

The Taxshift

*An EU Fiscal Strategy to Support
the Inclusive Circular Economy*

The Ex'tax Project

In collaboration with
Cambridge Econometrics, Deloitte, EY, KPMG, PwC

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Table of Content

Executive Summary	4
Introduction	9
1. Ambitions for 2030, and the role of tax	10
1.1. Challenges and ambitions	10
1.2. Tax system in line with ambitions	15
2. A circular taxshift scenario	21
2.1. Approach and preconditions	21
2.2. Explanation of the scenario	26
2.3. Raising revenues	27
2.4. Use of revenues	32
3. Impacts of the scenario	34
3.1. The E3ME model	34
3.2. Impacts of the scenario in the 27 EU Member States	35
3.3. FAQ about the modelling results	41
4. Roadmap and next steps 2022-2030	43
4.1. National level: roadmap	43
4.2. EU coordination: next steps	47
References	49

Figures

Figure 1: Selection of EU social and sustainability ambitions	12
Figure 2: Ex'tax Toolkit – Raising revenues	23
Figure 3: Ex'tax Toolkit – Use of revenue	24
Figure 4: Taxshift scenario EU27	25
Figure 5: Taxshift scenario EU27	36
Figure 6: Key modelling results 2021-2025, EU27	37
Figure 7: Power generation in 2025, EU27	38
Figure 8: EU27 scenario impacts 2021-2025	40
Figure 9: Sectoral output and employment in 2025, EU27	41
Figure 10: Taxshift Roadmap – Revenues	45
Figure 11: Taxshift Roadmap – Use of revenues	46
Figure 12: Recommendations	48

Tables

Table 1: New business models in the circular economy	14
Table 2: Traffic and transport	27
Table 3: Industry and production: pricing of CO2 emissions	28
Table 4: Industry and production: pricing of other emissions	29
Table 5: Industry and production: pricing of resource use	30
Table 6: Consumption taxes	31
Table 7: Lowering the tax burden for households	32
Table 8: Lowering the tax burden for employers	33
Table 9: Key modelling results in 2025, EU27	37

Boxes

Box 1: European Commission in support of the taxshift (1993-2021) ..	18
Box 2: EU tax policy and unanimity	19
Box 3: Preconditions for this study	22
Box 4: Cambridge Econometrics and the E3ME model	35
Box 5: Key cumulative results 2021-2025, EU27	38
Box 6: The Dutch 'Delta Plan': example of an intergenerational plan	44

Executive Summary

The European Green Deal includes a commitment to shift the tax burden from labour to pollution and resource use. This study presents a roadmap for such a rebalancing of the tax mix, both at national levels and in an EU context, and assesses the impact of a set of 20 example taxshift measures.

The results indicate that a budget-neutral taxshift is a critical strategy for a green and inclusive recovery. In the scenario, GDP levels in the EU in 2025 are on average 1.6% higher and employment levels are 3.0% higher than business as usual. This means that six million more people are in employment. At the same time, CO2 emissions have fallen by 7.1%.

Challenges

Transboundary environmental problems

The European Union and its 27 Member States are facing unprecedented socioeconomic and environmental challenges. The COVID-19 pandemic and the war in Ukraine have shaken the world. The transition from fossil fuels to renewable energy sources has never been more urgent. There are also geopolitical tensions around the access to resources such as rare earth metals and other critical materials. In addition, Europe is bracing itself for a range of climate impacts, including more floods, heat waves, droughts and forest fires. Air pollution is causing 300,000 premature deaths across Europe each year. Plastic pollution has spread to the most remote places on Earth and global food systems are at risk from the depletion of agricultural land and loss of biodiversity.

These are all complex problems that transcend national borders and cannot be solved in isolation or only at a national level.

Social challenges

There are also many social issues to be resolved. Well-functioning labour markets and welfare systems, and the elimination of poverty are core EU

objectives. In practice, such goals are difficult to achieve. The unmet need for employment in the EU27 stood at 29 million people in the fourth quarter of 2021. Labour markets have been turbulent and insecure for many years, among other things due to technological developments, flexibilisation and globalisation. Non-standard forms of employment have been on the rise. And despite rising GDP and expanding employment in pre-COVID times, one in ten workers was at risk of poverty. At the same time, some sectors and occupations are experiencing labour shortages and a mismatch between the skills of the workforce and the skills required for job openings. The European Commission calls for no less than a “skills revolution”.

The race to zero emissions

The EU has the ambition to become the first climate-neutral continent and to transition to a competitive circular economy: “a regenerative growth model that gives back to the planet more than it takes”. Half of all greenhouse gas emissions are related to materials management activities and the competitiveness of economies will increasingly depend on their resource efficiency.

Sustainability is becoming a race to the top, with more and more countries and businesses committing to circularity and climate neutrality.

A sustainable and inclusive solution

According to the European Green Deal, the circular economy offers great opportunities for jobs. Circular activities focus on value retention and the smart use of resources and energy. This means that products are redesigned to make them suitable for reuse. Companies offer repair services, while modification and refurbishment are other possibilities for extending the life of products. Homes are retrofitted to save energy. Supply chains are redesigned, with local and regional chains that require less transport and emissions. New technologies are developed to apply non-toxic materials from renewable sources. These types of processes are labour intensive, meaning they require a significant amount of time, effort and innovative thinking.

By tapping into human potential, the circular economy is not only a sustainable but also an inclusive solution.

Financial incentives not yet aligned

“The polluter should pay” is one of the key environmental policy principles articulated in the founding Treaties of the European Union. It is, however, inconsistently applied. Only 6% of the tax revenue comes from ‘green’ (environmental) taxes. These taxes cover all uses of natural resources, including fuels, metals, minerals, water, air and soil; in addition to pollution and emissions of CO₂ and other greenhouse gases. At the same time, on average, Member States derive the majority (52%) of their tax revenue from labour, through income tax, payroll taxes and social security contributions. Labour taxes are among the most economically distortive taxes.

They erode purchasing power because for every euro an employer pays in labour costs, only €0.61 ends up in the employee's pocket. In addition, they incentivise companies to minimise the use of human capacities, even if this means using more materials and fossil fuels, as resource use is relatively tax free – and even subsidised. EU Member States are subsidising fossil fuels to the tune of €50 billion per year, and 15 Member States allocate more subsidies to fossil fuels than to renewable energy.

The current tax systems in the EU create an uneven playing field for circular products and services. The polluter doesn't pay – the polluter gets paid. At the same time, labour taxes are a barrier to inclusive business models.

The taxshift from labour to resources

The basic principle of a taxshift is simple: lower the tax burden on labour and increase taxes on pollution and resource use. The principle has been promoted by EU institutions for at least 30 years. In recent decades, several countries have successfully implemented steps in this direction. Macroeconomic simulations have also shown how a taxshift from labour to resources can have positive effects on economic growth, employment, import dependence and the climate. Examples include research by the OECD, Eurofound, ILO, World Bank and IMF as well as meta-studies of hundreds of simulations with different macroeconomic models. It is now broadly recognised that shifting taxes from labour to natural resources and pollution has an important role to play. The European Green Deal includes a firm commitment to the taxshift:

“At national level, the European Green Deal will create the context for broad-based tax reforms, removing subsidies for fossil fuels, shifting the tax burden from labour to pollution, and taking into account social considerations.”

Businesses support taxshift principles

It may be clear that companies that 'do more with less' will gain a competitive advantage in the current climate. Business leaders in all sectors foresee that in a 1.5°C world, rising carbon prices are inevitable. And they are taking steps to ensure their companies remain competitive. Nearly half of the world's largest 500 companies have an internal carbon price or intend to adopt one in the coming two years. Business leaders are calling for governments to implement carbon pricing mechanisms while addressing social impacts. At COP26, for example, 90 CEOs of global corporations called to “Eliminate fossil fuel subsidies, cut tariffs on climate-friendly goods, develop market-based, meaningful and broadly accepted carbon pricing mechanisms and take adequate measures to ensure a just transition”. Moreover, the World Business Council for Sustainable Development (WBCSD), a CEO-led association of some 200 international companies, has called for a shift in the burden of taxation from “goods” to “bads”.

This study explores how financial incentives in the tax system could be aligned with the sustainable and social objectives of governments and businesses, so that circular and inclusive activities become more financially viable. Because when the sustainable options become more profitable, companies will be able to scale up those activities.

With the support of tax experts from Deloitte, EY, KPMG and PwC, The Ex'tax Project has selected a series of policy options to illustrate the impacts and implementation of a broad-based taxshift across Europe. The advanced macroeconomic E3ME model of Cambridge Econometrics was used in this project to model the impacts. E3ME is one of the European Commission's ten most frequently used impact assessment models.

Findings

A circular taxshift scenario

The scenario under review provides for a shift of €526 billion from labour to natural resource use in 2025. The burden for households is eased through a reduction in income tax and social security contributions, and income support for the lowest income groups. For employers, various payroll tax credits have been included: a generic payroll tax credit, a payroll tax credit specifically for new employment, and payroll tax credits for reskilling and training and for circular process innovation. Finally, a payroll tax credit has been included in the corporate income tax.

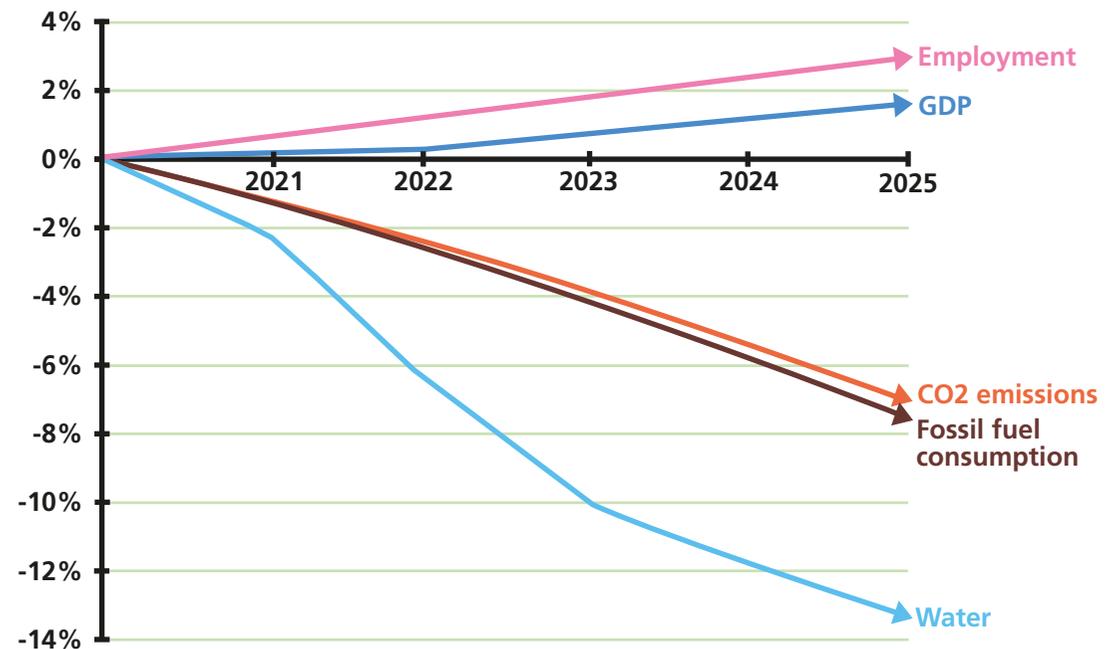
The necessary tax revenues are generated by introducing a kilometre charge, taxing consumption by increasing VAT rates, taxing CO2 emissions and other emissions from industry, aviation, shipping and agriculture, and increasing excise duties on tobacco. Finally, measures have been included that put a higher price on water, waste and the use of fossil fuels in chemical processes.

Positive impact on economy, society and environment

The scenario includes 20 measures, each with their own dynamics and impact. Some lead to higher costs for businesses and consumers when pollution and resource use are priced higher. Others reduce labour taxes, which reduces costs for employers and increases purchasing power. The net results of these two forces are positive for the economy, society and the

environment. As the measures are phased in between 2021 and 2025, the modelling results show an absolute decoupling of GDP from CO2 emissions, water and fossil fuel consumption (see Figure A). The EU economies move towards green growth as they become less energy intensive and less carbon intensive per million euros of GDP. In addition, employment growth outpaces GDP growth. This is an indicator of inclusive growth, as more people find a job per million euros of economic activity.

Figure A: Key modelling results 2021-2025, EU27
(Difference to baseline, E3ME)



Cumulative results

Between 2021 and 2025, the scenario shifts a total of €1,765 billion (non-discounted) in tax revenues in the EU27. Compared with the baseline, cumulative impacts over the five-year period are:

- **Higher economic growth**, adding €574 billion to GDP
- **Job creation**, adding 18.5 million person years of employment
- **Public investments**, enabling €124 billion in infrastructure investment
- **Carbon emission reductions**, saving 529 million tonnes of CO2 emissions
- **Saving on energy imports**, with EU member States jointly saving €56 billion on their energy import bill.

Impacts in EU Member States

Compared to business as usual, the scenario leads to lower CO2 emissions, higher economic growth and higher employment growth in 26 of the 27 Member States. The exact macroeconomic impacts vary, depending on factors such as the existing VAT structure, CO2 intensity and the labour market characteristics:

- The GDP increase ranges from 0.2% (Denmark) to 3.5-4% (Portugal, Estonia, Latvia, Lithuania, Poland, Slovenia, Bulgaria). The only exception is Malta, where GDP has fallen lightly in 2025 (0.2%).
- The employment increase ranges from 1.4% (Denmark) to 6.6% (Lithuania, Bulgaria). Despite the ageing of the population, the 27 EU Member States have enough potential workers to meet the increasing demand for labour in the scenario.
- CO2 emissions fall between 2.0% (Malta) and 11.6% (Luxembourg). Energy savings vary between 0.9% in Malta and 9.9% in Luxembourg.

- The reduction in personal income tax per person ranges from 1.8% in Denmark to as much as 86.0% in Bulgaria.

Distribution of benefits and costs

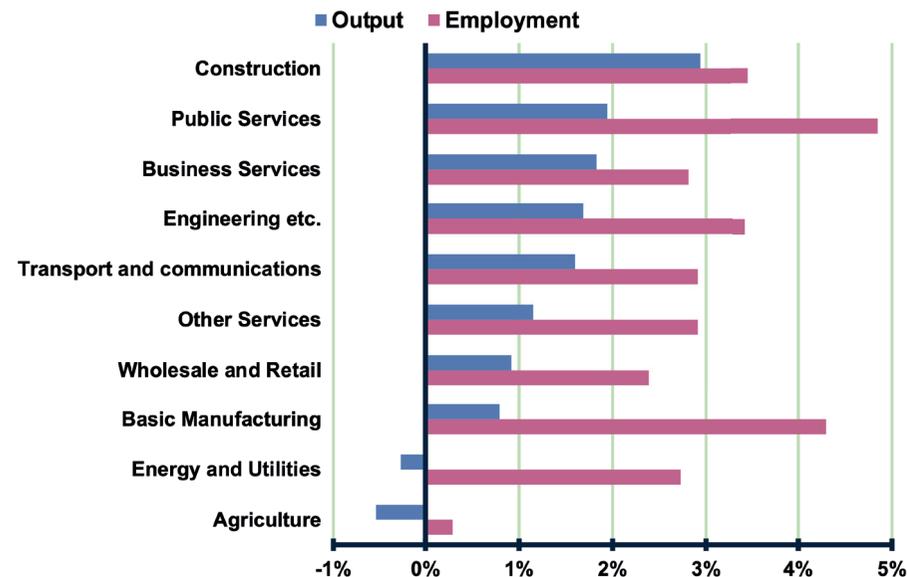
As with any reform, the costs and benefits are not evenly distributed across sectors, as they depend on the labour and resource intensity of businesses and sectors. Compared with the baseline, output increases in 2025 in all aggregate sectors, except for agriculture (-0.5% or -€2.2 billion) and energy and utility companies (-0.3% or -€3.6 billion). The highest output growth is observed in construction (2.9% or €53 billion), engineering (1.7% or €61 billion) and business services (1.8% or €152 billion) (see Figure B).

