting from own activities, such as plant emissions and own gas consumption
- Scope 2: indirect emissions for purchased energy (electricity and heat)
- Scope 3: all other emissions resulting from the company's activities, such as emissions from transport, from waste processing, from the production of materials (e.g. purchased metals or chemicals) or from the use phase of sold goods (e.g. from gas boilers or cars)

Additional information about this Greenhouse Gas Protocol can be found here.

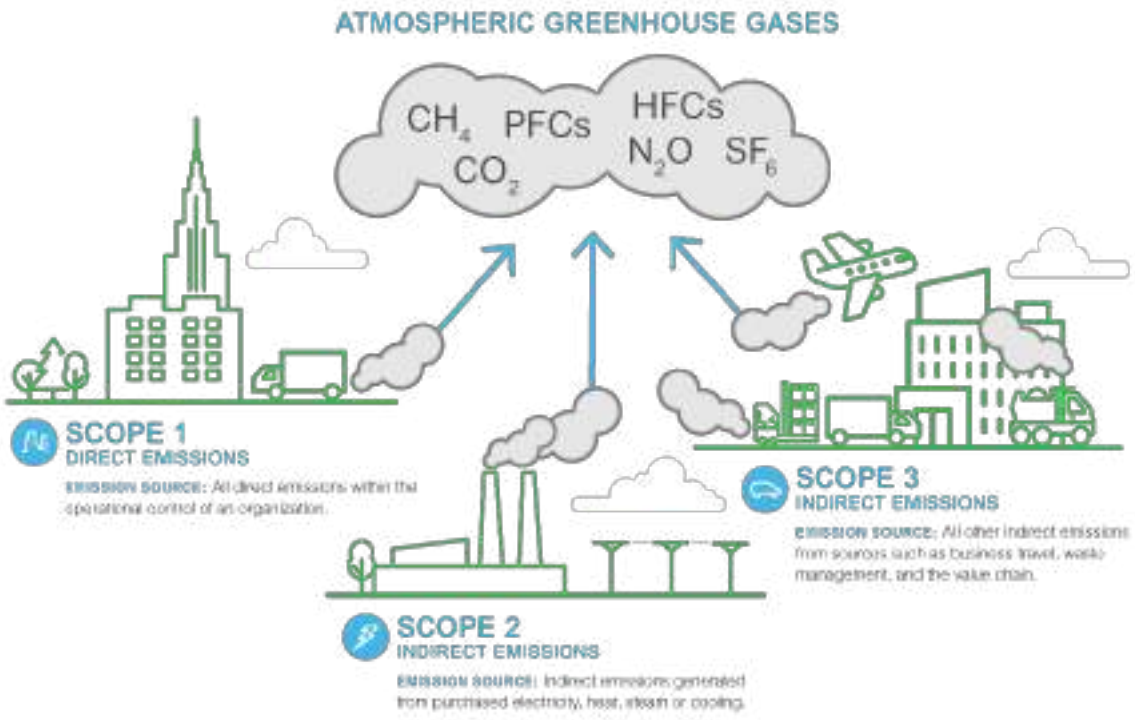

Figure 4: an overview of the different types of emissions according to the Greenhouse Gas Protocol. Source: groenbalans.nl

Companies usually take scope 1 and scope 2 emissions into account in their climate plans, but they often stop there. A truly climate-neutral economy means that all companies, from the manufacturing industry to the energy-intensive industry, are climate-neutral throughout their entire supply chain: from the extraction of raw materials to the end-of-life of the produced goods. This is an immense challenge, not least because companies rarely have direct control over their often very complex value chain. For plastics, these include emissions from the extraction of oil right up to the incineration of plastic waste. For a machinery manufacturer, this also includes emissions due to the energy consumption of the machinery.

For some companies, scope 3 emissions account for almost 90% of total emissions. The explanation differs from company to company, but one reason is the material footprint of the goods sold. The fact of the matter is that our society is a real resource gobbler, and this generates a particularly high level of greenhouse gas emissions. According to OVAM's study, 65% of the greenhouse gas emissions are material related in Flanders, more than in other European countries. In recent years, Flanders has been consuming some 180 million tonnes of materials each year. Of these primary raw materials, 149 million tonnes (83%) come from outside our region. When we talk about industrial transition, we have to take this data into account.

The importance of heavy industry in a climate-neutral economy

Although the challenge is particularly great, the industrial transition also offers opportunities for our region. The industrial sectors can make an essential contribution to the greening of our economy. A successful climate transition requires large quantities of raw materials such as steel, non-ferrous metals and plastics.

For some companies, the scope 3 emissions account for approximately 90% of total emissions. One of the reasons is the material footprint of the goods sold.

These are necessary for the production of solar panels, wind turbines, batteries and many other pillars of a green economy. So, the industrial transition can become part of the driving force behind the energy transition. In view of the demand for many of these products, it is recommended to maintain a strong European industry. If not, we will simply import these products from other countries, with a loss of economic activity without a reduction in the environmental pollution. On the contrary,

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‘The long tradition as an industrial region in the heart of Europe allows Flanders to pioneer the creation of a climate-neutral, circular industry

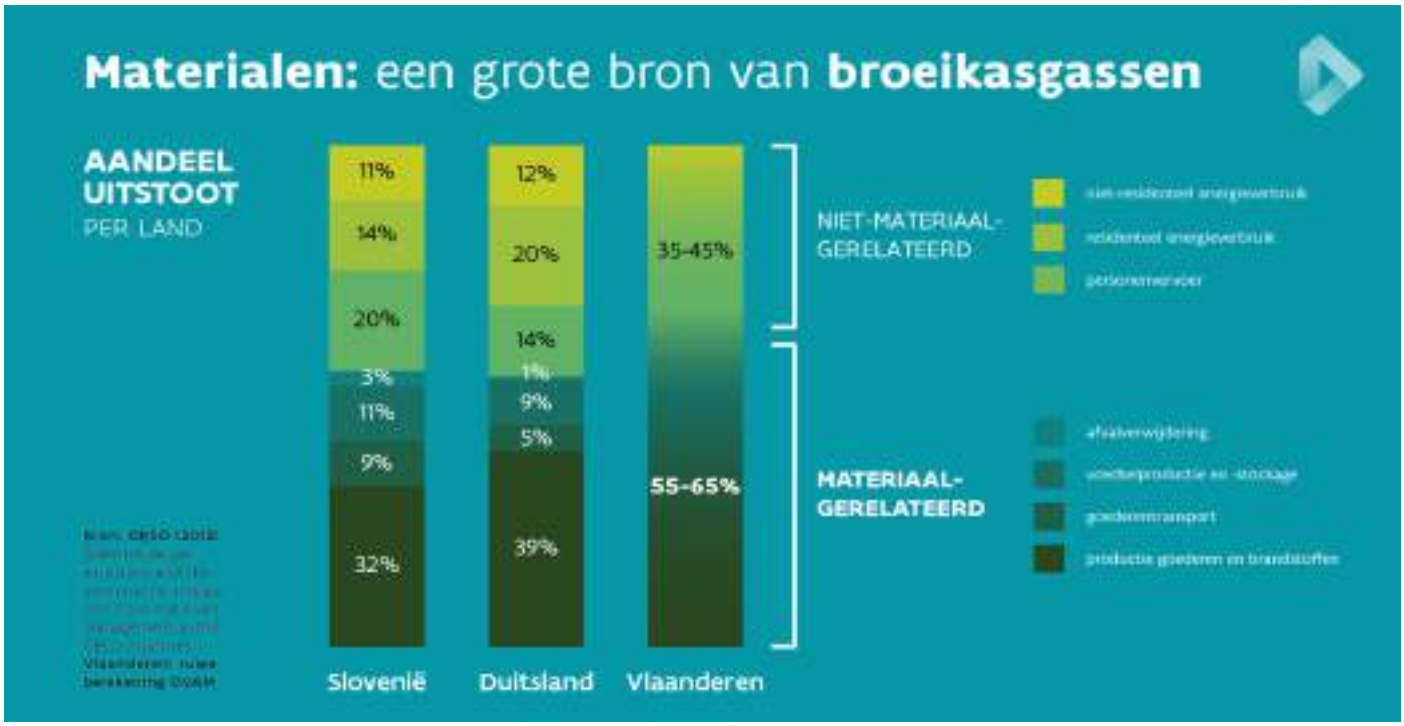


Figure 5: Material-related emissions in Flanders are high compared to other European countries. Source: OECD (2012) and OVAM.

because environmental standards are often lower outside Europe. Supported by the European Green Deal, Flanders, with its long tradition as an industrial region in the heart of Europe, can pioneer the creation of a climate-neutral, circular industry.

3. State of affairs with regard to industrial climate policy

Flanders: still many open questions

In the file 'From a defensive to an offensive industrial climate policy in Flanders', in 2020, Bond Beter Leefmilieu, Reset.Vlaanderen and Greenpeace produced a sharp analysis of industrial climate policy in Flanders. The essence of the analysis was that existing policies are strongly aimed at protecting existing fossil value chains (competitiveness, employment), including via a long series of multi-billion euro support measures for energy-intensive industry. This policy is a brake on the industrial transition, as there is no policy framework for industry decarbonisation.

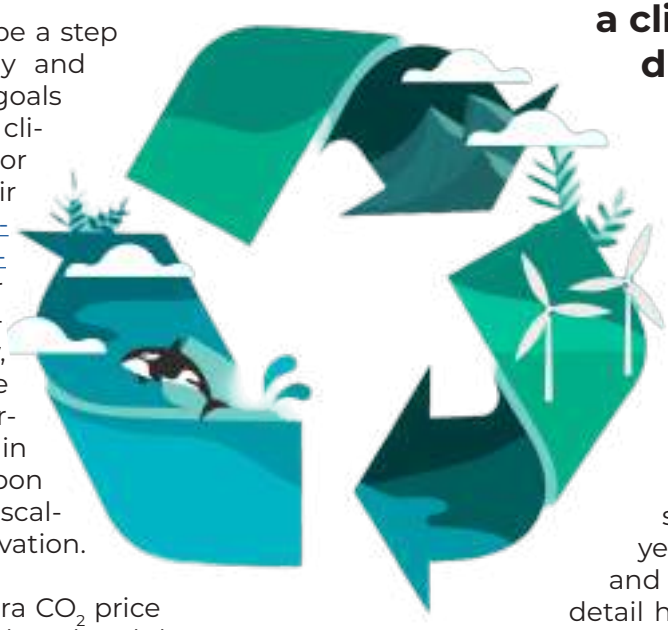
In the meanwhile, the presentation of the European Green Deal in 2019 has matured minds. In November 2020, an extensive study commissioned by the Flemish Agency for Innovation and Entrepreneurship (VLAIO) was presented with a roadmap 'Towards a carbon circular and CO_2-poor Flemish industry'. The study was carried out in close cooperation with the industry itself: the transition to a climate-neutral industry by 2050 is also on the agenda in most major European companies, at least in words. Some companies have already developed short-term and long-term climate plans and are making the first major investments for the climate transition.

Last year, the former Flemish Minister of Economy Hilde Crevits (CD&V) took the first steps for a policy framework for the Flemish industrial climate transition, the so-called Climate Leap. The Minister adapted the decree on innovation and science policy along these lines, but we are still waiting for any concrete form. For the time being, many questions remain unanswered: what will be the precise role of the civil society (trade unions and environmental movements)? What are the long and short term goals? What about transparency and democratic control? And how does the monitoring and evaluation take place?

In the meantime, companies still have the prospect of support in exchange for very limited conditions, as in the recently renewed energy policy agreements. Flanders currently does little to steer companies in the right direction or to offer them a framework or support for investments to move away from fossil fuels. However, it recently issued a permit for a new large 'fossil investment by chemical company Ineos, in particular for the construction of a large ethane cracker, which is admittedly presented as the most efficient in Europe.

Neighbouring countries: a step further

Our neighbours seem to be a step further. In both Germany and the Netherlands, climate goals are set in stone thanks to a climate law, and every sector is obliged to achieve their objectives. The new governments in both countries have large budgets for the greening of the economy. For several years now, policy instruments have been in place to encourage companies to invest in the transition, such as Carbon Contracts for Difference or scaling-up premiums for innovation.



In the Netherlands, an extra CO_2 price for industry was also introduced and there are multi-annual plans for energy and climate transition infrastructure: these are necessary to address the transition at the level of industrial clusters. In addition, in our northern neighbours there is a dynamic public debate about the industrial transition, which is completely non-existent here. In the negotiations of the national climate plans, environmental movements and trade unions sit at the table alongside industry.

In both Germany and the Netherlands, climate goals are set in stone thanks to a climate law

Europe

Finally, there is the European climate policy, which will force companies to reduce their CO_2 emissions. The European ambition to reduce CO_2 emissions by 55 percent by 2030 (compared with 1990 levels) was translated, in the summer of 2021, into the sizeable policy package Fit for 55. For energy-intensive industry, the ETS reform is particularly important: the ETS ceiling is being gradually lowered, so that the total emissions of all ETS companies in Europe will have to fall by 61% by 2030 (compared with 2005). Most industrial companies today receive many free emission allowances, but these would be phased out by 2032. Moreover, there will be a Carbon Border Adjustment Mechanism, an EU import tariff on CO_2-intensive products such as steel, cement and aluminium as from 2026.

4. Building blocks of a climate-neutral industry

How do we succeed in making our industry climate neutral on time? What strategies, technologies and policies are needed to achieve this ambition? Below we summarise the existing discussions and give the reader a number of broad outlines. This chapter is largely based on studies published in recent years by Agora Energiewende and Material Economics, which detail how European industry can make the transition to climate neutrality. For the Flemish industrial transition, we refer to the aforementioned study by VLAIO and the answer formulated by Bond Beter Leefmilieu in 2021.

Circular economy is central

Studies by Agora Energiewende and Material Economics conclude that the transition to a climate-neutral industry is impossible without the application of circular strategies and that circular strategies can facilitate and accelerate the transition. By circular strategies, we also mean looking at the demand side of materials. How can we use and reuse materials in our economy as efficiently as possible? How can we generate equal functionality and economic value with fewer materials?

According to a study by think tank Agora Energiewende, the current policy discussions about industrial transition largely ignore the need to produce fewer primary materials, and they focus purely on decarbonising current industrial production based on new primary raw materials – but with new, low-carbon technologies. The study also predicts that current strategies "are unlikely to succeed [will not succeed] in achieving a climate-neutral European industry by 2050." In fact, the current approach may require an unrealistic amount of new infrastructure, including electricity, hydrogen, carbon capture and others. "It is (would be) a major mistake not to activate the enormous additional potential of the circular economy in Europe."

In December 2019, the European Commission, led by Ursula von der Leyen, launched the EU Green Deal, with the aim of making Europe the world's first climate-neutral continent by 2050.

Why is circularity so important?

These are the three main reasons why circularity should be central to the industrial transition:

1. **Climate & energy:** the climate impact of the primary production of basic materials is very high due to the large amount of energy required that currently still comes primarily from fossil fuels. It is important to take into account the entire life cycle of materials, from the extraction of raw materials (mining worldwide is responsible for about 10% of all greenhouse gases) to the end product. Circular strategies ensure significant energy savings. The availability of green, climate-neutral energy is widely cited as the biggest bottleneck for the industrial transition.

Circular strategies ensure significant energy savings

2. **Strategic autonomy:** raw material stocks are by definition finite. The increasing scarcity of materials and raw materials poses a potential threat to the European industrial sectors. Future demand for a large number of raw materials will far exceed supply. The EU itself has limited stocks of raw materials and is dependent on third countries for its supply. European industries are therefore becoming increasingly vulnerable to high prices, market volatility and the political situation in the supplying countries. To secure the future of its industrial sectors, Europe must work towards reducing its use of materials and re-using materials from the already produced finished products.

3. **Economic added value & innovation:** a circular economy also makes economic sense. Circular strategies are often profitable and their cost is lower because we import less energy and raw materials – not unimportant in the current geopolitical context. In a linear economy, materials lose their economic value after use, while in a circular economy they retain their value. Circular strategies can make the climate transition considerably easier and cheaper. A McKinsey study calculated that the annual economic added value for the European Union will amount to EUR 1.8 billion by 2030. A more circular economy creates more added value with fewer resources, it focuses on technological and social innovation and improves the competitiveness and resilience of enterprises and sectors. There is great potential for a increase in growth and employment, while we would all spend less money on the production and consumption of goods. Households could see their disposable income increase by 11%.

A McKinsey study estimated that the circular economy will generate an annual added value of EUR 1.8 billion for the European Union by 2030

Circulaire economie, what's in a word?

The concept of the circular economy refers to an economic system in which we anticipate the depletion of raw materials as much as possible. We use raw materials as efficiently as possible and invariably put used raw materials back into circulation, creating a 'cycle' and preserving their value. The opposite of the circular economy is the linear economy, in which raw materials after use end up in the environment as unusable waste and we quickly deplete finite raw material stocks. This, for the most part, is the current system.

Circular economy is, however, a very broad concept that we must put into perspective. The number of circular strategies is particularly diverse, but not all strategies are equally important or efficient. The best known concept for setting priorities in the circular economy is the so-called R-ladder, referring to the words "Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle and Recover."

In practice, the concept of circular economy is often narrowed to the recirculation of materials after use, such as the recycling, reuse or recovery of raw materials.

However, the top steps on the ladders are the most efficient in preventing materials from being lost. The code word here is prevention: thoroughly rethink products and business models with a view to keeping raw materials in circulation for as long as possible. It is about fundamentally questioning consumption patterns without sacrificing functionality or economic value.

The code word is prevention: thoroughly rethink products and business models with a view to keeping raw materials in circulation for as long as possible

We will discuss this in more detail in the chapters on metal and chemicals. According to the study by Material Economics, the biggest opportunities for circular strategies lie in five sectors: 1)

steel, 2) aluminium, 3) transport, 4) the construction sector and 5) the plastics sector. In the transport sector, for example, it involves the massive expansion of shared cars to reduce the number of cars being produced. In the construction sector, there is a wide range of possible measures, such as modifications in the design of buildings to improve the lifespan and modularity, to enable end-of-life disassembly, the reuse of intact structural components, the recycling of cement, etc.

Other technologies and strategies in a nutshell

Of course, we will also have to focus on new technologies and invest in processes to decarbonise industry. Detailed information on this can be found in the studies cited (see the bibliography). The good news is that many of these technologies are in full development: Agora Energiewende provides an overview of pilot projects and planned investments in Europe. We briefly discuss the most important new technologies below.

1. Electrification

The major advantage of direct electrification includes high total energy efficiency. In many sectors, such as the chemical industry, electrification can replace a very large proportion of the fossil fuels used today for low- to high-temperature processes. There is also a great deal of research into solutions for the high-temperature requirements of, for example, steam crackers ("electric cracking"), for the production of basic chemicals or for cement production based on electricity. The main challenge for the large-scale electrification of industrial processes is the high need for carbon-free electricity. This requires a rapid expansion of the capacity of renewable energy – fortunately, it is the cheapest energy source today. Direct electrification is important because it can eventually reduce the demand for less energy-efficient energy carriers, such as hydrogen and e-fuels.

2. Groene waterstof

Green or emission-free hydrogen will play a very important role in the decarbonisation of the basic industry. For example, hydrogen will be needed, among other things, in the steel industry – for the production of direct reduced iron (see the metal sector chapter) – or as a raw material in the chemical industry, for example to produce ammonia. Today, the industry already uses grey hydrogen made from natural gas. The challenge is 1) to 'green' the hydrogen production and 2) to meet the growing demand for hydrogen for CO_2-free production in industry. Hydrogen can initially be produced within Europe, but if demand increases in the medium to long term, it can also be imported. Blue hydrogen produced from natural gas with CO_2 capture (CCS) can also be an option as long as the methane leaks from natural gas extraction can be remedied.

Expectations for the future hydrogen economy are high, not only for industry, but also for shipping and aviation, and in order to stabilise the electricity grid. However, there are some important obstacles, notably 1) the higher cost of hydrogen compared with fossil fuels, 2) the construction of new infrastructure to make large amounts of hydrogen available to industry, and 3) the large amounts of green electricity needed to produce hydrogen in electrolysers. The production of hydrogen through electrolysis is associated with energy losses in the conversion of electricity to hydrogen, making direct electrification much more energy efficient.

Green or emission-free hydrogen will play a very important role in the decarbonisation of the basic industry. For example, hydrogen will be needed, among other things, in the steel industry, for the production of directly reduced iron.
Image: Macrovector on Freepik

Expectations for the hydrogen economy are high. However, there are important obstacles'

3. Carbon Capture and Storage (CCS)

Industry often puts forward CCS (carbon capture and storage) as a potential alternative to phasing out fossil fuels, but it is a controversial technology. CCS captures CO_2 from industrial processes and permanently stores it in geological formations, such as empty gas fields. It is beyond dispute that CCS will play a role in certain sectors that are difficult to decarbonise, such as the cement industry, because there are no alternatives available in that industry. Most other industrial processes already have alternative technologies that do not use fossil fuels, such as direct electrification and green hydrogen.

CCS has the advantage that it requires no major changes in existing production processes in the short term, but the risk is that companies will be less inclined to invest in other innovative technologies. In addition, CCS is not expected to be able to capture 100% of CO_2 emissions, so that remaining emissions have to be offset elsewhere. It is currently unclear exactly what percentage of CO_2 emissions can be captured in which processes (dependent also on the CO_2 concentration of the gases). The use of fossil fuels also generates greenhouse gas emissions elsewhere in the chain, particularly during the extraction (e.g. methane leaks) and during the transport. A requirement for CCS is the development of infrastructure for the transport of CO_2, either via pipelines or ships, and the availability of empty gas fields, for example under the Dutch North Sea. Most observers agree that CCS is a temporary solution (because at some point the gas fields will be full) pending investment in other technologies.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“Most observers agree that CCS is a temporary solution pending investment in other technologies.”
CO2
©Freepik

4. Carbon Capture and Utilisation (CCU)

It is also possible to use the CO_2 captured from industrial processes as a raw material in other products, such as plastics, synthetic fuels (e-fuels), certain fertilisers, mattresses, concrete or other construction materials. But like CCS, CCU is also controversial. A recent study by Radboud University concluded that most forms of industrial CO_2 use do not sufficiently reduce emissions in order to comply with the Paris Agreement and that forms that could halve emissions by 2030 are often not ready for the market. This is why some people talk cynically about “Carbon Capture and Delay”.

We need to ask ourselves about the extent to which specific CCU applications fit into a climate neutrality strategy. An important parameter, for example, is the lifespan of the product in which the CO_2 is captured. For example, long-life products such as mattresses or building materials make more sense than synthetic fuels (for example, aircraft or shipping), because the CO_2 quickly escapes back into the atmosphere. In addition, the amount of energy required is also of great importance: some CCU applications are more energy intensive than others. Moreover, in many cases decarbonisation options are available with a much greater potential for greenhouse gas reduction – so that CCU leads to less efficient use of green electricity.

CCS and CCU in Flandres

Technological choices can have major socio-economic consequences, as we argue in chapter "Jobs in the circular industry of the future" (p.48) . For the Flemish industry, a discussion of CCUS (Carbon Capture Utilisation and Storage) is particularly relevant, because they form an important focus in the VLAIO study, and because major projects around these technologies are in the pipeline. At best, they represent an important step towards a climate-neutral industry. In a less favourable scenario, they lead to insufficient emission reductions while at the same time they perpetuate fossil value chains, with potential risks for the future of our industry.

For example, for CCU it concerns the North-CCU-Hub, a large consortium of partners in North Sea Port, the port of Ghent, in which steel giant ArcelorMittal is also closely involved. For CCS, it is the Kairos@C project in the port of Antwerp, announced as the largest CCS project in the world, funded by the European Commission. Since large quantities of CO_2 can be captured in the Antwerp petrochemical cluster in a limited area, this is a worthwhile project in terms of economic profitability, although there are still many uncertainties, for example with regard to what percentages of emission reductions per point source will be achieved.

5. Biomass

Finally, the reduction of CO_2 emissions in basic industry can also be achieved by replacing fossil fuels with biomass: the carbon from the biomass is then used as feedstock for the production of basic chemicals (for plastics, fertilizers and more), or the biomass is used to meet the demand for heat. However, the use of biomass in industrial processes is controversial: its potential seems limited, it can compete with other applications of biomass (such as for food) and, moreover, the cultivation of biomass can also lead to greenhouse gas emissions.

Towards an ambitious Flemish policy framework for a circular industrial revolution

If we look at the current Flemish policy discussions around the industrial transition, we note that circular strategies hardly come into the picture. In any case, policies for industry and the circular economy are never linked. The VLAIO study on the decarbonisation of Flemish industry does not cover circular strategies, with the exception of the (controversial) reuse of CO_2 (carbon capture and use).

This was one of the reasons why Bond Beter Leefmilieu published its own study in 2021. The BBL study focuses on, among other things, circularity, material efficiency and demand reduction, which results in energy savings of approximately 50% compared to the VLAIO study. We hear from various sources and discussions with experts that this scenario is more realistic. Flanders is a resource-poor region and the limited available area in our country creates important restrictions on the amount of renewable energy we can produce locally. Thus it seems crucial that we build industrial value chains that are as energy and material efficient as possible.

Flanders has many assets to make the circular economy a success, such as its central location at the heart of Europe's largest industrial cluster. Our region already has a strong recycling industry and considerable expertise in the area of the circular economy. The concentration of industry in a limited number of places enables far-reaching cooperation within industrial clusters, including the exchange of raw materials, energy and waste flows. Flanders is ideally located to set up logistics chains for waste processing and recycling. It can also specialise in an economy of sustainable products and circular business models, from reuse, recovery, remanufacturing, eco-design and product-as-a-service. To this end, it will have to set up innovative value chains. It can also create a great deal of economic value and local jobs.

By setting up innovative, circular value chains, Flanders can create a great deal of economic value and local jobs

To realise that potential, a paradigm shift is first needed. The VLAIO study explicitly assumes the opposite: “preserve the existing value chains to the maximum extent”. This is where we need to ask ourselves: is this desirable and realistic? In our opinion, this defensive reflex poses a major threat to the competitiveness and resilience of the Flemish economy. Our energy-intensive and linear value chains are vulnerable, not least because of the geopolitical context.

For industry, a successful climate transition amounts to a real green industrial revolution and the drastic rebuilding of our industrial value chains. The focus in policy must shift from protecting what we have to creating new value chains. All investments made today must be in line with the ultimate goal of a climate-neutral economy. Investments that fail to do so pose a direct risk to the competitiveness and resilience of the economy and thus to future jobs and prosperity.

The current energy crisis is bringing matters to a head. The existing fossil value chains are under severe pressure. Accelerating the industrial climate policy seems the best way out of the impasse, but our industry's climate leap will not happen by itself. This requires a supported vision of the future of industry and a strong policy framework to attract the right investments, to support companies in their innovations and to build the energy infrastructure of the future.

The programme memorandum for the Flemish Climate Leap is indeed being prepared, but it is unclear when this will lead to concrete policy instruments. Today, Flanders pursues an ad hoc policy without a coherent vision, with the consequence that, for example, the subsidy and innovation policy is not aligned with the industrial transition. In contrast to support for companies, investments must be in the transition, such as in electrification, energy savings and CO_2 reductions. In this way, we are no longer spending the money on preserving the fossil status quo, but on building the industry of the future.

In order to anchor jobs in industry permanently, we need a Marshall plan for our Flemish industry. Trade unions and environmental movements are now jointly advocating a 'quadruple helix model' in which the government shapes the transition policy in close interaction with companies, research institutions, civil society and the citizen. This is necessary in order to create support for the complex societal and social transition that is coming our way. Transition plans must come at all levels: at company and industrial cluster level, at a sectoral level and at Flanders level. Finally, a more holistic view of the transition is needed, outlining entire value chains in which production processes and products are no longer seen separately.

Trade unions and environmental movements are now jointly advocating a 'quadruple helix model' in which the government shapes the transition policy in close interaction with companies, research institutions, civil society and the citizen.

Further reading?

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The current energy crisis is bringing matters to a head. The fossil value chains are under severe pressure. Accelerating the industrial climate policy seems the best way out of the impasse.

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A circular future for the Flemish metal sector

How do we simultaneously reduce emissions in the sector and create added value?

What is the state of the Flemish metal sector today?

According to the study by Bernard Mazijn and Sander Devriendt, the Flemish metal sector accounted for 185,754 jobs in 2015, some 8.8% of the total number of people employed in Flanders. The study uses a broad definition of the metal industry: a diverse ecosystem ranging from producers of steel, iron and non-ferrous metals, a diversity of metal processors and manufacturing companies, including manufacturers of machinery, motor vehicles and electrical equipment, to even electricians and garages.

In terms of direct emissions from companies, we can divide industrial companies into ETS companies (the energy-intensive companies) and non-ETS companies. On a Flemish government website we can find an overview of all ETS companies in Flanders, and their respective CO_2 emissions between 2005 and 2021. In the categories 'iron and steel' and 'ferrous and non-ferrous', we still find a total of 11 companies in 2021 (that number

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has decreased in the past 17 years): ArcelorMittal Gent (Belgium's largest emitter), followed by Umicore (Hoboken and Olen), Aperam (Genk), Metallo-Chimique (Beerse), Aurubis (Olen), Alvance Aluminium (Duffel), Bekaert (Zwevegem), Picanol-Proferro (Ypres), Nyrstar (Balen) and Volvo Cars (Ghent).

As indicated in Chapter "A climate-neutral and circular basic industry in Flanders" (p.12), all these companies will have to take into account a substantial reduction of the ETS ceiling by 2030 and the phasing out of the free emission allowances. When we talk about the climate impact of a company, it is not enough to look only at the CO_2 emissions that the company itself causes at the production site (the so-called scope 1 emissions). Every credible climate plan takes into account the company's scope 2 and scope 3 emissions. It is therefore important for all metalworking companies to take into account the entire value chain.

Metals continue to be needed in a climate-neutral economy

The decarbonisation of the sector will undoubtedly be easier if we have to extract and produce fewer metals, especially by using them more efficiently in the economy. However, there will still be a great need for metals in the future. Metals, for example, are indispensable for realising the energy transition. In this respect, important economic opportunities for the sector lie ahead. These include (among others) 1) steel and magnets for wind turbines, 2) silicon for solar panels, 3) aluminium and copper for the expansion of the power grid, 4) nickel, lithium and cobalt for batteries for electric cars and energy storage, and 5) nickel and copper for hydrogen technologies. Numerous recent studies – such as that of Eurometaux from 2022 – describe the great need for metals for the energy transition. If we want to make the transition to 100% renewa-

ble energy, the demand for both basic metals such as aluminium, copper, nickel and silicon as well as specialised metals such as lithium and cobalt, and many lesser-known raw materials from the group of rare earth metals, will increase considerably.

If we want to make the transition to 100% renewable energy, the demand for many types of metals will increase considerably

Stocks of raw materials are by definition finite. Combined with the exponential rise in global metal use in the economy, stocks of some raw materials are dwindling fast. Europe today loves to talk about "strategic autonomy" and has identified a number of critical raw materials. In Europe itself, few raw materials are mined, so we are very dependent on the import of raw materials from other parts of the world. This is where the extraction of metals goes hand in hand with significant environmental damage, with greenhouse gas emissions and with human rights violations. In many cases, it is becoming increasingly expensive, complex and destructive to extract the necessary raw materials, as easily accessible stocks are exhausted. The European economy is also very vulnerable due to the huge dependence on, for example, China. Today, this leaves its mark on virtually the entire value chain for the energy transition, such as with solar panels and batteries.