Real incomes increase

Compared with the baseline, real incomes in the lowest two income groups increase 4%. In the highest three income groups, real incomes rise 1% compared with the baseline. The modelling results suggest that a progressive impact is possible, with more benefits (in relative terms) for lower income households.

Contrary to popular belief, it is possible to design policy measures that address environmental issues (applying the Polluter Pays Principle) and social issues ('leaving no-one behind') simultaneously. Effective planning for the use of the revenues is key.

Figure B: Sectoral output and employment in 2025, EU27
(Difference to baseline, E3ME)



Next steps

National roadmaps and EU coordination

Taxation is, in principle, a matter of national competence: many steps must be taken at national level. However, far-reaching changes could create differences between Member States that have an impact on the Single Market. Therefore, coordination within the EU is key. Based on their national priorities, all Member States could draw up a roadmap prioritising suitable policy options as well as a timeline. Depending on the speed at which the revenue-generating measures are introduced, financial room for tax reductions would develop. This report provides such a roadmap for the Netherlands as an example. While Member States implement unilateral steps, the preconditions could be created for the next, bigger steps. These should be taken together with neighbouring countries, in coalitions between Member States as well as jointly with the EU27. The proverb 'if you want to go fast, go alone. If you want to go far, go together' applies here.

National roadmaps should form the basis for changes to the system, where slowly but surely taxes on the extraction of value are increased and taxes on the addition of value for society are reduced.

EU coordination: next steps

There are compelling reasons for the EU to set an example on tax reform to enable a circular and social economy. The taxshift principles support many current EU programmes and action plans, including the Green Deal, the Fit for 55 package, the Zero Pollution Action Plan, the Farm to Fork strategy, the Waste Framework Directive, and the European

Pillar of Social Rights Action Plan. Taxshift measures cut across policy areas. This means that institutions need to work together on a comprehensive approach together with the business community. Stakeholders need to focus on the long-term perspective and the interests of society at large, rather than getting bogged down in the details of specific measures and interests. The task may seem daunting but where there's a will, there's a way. To set the necessary wheels in motion, the recommended concrete next steps are:

2022-2023: Organisation

The initial organisational phase (2022-2023) involves the following steps:

- **Establishing an informal coalition composed of Member States committed to applying the Polluter Pays and Making Work Pay principles.** Led by the Ministers of Finance, the coalition fosters dialogue and develops proposals for coordinated taxshift policies in the EU.
- **Developing an EU Policy Tracker:** a database mapping relevant tax policies under review in Member States, as well as progress on policy implementation. Such public Policy Tracker supports Member States in coordinated action and fosters consistent policy making.
- **Establishing an Expert Group on Tax Dynamics in Business composed of CEOs, entrepreneurs, tax specialists and other financial experts.** The group advises the Commission on how a taxshift might impact sustainable and social impact investment decisions, including the preferred activities under the green EU taxonomy.
- **Establishing an EU Taxshift Inter-Service Group composed of all relevant Directorates-General of**

the European Commission. Led by DG TAXUD and DG ECFIN, the group focuses on dilemmas and progress on taxshift principles and integrating taxshift policies in EU programmes. It facilitates cooperation and in-depth research and debate on taxshift scenarios and opportunities.

2024-2025: Implementation

In the next implementation phase (2024-2025), the Commission and Parliament should:

- **Identify external costs and minimum tax rates for a broad range of resource uses,** including water, non-energy use of fossil fuels, industrial air pollution and NOx emissions from aviation and shipping.
- **Issue recommendations on the use of revenues from new green taxes to lower labour taxes and make a positive social impact.** To support the internal market and effective social policies, ensure that labour tax competition is minimized.
- **Develop guidelines and recommendations on shifting the tax burden,** including a coherent set of quantitative (country-specific) tax mix targets, to be used in the European Semester. Ultimately such targets are to be converted into binding obligations. If unanimous agreement remains unviable, a group of Member States could decide to move ahead under the enhanced cooperation procedure.
- **Seek international cooperation through high-level tax diplomacy** (including within the UN, IMF, OECD and G20) to put the taxshift higher on the agenda and address potential border impacts outside the EU.

After 2025: Adaptation

From 2025 onwards, tax systems will be subject to a continuous process of evaluation and adaptation to challenges that arise in the global economy, environment and labour market.

Introduction

An era of change

The COVID-19 pandemic has had a huge impact on economies, labour markets and government budgets the world over. Some economies are recovering, others are struggling. The war in Ukraine has added a humanitarian crisis with global geopolitical and economic impacts. In addition to the unprecedented challenges caused by the pandemic and the war, some of the major issues that existed before remain unresolved, including the climate crisis and the challenges identified by the UN Sustainable Development Goals (SDGs). These goals have now become even more urgent but difficult to achieve. Governments these days are expected to provide effective and vigorous leadership as well as financial support. But while governments have risen to the challenge by rolling out unprecedented levels of fiscal support in order to stabilise and rebuild economies during the pandemic, only 2% of this global spending has been allocated to clean energy measures. Saving energy, shifting to renewables and reducing fossil fuel import dependence has never been more important. Will the European Green Deal be “the motor of economic recovery” envisaged by the Commission?¹

Taxes: barrier to a green recovery

The 27 EU Member States are committed to the circular economy as part of their sustainable growth strategy. A circular economy is an economy in which cycles are closed to maximise value preservation. It is climate neutral and regenerative; ultimately, there is no pollution and there are no external costs. The aim is to become the first climate-neutral continent and to build a high-quality, inclusive and competitive economy. EU companies are seeking to adopt circular practices, but many have found that the financial incentives in our tax systems are in fact curbing circular growth. Pollution and the use of natural resources are relatively tax-free, whereas labour is highly taxed. This system is a barrier to circular solutions, which tend to be more work and/or knowledge intensive. Also, they need to compete with products whose prices do not take into account the cost of externalities such as climate disruption, which is borne by society rather than by polluters or users.

‘Tax pollution, not people’

A shift in taxation from labour to resource use (a ‘taxshift’) is seen as key to the creation of sustainable inclusive economies. Leaders of the UN, IMF and OECD have expressed their support for the principles of taxing pollution rather than people. The G20 has committed to phasing out direct and indirect fossil fuel subsidies. Over the last thirty years, the European Commission has called upon Member States to apply the taxshift principles. The Green Deal and the coalition agreements in Belgium, Finland, and the Netherlands explicitly mention the taxshift principles as part of their strategy. But the question remains: what would a fundamental mid to long-term restructuring of tax systems look like and what impact would it have on our economies, labour markets, sectors and the environment?

Rebalancing the tax mix

This study provides a perspective on a rebalancing of the tax mix. The results of the project should support European policy makers and enable business leaders in a constructive dialogue on fiscal policy and green recovery. Chapter 1 explores the EU ambitions for the coming decades and whether EU fiscal systems are aligned with these ambitions. Chapter 2 maps policy options for a taxshift from labour to resource use. Chapter 3 looks at the potential impacts of a taxshift scenario based on macroeconomic modelling by Cambridge Econometrics. The final chapter presents a roadmap for 2030, as a potential starting point for national and international coordinated tax reform and sets out recommendations for next steps in the tax transition.

“The wider European goals to fight climate change, promote sustainable growth, jobs and investment, harness the benefits of digitalisation and secure a fair and sustainable social model, need swift and effective tax measures to support them.”

– European Commission (2019)²



1

Ambitions for 2030, and the role of tax

1.1. Challenges and ambitions

Transboundary environmental problems

The European Union and its Member States are facing unprecedented socioeconomic and environmental challenges. The COVID-19 pandemic still has major economic and budgetary impacts. In addition, the war in Ukraine has caused a humanitarian crisis with global geopolitical and economic consequences. Soaring fossil energy prices are driving a wave of inflation. The transition to renewable energy sources has never been more urgent. The IPCC has concluded that it is “unequivocal” that human influence has warmed the atmosphere, ocean and land. The effects of climate change are now seen in every region of the planet.² Europe is also bracing itself for a range of climate impacts, including more floods, heat waves and forest fires.³ The economic costs of drought in the EU are already estimated at €9 billion a year. According to the United Nations, drought is affecting 1.5 billion people globally.⁴ And over the past decade, weather-related events already triggered an average of 21.5 million forced displacements each year. This is more than twice the number of displacements caused by conflict and violence.⁵ The next decade will be decisive as the remaining global carbon budget for not exceeding 1.5°C global warming will be exhausted before 2030.⁶

There are also geopolitical tensions around the access to natural resources such as rare earth metals and other critical materials.⁷ In addition, solutions must be found for the pollution of soil, water and air. In concrete terms, in the EU27, 307,000 premature deaths are attributable to air pollution each year.⁸ Plastic pollution has grown so much out of hand that plastic particles are being found in the most remote places on Earth: from the deep sea to the snow on Mount Everest,⁹ and even in the placenta of unborn babies.¹⁰ At the same time, the stability and sustainability of global food systems are at risk from deforestation, the depletion of agricultural land and zoonoses such as swine fever,¹¹ while a million animal and plant species are threatened with extinction.¹² These are all complex problems that transcend national borders and cannot be solved in isolation or only at a national level.

Social challenges

There are also many social issues to be resolved. 'No poverty' is the first of the United Nations' 17 Sustainable Development Goals. And access to decent work is an important precondition for combating poverty. An inclusive labour market offers everyone room to develop their talents optimally and to earn a living with dignity. Well-functioning labour markets and welfare systems are core objectives of the European Union. Equal opportunities, secure employment and social protection are among the key principles of the European Pillar of Social Rights Action Plan, which according to the Commission is to be the "beacon guiding us towards a strong Social Europe".¹³

In practice, such goals are difficult to achieve. In 2019, even before the COVID pandemic struck, 92 million people in the EU27 were at risk of poverty or social exclusion.¹⁴ And while the unmet need for employment in the EU27 stood at 29.7 million people in 2019, by the first quarter of 2021 this number had grown to 34.3 million. The latest available data, for Q4 2021, indicate 28.9 million people are in need of (more) work.¹⁵ At a country level, young people and workers in lower-skilled, lower-paid and temporary work have been disproportionately affected by the pandemic.¹⁶

The long-term impacts of the pandemic on the labour market will depend on how quickly economies are able to bounce back and how countries will deal with soaring government debt. It should be noted, however, that labour

markets have been turbulent and insecure for many years, due to aspects such as technological development, flexibilisation and globalisation. Non-standard forms of employment (any type of work that does not involve a full-time permanent contract) have been on the rise over the past few decades. For most workers, employment in non-standard forms is not voluntarily and is associated with insecurity.¹⁷ According to Eurofound, "Even as GDP was rising and employment expanding in pre-COVID times, 1 in 10 workers was at risk of poverty."¹⁸ Income inequality, inequality in opportunity and joblessness reduce economic growth, lead to social unrest and enhance populist sentiments.¹⁹

While unemployment is still a huge challenge in Europe, some sectors and occupations are experiencing labour shortages. Eurofound states:

*"What keeps workers from seeking employment in certain jobs is the lack of employment and income security, poor career prospects and the demanding nature of the work, combined with low pay and poor working conditions."*²⁰

Some sectors are experiencing a mismatch between the skills of the workforce and the skills required for job openings, emphasising the importance of skills and education.²¹ The European Commission considers investments in human capital to be essential to equip people for the new green and digital jobs and help shield workers from unemployment,²² and calls for no less than a "skills revolution".²³ A survey by the World Economic Forum (WEF) found that employers expect half of employees to have to retrain within a few years.²⁴ The challenge will be to unleash the full potential of the labour force, addressing the needs of workers while avoiding soaring labour costs for employers.

What are the social and sustainability ambitions?

In view of the above issues, the EU Member States have committed to the circular economy as a sustainable and inclusive growth strategy. A circular economy is an economy in which cycles are closed to maximise value preservation. It is an economy that is climate-neutral and regenerative; ultimately, there is no pollution and there are no external costs. The EU aspires to become the first climate-neutral continent and to transform the EU

into a 'modern, resource-efficient and competitive economy'.²⁵ The Circular Economy Action Plan states:

"The EU needs to accelerate the transition towards a regenerative growth model that gives back to the planet more than it takes, advance towards

*keeping its resource consumption within planetary boundaries, and therefore strive to reduce its consumption footprint and double its circular material use rate in the coming decade."*²⁶

Figure 1 outlines some of the EU's major social and sustainability ambitions.

Figure 1: Selection of EU social and sustainability ambitions

Current EU challenges	2030 EU ambitions
<p>SOCIAL</p> <p>In 2019, 92 million people in the EU27 were at risk of poverty or social exclusion. In 2020 this number had gone up to 96.5 million.²⁷</p> <p>In Q4 2021, EU unemployment stood at 13,9 million.²⁹ The unmet need for employment (including, amongst others, parttime workers who wish to work more hours) was more than twice as high, at 28.9 million people.³⁰</p>	<p>No poverty (Sustainable Development Goals)²⁸</p> <p>78% of the population in employment (European Pillar of Social Rights Action Plan)³¹</p>
<p>SUSTAINABILITY</p> <p>Air pollution leads to 307,000 premature deaths per year.³²</p> <p>Without deep carbon emission cuts, average global temperatures will rise by 2° by the end of the century, causing more droughts, wildfires, floods and sea level rises.³⁴ Under current global warming scenarios, additional deaths due to heatwaves could reach over 130,000 per year in the EU.³⁵</p> <p>The food sector makes a major contribution to air, soil and water pollution and GHG emissions, and has a profound impact on biodiversity.³⁷ Twenty percent of the food produced in the EU is wasted. Food waste amounts to 173 kilograms per person per year.³⁸</p> <p>Half of global GHG emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing.⁴⁰ The EU is depending on imports for more than 80% of the raw materials needed for its industry and economy.⁴¹ Only 13% of the material input is being recycled.⁴²</p>	<p>Premature deaths from air pollution reduced by 55% (Zero Pollution Action Plan)³³</p> <p>Greenhouse gas (GHG) emissions reduced by 55% (European Climate Law)³⁶</p> <p>A circular and sustainable EU bioeconomy. Nutrient losses reduced by at least 50%, fertilizers use reduced by at least 20%, pesticides use reduced by 50%. At least 25% of the EU's agricultural land under organic farming. Halving food waste. (Farm to Fork Strategy)³⁹</p> <p>The EU needs become less dependent on primary materials and double its circular material use rate. Transform consumption patterns so that no waste is produced in the first place. (Circular Economy Action Plan)⁴³</p>

Circular economy and inclusive recovery

According to the European Green Deal, the circular economy offers great opportunities for new jobs.⁴⁴ After all, circular business models tend to be more labour intensive than linear business models. Circular activities are focused on value retention and the smart use of resources and energy. This means that products are given the longest possible life span. Products are redesigned to make them suitable for reuse. And homes are retrofitted to save energy. In a circular economy, companies offer repair services for products, while modification and refurbishment are other possibilities for extending the life of products. Lease contracts make it possible to get components and materials back at the end of a product's life cycle. Production chains are being redesigned, with local and regional chains that require less transport and emissions. New technologies are developed to apply non-toxic materials from renewable sources.