We also use metals for many other applications, such as for ICT or other electronics, in the construction sector or in machine construction. The main problem is unsustainable use: after use we do not recover precious metals, so they lose their economic value. In the field of ICT In recent decades, a huge market has emerged for devices that are full of metals but which have only a short lifespan and are difficult to repair and recycle due to their problematic design.

The question is how to keep these metals as much as possible in the economy and what priorities should be set for the use of certain scarce metals. Measures to reduce the demand for raw materials will be needed in all scenarios. Think of behavioural change in the mobility sector (more shared cars, bicycles and public transport) or ICT devices that last longer.

Circular use of metals is essential

In summary, a substantial increase in the circular use of metals is crucial for three reasons:

1. The **climate impact of primary production** – on the basis of newly extracted metals – is very high, due to the very high energy input during the extraction and production of these primary raw materials. The figures are different for each metal, but as an example: the difference in energy consumption between recycling and primary production is 85% for steel and 95% for aluminium. The higher the energy consumption, the more difficult decarbonisation is, as we have stated earlier in this brochure. The Ellen MacArthur Foundation calculated that by applying circular strategies, greenhouse gas emissions for the production of five sectors (including steel and aluminium) can be reduced by half.

2. **Strategic autonomy:** Circular use of resources makes the European economy more resilient as it protects it from supply chain disruptions, geopolitical tensions and diminishing reserves of raw materials. Our current consumption pattern for primary raw materials is simply unsustainable. We cannot actually afford to lose the value of scarce metals in the economy.

3. The **social and environmental impact of mining**: Due to the increasing use of metals worldwide, the impact of mining has taken on enormous dimensions in recent decades. Mining forms the largest human waste flowout there and is one of the largest emitters of CO_2 in the world. Europe wants to start with the extraction of more metals on the continent again, but this is expected to be difficult in practice, partly due to local opposition. There are plans to extract raw materials in unspoilt areas such as the Arctic, Greenland or in the deep sea, although this is highly controversial due to the potentially destructive effects on fragile ecosystems.

Decarbonisation of primary production is difficult

In the next paragraph, we discuss what the circular economy can mean specifically for the metal sector. But firstly we briefly examine the possibilities for decarbonising the production of metals on the basis of primary raw materials.

As an example, we take recent developments in the steel sector, which is already the furthest in decarbonisation. Steel is the world's most important building material, but today it has a huge climate impact (about 8 percent of all CO_2 emissions). The good news is that it is already technically possible to eliminate 90% of CO_2 emissions from steel production, particularly in a direct reduced iron (DRI) furnace on the basis of green hydrogen (more on green hydrogen in chapter "A climate-neutral and circular basic industry in Flanders" (p.12)). In the summer of 2021, the company SSAB in Sweden produced the first fossil-free or green sample in the world. This is a pilot project, but there are concrete plans to produce green steel on an industrial scale by 2026. The market for this fossil-free and more expensive steel is already guaranteed: Volvo and Mercedes in particular want to use it.

It is already technically possible to eliminate 90% of CO_2 emissions from steel production

However, scaling up such pilot projects is a major challenge, as it requires large quantities of green hydrogen. SSAB's steel mills are located in Luleå, in northern Sweden. Surpluses of renewable energy, from wind or solar energy or from hydroelectric power plants, are easier to achieve in this sparsely populated region than elsewhere.

The availability of green hydrogen can become the major bottleneck of the industrial transition. Large quantities of green hydrogen will also be needed in other industrial sectors. In Belgian industrial circles, we are therefore looking for possibilities to import the necessary quantities of green hydrogen. Some analysts already speculate that industrial production sites could shift to regions where renewable energy surpluses could easily be realised, which could then be used to produce hydrogen.

Natural gas can also be used in a DRI oven to reduce the iron ore. This is more realistic for many European factories in a first phase. ArcelorMittal plans to do this in Ghent.

Can ArcelorMittal Ghent produce fossil-free steel?

Can steel giant ArcelorMittal in Ghent also switch to fossil-free steel based on green hydrogen in the future? The multinational has already chosen the city for an important investment in a similar type of DRI furnace, replacing one of the two existing blast furnaces. This will enable the site to switch half of its capacity from coal to natural gas by 2027, which is already good for a very large CO_2 reduction. The next step is to switch to green hydrogen. What quantities of hydrogen are we talking about here?

For this, we refer to a study conducted by NGO Bellona for a similar steel factory, Tata Steel in IJmuiden in the Netherlands. The volumes produced are similar: 6.62 tonnes per year for Tata Steel compared with 5.9 million tonnes (2019) for Arcelor in Ghent. Bellona calculated that eight wind farms the size of the largest existing wind farms in the Netherlands are needed to produce the green hydrogen required for Tata Steel's steel production. Given the limited space on the Belgian North Sea, it seems completely unrealistic to produce such large quantities of 'green' electricity locally in Belgium.

Blue hydrogen (based on the use of natural gas, the emissions from which are captured) is also a potential avenue for the steel industry, according to the Bellona study. Electricity input is much lower, but to keep emissions to a minimum requires a very high CO_2 capture rate and a very low methane leakage rate. These are particularly tough challenges, and this option is probably accompanied by very high and continuing costs (such as for CO_2 capture and the purchase of natural gas). In any case, with both scenarios, near climate-neutral steel production on the basis of green or blue hydrogen, is not yet realistic for the Ghent steel giant.

More information about Tata Steel can be found on page 75.

In a circular economy, value chains will change drastically

As this example from the steel sector shows, decarbonisation of the primary production of metals is very energy intensive and requires a great deal of investment. For these reasons, we must focus as much as possible on circular value chains for metals. Primary production will remain important in the coming decades, both for steel and non-ferrous metals and certainly for metals for the energy transition. However, a Material Economics study indicates, among other things, that within a few decades there will be a mature market for recycled steel in Europe, which means that hardly any new ore will be needed. By then, many structures will have reached the end of their life, so there will be sufficient scrap and primary production can be virtually phased out.

What could these new circular value chains look like?

Recycling rate of various metals: Steel is the metal that is most recycled today: 85% of all the used steel returns to production. That certainly does not apply for all metals. For most basic metals, the recycling rate is quite high (especially for the metals that we use in large volumes such as steel, copper and aluminium), while other metals are hardly, or not at all, recycled (e.g. less than 1% for lithium). Today, recycling is currently employed efficiently for relatively simple applications and for large volumes. The recycling percentage decreases enormously as products become more complex, such as with electronics and other equipment. There is

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Within a few decades there will be a mature market for recycled steel in Europe, which means that hardly any new ore will be needed

thus still a great deal of potential here, because recycling companies are now able to recycle more and more different metals with ever better techniques. For many metals, recycling is also perfectly profitable. But even metals with high recycling rates, such as aluminium, a great deal of material is still lost: a 75% recycling rate for aluminium means that 25% of the aluminium is lost, while it can actually be recycled without loss of quality.

What is needed t**o improve the circularity of metals**? In the first instance, metals must be recovered more efficiently. But the problem lies deeper: waste has no intrinsic value in our economy and products are not designed for reuse and recycling.

Urban mining: In the future, the main place to 'mine' raw materials will not be under the ground, but from existing appliances and structures or buildings. We call this 'urban mining'. Many metals can be found in our living room, on the rubbish dump or the scrap heap, but these raw materials are often still being lost today, accompanied by a loss of economic value. For some metals, urban mining is already the only source of mining. Furthermore, in many cases it is cheaper. A striking example is gold: as a rule, there is about 100 times more gold in a kilo of discarded smartphones than in a comparable kilo extracted in gold mines. But that gold is rarely recovered today.

Eco-design: Manufacturers can be required to apply the principles of eco-design. This is an essential condition in order to increase the circularity of metals. It means, among other things, harmonisation in product design, extending the life of products by making it possible to disassemble them and thus make them easier to repair, as-a-service models in which producers retain ownership of the product, a generalisation of the recovery economy and of practices such as remanufacturing or refurbishment. Products must also become 100% recyclable, or producers must remain responsible for the waste. The European Commission is already working on eco-design, for example in its recent EU Sustainable Products Initiative.

Logistics chains: One difficulty of the circular economy is that raw material stocks are very dispersed. For a profitable recycling economy, certain volumes are required. The challenge is therefore to set up good logistics chains to get the raw materials from the waste mountain to the recycling plant. As an illustration, due to defective collection systems, approximately two thirds of the raw materials from electronics are still being lost in the chain today. We must also avoid exporting metals to other continents (where it is usually unclear what happens to the raw materials). Today, among other things, aluminium, copper, car wrecks or electronic waste are still being shipped off on a large scale. Europe is trying to prevent this in its new Waste Shipment Regulation.

Ecosystem thinking: What we need is an integrated and decentralised ecosystem that covering the logistics systems of waste processing, specialised recycling industry, the metal processors and the producers of end products. In order to waste as few raw materials as possible, the various branches of that ecosystem are coordinating their activities. The good news is that this can lead to a great deal of extra local employment. It is at the very least a fundamentally different model from the centralist production of metals that we are used to, with huge metal plants and mining multinationals. This transition will have important consequences for the types of jobs in the sector. More on that in chapter 'The circular jobs of tomorrow' (p.48).

New opportunities for the metal sector in Flanders

The best future strategy for Flanders would seem to be to continue to pioneer in recycling value chains and in energy and raw material efficiency, and furthermore to pro-actively construct the value chains for the energy transition.

The good news is that we already have a pretty strong ecosystem today. This is based on a rich tradition and includes important players from all parts of the chain, from metal manufacturing to metal processing companies. For example, Galloo in Menen (one of the largest recycling companies in Europe) succeeds in recovering more than 95% of the raw materials from a scrapped car. Another well-known examples are Umicore (a global player in materials technology and specialised recycling techniques), Aurubis (a major player in recycling basic metals such as copper, nickel and tin) and innovative networks such as Flanders Metals Valley and SIM Flanders. The basic conditions are thus in place for the further development of Flanders into a pioneer of high-quality recycling and industrial symbiosis, with in-depth expertise in metallurgical processes.

The basic conditions are in place for the further development of Flanders into a pioneer of high-quality recycling and industrial symbiosis

There is also considerable potential for Flanders in the new value chains of the energy transition. Earlier this year, the Flemish Circular Economy Research Centre carried out two studies on batteries and solar panel recycling respectively. The objective must be to achieve recycling percentages for metals in these crucial value chains that are approaching 100%. Flanders can also play a pioneering role in the design of sustainable products in accordance with the principle of eco-design. These essential value chains will not emerge by themselves: in addition to top companies and top employees, this requires a government that displays a sharp vision and has a bold policy.

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A circular future for our Flemish chemical sector

Can the Flemish chemical sector take on a pioneering role?

Profile of the Flemish chemical sector

Chemicals is a very important sector for the Flemish economy. Employers' federation Essenscia speaks of 65,159 direct and about 150,000 indirect jobs, which in total accounts for over 7% of Flemish employment. The chemical companies are concentrated in the region of Antwerp (83% of the CO_2 emissions in the sector) and further along the Albert Canal until in Tessenderlo (9%), and in the port of Ghent (3%). The petrochemical cluster in Antwerp is the largest in Europe and the second largest in the world, after the port of Houston (USA). The Flemish chemical industry is a highly integrated ecosystem linked to the refining of crude oil by ExxonMobil and Total in the port of Antwerp. Our chemical companies are also closely linked with the rest of Northwest Europe. A lot of chemical industry is located here in a relatively small area, particularly in Rotterdam, Terneuzen, Geleen (Chemelot), Dunkirk, the Ruhr, Frankfurt and Ludwigshafen.

Chemicals is a very diverse sector, with large multinational companies at the beginning of the value chain producing large quantities of basic chemicals and later in the chain small and medium-sized companies marketing a wide variety of specialist chemicals and end products. Basic chemicals are the building blocks for finished chemical products used in industrial processes and by consumers. There are petrochemicals (based on fossil raw materials such as petroleum) as well as ethylene, propylene, butadiene and methanol, and also inorganic chemicals (which do not contain carbon atoms) such as ammonia, sulphuric acid, chlorine and phosphorus. The end products of the chemical industry range from plastics, pharmaceutical products, fertilisers, rubber, paints and ink to soaps and cosmetics. Plastics have by far the largest share of the end products of the Flemish chemical industry, followed by pharmaceuticals. Flanders is a real plastics region. When it comes to plastics, packaging first comes to mind, but plastics have an application in many sectors, such as construction, the automotive sector or electronics.

Flanders is a real plastics region. Plastics have by far the largest share of the end products of the Flemish chemical industry

Climate and the environmental impact of the sector

Of all the industrial sectors under the ETS system, chemicals has the highest CO_2 emissions in Flanders. According to the recent VLAIO study, this concerns 36.6% of industrial emissions (2019 figures). The number of ETS companies is much higher than in the metal sector: in 2021 there were 59, with the largest emitters being BASF, Air Liquide, Total, Evonik, Ineos, BP Chembel, Borealis, Bayer and Eurochem.

However, it is not sufficient only to look at the CO_2 emissions at the company level. In such a highly integrated sector, we must take into account the entire value chain and thus the companies' scope 3 emissions, such as in the waste phase of plastics. Scope 3 emissions are often 'forgotten' in the discussion about the decarbonisation of chemicals. We will come back to this later. The sector's energy consumption is also very high: it has the highest energy need of all industrial sectors. According to the same VLAIO report, the sector is responsible for 33% of the final Flemish energy consumption and 61% of the industrial energy consumption.

In addition to the climate impact, we must also mention the broader environmental and health impact of chemical products. In the chemical sector, various ecological problems come together, which sometimes puts the sector in a bad light among citizens. Think of the plastic soup in the oceans, the problem of microplastics, the disruption of the nitrogen cycle, PFAS pollution and other hazardous chemicals such as glyphosate and bisphenol. The sector markets a great many different substances, of which we often only discover decades later whether and what damage they cause to the environment. Scientists at the Stockholm Resilience Centre recently concluded that the environment around the world is so polluted with chemicals that a safe planetary boundary has been exceeded. The graph opposite shows the diagram of the nine planetary boundaries identified by the Stockholm Resilience Centre. The chemical industry is involved in four of the nine.

Chemicals in a climate-neutral economy

A profound reinvention is looming for the chemical sector. On the one hand, the sector must restore the balance between the economy, the environment and health, and on the other, it must neutralise its major climate impact. With our expertise in chemicals, the presence of knowledge institutions and start-ups and the fact that our chemical value chains are so well integrated, Flanders has many assets in hand to make this challenge a success.

If Flanders takes the lead and pioneers in green and circular chemicals, it can benefit from this: the whole world is waiting for solutions for the chemical sector, and chemicals will also remain important in a climate-neutral world. Today, chemical products are ubiquitous in our economy, especially the number of applications for plastics which is enormous. Plastics are also important for the energy transition, especially as building blocks for, among other things, wind turbine blades, solar panels, batteries and insulation material. They have great advantages over some other materials: they make packaging or cars lighter.

The biggest obstacle to the decarbonisation of the sector is the enormous quantities, variety and complexity of the chemical products that are marketed annually. Global plastics production has increased exponentially in recent decades and this trend continues even as use in Europe declines. Whichever way you look at it, it is advisable to thoroughly rethink our consumption patterns and – especially in the case of plastics – focus on true circularity, including recycling, reuse and fewer disposable products.

If Flanders is a pioneer in green and circular chemicals, it can benefit from this: the whole world is waiting for solutions for this sector

Decarbonisation of chemical plants is not even half of the solution

Just like the other energy-intensive industries, chemicals belongs to the hard-to-abate sectors because of high energy consumption and, specifically in petrochemicals, the fossil raw materials used. For the decarbonisation of the sector, we must look at the entire value chains. We explain this using the most important value chain: plastics. (figure 7.)

Every tonne of plastic produces an average of 5.1 tonnes of CO_2 emissions across the entire value chain in Europe. Of this, only 1.2 to 1.5 tonnes can be attributed to the chemical industry itself, particularly in the steam crackers, for polymerisation, and for the electricity needed for various processes. The other emissions are related to the energy (oil extraction and refining) and waste sectors (waste incineration or landfill). More than half (3.1 tonnes) are end-of-life emissions, mainly from the incineration of plastic waste, landfill and recycling.

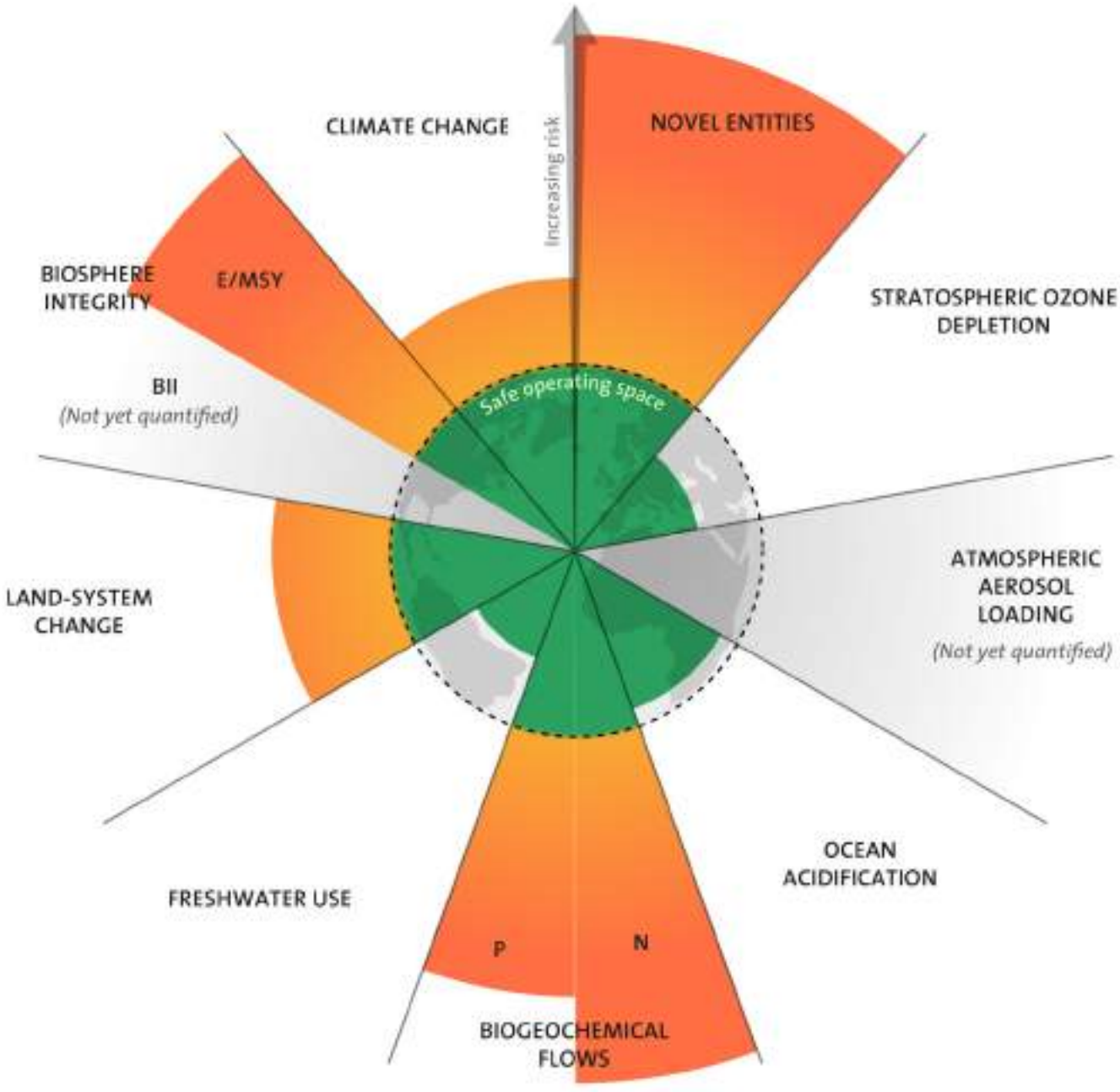

Figure 6: overview of the 9 planetary boundaries. Source: Stockholm Resilience Center

In concrete terms, this means, for example, that when a Flemish chemical plant announces plans to become climate neutral, this is in fact only a third of the solution – in terms of the chemicals used to produce plastics, anyway. Consider the recent announcements from Ineos and BASF.

With regard to the emissions in the chemical sector itself, the start of the value chain is particularly energy-intensive. The oil derivative naphtha is the raw material for 78% of plastics produced in Europe. On the basis of naphtha, the basic chemicals for the plastics industry – the so-called monomers such as ethylene and propylene – are made in steam crackers. In Flanders this takes place at BASF, Total and Borealis among others. Using these basic chemicals, a very large variety of polymers is produced (polymerisation).

In Europe, the production of basic chemicals is clustered in a few regions, one of which is Flanders. In the future, this sector will have to be supplied with particularly large quantities of carbon-free energy. That will be a big challenge. Today, the cracking itself is done with fossil fuels, but in the future we are looking at, among other things, the production of monomers based on green methanol/ethanol and at electric cracking. Demonstration pilot projects are being prepared for both production methods, among others by BASF.

At least as important is to address emissions at the beginning and end of the value chain, from the extraction of oil to the incineration of plastics. Carbon will remain the building block of plastics in a climate-neutral future. Where do we get that carbon when fossil fuels are phased out? Since renewable carbon sources such as biomass and CO_2 captured from the air will always be limited and expensive, closing the carbon cycles is crucial for a climate-neutral plastics sector. In this context, we are talking about a circular carbon economy, in which new plastics consist mainly of recyclates.

Opinions are divided about the feasibility of phasing out fossils completely in this sector. A Material Economics study from 2019 assumes a closed carbon cycle, with only a small fraction of new bio-based feedstock. Other experts are sceptical about phasing out fossil raw materials for new plastics altogether. Bio-based plastics are expected to remain a small niche, partly due to the limited availability of biomass. If we continue to use (limited) fossil raw materials in the future, negative emissions will be necessary. The possibilities for this too will probably be very limited. There are no "easy" solutions.

In a circular carbon economy, the incineration of plastic waste must in principle be phased out. The carbon must be kept in the cycle and thus reused for new applications. Chemical recycling and CCU (carbon capture and use) are the new technologies that the chemical industry wants to employ in this regard. These techniques will certainly be part of the solution, but it remains to be seen how much climate gain can actually be achieved with them.

With regard to CCU, we already noted in chapter 'A climate-neutral and circular basic industry in Flanders' that most forms of industrial CO_2 use lead to insufficient CO_2 reductions, partly because the captured CO_2 is often emitted again soon after it has been used in a product.

With regard to CCU, we already noted in chapter 'A climate-neutral and circular basic industry in Flanders' that most forms of industrial CO_2 use lead to insufficient CO_2 reductions, partly because the captured CO_2 is often emitted again soon after it has been used in a product. This is the case, for example, with plastic packaging that is used once, as opposed to, for example, insulation material where the carbon remains safely stored for several decades.

Chemical recycling is a collective name for techniques – mainly pyrolysis and gasification – to convert plastic waste chemically into usable chemical raw materials (e.g. to convert polymers to monomers). Chemical recycling prevents both the emissions from incinerating plastic waste and from the production of naphtha on a fossil basis for new chemical products. In many cases, the energy consumption of these techniques is high, and is often accompanied by additional emissions. Chemical recycling is promising, but many of the techniques are not yet ready.

Circular plastics means a drastic redesign of value chains

The most important decarbonisation strategy for the plastics sector is therefore the closing of the carbon cycles. CCU and chemical recycling will be insufficient to achieve the targets. A fully-fledged circular economy for plastics means a drastic redesign of value chains: hardly any plas-

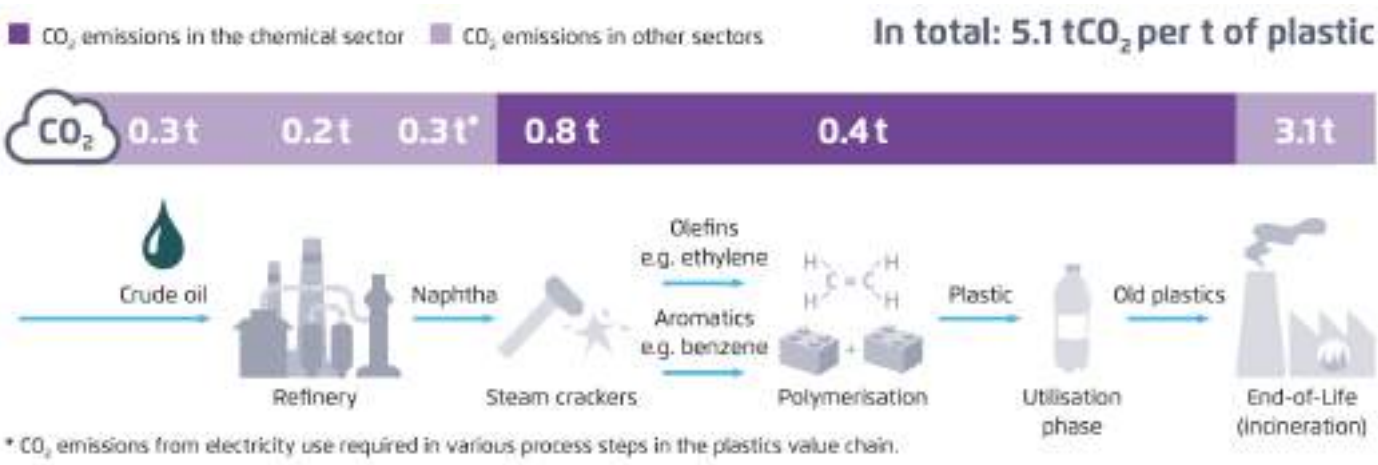

Figure 7: Process steps and CO_2 emissions in the plastics/synthetics value chain Source: Agora Energiewende and Wuppertal Institute (2021): Breakthrough Strategies for ClimateNeutral Industry in Europe: Policy and TechnologyPathways for Raising EU Climate Ambition.

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When a Flemish chemical plant announces plans to become climate neutral, this is in fact only a third of the solution

tic waste incinerated and pretty much all plastic waste recycled. An additional advantage is that we can reduce the enormous mountain of plastic waste, especially the litter and waste in the oceans.

In practice, we see this getting off the ground only very slowly. The plastics sector has become increasingly complex in recent decades, making the recycling of plastics difficult. The variety of plastics is enormous, highly tailored to the needs of the end customer. Multilayer polymers and numerous chemical additives are a serious barrier to the recycling process. Packaging is often too complex and standardisation is rare.

The current recycling rate for plastics is only about 10%. In Europe, a great deal of plastic waste is being incinerated and even dumped. In principle, plastics should never end up in this waste phase. Today, mechanical recycling is the most important recycling technique. Everything that we cannot recycle mechanically will have to be done chemically in the future.

Studies indicate that the potential for circular plastics is very high. According to Material Economics, by 2050, 62% of plastics demand could be covered by chemical and mechanical recycling. ReShaping Plastics even mentions 78% circularity of the plastics system by 2050. In any case, the aim must be to achieve recycling figures comparable to those of some important metals. According to the studies, the greatest potential lies in packaging, household goods, cars and buildings.

According to Material Economics, by 2050, 62% of plastics demand could be covered by chemical and mechanical recycling

A number of circular strategies are detailed below:

- **Preventive measures:** At the top of the R-ladder - the hierarchy of circular strategies - are preventive measures that reduce the use of plastics and thus have the most impact on the raw material consumption. These can include banning disposable products or plastics that are not 100% recyclable or employing reuse strategies (e.g. product with a deposit).

- **Eco-design:** Eco-design is also an essential strategy specifically for plastics. In the future, plastics should be less complex, more standardised, have fewer layers, additives and colours - all of which complicate the recycling process. In this context, there is also talk of design-for-recycling: only plastics for which efficient recycling techniques exist may be placed on the market.

In the future, only plastics for which efficient recycling techniques exist may be placed on the market

- **Recycling:** One step lower on the R-ladder is recycling. Mechanical recycling is preferred over chemical recycling: energy input is lower and we do not have to wait for techniques that are not yet ready for the market. It is also cheaper: the value of the recovered material pays back a large part of the recycling costs.

An important precondition is ecosystem thinking, i.e. that the entire value chain works together structurally to further optimise the circular use of plastics. For example, the industry is best off investing in collection systems itself and making agreements about which plastics may come on the market. The industry is made accountable for recycling and waste processes and is required to share information on appropriate recycling techniques.

The building blocks for the circular plastics system are beautifully represented in this Reshaping Plastics graphic. Towards 2050, there is less and less landfill and incineration, while the amount we mechanically and chemically recycle is increasing.

And Flanders?

In the first place, the challenge for Flanders is to invest in circular projects and collect and attract plastic waste en masse. If we manage to collect and process more than 2 million tonnes of plastic here, that is already a big part of the solution.

Are we on the right track in Flanders in order to achieve a circular plastics sector? Our analysis is that a number of promising projects regarding circular chemicals are in the pipeline, but there is no strategic vision to make the circular economy a top priority, either within government or within the business world. This is accompanied by a trend focused on maintaining the status quo.

A number of promising projects regarding circular chemicals are in the pipeline in Flanders, but a strategic vision is lacking

As a result, we may already be missing important opportunities. It is mostly outside our national borders that new chemical and mechanical recycling plants have been built in recent years, such as those of Neste and Ravago, QCP Polymers and XCycle in the Netherlands, and Eastman in France. In Belgium there is also potential to make the packaging tax on non-recyclable packaging more expensive, as it is in neighbouring countries. However, the business world is not in favour of such measures, just as it was not in favour of deposits on plastic packaging.

What Flanders does excel in is CO_2 capture. The Kairos@C project in the port of Antwerp is one of the largest installations for CO_2 capture in Europe. This is a very useful project for the Antwerp petrochemical cluster: a great many emissions are clustered in the port. The downside of such projects is that they help to maintain fossil value chains. The same goes for Project One by Ineos: this would build a large new ethylene cracker of the old model in Flanders. It amounts to the pro-

duction of ethylene on the basis of a fossil raw material, initially intended for the production of plastics. Circularity is completely lacking in this model.

The major disadvantage facing Flanders is that it is highly dependent on foreign headquarters of powerful multinationals from the chemical sector. These companies are very intertwined with the fossil fuel industry, which wants to stop the phasing out. However, the energy crisis makes it clear that we must quickly reduce our dependence on fossil fuels. Companies testify about the difficulty of getting raw materials. Some large chemical companies are starting to move their production partly to other continents, especially for the processes based on fossil raw materials. In Belgium, the plastics industry today consumes 18% of our fossil gas consumption and 23% of our oil consumption.

Fortunately, a few very interesting projects concerning circular chemicals can also be spotted on the radar in Flanders. The port of Antwerp is currently studying the possibilities of developing logistics chains to attract the necessary feedstock, such as plastic waste. The port provides space for innovative investments in the circular economy on the NextGen site. That is a good start, but really about ten such sites are needed. In the meantime, certain industries are strongly advocating a regulatory framework with regard to chemical recycling.

In many large multinational chemical companies, circular economy projects are ongoing, and the Belgian sites are certainly not lagging behind in this regard. Think of Recticel and Covestro: they both participate in major European research projects looking at the re-use of CO_2, for example for insulation material. Covestro even has the ambition to become the first fully circular company by 2050 – how those plans will be realised is still very unclear. Amcor, a leader in eco-design packaging, is building a brand new innovation centre at its Ghent location. In Flanders, we are leader in Europe in the collection and recycling of plastics, but even here recyclates are only good for about 6% of the plastic raw materials used by plastic processors. So there is still a very long way to go.