These types of processes are labour intensive, meaning they require a significant amount of effort, attention and innovative thinking. For example, when a building needs to be demolished, this can be done with a wrecking ball fairly quickly. However, this results in a pile of low-grade, mixed materials. Circular builders know how to 'harvest' materials from buildings, including wood, steel and concrete with attention and craftsmanship, thus preserving their value.⁴⁵ Labour intensity also plays a role in the energy transition. IMF research demonstrates that producing a certain amount of electricity using solar power creates 7.6 times more jobs than using coal power.⁴⁶ By tapping into human potential across different occupational strata, the circular economy is not only a sustainable but also an inclusive solution.

Efficiency: driver for competitiveness

Half of all greenhouse gas emissions are related to materials management activities.⁴⁷ And if current population and economic development trends are to continue, material use is projected to more than double by 2060:

“The growth in materials use, coupled with the environmental consequences of material extraction, processing and waste, is likely to increase the pressure on the resource bases of the planet's economies and jeopardize gains in well-being.” (OECD)⁴⁸

This means that the competitiveness of economies will increasingly depend on their resource efficiency. Sustainability is increasingly becoming a race to the top, with more and more countries committing to circularity and climate neutrality: the 'race to zero' is on. At least 29 countries have enshrined 'net-zero carbon' targets in laws or policy documents or have proposed legislation to do so, including the EU as well as individual Member States such as Denmark, France, Germany, Sweden, Spain, Hungary and Luxembourg. China aims for climate neutrality by 2060 and has started the world's largest emissions trading system in 2021.⁴⁹ Around the world, court cases are pressuring governments to further the climate agenda at faster rates.⁵⁰ 22% of global GHG emissions are now covered by carbon pricing mechanisms, representing an increase on 2020, when 15% of global emissions were covered.⁵¹

Companies evolve: doing more with less

The above trends mean that companies face crucial decisions in adapting to changing market conditions. Companies that 'do more with less' will gain a competitive advantage in the current climate. In the words of Feike Sijbesma (Chairman of the Global Center for Adaptation and former CEO of Royal DSM):

“Anyone who hopes to survive in business must understand the importance of adaptability. When conditions change in your environment – for example, if public demand for your product or service changes, or can be expected to change – you can't just bury your head in the sand and pretend it isn't happening. Consider what happened to Blockbuster Video when they failed to anticipate how the public would respond to Netflix. (...) We need to adapt to changing times.”⁵²

More and more companies are committing to sustainability goals. The RE100 initiative, for example, unites 280 global companies that are committed to 100% renewable energy.⁵³ Another example is the We Are Still In coalition. Its members represent 70% of U.S. GDP and include 4,000 cities, states, businesses, investors and organisations, who are working together to achieve the Paris climate goals in the U.S.⁵⁴ In the run-up to the COP26 climate summit, over 600 multinational companies have committed to science-based targets to limit global warming to no more than 1.5 °C.⁵⁵ Institutional investors are also stepping up to the plate. Fund managers with \$43 trillion in assets,

almost half of the asset management sector globally, have set a goal of achieving net zero carbon emissions across their investment portfolios by 2050.⁵⁶

Business model innovation

The European Commission states in the recent New Industrial Strategy:

“In line with Europe’s new growth strategy, which gives back more than it extracts, Europe’s industry must play a leading role in the ecological transition. This means reducing its carbon and material footprint and embedding circularity across the economy. To do this, we must move away from the age-old model of taking from the ground to make products, which we then use and throw away. We need to revolutionise the way we design, make, use and get rid of things by incentivising our industry. This more circular approach will ensure a cleaner and more competitive industry by reducing environmental impacts, alleviating competition for scarce resources and reducing production costs. The business case is as strong as the environmental and moral imperative.”⁵⁷

New business models are being developed in every sector. Some examples are shown in Table 1. However, these activities are currently the exception rather than the rule. The next section explores how financial incentives in the tax system could be aligned with the sustainable and social objectives of governments and businesses, so that circular and inclusive activities become more financially viable. Because when the sustainable options become more profitable, companies will be able to scale up those activities. A UN-convened group of 40 institutional investors representing \$6.6 trillion in assets under management is in support of such strategy:

“Non-regressive and revenue-neutral carbon-pricing instruments – harmonised across borders – will not only unleash massive investment in renewable power systems globally, but boost sectors from construction to transport, which are in urgent need of transition.”⁵⁸

Peter Bakker, CEO of the World Business Council for Sustainable Development, rightly observes that the real work starts only when long term emission reduction targets are translated into action:

“I think what is important – and that is where many are having their biggest challenges – is how do we translate the 2050 or 2040 target into an operating plan, including an investment or a research and development plan that will halve the emissions by 2030?”⁵⁹

Table 1: New business models in the circular economy

Sector	Business model innovation
Traffic and transportation	DAF, Daimler, Scania and Volvo are bringing electric trucks to the market ⁶⁰ Volkswagen is investing €73 billion in electric, hybrid and autonomous cars ⁶¹ Opel is bringing electric delivery vans to the market ⁶² FedEx is using electric cargo bikes ⁶³ Hyundai, Volvo and Bobcat supply electric mobile equipment such as bulldozers and excavators that reduce emissions at building sites ⁶⁴
Aviation and shipping	Airbus aims to operate hydrogen-powered planes by 2035 ⁶⁵ Wallenius Marine is developing a freighter equipped with sails that will cut emissions by 90% ⁶⁶ Maersk is investing \$1.4 billion in vessels propelled by methanol rather than fossil fuels ⁶⁷
Energy	IKEA plans to be climate positive by 2030; the multinational conglomerate has installed 1 million solar panels on its stores, built 535 wind turbines and 2 solar parks, and recently started selling renewable energy to households ⁶⁸ LafargeHolcim (the world’s largest cement manufacturer) has launched an €850 million sustainability-linked bond offering ⁶⁹ SSAB, LKAB and Vattenfall have produced the first fossil-free steel, using green hydrogen ⁷⁰
Consumer goods	Unilever is investing €1 billion to eliminate fossil fuels from its cleaning products ⁷¹ Nestlé is investing €1.2 billion to help farmers and suppliers transition to using regenerative agriculture practices ⁷² McDonald’s is phasing out the use of virgin fossil fuel-based plastics in the one billion Happy Meal toys it sells each year ⁷³ TooGoodToGo and Olio apps enable millions of businesses and individuals to share food and reduce food waste ⁷⁴ Lidl supermarkets sell ‘expiry date products’ for just €0.25 ⁷⁵ LEGO is replacing plastic bags with fossil-free packaging materials ⁷⁶ P&G has launched recyclable refill pods made of 100% recycled paper for its best-selling moisturizer and unveiled a reusable and refillable aluminium bottle system in hair care ⁷⁷ Zalando and Tommy Hilfiger have started selling pre-owned clothing ⁷⁸ Adidas, Stella McCartney, Lululemon and Kering are collaborating to produce plant-based leather. ⁷⁹

1.2. Tax system in line with ambitions

Financial incentives through taxation

The 27 Member States of the European Union collect €5.6 trillion in taxes each year.⁸⁰ These taxes are financial incentives that drive consumption and investment decisions, such as the type of products and services being purchased, the scale and location of investment, and the supply and demand of labour.⁸¹ On average, the Member States derive the majority (51.7%) of their tax revenue from labour, through personal income tax, payroll taxes and social security contributions. Only 5.9% of the tax revenue comes from 'green' (environmental) taxes. These taxes cover all uses of natural resources, including fuels, metals, minerals, water, air and soil; in addition to pollution and emissions of CO₂ and other greenhouse gases.⁸²

Polluters Pays Principle not applied

"The polluter should pay" is a key principle in the founding Treaties of the European Union.⁸³ It is, however, inconsistently applied across the EU27. The European Court of Auditors has concluded that the level of taxation of energy sources does not reflect their greenhouse gas emissions and that low carbon prices and energy taxes are increasing the relative cost of greener technologies and delaying the energy transition. In addition, differences in fuel taxation between Member States are leading to distortions in the internal market.⁸⁴ Many harmful activities such as the burning of kerosene to power aircraft remain tax free. The same applies to bunker fuels burned in ships, air pollution from factories, harmful substances leaking into the air, water and soil from agricultural practices, deforestation, and the depletion of freshwater sources. Research shows that in the EU, energy consumption results in €340 billion in external costs, such as the impacts of emissions from power plants on health, ecosystems, agriculture, buildings and the climate. Only 10% of these costs are passed on to producers through measures such as the EU ETS and carbon tax policies.⁸⁵

Polluters are being subsidized

Compounding this, fossil fuels are in fact subsidised in the EU to the tune of €50 billion each year, 70% of which is provided through tax expenditures.⁸⁶

Fifteen Member States allocate more subsidies to fossil fuels than to renewable energy.⁸⁷ In the G20 (of which the EU is a member), a mere 0.5% of the external costs of energy consumption is passed on to producers.⁸⁸ And since the signing of the Paris Agreement in 2015, the G20 provided a staggering \$3,300 billion in subsidies for fossil fuels.⁸⁹

The current tax systems in the EU create an uneven playing field for sustainable products. The polluter doesn't pay – the polluter gets paid.

The potential role of green taxes

Green taxes can be introduced to make users of natural resources pay for their use as well as for any associated negative consequences (such as health and climate impacts) that would otherwise be passed on to individuals or society at large. Experts agree that green taxes are among the least economically distortive taxes. They are also cost-efficient compared to non-tax measures given their lower administrative costs and ease of management. Depending on the tax base and rate structure, green taxes could serve multiple purposes. They could enable changes in behaviour and help meet environmental targets, in addition to raising revenue.⁹⁰

In some cases, green taxes can be regressive, necessitating compensatory measures. The Commission notes:

"This is for example the case for taxes on energy, as lower income households spend a larger share of their income or a higher share of their consumption expenditure on energy intensive products (Marron, 2014). In contrast, a rather broad consensus has emerged in the literature that fuel taxes are less regressive than other environmental taxes, see, e.g. (European Commission, 2021). This result is due to the fact that the share of household transport expenditure rises with income, whereas the share of household energy consumption for housing decreases with income. Such evidence suggests that revenue collected from environmental taxes could therefore be used to provide lump-sum payments to lower income households, mitigating any regressive effects on living standards(81). Evidence shows that if the same revenue is used to decrease social security

contributions and taxes on labour income, this could generate positive employment effects.” (EC 2021)⁹¹

It is important to note that low-income groups tend to be more exposed and more negatively affected by environmental health hazards. Effective action against environmental degradation is therefore of the utmost importance, especially for the unemployed and those with low incomes.⁹²

Financial incentive to minimize labour input

While the degradation of nature remains relatively tax free, the deployment of human capacities is heavily taxed. This practice continues despite labour taxes being among the most distortive taxes.⁹³ From a worker’s point of view, labour taxes effectively mean lower net take-home pay. For employers, they mean higher production costs. In their cash flow, employers must allocate money for labour costs, comprising net wages, wage tax and social security contributions. For low-income workers in the EU, the average tax wedge (the difference between an employer's total wage costs and the employee's net wage) is 39.2%. This means that for every euro an employer pays in labour costs, only €0.61 ends up in the employee's pocket.⁹⁴ For many companies, the wage bill represents the biggest cost item. Such costs often compel employers to look for ways to minimise their workforce; for example, by:⁹⁵

- shifting to mass production rather than bespoke, custom-made products (e.g., hand-made shoes versus mass produced shoes)⁹⁶
- replacing manual service with machines (e.g., self-checkout lanes in supermarkets)⁹⁷
- reducing service levels provided to customers (e.g., in hotels)⁹⁸
- hiring short-term, informal workers rather than workers on a permanent contract (e.g., hiring interns or operating in the gig-economy)⁹⁹
- understaffing (putting pressure on workers to produce more in less time)¹⁰⁰
- outsourcing to lower-income countries.¹⁰¹

Labour taxes are no longer sustainable

High labour taxes incentivise the flexibilisation of labour, where people are hired on a temporary basis. Social security and pension contributions tend not to be paid in this model. Two out of five EU workers are now in

non-standard employment, meaning they are in part-time work, temporary work, family work or self-employment.¹⁰² The EU’s reliance on labour taxes is not sustainable as, according to the Commission, “population ageing and an increase in non-standard work may reduce the ability of labour taxation to generate the same revenues as today”.¹⁰³

Labour tax competition is on the rise

Within the European Union, differences in labour taxation contribute to hourly labour costs ranging between €47 in Denmark and €7 in Bulgaria.¹⁰⁴ Labour mobility means that jobs shift from high-tax jurisdictions to low-tax jurisdictions (e.g., Romanian truck drivers working in Belgium).¹⁰⁵ Digitalisation has enabled remote working and the COVID crisis has accelerated this phenomenon. Workers (especially those with high incomes) no longer need to live and work in the same country. Therefore, labour tax competition among Member States to attract foreign residents is expected to rise.¹⁰⁶

Barrier to inclusive and circular entrepreneurs

Current tax systems in the EU incentivise companies to minimise the use of human capacities, even if this means using more materials and fossil fuels, as resource use is still subsidised and relatively tax free. Tax systems therefore continue to support the linear 'take-make-waste' economy in which the throughput of products is maximised and products become waste after a short lifecycle. Considering the way financial incentives are structured in our tax systems, it’s not surprising that the circular economy represents just 1.7% of employment and 1% of GDP.¹⁰⁷ The current tax systems are a barrier to circular investments, as these activities tend to be more job intensive. A level playing field for sustainable and social business models is a prerequisite for success. In its 2014 circular economy communication, the Commission recognized the need for tax reform, shifting from labour to pollution and consumption taxes (the 'taxshift'):

“Policy has a further role in providing the right signals for investment in resource efficiency by eliminating environmentally harmful subsidies and switching taxation away from labour towards pollution and resources.” (EC 2014)¹⁰⁸

What opportunities arise from lower labour costs?

When taxes on labour are reduced for employees, their net incomes increase, contributing to income security. When labour taxes for employers are reduced, it lowers their costs. This makes labour-intensive business activities more competitive and scalable. When the demand for labour increases, it's easier for flexible workers and those laid off, for example due to automation, to find work. The Commission concludes:

“Targeted labour tax reductions coupled with the tapered withdrawal of benefit payments, jointly designed to avoid high marginal tax rates, can help to raise the employment levels of people further away from or at the margins of the labour markets, and as a result reduce poverty and social exclusion.” (EC 2021)¹⁰⁹

Training, retraining and research and development become more affordable, as these activities are knowledge and labour intensive. Public sectors such as education, health care, police, justice, the prison system, and psychiatric care also benefit from tax cuts. As these key sectors have relatively small ecological footprints, the net impact of a taxshift for them would, in principle, be positive. This could contribute to decent working conditions in these sectors.