To summarise, we can say that Flanders needs a reconversion plan for its chemical clusters, as has been done for the Chemelot site in the Netherlands (see example below). If we fail to develop a future scenario ourselves in Flanders, we may risk losing our chemical value chains in the long term because they do not fit in with the climate-neutral Europe prescribed by the Green Deal.

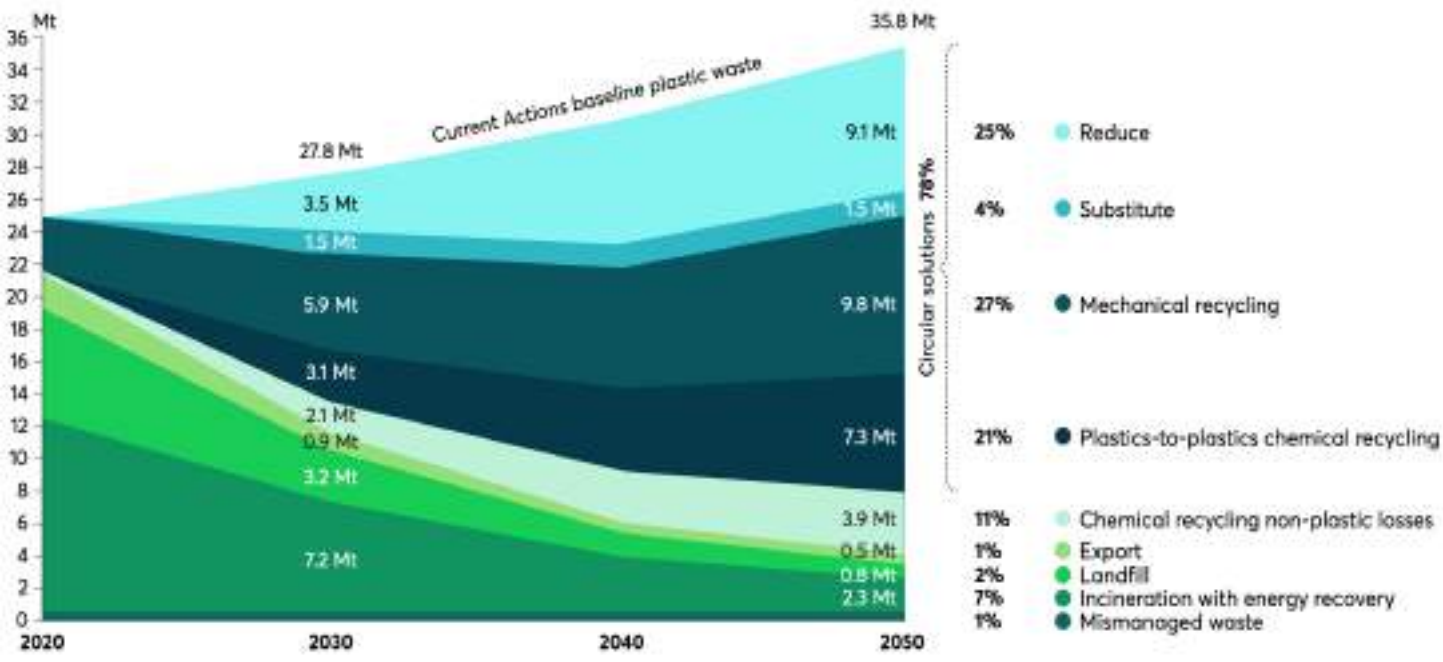

Figure 8: Physical destination of plastic waste from packaging, household items, cars and construction 2020-2050 (Mt). Source: SYSTEMIQ (2022). ReShaping Plastics: Pathways to a Circular, Climate Neutral Plastics System in Europe.

The Chemelot Circular Hub in the Netherlands

Chemelot in Geleen (Netherlands Limburg) is a good example of a chemical cluster in full conversion, with concrete plans regarding the social aspects of the transition and with preparing employees for the circular jobs of the future – more specifically, an own innovative campus (Brightlands) and a real 'Circular Human Capital Agenda' (see page 48 of this document).

While Chemelot's chemical cluster is much smaller than Antwerp's petrochemicals, with more than 8,000 jobs, it is among the top three Dutch chemical clusters and is equally integrated (naphtha crackers, ammonia production, plastics and fertiliser).

Chemelot is an inspiring example because the challenges are stated in concrete and straightforward terms, as in an application by the Dutch government for the Just Transition Fund of Europe. Trade union FNV testifies that these plans offer a useful basis for the trade union work.

As an illustration, three passages from the application for the Just Transition Fund:

- "The disappearance of fossil jobs (as a result of the closing of naphtha crackers and fossil ammonia plants) and the creation of new, green jobs."
- "In principle, all 8,000 'fossil' jobs at Chemelot, plus all the indirect employment associated with it, will either disappear or change completely in the period up to 2050."
- "In South Limburg, efforts are being made to innovate, strengthen and diversify the economy and thus create future-proof employment. This absorbs the "fossil jobs loss" as a result of the climate transition. The development need to achieve this lies mainly in innovation around the themes of circular and bio-based chemicals."

Further reading?

- SYSTEMIQ (2022). ReShaping Plastics: Pathways to a Circular, Climate Neutral Plastics System in Europe.
- Material Economics (2018). The Circular Economy a Powerful Force for Climate Mitigation, Transformative innovation for prosperous and low-carbon industry, 2018
- Material Economics (2019). Industrial Transformation 2050 - Pathways to Net-Zero Emissions from EU Heavy Industry

Jobs in the circular industry of the future.

How do we create perspectives for sustainable employment?

A rapid climate transition, under pressure from the European Green Deal, will lead to major changes in the labour market. Partly because we are going to produce and use materials in a different way, a climate-neutral economy will look structurally different. Subject to the right preconditions, the circular economy offers the best opportunities for sustainable future employment. In this chapter, we do not limit ourselves to the energy-intensive industrial sectors, but look at the entire value chains.

What can we say today about the consequences of the Flemish industrial transition for workers in the industrial sectors? Making forecasts about the future of the labour market is no easy task, but there are a number of clear trends that recur over and over again in studies and discussions on this topic. .

The labour market and the climate transition: what do the studies say?

Research into the effects of the European Green Deal on the labour market is still in its infancy. The European Green Deal only dates from 2019 and has not yet been fully translated into climate policy at all levels. Most available studies indicate that a successful climate transition will lead to a net creation of additional jobs. For example, the Federal Planning Bureau concluded in 2016 that an ambitious climate policy in our country could create 80,000 new jobs by 2030. Research firm McKinsey calculated in 2020 that in a cost-effective scenario, the European Green Deal could deliver 4.9 million new jobs by 2050. While 6.4 million jobs would disappear, this would be offset by 11.3 million new ones. The number of jobs is rising sharply, especially in the energy and construction sectors, while manufacturing is experiencing a net decline, according to the McKinsey report.

There is hardly any research into the effects of the European Green Deal on the Flemish labour market. With funding from the European Commission a Green Skills Roadmap for Flanders, a project from Trinomics that runs from December 2021 to June 2023, is currently being worked on in close coopera-

Employees choose companies with a climate policy

Many employees today in their jobs want to make a positive contribution to the climate transition. A recent survey by Acerta shows that for 61% of the employees, the climate policy of the company can influence their choice of a new employer. Companies notice that applicants often ask questions about it. Companies with a climate policy therefore have an advantage in winning the 'war for talent' on the labour market. Some observers even predict that companies in polluting sectors may no longer find suitable staff at all in the future.

tion with the Department of Work and Social Economy of the Flemish government. This project maps out the needs and potential bottlenecks for the Flemish labour market in the transition, together with a proposal for a policy implementation roadmap.

According to the latest Green Skills Report from Trinomics as part of this Green Skills Roadmap for Flanders, 26% of jobs will be significantly impacted by the green transition. In the first instance, this concerns an upskilling for existing jobs. New types of green jobs are strongly concentrated in the circular economy sectors, in utilities (i.e. in the energy sector) and in construction, and to a lesser extent in manufacturing industry. It is estimated that approximately 74% of jobs will not be significantly affected, mainly because the services sector, which is very large in Flanders, remains largely untouched. Very few jobs would be at risk as a result of the green transition.

New types of green jobs are strongly concentrated in the circular economy sectors, in utilities and in construction'

The labour market and the circular economy: what do the studies say?

With regard to the circular economy, most studies agree that increased circularity in the economy creates jobs, because the circular economy is labour and technology intensive. The studies see a net increase in jobs of 0 to 2%, depending on the scenario used. The 2018 study by Cambridge Econometrics, Trinomics and ICF foresees a potential 700,000 new jobs in Europe by 2030. A UK think tank calculated that 450,000 jobs could be created in the recovery and reuse sectors in the UK over the next 15 years.

As far as Flanders is concerned, the positive effects are already visible today. While the number of jobs on offer in traditional industry has stagnated in recent years (see chapter "A climate-neutral and circular basic industry in Flanders", p. 12), the circular economy is an important driver for job creation in our region. The job creation is almost three times faster than in other sectors. By 2030, the circular economy will deliver around 30,000 additional jobs.

While the number of jobs on offer in traditional industry has stagnated in recent years, the circular economy is an important driver for job creation in Flanders

According to the final report of the European Social Partners' Project on Circular Economy (a project from Trinomics, based on an initiative of, among others, the European Trade Union), these are broadly the consequences for employment during the transition to a circular economy:

- **Creation of new jobs:** Especially in countries with a strong waste sector – such as Flanders – a great many jobs may be created.
  - » The clearest growth is expected in the typical circular sectors, such as the waste sector, in the recovery and sharing economy and for recycling and remanufacturing activities.
  - » In parallel, we can also expect an increase in jobs in the broader services sector, due to the increase in product service formulas or in the extensive logistics chains and secondary markets of the circular economy.
  - » Furthermore, many employees are needed in R&D for the development of sustainable, circular products of high quality and with a long life.

The energy sector and the transition in the labour market in practice

In the energy sector, the transition in the labour market is already in full swing. According to a report from the International Energy Agency (IEA) in 2022, more people are already working in the renewable energy sector worldwide than in the extraction and processing of fossil fuels. The report also states that many employees in the fossil-fuel sector have the right skills for the new green sectors and that employees in large energy companies are already being transferred internally from fossil to low-carbon activities. For the energy sector, in all scenarios, the IEA expects employment in the energy sector to increase, so that the loss of fossil jobs will be more than compensated.

Figure 9: Evolution of the number of employees in the circular sectors and in the Flemish economy.
Source: Crossroads Bank for Social Security, CBSS (edit Steunpunt Werk) and Bel-first

- » The local, circular manufacturing industry is also progressing, as are the number of jobs in the renewable energy sector.

- **Loss of jobs:** Jobs will be disappearing primarily in the mining sector and in the production and trading of basic commodities (such as metals and petroleum products). Rising prices will reduce demand. Furthermore, jobs in the production sectors are impacted because, in a true circular economy, the demand for new products decreases, for example, because they last longer. These job losses must be nuanced, the report indicates:

  - » The number of jobs in these sectors has been declining for some time. In many cases it represents a small share of total employment in Europe. Importantly, these jobs are often concentrated in industrial clusters in specific regions.
  - » Circular economy activities can also present many opportunities in the raw materials sector, for example in recycling activities. This can offset losses in primary raw material processing activities. The question is whether these new jobs are created in existing or in new companies. The most important parameter is the extent to which companies anticipate the economic changes.
  - » In manufacturing industry, the circular economy can lead to the return of jobs currently being performed outside of Europe (through the increase in jobs concerned with maintenance, repair or the refurbishing of products).
  - » With regard to trade, job losses are expected, although they will be offset by jobs in the recovery sector or the second-hand market.

Let us take a closer look with the automotive industry as an example. Cars are mostly produced in Europe. Some are apprehensive about the rise of shared cars and electric cars,


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which are less labour-intensive in production and also require less maintenance. Here too, the fear of job losses must at least be nuanced. The change also offers opportunities: the rise of shared cars can lead to many new jobs in the leasing sector, many charging stations will have to be installed and Europe is drawing up plans to build a European battery industry. A 2018 study by Cambridge Econometrics even speaks of an increase of about 200,000 jobs in the automotive sector by 2030.

Studies on the impact of the transition in the labour market for the metal and chemical sectors are not yet available.

In manufacturing industry, the circular economy can lead to the return of jobs currently being performed outside of Europe

Skills for the future: what do the studies say?

The circular economy therefore thus has a great potential for the creation of new jobs, while other jobs will evolve significantly in terms of their content. To ensure a smooth transition in the labour market, employees' skills must evolve accordingly. This discussion goes far beyond drawing up a list of the professions of the future. Kris Bachus (KU Leuven) provides a good summary of the challenge in the chapter 'The job impact of the circular economy' (in the book The Circular Economy and Green Jobs, 2022). The skills required for the circular economy are quite diverse, making it difficult to generalise. Overall, it can be said that the need for the upskilling of the workforce is expected to be high. Jobs in the circular economy often involve more complex work, which generally means a greater need for work experience and on-the-job training. The need for technical skills, the so-called STEM studies, will be great.

To ensure a smooth transition in the labour market, employees' skills must evolve accordingly. This discussion goes far beyond drawing up a list of the professions of the future

In addition to vertical skills (technical, specialist skills) horizontal skills are also important (e.g. digital and social skills) plus transversal skills such as creativity, problem-solving skills as well as the willingness and ability to learn and adapt to changing circumstances. In general, the new jobs will focus more on high-skilled job profiles, while changes in existing jobs tend to focus on low- and medium-skilled profiles.

According to the final report of the Social Project Partners on Circular Economy, there will be a greater need, among others, for technicians, engineers and the like (e.g. specialists in product design and manufacturing/process techniques), machine op-

Modelling of different decarbonisation scenarios

As stated in chapter “A circular future for the Flemish metal sector” (p.27), there is still discussion in Flanders about which decarbonisation scenarios to follow. On the one hand, there is the model of the VLAIO study with a focus on existing value chains and on carbon capture, while, on the other hand, there is the BBL model that focuses on the circular economy with new value chains, on electrification, on phasing out oil refining and less on carbon capture.

Which scenario is best for employment, in the medium and long term? Cambridge Econometrics made the analysis for the German industrial transition. Commissioned by the European Trade Union Institute (ETUI), Cambridge Econometrics compared the potential job effects of three decarbonisation scenarios for German industry, Europe’s economic engine: 1) an innovation-driven scenario (INNO), 2) a scenario focusing on circularity and efficiency (CIRC), and 3) a CCS (carbon capture) scenario.

The conclusions are nuanced. The assessment of the three scenarios depends on the point of departure used: if we only look at the energy-intensive industry, then the effects of CCS on employment are the most positive, those of CIRC are clearly negative, and those of INNO are somewhere in between. Looking at the effects on the entire economy, on both GDP and employment, the conclusion is just about the opposite.

The advantage of the CCS scenario is that it does not require major restructuring of the industries involved. The downside is that it leads to substantial price increases (due to the cost of carbon capture), which can lead to reduced consumption, less money available for investments in other sectors and a less thorough energy transition, because fossil fuels are retained.

The CIRC scenario (the cheapest scenario) amounts to more efficiency and therefore a reduction in raw material imports, which has a beneficial effect on GDP. The disadvantage is that it requires a large-scale restructuring of the economy, which brings additional challenges with it, including in the labour market. Employment is shifting partly from the energy-intensive industry to other (service) sectors. According to the study, this scenario has by far the best potential for both GDP and the number of jobs.

Most experts and industry players agree that CCS is a temporary transition solution. If the CCS scenario receives too much attention, it will preclude the transition to new value chains with the associated sustainable employment.

erators, assemblers (for more technology-intensive work) and craftspeople (including for the repair sector and for the circular construction sector).

According to Trinomics' Green Skills Report, circular economy workers will be more involved in the various steps before and after the value chain. This will require new combinations of skills: a combination of traditional (such as manual) and new skills (such as material science), and a combination of soft skills (such as service provision) and hard skills (such as programming, operating and repairing equipment).

In 2021, the Flemish Government commissioned a study by Roland Berger, which maps out the skills challenges until 2035 for the energy-intensive industry. This study predicts that the energy-intensive sectors will need to attract around 30,000 new people by 2035. A large part of this recruitment requirement goes to STEM profiles, but there is currently a major mismatch between graduates and the required recruitments.

Furthermore, about 59,000 employees already working in the sector today need to be upskilled with regard to the green themes, such as sustainable material design, new safety procedures and sales models in the circular economy. Another 67,000 workers need further training in creative thinking, flexible planning and organisational and transformation management. Finally, 49,000 workers need upskilling in basic digital skills – the green transition goes hand in hand with the digitisation of the economy.

Are we in Flanders ready for the transition?

To what extent is the Flemish labour market prepared for the transition? How are we going to train the people of Flanders for the jobs of the future? And who should be responsible?

In fact, the skills challenges for the circular economy are in line with a range of other trends in the Flemish labour market. From that perspective, the climate transition can add to the existing challenges. Even without the climate transition, the labour market is constantly evolving. Studies from 2019 by Agoria showed that approximately 7 to 9% of workers in Flanders will have to undergo serious retraining by 2030, in the first instance because of digitisation – the climate transition has not yet been studied separately here.

The Flemish labour market is currently not very flexible. Upskilling and lifelong learning are not structurally embedded. Most employees do not change employers very often. There is an acute tightness in the labour market today, partly due to the ageing population with many bottleneck occupations that are unfilled or difficult to fill. STEM studies are structurally undervalued. On the other hand, there are many inactive people and, according to most observers, the employment rate is too low in our region. There is a mismatch in competences between supply and demand.

Lifelong learning as the norm

A shortage of suitable workers can be a major obstacle for the realisation of the climate ambitions. This shortage, for example, is already apparent in the construction sector. All policy processes around the climate transition must therefore include some related to the labour market. It is also crucial to link innovation policy with a policy for developing skills. The government needs a strong vision of the transition, with climate as a transversal theme throughout the policy. The Skills Roadmaps for the climate transition are a first step, but it is crucial that this translates into bold policies. Today, all policy processes assume predictability and linearity, predictions for the future are made on the basis of the present. Given the unpredictable nature of the transition, we must consider more disruptive scenarios and use this logic to shape labour market policy.

In this context, it is clear that lifelong learning is becoming the norm. This requires, above all, a flexible labour market, where employees have opportunities to retrain, as well as an adaptive education policy that responds more quickly to changing circumstances. We must provide more possibilities for dual or workplace learning, that the right to learning is structurally recognised during the career (e.g. in a separate status of the learner), and that we develop short, tailor-made training paths, directly linked to the specific needs of the labour market.

It is also important to look at the climate transition in the labour market across sectors. A flexible labour market implies that it is easier to deploy valuable employee skills in other sectors. As described in chapter "A climate-neutral and circular basic industry in Flanders, a more holistic view of the transition is needed, with entire value chains put in the picture. If, in the future, fewer workers are needed in, shall we say, basic chemicals, those released can be used equally well in the recycling industry or in other circular companies. There is also a strong link between the energy sector and industry: hydrogen production in industry can lead to jobs in the renewable energy sector. There are many opportunities for new jobs if we are prepared to think and innovate outside existing value chains.

Working conditions and disadvantaged groups

Important preconditions for the transition include pay and working conditions in the new circular sectors, a policy for the inclusion of disadvantaged groups in the labour market, the willingness of employees to retrain and the support that they receive from the policy. Trade unions can play a role in all these points.

Traditional “fossil” industries often offer better wage and working conditions than new emerging sectors, such as the renewable energy sector or typical circular sectors such as the recycling, waste and recovery sectors. In order for the transition to succeed, it is of great importance that pay and working conditions improve in these new sectors.

Due to the tight labour market, we must be able to use all talents and all sorts of profiles. The only way to achieve this is with an inclusive labour market that creates opportunities for all groups of employees. However, there is a real risk of mar-

> **Given the high speed of the developments in the field, learning new competences will have to happen largely on the shop floor**

ginalising certain groups in a flexible, fast-changing labour market that places a strong emphasis on highly skilled profiles or technical directions (IT workers, engineers, technicians). The circular economy can also absorb this risk: today, the circular economy already creates jobs for the low-skilled, such as in the waste processing or recovery sectors, mostly via the social economy.

Let us hope that the climate transition – under pressure from the European Green Deal – will provide the necessary sense of urgency in order to tackle the various challenges on the Flemish labour market at the same time.

To summarise: what are the opportunities and pitfalls of the transition for the Flemish labour market? According to Trinomics' Green Skills Report, "the circular economy transition (...) can have a positive impact on the Flemish labour market if properly implemented. Thus, (the transition) can create additional job opportunities, raise labour standards and reduce inequality. This is due to various trends, such as the increase in labour-intensive activities (repairing, remanufacturing and recycling are more labour intensive than traditional manufacturing and waste disposal); the relocation of manufacturing activities (reshoring of production); and the creation of new markets (e.g. lease constructions). Risks associated with not being prepared for the circular transition concern job insecurity, labour shortages and skills shortages."

Further reading?

- Trinomics (2022). Green Skills Roadmap Flanders Final Report on Green Skills Need in Flanders
- Trinomics (2021). European Social Partners' Project on Circular Economy - Final Report
- FEPS (2022) The Circular economy and green jobs in the EU and beyond
- Roland Berger (2021) Skills roadmap voor de Vlaamse klimaattransitie Focus op de energie-intensieve sectoren 2020-2035
- Agoria (2018) Digitalisering en de Belgische arbeidsmarkt. Shaping the future of work .
- Mckinsey (2020) How the European Union could achieve net-zero emissions at net-zero cost
- ResearchGate (2022). Towards a CO_2-neutral steel industry: Justice aspects of CO_2 capture and storage, biomass- and green hydrogen-based emission reductions.

Just Transition: a climate transition that leaves no one behind

How can the trade union be a partner for a fair green future?

What does 'Just Transition' mean?

In 1990, American trade unions launched the term "Just Transition", a package of demands to protect workers who lost their jobs through environmental protection measures. The concept of a just transition links insight into the urgency of an economic green transition to the need for this transition to be socially just and inclusive. No one should be forgotten. In the meantime, a Just Transition commitment has been included in the preamble of the Paris Agreement (2015) and trade unions worldwide are endorsing its need. As a rule, a just transition includes both measures to reduce the impact of job losses for the affected workers and communities and to create new, green, and sustainable jobs. In this way, the transition can provide healthy sectors and communities.

In 2015, the International Labour Organisation (ILO) fleshed out the concept of 'Just Transition' in a number of accompanying guidelines. The broad principle is that employees and their communities, employers and the government actively

develop plans together that guide a just transition. Decent work is central in this. Ensuring and strengthening employee rights, social dialogue, social protection and employment are necessary as well. The Just Transition Centre of the International Trade Union (ITUC) adds a few more important points, such as empowering target groups that are not or are less engaged today and documenting best practices around the just transition.

The four principles of a just transition follow these guidelines:

1. adequate funding and investment in sectors and areas having to undergo a transition, with particular focus on vulnerable countries
2. social dialogue and democratic consultation with the various social partners and stakeholders across the domains
3. adequate scientific research and calculation of the impact on communities and on employment
4. a sound economic diversification plan that provides stability for communities and leaves no one to their fate.

A just transition for Flemish industry

In the previous chapters, we described the major challenges facing Flemish industry in the light of the climate transition and the important role that a strong circular pillar can play. There is no longer any doubt about the necessity of the transition among Flemish trade unions, but there is a great deal of uncertainty about the path towards it.

Today, there is barely a public debate in Flanders about the direction our industry should take. Which industry do we want to retain in Flanders in the medium and long term? It is the industrial companies who are setting the tone today: companies want to transform their production processes into climate-neutral equivalents, without sacrificing profitability. The wider socio-economic impacts on society remain largely unaddressed.

In contrast to this, a just transition takes all stakeholders into account, with as the central focus of the debate: sustainable and high-quality employment and social added value creation in the long term for the industry. In this sense, 'circular economy' and 'just transition' are concepts that mutually reinforce and support each other in the green transition. Who other than the trade union can put this topic on the agenda?

Following on from this logic, the transition is becoming very important in trade union work: after all, we are well aware that if we take our climate ambitions seriously, only companies that work in a climate-neutral way can have a future. For both enterprises and trade unions, there is added value in companies being committed to reliable climate plans. The reasons why trade unions want to claim a voice in this debate are not negligible: today we see that such plans are either completely lacking, or are the prerogative of the employer, resulting in 'confidential' or unreliable plans. Moreover, greenwashing is not uncommon – think of the analysis made by the New Climate Institute of the climate plans of 25 of the largest international companies.

A just transition takes all stakeholders into account, with as the central focus of the debate: high-quality employment and social added value creation

A proactive trade union that is familiar with the challenges of the climate transition and with the socio-economic consequences can be a key player in making support for the inclusive green transition a reality. Although the trade unions as a whole today subscribe to the transition, we note that relatively few trade union members understand the importance of engaging in the green transition given their own situation. The climate transition, like any other complex socio-economic change, requires the close involvement of all parties. The increasing attention paid by trade unions to this issue is gradually bearing fruit. The positive response of trade union representatives to internal publications and events in response to the green transition is on the rise. And the explanation with good examples from practice is sparking interest and motivates us to also highlight the green transition from the perspective of our own trade union work.

A proactive trade union can be a key player in making support for the inclusive green transition a reality

Employees struggle with a lack of perspective, certainty, predictability and participation with regard to their work in the future climate-neutral society. This uncertainty is depressing. The government, employees and employers can work together to eliminate this mistrust. It is very important that everyone knows what the transition is about, what interests are involved and how they can be fairly represented.

There is no one general solution for every company, sector, region or country: each situation is specific. This underlines the need to ensure employee engagement at all levels. The active involvement of trade unions in the design, management and negotiation of the green transition is required when it comes to decent work and good working conditions. This can only succeed if the government develops a strong policy vision and an appropriate policy framework. The principles of a just tradition must not only be respected at all levels, but also be enforceable.

The added value of a strong social dialogue is particularly striking. Good mutual relationships encourage more supported visions and measures. Trade unions are a strong partner and give a voice to socio-economic needs and concerns. This is also possible in the transition policy, where employees and trade unions can act as climate ambassadors in their own company and sector.

The transition will not only create new jobs; some activities and sectors will experience a sharp decline. Some workers will have to be trained in new production techniques as the structure of the enterprises will change dramatically. Companies that do not adapt in good time risk disappearing, while new enterprises will see the light of day. How do we make the adjustment manageable and digestible for employees when they lose their job or move to another job or to another sector? What are the needs for further training and retraining?

How do we make the adjustment manageable and digestible for employees when they lose their job or move to another job or to another sector?

Which CLAs can be applied in the new circular sectors? Will employees who carry out these new economic activities within an existing company also fall within the area of application of the applicable CLAs? How do we ensure the safety and health of employees in the new activities? And how do we get a strong trade unionisation in the new (sub)sectors? Precisely because the transition can be accompanied by the necessary disruption, it is very important to anticipate the potential social consequences.

Nothing about us without us

The trade union federation IndustriAll also emphasises the importance of social dialogue and negotiations in its 'Just Transition Manifesto', with the subtitle 'Nothing About Us Without Us'. IndustriAll states that "it is good that Just Transition has become the common language of European policymakers and national leaders, but it is now time to move beyond slogans." The trade union calls for a "transition that is anticipated, managed and negotiated together with employees, with regard to every aspect that concerns them. Nothing about us without us!"

Trade union leverage in the climate transition

It is also not always easy for trade unions to integrate the Just Transition concept into their daily operations. In this chapter, we make suggestions for trade unions with regard to engaging in a just industrial transition. What is needed to get climate higher on the agenda, to reconcile ecological and employee interests and to gain strength as a trade union on this issue?

We list a number of strategies that trade unions can use: strengthening their own internal organisation, establishing alliances, strengthening social dialogue and rethinking within existing or newly created consultation structures. We drew inspiration for this chapter from, among other things, the numerous discussions we had with trade union employees at home and abroad during this project. We also mention a number of striking examples from other countries.

Strengthen the support and mobilisation power

It is important for the trade union to focus on raising awareness and acquiring knowledge about what the climate transition entails and the (economic) risks, possibilities and opportunities associated with it. In a rapid industrial transition, much is at stake for all stakeholders. The transition can only succeed if employees feel involved. The trade union, with its large support base, has the opportunity to strengthen support for the transition and to take on a proactive role. If the trade union mobilises at all levels and starts working with concrete actions, it can help define the debate, strengthen its social role and become a driver of the transition.

Increase capacity

In recent years, trade unions have been increasingly working on the climate transition. Yet trade union activists often say they need more support and guidance before the climate transition can really get to the core of their work. After all, the subject matter is complex and the link with traditional trade union work is difficult to get right. The trade union delegation must be able to rely on sufficient knowledge and capacity within its own organisation so that it can come to the negotiating table well prepared. This is important in order to counterbalance the information dominance of the employers. Activists currently receive assistance

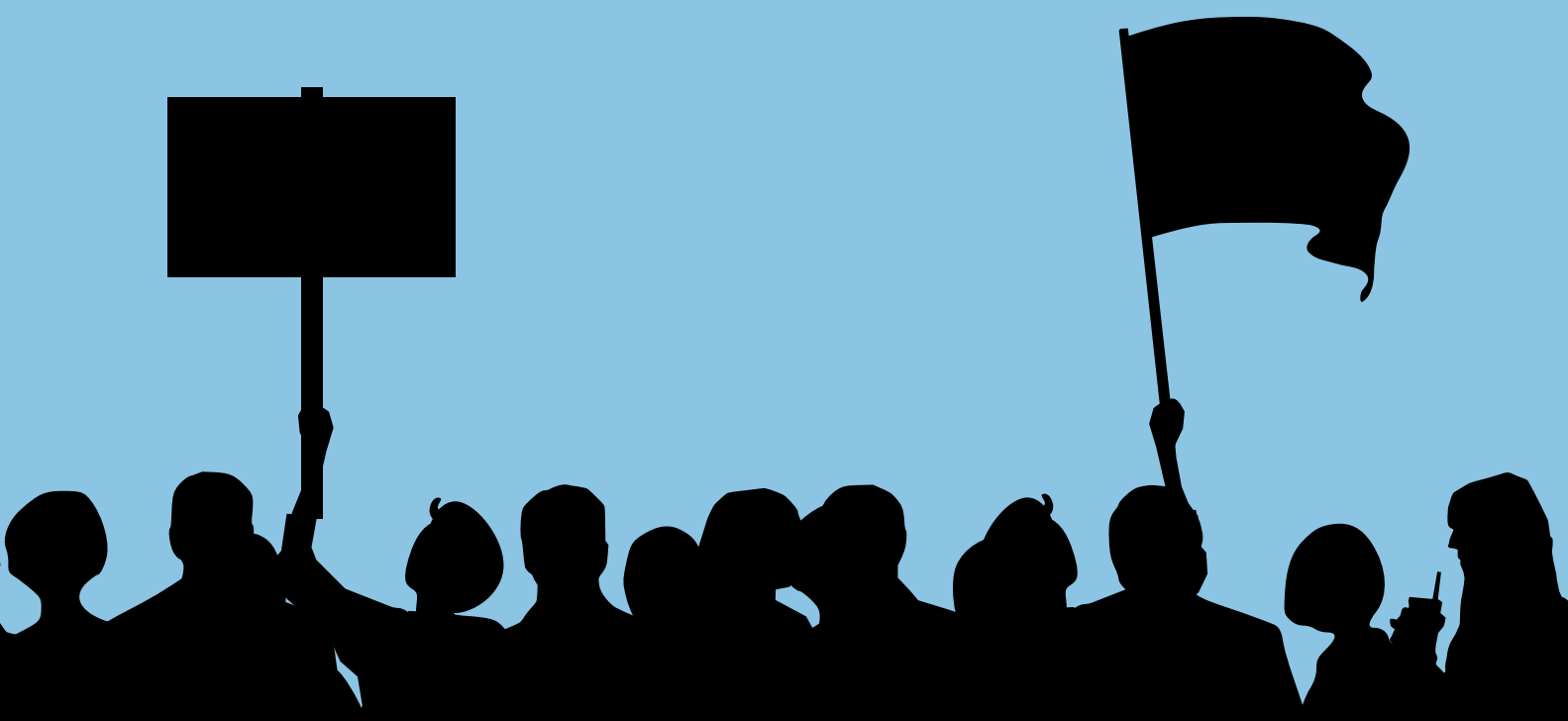
How do Belgian trade unions tackle it today?