Studies show that a taxshift works

Macroeconomic simulations have shown how a taxshift from labour to resources can have positive effects on economic growth, employment, import dependence and the climate. Examples include research by the OECD,¹¹⁰ Eurofound,¹¹¹ ILO,¹¹² World Bank¹¹³ and IMF¹¹⁴ as well as various meta-studies of hundreds of simulations with different macroeconomic models.¹¹⁵ Earlier studies by The Ex'tax Project and its knowledge partners also found positive effects for a broad set of measures.¹¹⁶ It is now broadly recognised that shifting taxes from labour to natural resources and pollution has an important role to play. The European Green Deal states:

“Well-designed tax reforms can boost economic growth and resilience to climate shocks and help contribute to a fairer society and to a just transition. They play a direct role by sending the right price signals and providing the right incentives for sustainable behaviour by producers, users and consumers. At national level, the European Green Deal will create the

context for broad-based tax reforms, removing subsidies for fossil fuels, shifting the tax burden from labour to pollution, and taking into account social considerations.” (EC 2019)¹¹⁷

The Member States are also encouraged to consider sustainable fiscal reforms in the context of their Resilience and Recovery Plans.¹¹⁸ The European Economic and Social Committee (EESC) – the EU's advisory body, which represents more than 300 employers, trade unions and other interest groups – agrees:

“The EESC feels that a shift in the distribution of taxation should be considered, easing the tax burden on labour and increasing it on resources and, in particular, on less sustainable products (...).” (EESC 2020)¹¹⁹

UN Secretary-General António Guterres and Managing Director of the IMF Kristalina Georgieva have also voiced their support for the taxshift principles:

“Solutions exist. First, let's shift taxes from salaries to carbon. We should tax pollution, not people. Second, stop subsidizing fossil fuels. Taxpayers' money should not be used to boost hurricanes, spread drought and heat waves, and melt glaciers.” (Guterres 2019)¹²⁰

“What we want to see is, very simply, to move the revenue raising objectives of governments from taxing people, taxing labour, to taxing pollution.” (Georgieva 2020)¹²¹

Although challenging to implement...

The basic principle of the taxshift is simple: lower the tax burden on labour and increase taxes on pollution and resource use. The principle has been promoted by EU institutions for at least three decades (see Box 1). But, of course, tax reform is a challenging endeavour. For politicians it is a hard sell. The electorate dislikes having to pay for things that were previously tax free. Cabinets only have a two to four-year horizon and an election cycle that does not reward the development of long-term policies. Tax policy reform, especially the introduction of new green taxes, creates fears of competitive disadvantages, even when tax reform is of vital importance to key public and labour-intensive sectors. Also, coordination and collaboration in the European Union are critical for success, which is difficult as tax legislation is largely a national competency and amendments within the EU require unanimity (see Box 2). Finally, the main opposing forces have so far been industries with an

interest in maintaining the status quo. These parties tend to have a more powerful voice in our political systems than other interest groups, such as healthcare organisations or small and medium-sized enterprises (SMEs) that may benefit from a transition because they operate in a local market and thus depend on local labour input.¹²²

... the taxshift is certainly possible

Despite the barriers, the taxshift has been successfully implemented in several countries in recent decades:

- Sweden (starting in 1991), Denmark (1993), the Netherlands (1996), Finland (1997), Slovenia (1997), Germany (1999) and the UK (2001) introduced taxes on energy and transport that reduced taxes on labour. In total, more than €25 billion in costs were shifted, with a generally positive effect on the

economy. Employment increased by up to 0.5% in some countries.¹²⁹

- In 1996, the UK introduced a landfill tax, with the proceeds being used to reduce employer contributions. In 2010, the tax generated €1.2 billion and the amount of landfilled waste had been halved.¹³⁰
- In 2007, Germany increased the VAT rate by three percentage points. The proceeds were used to reduce unemployment contributions.¹³¹
- In 2008, British Columbia introduced a carbon tax, the revenues from which are used to reduce other costs. The province since achieved higher economic growth rates and lower CO2 emissions than the rest of Canada. The measure had a progressive effect through the way in which households were compensated.¹³² The federal government has since rolled out the tax nationally and the price level is set to increase from \$30/tCO2 to \$170 per tonne by 2030.¹³³

Box 1: European Commission in support of the taxshift (1993-2021)

A selection of quotes

“Shifting away from labour taxation to environmental taxes that are fit for purpose, with due consideration of possible distributional effects, has the potential to stimulate employment and change behaviour in favour of more sustainable consumption and production.”

European Commission (2021), Annual report on taxation¹²³

“The transition towards climate neutrality can be a unique opportunity to reduce systemic inequality. Carbon pricing instruments, for example, raise revenues that can be reinvested to address energy poverty and mobility challenges for the vulnerable, spur innovation and economic growth, and create employment.”

European Commission (2021), Fit for 55¹²⁴

“The tax system for energy products must safeguard and improve the Single Market and support the green transition by setting the right incentives. A revision of the Energy Taxation Directive proposes to align the taxation of energy products with EU energy and climate policies, promoting clean technologies and removing outdated exemptions and reduced rates that currently encourage the use of fossil fuels. The new rules aim at reducing the harmful effects of energy tax competition, helping secure revenues for Member States from green taxes, which are less detrimental to

growth than taxes on labour.”

European Commission (2021), Press release¹²⁵

“Since an efficient and fair tax system is particularly important to support an effective economic recovery in the medium term, some Member States are recommended to reform their tax system, including through shifting from labour to environmental taxation.”

European Commission (2020), European Semester¹²⁶

“One of the biggest tax policy challenges in Europe is that governments tend to rely too much on labour taxes. But overdependence on labour taxes can be a disadvantage when they make it too expensive to employ people. Passing some of the taxes to other things, such as pollution, could help to accelerate employment and economic growth. Smart taxation is a winning strategy.”

European Commission (2015), Smart Taxation – A winning strategy.¹²⁷

“The tax burden must be redistributed so as to lighten the burden on labour and increase the burden on the use of natural resources.”

European Commission (1993), Growth, competitiveness and employment. Challenges and the ways forward into the 21st century.¹²⁸

- In 2012, Colombia reduced labour costs and simplified the rate structure for corporate income tax and VAT. The reforms boosted employment and economic growth.¹³⁴

In 2017-18 (the latest year for which data are available) most of the revenues from carbon pricing mechanisms worldwide were used for environmental and development projects and general funds. Nine percent of the proceeds (over \$4 billion) are known to have been used to reduce other specific taxes and to support households and businesses.¹³⁵

Increasing application of ‘polluter pays’ globally

Ten years ago, only 21 carbon pricing instruments (CPIs) were implemented globally. Today, 64 such instruments are in operation, 35 of which in the form of a tax and 29 in the form of an emissions trading scheme. Now, 22% of global greenhouse gas emissions fall under a pricing mechanism, up from 15.1% in 2020. The increase from 2020 is mainly due to the launch of China’s ETS. In 2020, carbon pricing instruments generated \$53 billion in revenue

globally. This is an increase of around \$8 billion compared to 2019, largely due to the increase in the EU allowance price.¹³⁶ The price of EU ETS permits has ranged between €5/t in 2017 and €97/t in 2022.¹³⁷ Across the G20 economies, the average “effective carbon rate” – the sum of explicit carbon prices and fuel excise taxes – has increased by around €2 since 2018 to €19 per tonne of CO₂. An increase in pricing is observed, yet, according to the OECD, “variable progress remains uneven across countries and sectors and is not well enough coordinated globally”.¹³⁸

Use by companies of internal prices for CO₂ and water

Business leaders in all sectors foresee that in a 1.5°C world, rising carbon prices are inevitable. And they are taking steps to ensure their companies remain competitive. In 2020, more than 2,000 companies globally were using an internal carbon price to integrate climate risks and opportunities into their business strategies (or expected to do so within two years). This represents an increase of 80% over just five years. Nearly half of the world’s largest 500

Box 2: EU tax policy and unanimity

Taxation is the last EU policy area where decision-making exclusively relies on unanimity. In a 2019 communication,¹³⁹ the Commission concludes that Member States perceive taxation as a matter of national sovereignty, due to its role in national revenues, budgets and policy choices. As a result, EU tax legislation has focussed mostly on removing obstacles to the Single Market and on preventing distortions to competition. Unanimity is a barrier to effective policymaking:

“In order to keep pace with today’s rapidly changing environment, EU tax policy must be able to react and adapt quickly. However, this is not possible when unanimity is the rule.” (EC 2019)¹⁴⁰

In the first place, unanimity makes it very difficult to reach compromises, as only one Member State is required to prevent agreement. Secondly, even when agreement is reached, it tends to be at the level of the lowest common denominator, limiting the impact and effectiveness. Thirdly, some Member States can use important tax proposals as a bargaining chip against demands on other -unrelated- issues. And lastly, decisions taken by unanimity can only be undone by unanimity, which makes Member States cautious, dampening ambitions and weakening final outcomes

in negotiations. According to the Commission, the need to change voting arrangements is especially relevant when it comes to solving sustainability and social challenges:

“Harmonised and targeted taxation on negative social and environmental externalities in the EU Single Market – such as in transport and energy – based on the “user pays” and “polluter pays” principle would also enable the EU to shift towards a more efficient and sustainable economy. This highlights the self-defeating nature of unanimity in taxation and is further evidence of the need for change.” (EC 2019)¹⁴¹

The Commission and Parliament have repeatedly proposed moving to qualified majority voting in tax matters. The issue remains unresolved, however, as invoking the so-called Passerelle Clause in the Treaties -again- requires unanimous consent. Another solution might be using the internal market argument of Article 116 TFEU to circumvent the unanimity requirement. Such route, however, is not mentioned in the Commission’s recent tax policy agenda *Business Taxation for the 21st Century*.¹⁴² The recommendations in this study are based on the current legal context, without assuming voting reform.

companies based on market capitalisation already have an internal carbon price or intend to adopt one in the coming two years.¹⁴³ At Unilever, for example, an internal levy of \$40 per tonne of carbon created an internal clean technology fund for energy, waste and water-saving projects.¹⁴⁴ In relation to water, internal pricing is applied by more than 200 companies.¹⁴⁵

Do businesses support the taxshift?

Business leaders are actively calling for governments to implement carbon pricing mechanisms while addressing social impacts. At COP26, for example, 90 CEOs of global corporations called to “Eliminate fossil fuel subsidies, cut tariffs on climate-friendly goods, develop market-based, meaningful and broadly accepted carbon pricing mechanisms and take adequate measures to ensure a just transition.”¹⁴⁶ Moreover, the World Business Council for Sustainable Development (WBCSD), a CEO-led association of some 200 international companies, has called for the “most immediately impactful steps that governments can take to help reinvent capitalism so that it rewards true (long-term) value creation”, including a shift in the burden of taxation from “goods” to “bads.”¹⁴⁷

The results of a survey in the Netherlands conducted in 2020 also point to strong support for the taxshift among entrepreneurs. A clear majority (96%) of 300 respondents agreed or strongly agreed with the statement: “The tax burden on labour should be reduced, and taxes on resource use and pollution should be raised.” When asked what should be taxed at higher rates, 86% of respondents said CO2 emissions, 81% said plane tickets or kerosene, 72% said plastics, 74% said air pollution, 60% said waste, 51% said metals and minerals and 40% said water.¹⁴⁸

EU to address environmental and social issues simultaneously

The EU is committed to becoming the world’s first climate neutral continent and to transitioning to a circular economy. The Green Deal and the Fit for 55 package have set in motion the process to achieve these goals. Simultaneously addressing environmental issues (applying the Polluter Pays Principle) and social issues (‘leaving no-one behind’) will be key. In the words of European Commission Executive Vice-President Frans Timmermans:

“(...) the one thing I hope we can avoid is that we are paralyzed by the fear of change (...) whatever measure you take, all these measures have a price effect and the art of politics will be to ensure that the price effect does not affect the most vulnerable and that we use the age-old political instrument of redistribution to make sure that the burden is evenly spread in society. And that people can see clearly, beyond any doubt that we have taken measures that will assure an equal burden sharing across society.”¹⁴⁹

In support of this historic transition for the EU Member States, this study presents a perspective on a potential broad-based taxshift scenario, as described in the next chapter.



2

A circular taxshift scenario

2.1. Approach and preconditions

This study examines how Member States can effectively shift taxes from labour to pollution and resource use, both at national level and in an EU context. How can new tax revenues be used optimally? And what are the consequences for the economy and society? To create a workable mission within this large research area, several preconditions were applied (see Box 3). Within these preconditions, a potential taxshift scenario ('the scenario') was developed.

First, an inventory was made of potential tax bases. The Toolkit in this chapter provides an overview of potential tax bases for the application of the taxshift principles; in other words, 'the buttons governments can push'. Figure 2 lists potential tax bases for taxing consumption, pollution and natural resource use (the income side). Figure 3 contains an inventory relating to the potential use of new tax revenues.

For this study, the tax bases were used to analyse more than 250 policy options. A selection of 20 policy options was made that fit within the preconditions of this study (as mentioned in Box 3). These policy options have been included in the scenario. In the scenario, revenues are generated by

applying the Polluter Pays Principle, including through the pricing of CO2 emissions, other emissions and water use. The scenario also provides for an increase in VAT rates. The revenues are used in the scenario to reduce the labour costs for both households and employers as well as for infrastructure investments (such as public transport). In the Toolkit, the bases used are marked in pink.

Box 3: Preconditions for this study

Geography. Geographically, the focus is on the EU27, assuming that European coordination will take place. When introduced at national level, almost every tax measure has a leakage effect, whereby activities move to avoid taxes. This effect is regularly cited as an argument against green taxes, but usually overlooked when it comes to labour taxes. Modelling is done on an EU scale, so internal EU carbon leakage is not taken into account.

Each measure aims to: a) stimulate employment or discourage the use of natural resources; and b) generate substantial revenue or provide a clear price signal to discourage environmentally harmful products and activities; and c) contribute, where possible, to simplifying the tax system so as to reduce administrative costs and minimise economic disruption.

Generic measures. The focus is on generic measures. Exceptions for specific stakeholders, direct and indirect subsidies and flanking measures are kept to a minimum. In this way, policy becomes more consistent and less fluctuating. This contributes to the general aims of simplicity, neutrality and stability in taxation. When taxing emissions such as CO2, consistency is also appropriate because every tonne of CO2 released into the atmosphere – regardless of its source – contributes equally to the climate crisis. A uniform price, where everyone pays the same per tonne of CO2 emissions, is the most cost effective.¹⁵⁰

General objectives: a) social equality: the measures should be fair and equitable, with sufficient protection for vulnerable groups; and b) sustainability: the measures should contribute to the achievement of the national and international targets regarding the circular economy, the SDGs and the Paris Climate Agreement.