Belgian trade unions and their confederations formulate the need to tackle the climate transition together at their conferences and in their internal operations. In this way, they not only work on raising awareness in their own ranks, but also send strong signals to other stakeholders. For example, Belgian trade unions are becoming increasingly active members of the Climate Coalition and they have endorsed an open letter from the wider civil society in which they call on Belgium to make a model of just transition. The lack of concrete tools for translating these principles into concrete trade union practice is still a sore point, but it is systematically getting more substance.

Thus, they have been setting up internal committees and work groups in order to work on the themes in a more concrete fashion. Furthermore, the various trade unions are working nationally and internationally on tools to help employee representatives ask the right questions about their company's future plans in their consultative bodies.

Some valuable tools and publications to highlight: :

- **JusTra**: The recent European project. JusTra, with the active involvement of ACV and ABVV, produced a toolkit with which trade union representatives at delegation level can work on sustainability, climate and the just transition within their company. The toolkit scores ecological and social factors at company level. This gives the delegates a better picture of the company's opportunities and risks during the climate transition.
- **Climate Comrade**: In 2018, ABVV launched the campaign 'Make your future with us - become a climate comrade'. The intention is to bring motivated trade union members together during activities around a just transition and to motivate them to undertake concrete actions within and outside their trade union work.
- **Publications ABVV Metaal – future of the sector** : ABVV Metaal recently published two brochures focusing on the role of the metal industry in the transition to climate neutrality and in more circular production, an e-book "Metal and Climate" from 2021 and an information bundle from 2022 on a sustainable metal industry.
- **New Conspirators**: In the New Conspirators project, trade union representatives take up the gauntlet themselves. Under the guidance of Reset.Vlaanderen, they are gradually fleshing out their own plans regarding climate change, sustainability or the circular economy into an applicable lever for their shop-floor. Inherently, they are also working on a culture to get employees more involved in sustainable processes on the shop-floor.



in analysing and discussing the EFI (economic and financial information). To get a picture of their company's climate policy, they must also be able to distil the necessary information from other environmental documents that employers structurally deliver.

Build alliances

The different stakeholders in the industrial transition have their own priorities, concerns and interests. It is important for a supported transition to get to know each other's views, to discuss a just transition with each other and, where possible, to work together with partners on specific matters. Building alliances with stakeholders with a shared agenda is a strong strategy to weigh in on the debate together on specific issues. Examples are the alliances between civil society organisations such as trade unions and environmental movements that are emerging in a number of countries.

Danish trade union 3F and the green think tank Grønnejob

During this project, Bond Beter Leefmilieu and Reset.Vlaanderen also held talks with trade unions in Denmark, who expressed striking optimism about the green future. There seems to be a broad consensus among the Danes that it is an asset to be a forerunner in the green transition and then to export that knowledge. The transition is already a success story: Danish companies such as Ørsted are now going to install windmills around the world.

To acquire the necessary expertise, the Danish trade union 3F has set up its own green think tank, which includes representatives of companies and academic institutions in addition to trade union representatives. A number of their papers are available in English on the website, such as the paper Climate and Green Jobs. Through this work, 3F can add its own emphasis to the debate. For example, the trade union made an assessment of the potential for green jobs in Denmark, together with the Economic Council of the Workers' Movement (ECLM).

Zinc factory Nyrstar and the climate transition

A mobilising trade union delegation can succeed in putting the climate transition within a company on the map. A good example is Marc Alexander, chief trade union representative at the Nyrstar zinc plant in Balen and active at Climate Express and at Grootouders voor het Klimaat. Marc spoke to the company's management about the climate transition. Thanks to his own expertise and involvement, the Nyrstar management also rely on Mark's advice. He also sits on the European works council.

In Marc Alexander's words: "Nyrstar is a zinc company that primarily processes zinc ore into refined zinc. However, the share of recycled zink is increasing. The company also wants to reduce its scope 2 emissions, especially of purchased electricity, through a combination of physical renewable energy at or near the plant, in combination with energy purchased with the help of guarantees of origin. As European trade unions, via the European Works Council, we have asked the management to fund an independent study. Our goal is to start consultations about the strategic orientations in order to make the company not only climate neutral but even climate positive, as the IPCC reports increasingly recommend. The line of approach is that job security is best guaranteed if we as trade unions can play an active role in the necessary socially just transition to a climate-positive, circular and ecological regenerative strategy of the company."

Focus on a strong social dialogue around the transition

In Belgium we are in a privileged position with our tradition and entrenched trade union structures and strong social dialogue. This offers excellent opportunities to give Just Transition, in its broad social sense, a place in the consultations between employers, employees, government bodies and other social actors. The concept of social dialogue can be interpreted innovatively here: a renewed social dialogue, broader than the traditional approach to wage and labour conditions, protection and safety at work, whereby ambitious ecological goals are linked to social and economic progress.

- **Levers within companies**

  We suggest a thorough review of existing consultative bodies within companies in order to facilitate discussions and negotiations

The Netherlands: cooperation between Milieudefensie and FNV

FNV, the largest trade union in the Netherlands, has developed a very good informal cooperation with the Dutch climate organisation Milieudefensie, where they strive to maintain short lines at all levels.

This cooperation gained new impetus when the Dutch Climate Agreement was established in 2019. Until the last day, negotiations were held regarding the creation of a coal fund to compensate and support the employees from the coal sector in the event of a coal exit. The trade unions worked closely with environmental organisations such as Milieudefensie and Greenpeace.

Milieudefensie recently had the climate plans of 29 major Dutch companies evaluated by the New Climate Institute. They have shared that work extensively with the trade unions. Milieudefensie has also produced a brochure for works councils in close cooperation with FNV; a kind of guideline for trade union leaders to work around company climate plans.

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IG Metall and the aluminium pact in Germany

The high prices of raw materials and energy since the Ukraine crisis have a major impact on the German aluminium industry. There is a sense of urgency to work on the transition to a climate-neutral and circular sector, while maintaining local employment.

Trade union IG Metall is a leader of the Aluminiumbündnis ('aluminium pact') for the North Rhine-Westphalia region, an alliance of trade unions, employers and governments working on transition plans for the sector. At the federal level, the German trade union is calling for a "Transformationsrat Industrie" (industry transition council), a demand included in the coalition agreement of the Scholz government.

Even within the companies themselves, the trade union insists on working on transition plans, based on the German tradition of "Mitbestimmung" (co-determination) in works councils. A striking example is the aluminium company SPEIRA. The transition is increasingly seen as a strategic priority for the German trade union.

about the industrial transition. The competences of the works councils (WC) and committees for prevention and protection at work (CPPW) allow for a great deal. By structurally embedding the climate transition in these bodies, both parties feel heard and valued and the councils and committees gain strength. An important point for attention is that there is sufficient room to allow external expertise about the transition in order to feed insights and be able to make informed decisions.

Reset. Vlaanderen

And Flanders?

Here too, we see unique collaborations between trade unions and environmental organisations (and the wider socially engaged civil society). Back in 1987, Arbeid & Milieu created a platform where trade unions exchanged views among themselves and with environmental movements about upcoming changes and challenges. Also today, trade unions are core partners in the network organisation Reset.Vlaanderen, the successor to Arbeid & Milieu, and the focus has broadened from exchange and awareness-raising to include a strong pillar of expertise, knowledge development and research. Thanks to the network built-up and joint projects, trade unions and environmental movements are also finding each other more easily in external forums and for concrete collaborations, such as for the current project Employees as Lever for a Circular Economy.

Initiatives are emerging in many places with regard to the creation of a structural framework for social dialogue around a just transition.

- In **Germany,** the Kohlekommission was founded in 2018; a committee with representatives from industry, trade unions, government and environmental movements that is examining the phasing out of coal-fired power stations. This includes compensation plans for affected companies, regional development plans and guidance for workers who see their jobs disappear.

- In **Scotland**, a standing commission, 'Just Transition Commission', was set up to ensure a just transition, encouraging everyone affected to work towards a fair green future for all. In addition to scientists from various fields, trade unionists, entrepreneurs and representatives of civil society also serve on the independent commission..

- **Finland** has the Climate Policy Roundtable, in which trade unions flesh out their engagements, needs and capacity around Just Transition in order to help shape national climate policy. By involving stakeholders in the policy, they are building support and understanding for a fair transition to a carbon-neutral society.

- At the **Belgian federal level**, first steps are being taken towards a Just Transition policy. This spring, federal Climate Minister Zakia Khattabi launched the activities of the States General for Just Transition. Academics, citizens, civil society and the federal administration deliver the necessary input. The trade unions are represented in the so-called Forum, which gathers input from the wider civil society. Furthermore, federal climate panels took place in the autumn of 2022, which gathered input from the wider civil society for the National Energy and Climate Plans (NEKP). Here, too, trade unions have had the opportunity to incorporate Just Transition principles into federal climate policy.

- At **Flemish level**, there is the Permanent Consultative Body on the Industrial Climatic Leap, which was created within the context of the new industrial decree of former Flemish Minister for Work Hilde Crevits (2021). Here, the trade unions are on the steering committee and that is absolutely crucial. The far-reaching transition of our industry demands broad support. It thus benefits from active participation from the whole of civil society, including trade unions and environmental movements, in all aspects of industrial policy.

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- **Levers at sectoral and intersectoral level**

  Even if it is very important for every industrial company to draw up climate plans, that will not suffice. The industrial transition will also require a great deal of coordination within and between sectors. Industrial value chains are very intertwined. For example, the basic industry supplies basic materials (such as metals, steel or basic chemicals) for the manufacturing industry. In a circular model, waste flows must return to the production sites for basic materials, among other things for recycling activities.

  There is also a strong link with the energy sector: the supply of green energy is a basic condition for a green basic industry. Companies need to start working together fundamentally, among other things to share or exchange energy, raw materials and waste flows. Ecosystem thinking and industrial symbiosis are a key to success. It is therefore important to look at the transition at the level of industrial clusters and to provide sufficient socio-economic coordination.

  This observation has important consequences for employment. The work of trade unions must also respond to this. It is preferable for everyone that employees remain with existing companies, but major structural changes may not be avoidable. The most important thing is to maintain the total employment within industrial clusters and to create sufficient opportunities for all types of profiles and for the development of the right skills.

CLA regarding innovation and development

Existing frameworks can serve as a guideline for new challenges. To this end, we look at **CLA 39,** with regard to the consultation concerning the social consequences of the introduction of new technologies. In the 1980s, the speed of technological innovation overwhelmed labour organisations. With CLA 39, the social partners drew up a framework to make these rapid developments the subject of consultation and information in order to minimise mistrust and to point out concerns about job security. A general, cross-sectoral framework is also needed now, in which social partners agree on how to deal with the rapid evolutions.

Another example is the framework CLA "for an innovative and sustainable sector", which was concluded by the various joint committees at sectoral level – including the metal and chemistry sectors – following the Pact for competitiveness, employment and recovery of November 2013. In that CLA, the parties agreed to discuss how innovation can be encouraged or how the knowledge and competence of employees can be worked on in order to make innovation a reality. This framework can also serve as a guideline in order to give the new challenges a place in the social dialogue. The condition, however, is that the agreements made are actually implemented and evaluated.

Green CLAs

During the course of the project, we did not encounter any real 'green' CLAs specifically aimed at turning a company into an ecological player. However, there are references to 'green clauses'.

Pioneers in green CLAs and clauses are the **Canadian trade unions**. Since the end of the last century, they have been working pretty much systematically with green perspectives. Over the years, Canadian trade unions have reinforced a progressive climate and jobs policy through their negotiating strategy and political influences. The Canadian ACW (Adapting Canadian Work and Workplaces to Respond to Climate Change) has a database at York University with a large collection of documents concerning how trade unions (can) deal with climate change.

There is no such library in Europe. In the literature we found references to green clauses in some countries. However, these are usually generic, vague and general declarations of intent in which the parties undertake to consider the theme, without any binding formulation. This allows a company to present itself as an ecologically responsible player without actually working on it.

Enforceable, concrete green clauses and CLAs are a better instrument for working on the climate transition at company level. A CLA is the result of negotiations and therefore contains a certain amount of support and authority. This may concern the practical approach in the workplace itself, the training and education of employees, the internal climate policy or benefits or support for employees whose job is threatened or who need to be retrained because of the transition in the company.

CLA 90 is known. This framework CLA provides for the possibility of making arrangements within the set guidelines for non-recurring performance-based premiums for employees for a specific assignment or objective. This framework can be used to work at company level on raising awareness among employees, challenging them to achieve particular results with a focus on climate, environment or sustainability and reward them with a bonus if they achieve this. Consider, for example, projects that can limit the energy costs of the company and, as a result, where the saved funds can be distributed among employees as a bonus (see, for example, CLA 90 at Umicore).

Thanks to the freedom of negotiations in the social dialogue, companies are also free to conclude an experimental collective labour agreement. The transition is approaching quickly, and often it is also unclear to a company how best it can work on it. In an experimental collective labour agreement, the social dialogue regarding the transition can be fleshed out more creatively. For example, trade unions can be more involved in the climate policy by extending the outlines of co-decision rights on a limited and temporary basis. The experimental CLA can be concluded for a limited period and contain a well-defined framework of respective obligations, rights and expectations. Furthermore, an evaluation of the CLA is necessary to examine the extent to which the social dialogue can be improved across the entire company.

Existing interprofessional frameworks of social dialogue make the structural reform of industrial value chains open to discussion. Belgium has a tradition of biennial interprofessional agreements (IPA) of the Group of 10 in which, in addition to the wage form, agreements about employee training, working conditions, employment efforts and the like are plotted out. The agreements are fleshed out further in CLAs within the National Labour Council and the respective joint committees, as well as in laws and decisions.

These interprofessional agreements can be a lead for embedding the just transition in policy. For example, cross-sectoral agreements between employers and employees can plot out which transition topics are discussed and explored and how specific cross-sectoral needs, requirements and perspectives are identified. These agreements also provide a framework for the planning of appropriate customised measures – with sufficient attention for employment, (re)training, skills and abilities, safety nets and compensation. Furthermore, attention is also paid to new adjacent sectors that come about because of the transition. By aligning wage and employment conditions for these new (sub)sectors with the existing order of things, sectors and companies work out a path to make jobs in these sectors attractive to those who have to or want to make the transition as a result of economic changes.

The 'Energy Service Agreement' in the United Kingdom

On the one hand, this collective agreement safeguards labour relations and employment in the context of the transition in the energy sector and, on the other hand, it provides sufficient flexibility for adjustments if these appear necessary. This makes it possible to involve additional discussion partners or experts in a subsequent phase of negotiations. Through this enhanced and constructive cooperation with employers and the sector, trade unions are more quickly involved in the organisation of the transition itself. Thanks to the agreements and mechanisms fleshed out, there is a good framework for preparing the sector for the coming transition and decarbonisation, and, for example, developing common positions with regard to the necessary public investment and support.

At the company and sectoral level, as well as at the interprofessional level, trade unions can help to identify the training needs for the skills of the future. The fact that this happens in advance is crucial as it will increase the chance that employees will be able to participate in the transition. A good example from the UK is 'Unionlearn' from the Trade Union Congress (TUC). Among other things, this helps to set up 'green skills partnerships' between trade unions, local civil society, government bodies and business.