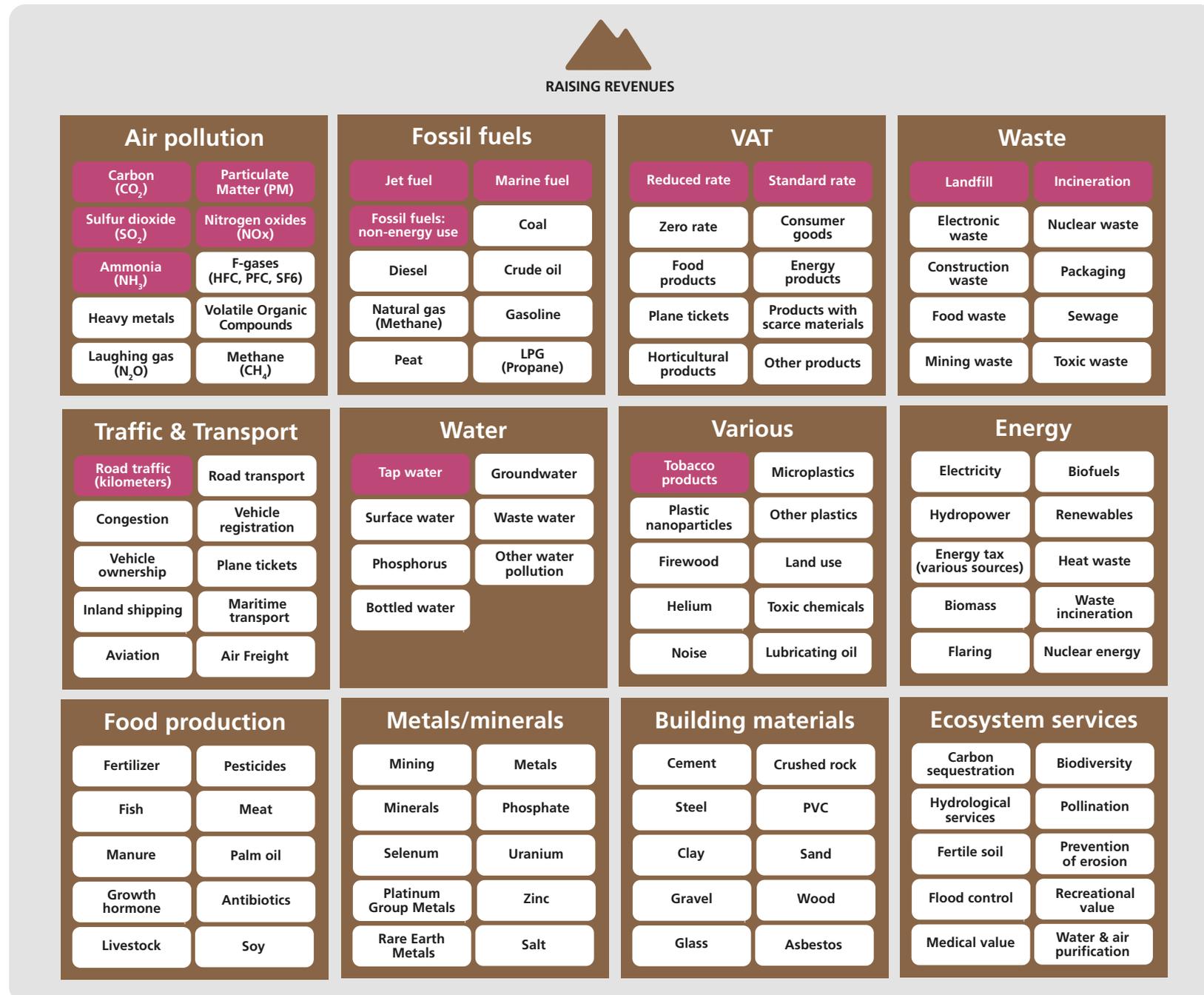
The scenario developed for this study provides for a shift of €526 billion from labour to natural resource use in 2025 (see Figure 4).¹⁵¹ This represents a shift of about 9.5% in revenues from taxes and social contributions in the EU.¹⁵² The burden for households is eased through a reduction in income tax and social security contributions, and income support for the lowest income groups. For employers, various payroll tax credits have been included: a generic payroll tax credit, a payroll tax credit specifically for new employment, and payroll tax credits for reskilling and training and for circular process innovation. Finally, a payroll tax credit has been included in the corporate income tax.

In the scenario, the necessary tax revenues are generated by introducing a kilometre charge, increasing VAT, taxing CO2 emissions and other emissions from industry, aviation, shipping and agriculture, and increasing excise duties on tobacco. Finally, measures have been included that put a higher price on water, waste and the use of fossil fuels in chemical processes. Note that the scenario does not provide a blueprint for implementation; it gives direction through a selection of policy measures and illustrates a possible taxshift scenario.

The next sections provide more detail on the policy measures in the scenario.

Figure 2: Ex'tax Toolkit – Raising revenues

Tax base options for the taxation of consumption, pollution and use of natural resources



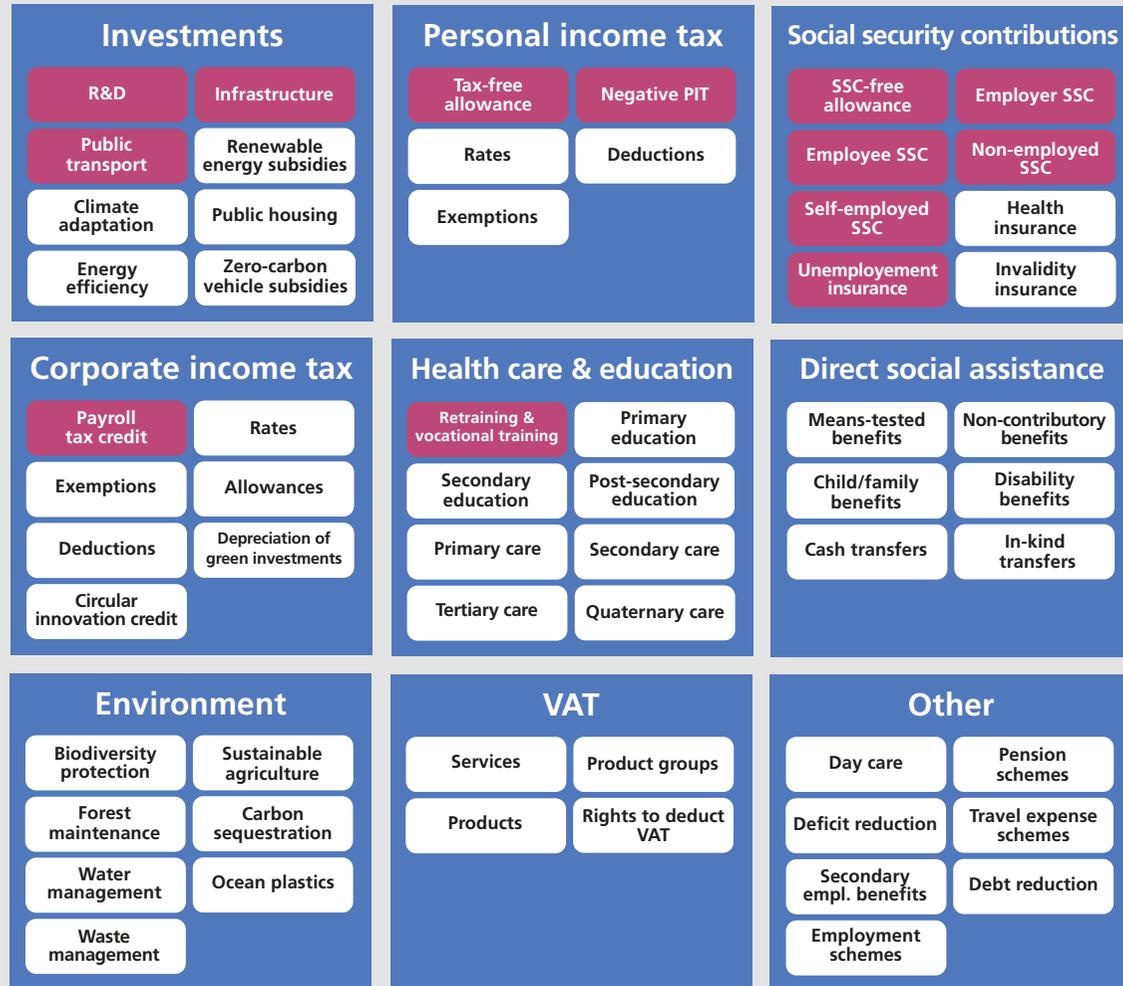
Tax base option
 Included in scenario

Figure 3: Ex'tax Toolkit – Use of revenues

Policy options



USE OF REVENUES



Tax base option
 Included in scenario

Figure 4: Taxshift scenario EU27

(€ billion, in 2025, E3ME)



Labour - €526 billion

Households (60%)	Reduction in personal income tax and social security contributions	-214	41%
	Income support lowest two income quintiles	-101	19%
Employers (40%)	Payroll Tax Credit (PTC) for new employment	-105	20%
	PTC generic	-42	8%
	PTC for reskilling	-32	6%
	PTC for circular innovation	-21	4%
	PTC Corporate Income Tax	-11	2%
		-526	100%



Natural resource use €526 billion

Traffic (34%)	Kilometre charge	180	34%
Emissions (26%)	Industrial air pollution tax	55	10%
	Ammonia tax (agriculture)	44	8%
	Carbon tax (non-ETS sectors)	28	5%
	Carbon price floor (ETS sectors)	15	3%
VAT (21%)	VAT increase (reduced rate)	63	12%
	VAT increase (standard rate)	47	9%
Shipping (7%)	Marine transport tax	35	7%
Aviation (6%)	Aviation tax	29	6%
Use of resources (4%)	Water tax	11	2%
	Feedstock tax (non-energy use of fossil fuels)	6	1%
	Waste incineration and landfill tax	3	1%
Excise duties (2%)	Tobacco tax	10	2%
		526	100%

2.2. Explanation of the scenario

The policy options included in the scenario are explained in more detail below. The measures relating to revenue-raising are described per sector (traffic and transport, industry and production and consumption). The measures relating to the use of tax revenues are described per target group (households and employers). Five principles apply:

- The measures are **phased in gradually (linearly)** in each Member State in the period from 2021 to 2025, so that they are fully in place by 2025. In practice, the implementation of such a major reform will take longer.
- Each country can start implementing the measures at national level. As the scale of the measures is gradually increased, coordination within the EU must be sought in the coming years. In this study, **coordinated policy within the European Union** has been assumed to avoid border effects within the bloc. Border effects outside the EU are included in the calculation. Chapter 4 describes a roadmap for national policy and European cooperation.
- The measures have been **adapted to the limitations in the availability of data and the structure of the model used in the calculations** (see 3.1). When implemented in practice, it is important to take more account of country-specific data, contexts and needs. Planning agencies will be able to make recommendations based on more information, as well as greater consistency in the information.
- The measures are in **addition to existing schemes**, unless otherwise indicated. Benefit entitlements also remain unchanged. Implementation costs are not explicitly included, except for the kilometre charge.
- Where **external costs** are used, these amounts are based on best estimates from reputable institutions. However, the valuation of externalities is subject to discussion due to differences in valuation methods and personal opinions. The scenario does not consistently take into account the passing on of all the external costs to sectors. Some sectors do not yet pay for the extraction of value. In these sectors, a prudent approach has been to present only part of the bill.

It should also be noted that calculating externalities could be helpful in taxing certain activities. But full pricing of an externality may not be required for effective behavioural change or technical innovation.

In some cases, a minor price incentive below the level of external costs may be sufficient to bring about a relatively significant change in behaviour. In other cases, pricing will have little or no effect on the consumption of a certain product. The impact of pricing mechanisms depends on various factors. For example, are affordable alternatives available and how much effort would it take to change processes? The determination of external costs supports the process of legislation, regulation and pricing mechanisms such as taxes and trading systems. In practice, evaluation and price level adjustments will be necessary to make sure tax systems evolve and adjust to changing circumstances.

For each measure in the scenario under review, the tables below provide a brief description of the measure, its rationale and an outline of the EU context. They also include a brief assessment of how each measure ties in with the Fit for 55 package tabled by the Commission in July 2021 to achieve the target of at least 55% net emission reductions by 2030, as well as other legislative processes. Finally, the expected impacts of each measure are given, alongside some additional notes.

The context of each measure is more complex than can be shown here. Therefore, the aim of this section is not to provide a full picture, but rather to outline a general perspective on different policy options. Of course, the scenario is not meant to be an end station either. The steps described are only the beginning of a long process of developing tax policy, where optimisation is sought in each period. Chapter 4 explores the timing, scale and international alignment of policy options not yet included in this scenario.

2.3. Raising revenues



A 'smart' kilometre charge

differentiated by type of vehicle, weight and fuel use. Part of the revenue is invested in public transport. Annual vehicle tax is abolished.¹⁵³



An aviation tax

based on 1) the abolition of aviation fuel duty exemption and 2) climate costs.¹⁵⁴