Recommendations

Mobilisation and strengthening of the support base

- Build up knowledge about what the climate transition entails at all levels of the organisation, from the activists on the shop floor to the secretaries and study staff to top management. Climate must be a transversal theme throughout society- thus also within the trade union - that permeates into all relevant policy themes (such as economy, energy, mobility, housing, labour market or education).

- Build awareness and support by communicating consistently and regularly about the industrial transition. In this way, help employees to imagine the concrete consequences for the company or the sector and what role they can play in the transition. Explain the opportunities and challenges for employees, without concealing any of the dangers or negative effects. Ask trade union members about the climate transition in general and about the transition in the sector in particular. Knowledge of the concerns and needs of people on the shop floor is a good starting point for developing appropriate awareness-raising actions. Only those who feel heard will want to contribute to the bigger story in a solution-oriented manner. In this manner, a guide to climate adaptation in healthcare was created in Flanders. In France, the oil trade unions surveyed their members. This sector is under significant pressure and concerns among employees are significant. The survey made it clear to the unions how to divide their attention in addressing those concerns. In the United Kingdom, Greenpeace conducted an extensive survey of employees in the offshore oil and gas industry. This clearly indicates that, on the one hand, employees are concerned about the decline in the sector and, on the other hand, they are prepared to retrain and switch to other sectors – the perspective must be a sustainable and well-paid job in which they can use their skills and experience.

At the company and sectoral level, as well as at the interprofessional level, trade unions can help to identify the training needs for the skills of the future

- Motivate employees to take on a proactive role regarding the transition in the company and to sharpen their competences. Make the own training for activists as specific as possible: deal not only with the broader story of the transition, but also with sector-specific challenges and socio-economic consequences such as the necessary skills for the jobs of the future. We have already referred to the New Conspirators, a good example that can give concrete form to this recommendation.

- Consider targeted campaigns that link together economic and ecological challenges. For example, targeted actions against companies without credible transition plans – increasingly a clear risk to future employment – or in support of policies that can attract green investment. The annual campaign "Climate-Proof our Work" of the ITUC can offer a good starting point, converted into an own context.

Strengthen capacity

- Build internal capacity for knowledge building and own studies regarding the socio-economic effects of the industrial transition. The perspectives relevant for trade unions are not always reflected in existing "external" studies. Consider the impact on employment of different decarbonisation scenarios (as described in the previous chapter) and other sorts of socio-economic impact that may affect workers' welfare and prosperity. Trade unions must come prepared to the (negotiating) table when the transition is discussed, in order to counterbalance the information dominance of employers. Good cooperation with specialised organisations or institutions is also important for building knowledge. This can be cross-union: a joint budget can fund deeper investigation, for example.

Trade-unions must come prepared to the (negotiating) table when the transition is discussed, in order to counterbalnce the information dominance of employers .

- Strengthen the study and other services with employees who can provide knowledge of the climate transition, its impact on specific sectors, businesses and employment. Environmental services, whether sectoral or umbrella (such as an ISMI initiative, for example), also need to be better known and strengthened internally. After all, the climate transition is essential for the future of the economy.

- Vertaal dit studiewerk naar praktische tools Translate this study into practical tools for activists within the companies, such as for the analysis of climate roadmaps. Training services play an important role in this. New tools can help activists to ask the right questions in consultation bodies in order to get an insight and a say in their company's future plans.

Make alliances

- Discuss a fair industrial transition with the various stakeholders. Organise exchanges on specific topics related to the transition and build up your expertise with regard to the transition.

- Enter into informal and formal alliances about the industrial transition, such as with environmental movements or with business federations.

- Reach out proactively to trailblazing companies who want to pioneer climate roadmaps and are prepared to set up pilot projects to work structurally with trade unions around a just transition.

- Negotiate sustainable development plans for 'abandoned' or 'discarded' industrial sites and regions in crisis

Recommendations for the social dialogue

- Always put the socio-economic effects of the industrial transition on the social dialogue agenda and at all levels (within companies and sectors, and at national level). Where possible, substantiate with own studies. In the social dialogue, discuss concrete proposals for the structural anchoring of a just transition.

- Look where it is feasible to conclude social contracts for the decarbonisation of companies, industrial clusters or sectors. A good source of inspiration is the social contract that FNV is concluding with Tata Steel, with agreements on future employment for the wider site of Ecoport IJmuiden (see next page).

Advocate for the introduction of transition plans for all businesses, industrial clusters and sectors and at regional level. Such plans provide guidance and perspective to all stakeholders and provide clarity regarding the challenges involved in realising the plans. Such transition plans must include medium- and long-term targets for decarbonisation (2030,

Tata Steel and FNV: green steel in IJmuiden

IIn the story about Tata Steel, the trade union FNV applies all the listed trade union strategies: the union mobilised its supporters around the transition, funded its own study and in the meantime is looking at future employment within the broader industrial cluster and is negotiating a social contract around the transition.

In the spring of 2020, the Dutch trade union FNV Metaal organised a 24-day strike against the announced dismissal of 1,200 people at the steel company Tata Steel in IJmuiden (the Netherlands). The union realised that the future of the plant was in jeopardy due to ongoing criticism of the company because of its high environmental impact; both the plant's high CO_2 emissions and the impact of toxic substances on the health of nearby residents. Decarbonisation was suddenly high on the union's agenda. FNV gathered together the necessary expertise in order to draw up its own plan for the greening of the steel plant. The result was the Green Steel Plan. In that plan, they advocate the hydrogen route, not carbon capture, the option proposed by the Dutch government. The trade union said the latter route did not provide enough certainty for the jobs in the long run and did not address the health impact associated with the plant.

The environmental movement supported the Green Steel Plan, and eventually the government changed its mind. FNV thus succeeded, thanks to a well-developed plan, in pushing the decision-making on the decarbonisation of a large industrial emitter in a completely different direction. The union called this victory "essential for the preservation of the basic industry in the Netherlands". The questions about the future of the plant are not entirely resolved with this, but the hydrogen route is no longer questioned and the plan was judged feasible, although it requires a great deal of money and bold policy from all government bodies.

In the meantime, FNV is negotiating a social contract with the employer to absorb the impact of the greening of the plant on the employees themselves. The aim is to give employees the best future prospects within the company itself. The trade union is also looking at the broader ecosystem around the steel plant, which they call Ecoport IJmuiden, for the development of innovative activities such as a hydrogen hub and circular start-ups. FNV advocates sustainable, future-oriented jobs and close trade union involvement in all transition discussions.

2040 and 2050), with employment projections.

- Make proposals to supplement the obligation to provide information at company and sectoral level (works council, Committee for Prevention and Protection at Work (CPPW) and trade union delegation) with proposals with regard to climate, for example on greenhouse gas emissions in the value chain (scope 1, 2 and ideally 3), or with regard to circular material use.

- Ensure for a strengthening and broadening of the operation of the CPPW around the theme environment. Ensure that their members build up competences in the climate transition.

Recommendations for CLAs

Evaluate the effects of the circular transition on existing collective labour agreements. An example is the traditional chemical companies that are making the switch to recycling activities. Do the formulated agreements on working conditions, safety and protection still correspond with the performance of the work, now and in the future? Do they still apply to new profiles and changing jobs in a company or sector? Does a new economic activity fall within the area of application for which these agreements have been made?

Evaluate the effects of the circular transition on existing collective labour agreements.

- Negotiate new CLAs that include enforceable green clauses and/or put forward sustainable, future-oriented entrepreneurship and work. Such CLAs can formulate obligations for companies or provide a framework for climate roadmaps. They can consist of, for example, green pay clauses, whereby pay increases are linked to environmental and climate objectives for all employees who can have an impact on this; of flexible labour measures reserved for companies that clearly invest in sustainability or commit to sustainable investors; of measures to promote sustainable commuting by investing in public transport or cycling.

Sectoral and intersectoral recommendations

- As trade unions, pay extra attention to growth sectors that are crucial for the transition – such as wind and solar energy, recycling and repair sectors or the waste processing sector. These sectors and their workers benefit greatly from strong trade unionism and social dialogue.

- Use intersectoral frameworks to coordinate cooperation between sectors also with regard to pay and working conditions.

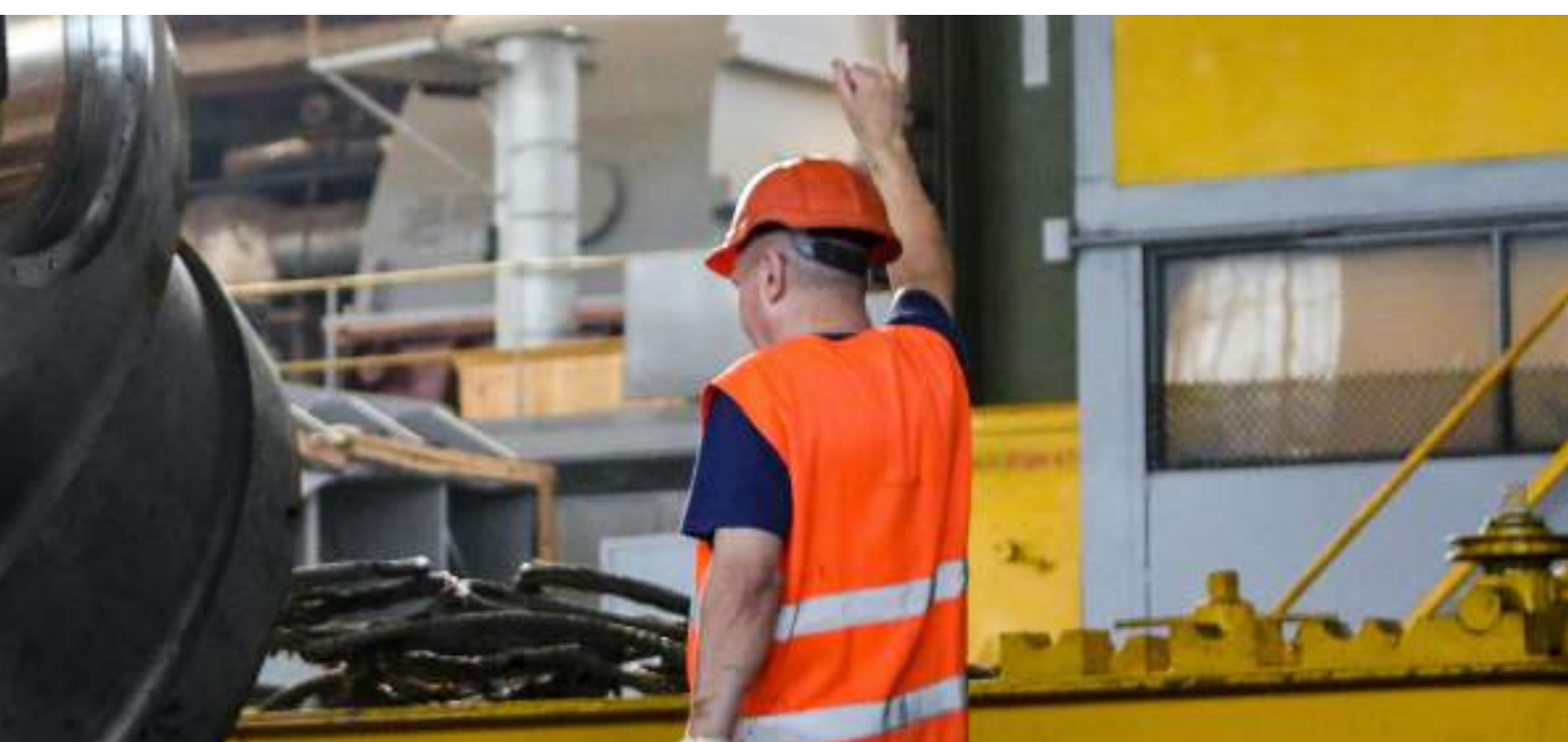
- Also use intersectoral frameworks to indicate sector-specific perspectives, needs and interests so that climate and environmental objectives can be discussed more effectively.

Recommendations for upskilling

- Identify training needs for the skills of the future and always bring up this point when transition plans are discussed at the various levels.
- Promote a culture of lifelong learning, with a proactive focus on the skills of the future. Start from an inclusive approach and from the needs of current employees so that they continue to get opportunities to develop themselves in their current position and to contribute to the transition. Support employers and employees in working on initiatives for further training and retraining.
- Lobby government bodies for adjusted training budgets for the industrial transition. Make proposals about the reform of sectoral joint training funds. Make the climate transition a focus for these training funds and ensure that they support an accelerated roll-out of future-oriented value chains. Make sure the funds are adjusted to today's adaptive and flexible labour market. Make them cross-sectoral or reserve part of the budgets for intersectoral working.

Further reading?

- HIVA (2022). Building capacities and strategies of trade union involvement in shaping a just transition towards a sustainable and decarbonised industry.
- Denktank Minverva (2020) Klimaat en sociale rechtvaardigheid
- ETUC (2021) European social partners project on circular cconomy and the world of work
- Agreenment (2020). Labour and Environmental Sustainability
- Denktank Minerva (2020) Het sociaal overleg op ondernemingsniveau: innovatie met de experimenten Hansenne
- Circle Economy (2021). How social partners can ensure a Just Transition to a circular economy.
- ETUC (2018) Involving trade unions in climate action to build a just transition
- ILO (2015) Guidelines for a just transition towards environmentally sustainable economies and societies for all
- ETUI (2019). Towards a just transition: coal, cars and the world of work



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Trade unions' afterwords

Both company and employee can come out stronger here

The intention now is to integrate the knowledge that we have gained in this project – and also in other projects – into our trade union practice. Among other things, this brochure will serve as a guideline for this. We must be ambitious and want to build on a structural social dialogue in more metal companies about the transition to a sustainable industry. Only by working together can we tackle this immense challenge and ensure that both company and employee come out of this stronger.

Marc Lenders, General Secretary ABVV Metaal

Nothing about us without us

As ACV-CSC METEA, we did not wait until the end of this project to get everyone involved in the social dialogue on the theme. But it doesn't stop there. The challenge now is to put theory into practice and to achieve enterprise and sector success.

Because it is clear to us that the future of the industry in Flanders and Belgium depends on how well our companies score in terms of climate transition and circular economy. Let us as a trade union ensure that this is done with the employee's interests in mind.

Nothing about us without us.

Lieve De Preter, General Secretary ACV-CSC METEA

A leading role for activists in the debate

We have learned a great deal with this project. It is now important to continue this project's dynamic. We need to further increase the knowledge of our shop stewards and activists with regard to this matter in order to lead the debate on the energy transition in the companies, in favour of the workers.

Andrea Della Vecchia, Federal Secretary AC-ABVV and spokesperson ABVV-Chemistry

Without employees, the transition is not possible

In the very short term, the economy will change profoundly. Employees in our industries will feel this. We remain committed to the integration of the circular economy into our work because employees are an important link in this transition. It is not possible without them. We continue to put and defend job retention, decent work, income and participation on the social dialogue agenda. As the issue is not limited to our national borders, we do so together with our international partners, such as IndustriAll Europe and IndustriAll Global.

Koen De Kinder, Federal secretary ACV construction, industry & energy

This brochure tailored to trade unions stems from the project “Employees as a lever for a circular economy”, a cooperation between Reset.Vlaanderen, Bond Beter Leefmilieu and IndustriAll Europe. The brochure discusses the transition to a climate-neutral industry in Flanders, and makes recommendations to trade unions to work more actively on this theme. Together with the Flemish trade union centres ABVV Metaal, Algemene Centrale ABVV, ACV BIE and ACV Metea, we studied the future perspectives for a circular metal and chemical sector, as well as the role that trade unions can adopt in the transition. A literature study and numerous interviews provided material for round-table discussions and workshops, with a focus on (inter)national exchange of knowledge with trade unions, supplemented by inspiring real-life examples.

In cooperation with:

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