A shipping tax

based on part of the external costs of CO₂ and NO_x emissions.¹⁵⁵

	A 'smart' kilometre charge	An aviation tax	A shipping tax
Context	<p>Road transport is responsible for almost 20% of EU greenhouse gas (GHG) emissions.¹⁵⁶ The total external costs of road transport in the EU27 (including climate change, air pollution, noise, accidents and congestion) are €720 billion per year.¹⁵⁷</p> <p>The Green Deal states: <i>"The price of transport must reflect the impact it has on the environment and on health."</i>¹⁵⁸ Road taxation structures in the EU are widely diversified.¹⁵⁹</p> <p>The IEA notes that: <i>"In the net zero pathway, tax revenue from oil and gas retail sales falls by about 40% between 2020 and 2030. Managing this decline will require long-term fiscal planning and budget reforms."</i>¹⁶⁰</p>	<p>In 2019, a billion passengers flew to and from EU airports¹⁶¹ and 13.7 million tonnes of air freight were loaded and unloaded.¹⁶² Aviation is responsible for 3.8% of EU CO₂ emissions.¹⁶³ The total external costs of aviation in the EU27 are €38 billion per year.¹⁶⁴ Sustainable Aviation Fuel (SAF) is estimated to be 1.5 to 6 times more expensive than conventional jet fuel, as prices do not factor in environmental impacts.¹⁶⁵ Only intra-EU flights are covered by the ETS and in 2019, the sector received €0.8 billion worth of free emission allowances.¹⁶⁶ It also benefits from a fuel tax exemption estimated to be €13.3 billion.¹⁶⁷ Consumers do not pay VAT on plane tickets. Member States have called for fair pricing of negative externalities in aviation¹⁶⁸ and some have introduced national aviation taxes.¹⁶⁹ International agreements and EU legislation limit the possibility to raise excise duties on aviation fuel.¹⁷⁰ Potential alternative tax bases are: number of passengers, type of aircraft (gross weight, noise level, seat capacity), weight of the freight or distance travelled.¹⁷¹</p>	<p>The shipping sector is responsible for 3% of EU CO₂ emissions.¹⁷² Maritime transport is the only sector not yet subject to GHG reduction targets and policies in the bloc.¹⁷³ Most ships use heavy fuel oil, which is one of the most polluting fuels. Pollutants from ships (including sulphur oxides, nitrogen oxides and black carbon) cause serious harm to human health and the environment.¹⁷⁴ By 2050, shipping emissions are projected to increase by up to 50%.¹⁷⁵ The external costs from EU28 maritime and inland shipping are over €100 billion/year.¹⁷⁶ The EU27 maritime sector enjoys €22 billion in fossil fuel tax exemptions per year.¹⁷⁷ International agreements and EU legislation currently limit the possibility to raise excise duties on bunker fuels.¹⁷⁸ Alternative tax bases are ship kilometres, weight of the freight, or specific emissions.</p>
Rationale	<p>A. Applying the Polluter Pays Principle. B. Taxing use rather than ownership. C. Incentivising more efficient (e.g., smart routing) and cleaner mobility and transport (e.g., public transport). D. Incentivising short supply chains (circular economy) and discouraging excessive transportation (e.g., of livestock).¹⁷⁹ E. Reducing fossil fuel import dependency. F. Investing in future-proof taxation, considering the loss of revenues from excise duties due to electrification. G. Creating fiscal space to lower the tax burden on labour.</p>	<p>See A, C, D and E and G in previous column, plus: - Rebalancing the competitive advantage in terms of fiscal treatment of aviation compared with other transport modes. - Stimulating a higher occupation rate and therefore, a reduction of emissions per passenger.¹⁸⁰</p> <p><i>"EU international emissions from navigation and aviation have grown by more than 50% since 1990. Action in these sectors is urgently needed, including as they recover from the current crisis."</i> (EC 2020)¹⁸¹</p>	<p>See A, C, D and E and G, plus: - Rebalancing the competitive advantage in terms of fiscal treatment of shipping compared to other transport modes.</p> <p><i>"The subsidization of the environmental costs of production has made it more financially appealing for a company to ship fish caught off the coast of Scotland to China to be filleted and then shipped back to Scotland for sale instead of simply paying Scottish filleters to prepare the fish."</i> (Falcão 2020)¹⁸²</p>
Ties in with	<p>The ongoing revision of the Eurovignette Directive aims at a wider application of the "user/polluter pays principle".¹⁸³ The recent deal reached will see a phasing out of time-based road charges in favour of distance-based charges for heavy duty vehicles, and ultimately lighter vehicles. The Directive includes a legal basis for the sharing of national vehicle registration data.¹⁸⁴ Fit for 55 includes proposals for a de facto ban on new fossil fuel cars from 2035 and a separate ETS for road transport fuels.¹⁸⁵</p>	<p>Fit for 55 includes proposals to impose an SAF blending mandate on the fuel suppliers, to phase out the free allocation of ETS allowances to the sector and to remove the ETD tax exemption of jet fuel.¹⁸⁶ <i>"Different policy options are being considered in relation to the air transport sector, including the introduction of intra-EU harmonized fuel tax and/or a harmonized ticket tax."</i> (EC 2021)¹⁸⁷ Note that only intra-EU flights are included in the Fit for 55 proposals, meaning that 63% of fuel sales would remain exempt.¹⁸⁸</p>	<p>Fit for 55 includes a proposal to review the ETD and to remove the current tax exemption of fuel used by ships. Also, the Commission aims to extend the EU ETS to the maritime sector.¹⁸⁹ The FuelEU Maritime initiative aims to increase demand for renewable transport fuels by setting a limit on the GHG content of fuels.¹⁹⁰</p>
Impact	<p>a. Higher costs for companies and consumers.¹⁹¹ b. Lower vehicle mileage and shorter distance per ride. c. Logistic efficiency (e.g., shorter routes, pooling of deliveries). d. Less noise disturbance, air pollution and CO₂ emissions.¹⁹²</p> <p><i>"The transport sector had the lowest share of renewable energy in 2015, with only 6%. By 2030, this has to increase to around 24% (...) A smart combination of (...) efficiency improvements, fuel mix changes, greater use of sustainable transport modes and multi-modal solutions, digitalisation for smart traffic and mobility management, road pricing and other incentives can reduce greenhouse gas emissions and at the same time significantly address noise pollution and improve air quality."</i> (EC 2020)¹⁹³</p>	<p>See a, c and d. More travellers will choose destinations closer to home.¹⁹⁴ <i>"(...) increased carbon pricing on air travel is likely to be socially progressive as it primarily affects higher-income households, while increasing equal treatment with other modes of transport such as railways and road transport which are subject to taxation and VAT."</i> (EC 2021)¹⁹⁵ <i>"The coverage of aviation ETS and in particular the speed of free allocation phase-out strongly affect aviation allowances auctioning revenue over the 2023-2030 time period. As the auctioning revenue is currently directed to Member States' budgets, the revenue may enable lowering other taxes, such as income tax, or increasing government expenditure."</i> (EC 2021)¹⁹⁶</p>	<p>See a, c and d. If the international shipping sector were a country, it would be the sixth highest emitter. <i>"(...) up to one third of the EU's shipping's GHG could be eliminated by energy efficiency alone. This includes both technical options (e.g. wind-assist, hull air lubrication, etc) but also operational measures (most notably slow steaming)."</i> (T&E 2021).¹⁹⁷</p> <p>99% of container ship voyages could be powered by hydrogen with only minor changes to fuel capacity or operations.¹⁹⁸ Maersk, the world's largest shipping firm, has called for a tax of €125 per tonne of carbon on ship fuel <i>"to bridge the gap between the fossil fuels consumed by vessels today and greener alternatives that are currently more expensive."</i>¹⁹⁹</p>
Note	<p>Implementation will take several years. The technical implications, privacy, and implementation costs are focus areas.²⁰⁰</p>	<p><i>"Someone flying from Lisbon to New York and back generates roughly the same level of emissions as the average person in the EU does by heating their home for a whole year."</i> (EC 2021)²⁰¹</p>	<p>A third of all shipping is dedicated to moving fossil fuels around.²⁰² The EU and Member States could advocate for pricing of NO_x emissions at IMO level.²⁰³</p>

Table 3: Industry and production: pricing of CO₂ emissions



A carbon price floor for ETS sectors of €60/tCO₂.²⁰⁴



A carbon tax of €60/tCO₂ for non-ETS sectors.²⁰⁵

Context	<p>The EU ETS is one of the largest emissions trading systems in the world.²⁰⁶ It regulates the emissions of around 10,000 installations in the power sector, manufacturing, industry and aviation, which are jointly responsible for 40% of EU GHG emissions.²⁰⁷ In 2020, ETS companies emitted 1.2 billion tonnes of CO₂.²⁰⁸ The price of EU ETS permits has ranged between €5/t in 2017 and €97/t in 2022.²⁰⁹ According to the High-Level Commission on Carbon Pricing (2017), a price of €40-90/t would be necessary in 2030 to achieve the Paris climate targets.²¹⁰ A recent study found that the economic impact of climate disruption has been underestimated, and that each ton of carbon emitted could cost the global economy as much as \$5,000 by the end of the century.²¹¹ In 2019, EU Member States generated €14 billion in revenue from the auctioning of ETS allowances.²¹² Industries received more free allowances than needed to cover their emissions in the period from 2008 to 2019. Selling such excess allowances generated an estimated €30-50 billion in profits.²¹³ Current projections still fall short of the 55% EU reduction target for 2030.²¹⁴ Only a 65% reduction target would be compatible with the Paris Agreement.²¹⁵ Several Member States have announced or introduced a national price floor for ETS sectors.²¹⁶</p>	<p>Almost 60% of domestic EU CO₂ emissions are emitted by non-ETS sectors, including transport, buildings, agriculture, some industries and waste. Member States have agreed to reduce non-ETS sector emissions by 30% by 2030 compared to 2005. The Effort Sharing Regulation (ESR) translates this commitment into binding emission targets for each Member State.²¹⁷ Member States are responsible for national policies and measures to limit emissions.²¹⁸ Existing policies are on track to deliver an aggregated reduction of 32% in ESR sectors. Such reductions, however, fall short of the overall 55% EU reduction target established in the 2020 European Climate Law.²¹⁹ Several Member States have announced or introduced carbon taxes for non-ETS sectors.²²⁰</p>
Rationale	<p>A. Reducing emissions to achieve climate and air pollution goals. B. Applying the Polluter Pays Principle. C. Incentivising sustainable innovation. D. Creating fiscal space to lower the tax burden on labour.</p>	<p>See A, B, C and D. <i>"A uniform carbon price, whereby the same price applies to all emissions, is preferable and cost efficient."</i> (CPB 2019).²²¹</p>
Ties in with	<p>Fit for 55 proposes a faster reduction of the ETS emissions cap, and a phasing out of free allowances.²²² The Commission also proposes a Carbon Border Adjustment Mechanism (CBAM), putting a price on the carbon footprint of imported cement, electricity, fertilizers, iron, steel and aluminium. Most revenues of the CBAM would go into the EU budget rather than the MS treasuries. The remainder would be used to finance the NextGenerationEU COVID recovery fund.²²³ The Commission has also proposed that Member States should spend the entirety of their emissions trading revenues on climate and energy-related projects.²²⁴ Such approaches would limit opportunities to use revenues to reduce labour taxes.</p>	<p>Fit for 55 proposes a 40% reduction target for ESR sectors by 2030.²²⁵ It proposes increased minimum energy tax rates²²⁶ and an extension of the ETS to cover buildings and road transport.²²⁷ It also makes a proposal for establishing a Social Climate Fund to address negative social impacts, through temporary income support and measures and investments intended to reduce reliance on fossil fuels.²²⁸</p>
Impact	<p>a. Higher costs for companies, which will partly be passed on to consumers. Products with a large footprint become more expensive compared to those with a smaller environmental footprint. b. Competitive disadvantage and possible leakage of emissions.²²⁹ c. Less insecurity about the price of emissions, which enables business to invest in energy saving technologies and sustainable energy sources. d. Employment may shift from energy-intensive to less energy-intensive sectors and activities.</p>	<p>See a, b, c and d.</p>
Note	<p><i>"The main advantage of the price floor is that it is transparent and predictable, and helps investors and consumers to make a sustainable shift to low-carbon solutions. This is particularly relevant when considering the wave of forthcoming investment in response to the COVID-19 economic crisis."</i> (Bruegel 2021)²³⁰</p>	<p><i>"The introduction of the carbon price in road transport and buildings should be accompanied by effective social compensation, especially in view of the already existing levels of energy poverty"</i> (EC 2021).²³¹</p>

Table 4: Industry and production: pricing of other emissions



A tax on industrial air pollution
(nitrogen oxides (NOx), sulphur dioxides (SO2) and particulate matter (PM2.5)), based on the external costs.²³²



A tax on ammonia emissions to air by the agricultural sector
at 50% of the external costs.²³³ Due to the precarious situation of the sector, other external costs (e.g., water pollution, biodiversity loss)²³⁴ are not yet included.

Context

The total health-related external costs of air pollution in the EU are in the range of €330-940 billion per year.²³⁵ **The Industrial Emissions Directive (IED)** is the main instrument regulating air, water and soil pollutant emissions from over 52,000 of the largest EU industrial installations. While large combustion plants now emit seven times less pollutants than they did 20 years ago, air emissions from large industrial installations still account for close to **€100 billion** per year in damages.²³⁶ A tax on NOx emissions is applied in Sweden and Denmark.²³⁷

Ammonia (NH3) emissions are the dominant source of excess nitrogen deposition on vulnerable ecosystems and they play an important role in the exposure of the population to fine particulate matter.²³⁸ More than 90% of ammonia emissions in the EU come from agriculture, notably from manure and fertilizers.²³⁹ There are almost 700 million farm animals in the EU27.²⁴⁰ The Commission states: **“the measures Member States announced in their national air pollution control programmes will not be enough to reach the levels of ammonia emission reductions needed to achieve 2030 objectives: (...) the most cost-effective measures to cut its emissions all relate to agriculture, in particular to animal feeding practices, manure management and the use of fertilisers”**.²⁴¹ The damage due to EU agricultural ammonia emissions is estimated to be **€60 billion** per year by 2030.²⁴²

Rationale

- A. Reducing emissions to achieve climate and air pollution goals.
- B. Applying the Polluter Pays Principle.
- C. Incentivising sustainable innovation.
- D. Creating fiscal space to lower the tax burden on labour.

See A, B, C and D.
The measure applies a financial incentive upstream in the supply chain.²⁴³

Ties in with

The Commission’s **Zero Pollution Action Plan** aims to achieve zero pollution in 2050. The plan states: **“Today, despite numerous calls, pollution is still mainly addressed through regulation and its external costs are not fully internalised. There is scope to promote further use of price instruments 65. To support this process, the Commission will adopt recommendations on how to further promote relevant instruments and incentives to better implement the polluter pays principle and thus complete the phasing out of ‘pollution for free’.**” (EC 2021)²⁴⁴

A coherent perspective on the future of agriculture and the role of incentives and external costs needs to be developed, in conjunction with national and EU policy targets.²⁴⁵ The Farm to Fork strategy includes: **“EU tax systems should also aim to ensure that the price of different foods reflects their real costs in terms of use of finite natural resources, pollution, GHG emissions and other environmental externalities.”** (EC 2020)²⁴⁶

Impact

- a. Higher costs for companies, which will partly be passed on to consumers. Products with a large footprint become more expensive compared to those with a smaller environmental footprint.
- b. Competitive disadvantage and possible leakage of emissions.²⁴⁷
- c. Security about the price of emissions, which enables business to invest in sustainable technologies.²⁴⁸
- d. Clean air and health benefits (healthy life years).²⁴⁹ Research has linked exposure to particulate matter with higher rates of COVID-19 cases, hospitalisations and deaths.²⁵⁰

See a, b, c and d, plus:
- Stimulates the transition to a circular bioeconomy.
- A reduction of ammonia emissions from manure would create the co-benefit of reducing methane, and therefore reducing GHG emissions.²⁵¹
“If farmers were to adopt an integrated approach to nitrogen and work towards a “circular” agricultural system, less nitrogen would be lost at the farm level and farmers would need to buy less mineral fertilizer. Currently, €15 billion per year is spent in the European Union to buy fertilizers. According to the European Nitrogen Assessment, 50 per cent of the nitrogen fertilizer use is wasted.” (UNESC 2021)²⁵²

Table 5: Industry and production: pricing of resource use



An increase in water taxation
raising the price of fresh water by 25%.²⁵³



A tax on non-energy use of fossil fuels
(‘feedstock’) in the chemical industry.²⁵⁴



An increase in incineration and landfill tax.²⁵⁵

Context

Water scarcity affects over 100 million people in Europe.²⁵⁶ The economic costs of drought in the EU are estimated to be €9 billion a year.²⁵⁷ *“The water resources of the Union are increasingly coming under pressure, leading to water scarcity and a deterioration in water quality. In particular, climate change, unpredictable weather patterns and drought are contributing significantly to the strain on the availability of freshwater, arising from urban development and agriculture.”* (EP 2020)²⁵⁸ The agriculture sector exerts the highest pressure on renewable freshwater resources, being responsible for 59% of total water use in Europe.²⁵⁹ Freshwater abstraction for public water supply needs ranges from 30m³ per inhabitant in Malta to 157m³ per inhabitant in Greece.²⁶⁰ A wide variety of water pricing mechanisms is available to policy makers.²⁶¹ The 2000 Water Framework Directive concluded that *“Member States shall ensure (...) that water-pricing policies provide adequate incentives for users to use water resources efficiently”*.²⁶² The use of taxes to address water use and pollution, however, is much less widespread than energy, carbon and transport taxes.²⁶³ OECD research found that pricing instruments are potentially more cost-effective than the direct regulation of utilities and water users. Optimal pricing for water and sanitation services should reflect 1) the full supply costs, 2) resource costs (reflecting its scarcity), and 3) pollution costs.²⁶⁴

Fossil fuels are not only combusted for energy and heat but also used as a basic ingredient in production processes. Natural gas, for example, is used in the production of artificial fertilizer, and petroleum is used to make plastics and paint. Such ‘non-energetic use’ tends to remain untaxed²⁶⁵ although significant negative impacts occur in the production, life cycle and end-of-life stages of the materials. Ending up as waste in Europe and abroad, in incinerators, dumpsters and nature, the products have negative impacts on human health, air pollution, climate, aquatic life and biodiversity.²⁶⁶

Every year, 2.3 billion tonnes of waste are generated in the EU.²⁷² Of all the waste treated in the EU, 38% is landfilled, 37% is recycled and 11% is used for backfilling. 7% is disposed of through incineration, either simple incineration or incineration with energy recovery.²⁷³ Of all material resources used in EU economies, only 13% comes from recycled products and recovered materials.²⁷⁴ The EU is depending on imports for more than 80% of the raw materials needed for its industry and economy.²⁷⁵ Half of global GHG emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing. When waste is landfilled or incinerated (with or without energy recovery), valuable materials are lost (‘downcycling’).²⁷⁶

Rationale

- A. Internalising external costs.
- B. Stimulating efficient use and sustainable innovation. In a circular economy, water and other resources are used in closed loops, retaining their value.²⁷⁹
- C. Creating fiscal space to lower the tax burden on labour.

- See A, B and C, plus:
- Reducing fossil fuel (import) dependency.
 - Levelling the playing field between (finite) fossil resources and secondary, renewable and biobased resources.

- See A, B and C. A financial incentive to salvage natural resources. Landfilling, incineration, and incineration with energy recovery are often cheaper than the reuse or recycling of materials.²⁸⁰ The measure improves the business case for the recovery and high-quality reuse of waste streams such as metals and wood.²⁸¹

Ties in with

The Commission’s 2020 Circular Economy Action Plan aims to encourage circular approaches to water reuse (see note 279). Revisions of the **Drinking Water Directive** and the **Urban Waste Water Treatment Directive** focus on quality standards and access to drinking water in public spaces, rather than pricing mechanisms.²⁸² In some countries, such as in Germany, Belgium, Italy and Spain, water taxation is devolved to a regional level.²⁸³ This may limit options in the use revenues in terms of labour tax reductions.

EU laws and action plans on plastics²⁸⁴ tend to revolve around end-of-pipe solutions, such as recycling targets, standards and EPR schemes. As of 2021, a contribution based on non-recycled plastic packaging waste was introduced as a new EU own resource.²⁸⁵ Member States are not obliged to pass on the costs to industries.²⁸⁶

The **Waste Framework Directive** and its **2018 amendments** support the Polluter Pays Principle.²⁸⁷ *“Member States should make use of economic instruments and other measures to provide incentives for the application of the waste hierarchy (...), which includes, inter alia, landfill and incineration charges, pay-as-you-throw schemes, extended producer responsibility schemes, facilitation of food donation, and incentives for local authorities, or other appropriate instruments and measures.”* (EP 2018)²⁸⁸

Impact

- a. A higher tax burden for businesses and consumers. Products with a larger environmental footprint become more expensive.
- b. Consumers and businesses will be inclined to assess their water consumption. Water saving technologies will be more financially attractive.

See a. Compared with ‘end-of-pipe’ solutions, the pricing of inputs is effective further upstream in the supply chain. This stimulates prevention, redesign and reuse, under the motto ‘prevention is better than cure’.

See a. A reduction in landfilling leads to lower emissions of the potent GHG methane.²⁸⁹

Table 6: Consumption taxes



Raising the standard VAT rate to 22% in every Member State.²⁹⁰



Raising the reduced VAT rate (or rates) to 12% in every Member State. Zero-rated items remain so.²⁹¹



An increase in excise duties on tobacco products related to environmental damage caused during the product life cycle.²⁹²

Context	<p>Value added tax (VAT) is a consumption tax applied to nearly all goods and services that are bought and sold for use or consumption in the EU. VAT revenues across the EU increased from around €400 billion in 1995 to over a trillion in 2019.²⁹³ In the EU27, VAT accounts for 17% of total tax revenues.²⁹⁴ The EU has standard rules on VAT. Each EU country has a standard rate for the supply of most goods and services. This cannot be less than 15%.²⁹⁵ The average standard VAT rate is 21.5%. Hungary has the highest standard rate (27%), followed by Croatia, Denmark and Sweden (25%). Luxembourg has the lowest standard rate (17%).²⁹⁶ Consumption taxes are less detrimental to growth than labour taxes.²⁹⁷</p>	<p>Based on the VAT Directive, Member States may apply one or two reduced rates to the supply of specified goods and services. The reduced rates cannot be less than 5%. Some EU countries are allowed to depart from the basic rules.²⁹⁸ The reduced VAT rate is applied, amongst others to basic needs such as food and water. An increase may seem undesirable from a social perspective. Experts agree, however that the reduced rates are an ineffective tool for income distribution, as high-income groups also benefit from reduced rates. Most studies conclude that a uniform VAT system, combined with direct social policies are more efficient.²⁹⁹</p>	<p>In 2019, 493 billion cigarettes were consumed in the EU28.³⁰⁰ Smoking causes 700,000 deaths in the EU each year.³⁰¹ The EU objective is to create a tobacco-free generation, with less than 5% of people smoking tobacco by 2040.³⁰² In addition to being harmful to health, tobacco products cause environmental damage.³⁰³ “Cigarette butts and other tobacco product wastes (TPW) are the most common items picked up in urban and beach worldwide. TPW contains all the toxins, nicotine, and carcinogens found in tobacco products, along with the plastic nonbiodegradable filter (...). With as much as two-thirds of all smoked cigarettes (numbering in the trillions globally) being discarded into the environment each year, it is critical to consider the potential toxicity and remediation of these waste products.” (Novotny 2014)³⁰⁴</p>
Rationale	<p>A. Higher taxation of consumption and, therefore, the use of resources in general. B. Disincentive to waste products, materials and food. C. Creating fiscal space to lower the tax burden on labour. D. Simplifying the rate structure and administrative costs for the benefit of the internal market.</p>	<p>See A, B, C and D. The current diversification of VAT rates creates uneven competition in the EU internal market, increases the compliance burden and distorts revenue collection by governments.³⁰⁵</p>	<p>See C, plus: - Pricing of externalities (applying the Polluter Pays Principle). - Discouraging the use of these products.</p>
Ties in with	<p>Over the past five years, EU VAT proposals included measures to simplify compliance for SMEs, prevent fraud, ease trade between Member States, and provide more flexibility to Member States.³⁰⁶ The Commission has proposed that Member States apply a weighted average VAT that exceeds 12%.³⁰⁷</p>	<p>In 2018, the Commission proposed allowing Member States more flexibility to adapt their VAT rates.³⁰⁸ There is some concern that greater flexibility could increase the use of reduced rates and therefore to a more complex system EU-wide.³⁰⁹ The Commission has noted: “Priority should be given to limiting the inefficient use of reduced VAT rates and exemptions, which often fail to deliver on their presumed policy objective.” (EC 2021)³¹⁰</p>	<p>EU legislation only sets harmonized minimum rates.³¹¹ The Commission is updating the Tobacco Tax Directive to include environmental issues. The Single Use Plastics Directive and the Extended Producer Responsibility Scheme also aim to apply the Polluter Pays Principle to tobacco products.³¹²</p>
Impact	<p>Since current VAT rates vary, impacts of the measure will vary as well. Prices of products and services may increase when higher rates are passed on to consumers. In the scenario, however, the measure is part of a broader package in which labour taxes are reduced significantly. When it comes to services, labour costs may represent a larger share in purchase prices than VAT. In future, when more resource and pollution taxes are implemented, VAT rates could be reduced again.</p>	<p>See ‘VAT (standard rate)’ section. The measure would raise food prices. It’s important to keep in mind, though, that in the EU, every year, 89 million tonnes of food is wasted, or 180 kg per capita per year. This means that there is potential for efficiency gains.³¹³ Food waste is responsible for 8% of GHG emissions.³¹⁴</p>	<p>Impacts will vary across the EU since excise duties per 1,000 cigarettes range from €19 in Luxembourg to €356 in Ireland.³¹⁵ “Taxing addictive substances such as alcohol and tobacco can be a very cost-effective way to improve public health by changing behaviour, leading to a reduction in medical care costs and an increase in productivity (Frank J. Chaloupka, 2019). The revenues it generates can also help reduce the burden on other tax bases such as savings and income, even if this may not be the primary goal.” (EC 2021)³¹⁶</p>

2.4. Use of revenues

Table 7: Lowering the tax burden for households



A reduction in personal income tax (PIT) and social security contributions by employees

Potentially in the form of a tax-free threshold and/or negative income tax. Social benefits remain unchanged. Social security may be extended to workers in non-standard forms of employment.



Income support for the lowest two income quintiles.

Each country will have a preferred way of distributing such budget, for example through a negative income tax, cashable tax credits or other forms of targeted income support.

Context	<p>In 2019, the 27 Member States collected a total of €1,345 billion in personal income tax (representing 24% of total tax revenues). A further €1,830 billion in social security contributions was collected (representing 33% of total tax revenues). The employers' share of social security contributions was €1,014 billion, while employees paid a total of €816 billion.³¹⁷ The 'tax wedge' measures the difference between the effective (cash-out) labour costs for employers and the net take-home pay an employee receives. The average tax wedge measures the extent to which tax on labour income discourages employment. In 2021, the tax wedge for low wage earners in the EU27 was 39.2%. This means that for every euro in labour costs paid by an employer, only €0.61 ended up in the employee's pocket. Belgium (46%) and Germany (44%) have the highest tax wedges on labour costs for low-wage earners, while Cyprus (18%), Ireland and Malta (25%) have the lowest.³¹⁸</p>	<p>In 2019, a staggering 92 million Europeans were affected by poverty.³¹⁹ Over 20% of Europeans were 'at risk of income poverty', a category defined as, "the proportion of individuals living in a household whose disposable income is below the national at risk of poverty threshold. As the thresholds reflect actual income distribution in the countries, they vary greatly both between Member States and over time." (Eurostat 2020)³²⁰ According to Eurostat, "(...) 5.6% of the EU population were severely materially deprived in 2019, meaning that their living conditions were seriously affected by a lack of resources such as not being able to afford to pay their bills, keep their home adequately warm, or take a one week holiday away from home."³²¹ The risk of poverty or social exclusion is higher on average for women, young adults, unemployed persons and those with a low level of educational attainment.³²²</p>
Rationale	<p>A. Reducing the tax wedge to 'make work pay'. B. (Partial) compensation for higher expenses as foreseen in the revenue raising measures. C. Simplifying the tax system and enhancing transparency.</p>	<p>See A, B, C. A focus on the lowest two income quintiles is in line with the OECD, World Bank and UN concept of 'shared prosperity for the bottom 40%'.</p>
Ties in with	<p>The European Green Deal states: "Well-designed tax reforms can boost economic growth and resilience to climate shocks and help contribute to a fairer society and to a just transition. They play a direct role by sending the right price signals and providing the right incentives for sustainable behaviour by producers, users and consumers. At national level, the European Green Deal will create the context for broad-based tax reforms, removing subsidies for fossil fuels, shifting the tax burden from labour to pollution, and taking into account social considerations."³²³</p>	<p>The measure ties in with the aim for a just transition, as agreed in the Green Deal. Poverty reduction is one of the key issues to be tackled in the EU: "The number of people at risk of poverty or social exclusion should be reduced by at least 15 million by 2030." (The European Pillar of Social Rights Action Plan 2021)³²⁴</p>
Impact	<p>a. Households will have more disposable income, which will help to reduce poverty. b. Households will have better insight into their disposable income. The completion of tax returns will become easier. c. For employees whose income remains below a tax-free threshold, employers would not need to process tax returns. This would make it easier and therefore more attractive to provide work. Informal work will become less attractive.</p>	<p>See a and b.</p>

Table 8: Lowering the tax burden for employers



Payroll tax credit for new employment

A payroll tax credit for companies that effectively increase labour demand. Potentially administered based on the number of FTEs compared to the previous year. In the modelling the budget is dispersed among sectors based on the increase in labour demand.

Payroll tax credit generic

A generic payroll credit (without the pre-condition of hiring more people). In the modelling it is shared among sectors based on labour costs.



Payroll tax credit for reskilling

A tax credit to foster investment in human capital in the EU. In the modelling the budget is dispersed to sectors based on the shifts in employment.



Payroll tax credit for circular innovation

A labour cost reduction for companies that invest time and effort (human capacities) into circular innovation. In the modelling the budget is dispersed among sectors based on the relative weight of the tax increases.



Payroll tax credit in corporate income tax

A tax benefit for companies that use profits towards an increase in social impact. It is administered as a reduction in corporate income tax based on the increase in FTE.³²⁵ In the modelling the budget is dispersed among sectors based on the increase in labour demand.

Context	<p>In the third quarter of 2021, 14.6 million Europeans were unemployed.³²⁶ The ‘unmet need for employment’ indicator (or ‘labour market slack’), stood at 29.9 million. This includes, amongst other groups, part-time workers who wish to work more. Note that in Q4 2019, before the COVID-19 crisis, the unmet need for employment was already 29.7 million.³²⁷ Since 2008, in most Member States, permanent full-time jobs (or: ‘standard employment’) have become less prevalent. Such job arrangements now constitute 6 out of 10 jobs in the EU.³²⁸ In addition, many internships for young people are unpaid or underpaid.³²⁹ The youth unemployment rate stood at 17.8% in December 2020.³³⁰ The target for 2030 is 9%.³³¹</p>	<p>See ‘payroll tax credit for new employment’.</p>	<p><i>“Although skills are essential to equip people for the new green and digital jobs and help shield workers from unemployment, under 40% of adults participate in any form of training every year. (...) Increasing adult participation in training to 60% is paramount to improve employability, boost innovation, ensure social fairness and close the digital skills gap.”</i> (EC 2021)³³² A WEF survey indicates that employers expect half of employees will have to retrain within a few years.³³³</p>	<p>EU companies increased their investment in R&D by 5.6% in 2019, which is well below that of their Chinese (21%) and US counterparts (10.8%). Commissioner for Innovation Mariya Gabriel states: <i>“(...) more investment is needed in the ICT sector in particular in the global race for technological leadership and in the green and digital transitions. If we want Europe to drive the transition to a climate-neutral economy, we need to redouble our efforts.”</i>³³⁴ In the Netherlands in 2019, some 20,000 companies (of which 97% SMEs) participated in an innovation and research payroll tax credit mechanism worth €1.2 billion. The arrangement supported 85,000 high-end jobs.³³⁵</p>	<p>To stimulate employment, South Korea has introduced a Corporate Income Tax (CIT) credit for each new employee on the payroll. According to the Dutch Ministry of Finance, which included the policy option in a scoping study, <i>“such facility has the same effect as a reduction in employers’ costs, but then tied to profitability (pro-cyclical).”</i>³³⁶</p>
Rationale	<p>A. Reducing the tax wedge to ‘make work pay’. B. (Partial) compensation for higher expenses as foreseen in the revenue raising measures. C. Employers can afford more labour input.</p>	<p>See A, B and C.</p>	<p>See B. This budget allows employers to support employees to transition to new jobs or sectors (a ‘skills bridge’).</p>	<p>See B. This budget allows for investments in circular process innovation, based on ‘reduce, reuse, recycle’ principles as well as biobased and non-toxic materials.</p>	<p>See B and C. In boardrooms, the attention CIT receives is disproportionate to that given to the employment-related tax take.</p>
Ties in with	<p>Secure employment and social protection are among the key principles of the European Pillar of Social Rights Action Plan.³³⁷</p>	<p>See previous section.</p>	<p>By 2025, the European Skills Agenda aims to have 50% of adults participate in learning each year (a 32% increase compared to 2016). The Commission will explore how fiscal frameworks can better support investment in skills.³³⁸</p>	<p>The European Green Deal Investment Plan (EGDIP) aims to mobilize public and private financial resources to support €1 trillion in green investment over the next decade. At least 30% of InvestEU is to contribute to the EU’s climate objectives.³³⁹</p>	<p>The Business Taxation for the 21st Century communication outlined plans for a framework for income taxation for businesses. One of the stated purposes is to support job creation.³⁴⁰</p>
Impact	<p>a. More jobs. b. Productivity for employers at lower cost. c. A large impact on employment as there is no ‘leakage’ of funds used for investments other than human capital (e.g., profit distribution).</p>	<p>See a and b.</p>	<p>See a, b and c.</p>	<p>See a and b. As climate change and resource supply risks grow in intensity, demand for sustainable products and services will also grow. Circular innovation contributes to improved competitiveness.</p>	<p>See a, b and c. As this measure impacts CIT withholding tax, it should impact investment decisions, incentivising social impact.</p>



3

Impacts of the scenario

3.1. The E3ME model

Which model is used?

The advanced macroeconomic E3ME model of Cambridge Econometrics was used in this project (see Box 4). E3ME makes it possible to analyse the effects of policy measures in detail. It is one of the European Commission's ten most frequently used impact assessment models.³⁴¹ E3ME is also one of the three models used in the impact assessment of the EU 2030 Climate Target Plan.³⁴²

The baseline

Results in E3ME are presented as a deviation from the baseline. The baseline in E3ME is based on the main projections of the European Commission. It is then adjusted based on the OECD's projections regarding the impact of the COVID-19 pandemic.³⁴³ The baseline takes into account technology trends and established policies. This means that proposals that have not yet been translated into policy are not included in the analysis. New geopolitical and economic developments would shift the baseline projections. However, since the impacts of policies in this study are reported compared with the baseline, the observed impacts in the model would remain largely valid and provide valuable information on the impacts of different types of interventions. The following sections describe the macroeconomic effects for the 27 EU Member States.

Box 4: Cambridge Econometrics and the E3ME model

Cambridge Econometrics was founded in 1978 as a spin-off from the University of Cambridge, to take forward the work of Sir Richard Stone, Nobel Laureate in Economics. The company developed the E3ME model, a macroeconomic model of global economies, used for analysing the detailed linkages between the economy, commodities, environment, and energy. The model was originally developed through the European Commission's research framework programmes and is now widely used in collaboration with a range of institutions for policy assessment, forecasting and research purposes. E3ME covers details of 61 countries and regions, 70 sectors, 12 fuels, and 14 socioeconomic groups.

E3ME differs from most mainstream models in that it provides a strong empirical basis for analysis. It can fully assess both short and long-term impacts and is not limited by many of the restrictive assumptions common to Computable General Equilibrium (CGE) models. E3ME does not assume optimising behaviour and full utilisation of resources. It therefore includes real-world features such as involuntary unemployment.³⁴⁴ The depiction of the financial sector in E3ME (including 'endogenous money') is now recognised by central banks as an accurate representation. A core feature of the model is its treatment of technology, which will be key to meeting many of the policy challenges the model is used to assess. The FTT models of technology diffusion provide a representation of the adoption of new technologies.

For more information see: www.e3me.com.

3.2. Impacts of the scenario in the 27 EU Member States

The scenario: shifting €526 billion in taxes

As mentioned in chapter 2, the scenario under review provides for a shift of €526 billion from labour to pollution and resource use in 2025 (see Figure 5). The burden for households is eased through a reduction in income tax and social security contributions, and income support for the lowest income groups. For employers, various payroll tax credits have been included: a generic payroll tax credit, a payroll tax credit specifically for new employment, and payroll tax credits for reskilling and training, and for circular process innovation. Finally, a payroll tax credit has been included in the corporate income tax.

In the scenario, the necessary tax revenues are generated by introducing a kilometre charge, increasing VAT, taxing CO₂ emissions and other emissions from industry, aviation, shipping and agriculture, and increasing excise duties on tobacco. Finally, measures have been included that put a higher price on water, waste and the use of fossil fuels in chemical processes.

The next sections provide details on the impacts on all EU Member States of the scenario, as assessed by Cambridge Econometrics.

Impact scenario: positive for the economy, society and the environment

The scenario is broad-based and includes 20 measures, each with their own dynamics and impact. Some lead to higher costs for businesses and consumers when pollution and resource use are priced higher. Others reduce labour taxes, which reduces costs for employers and increases purchasing power. The net results of these two forces are positive for the economy, society and the environment. As the measures are phased in between 2021 and 2025, the modelling results show an absolute decoupling of GDP from CO₂ emissions, water and fossil fuel consumption (see Figure 6). The EU economies move towards green growth as they become less energy intensive and less carbon intensive per million euros of GDP. In addition, employment growth outpaces GDP growth. This is an indicator of inclusive growth, as more people find a job per million euros of economic activity.

Figure 5: Taxshift scenario EU27

(€ billion, in 2025, E3ME)



Labour - €526 billion

Households (60%)	Reduction in personal income tax and social security contributions	-214	41%
	Income support lowest two income quintiles	-101	19%
Employers (40%)	Payroll Tax Credit (PTC) for new employment	-105	20%
	PTC generic	-42	8%
	PTC for reskilling	-32	6%
	PTC for circular innovation	-21	4%
	PTC Corporate Income Tax	-11	2%
		-526	100%



Natural resource use €526 billion

Traffic (34%)	Kilometre charge	180	34%
Emissions (26%)	Industrial air pollution tax	55	10%
	Ammonia tax (agriculture)	44	8%
	Carbon tax (non-ETS sectors)	28	5%
	Carbon price floor (ETS sectors)	15	3%
VAT (21%)	VAT increase (reduced rate)	63	12%
	VAT increase (standard rate)	47	9%
Shipping (7%)	Marine transport tax	35	7%
Aviation (6%)	Aviation tax	29	6%
Use of resources (4%)	Water tax	11	2%
	Feedstock tax (non-energy use of fossil fuels)	6	1%
	Waste incineration and landfill tax	3	1%
Excise duties (2%)	Tobacco tax	10	2%
		526	100%

Observed effects in Europe in 2025

In the fifth year (2025), the scenario has the following effects on average in the EU (see also Table 9):

- **GDP levels are 1.6% higher than in the baseline, adding a total of €237 billion in financial value.**

The positive effects of reduced labour taxes and the associated increase in employment offset the negative effects of the price increases. By lowering direct income tax, households have more disposable income to spend. This increases the demand for goods and services in the economy. Output is higher than in the baseline in all sectors, except for agriculture and energy and utilities companies in 2025 (more information per sector is provided below).

- **Employment levels are 3.0% higher, meaning 6 million more people can be in employment.**

This contributes to the core EU objectives of full employment and social cohesion. A large share of the increase in the number of people in employment (3.9 million) is the result of the payroll tax credit measures specifically designed for new employment. In each sector, employment levels are higher than in the baseline (more details below). Despite an ageing population, there are more than enough reserves (potential labour force) in the EU to meet the growing demand for labour in the scenario.

- **Personal income taxes and social security contributions are reduced by €315 billion.**

This represents a decrease of 13% compared with the baseline.

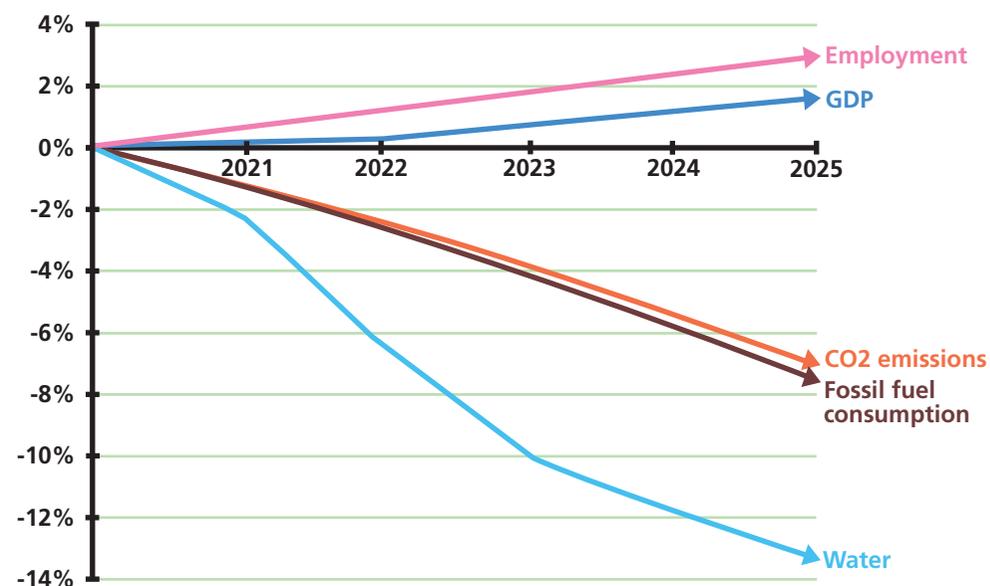
- **The tax burden on employers has fallen by €210 billion.**

The average saving per employed person in 2025 is about €1,000.³⁴⁵ The financing of social security changes, but this does not affect the level of social protection.

- **Real incomes increase in all socioeconomic groups. The lowest income groups gain the most spending power as a share of their income.**

Compared with the baseline, real incomes in the lowest two income groups increase 4%. In the highest three income groups, real incomes rise 1%

Figure 6: Key modelling results 2021-2025, EU27
(Difference to baseline, E3ME)



Water: based on water supply (gross output) as a proxy.

Table 9: Key modelling results in 2025, EU27
(Difference to baseline, E3ME)

GDP	1.6%
Consumption	2.0%
Investment	12.0%
Employment	3.0%
Imports	-0.05%
Exports	-0.2%
CO2 emissions	-7.1%
Fossil fuel consumption	-7.6%

compared with the baseline. The modelling results suggest that a progressive impact is possible, with more benefits (in relative terms) for lower income households.

- **Fossil fuel consumption is down 7.6% as power generation shifts from fossil fuels to renewables (see Figure 7).**
- **CO2 emissions are 7.1% lower, which means 184 million tonnes of emissions are avoided.**

This contributes to the EU’s goal of becoming the first carbon-neutral continent. The proposed policy measures may seem ambitious from a policy makers’ point of view, but such interventions are necessary to put the EU on a CO2-free trajectory in the coming decades. It should be noted that the measures in the scenario achieve significant additional emissions reductions in international shipping and aviation. Under the UNFCCC, emissions from these sectors are recorded separately from the CO2 statistics of the EU Member States. For this reason, this reduction is not yet visible in the results.

- **Exports fall 0.2% (€16 billion).**

Higher production prices create a competitive disadvantage compared with other regions. Increases in export prices are, however, limited because the additional taxes on resources and consumption are offset by lower labour costs.

- **Imports fall 0.05%, among other things as a result of the 3.9% decline in fossil fuel imports.**

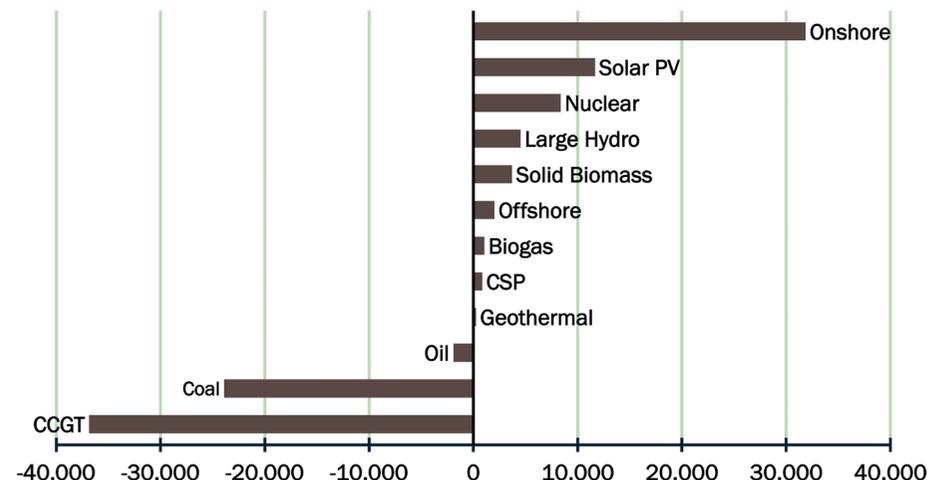
The EU becomes less dependent on energy imports. Overall impacts are small because of increased non-energy imports from higher economic activity and higher consumer demand in the EU.

Cumulative results

The cumulative results over the 2021-2025 period are shown in Box 5. As mentioned, the taxshift scenario assumes a gradual introduction of policy measures from 2021 to 2025. By 2025, they are in full force, after which the measures are maintained. As the E3ME model does not assume a return to equilibrium (see section 3.1), GDP and employment continue to increase after 2025 in the scenario, albeit at lower rates than the period between 2021 and 2025.

Figure 7: Power generation in 2025, EU27

(Difference to baseline, in GWh, E3ME)



Box 5: Key cumulative results 2021-2025, EU27

Between 2021 and 2025, the scenario shifts a total of **€1,765 billion (non-discounted)** in tax revenues in the EU27. Compared with the baseline, cumulative impacts over the five-year period are:

- Adding €574 billion to GDP
- Adding 18.5 million person years of employment
- Enabling €124 billion investment in infrastructure
- Saving 529 million tonnes of CO2 emissions
- Saving €56 billion on the EU energy import bill.

The impacts of the payroll tax credit for circular innovation are not yet included in the results, as the impact of innovation efforts in the period from 2021 to 2025 is expected to occur after 2025.

Detailed results for each country and sector are presented in separate reports. A few highlights are provided below.

Impacts in EU Member States in 2025

According to the modelling results, compared to business as usual, the scenario leads to lower CO2 emissions, higher economic growth and higher employment growth in 26 of the 27 Member States. The exact macroeconomic impacts vary across Member States, depending on factors such as the existing VAT structure, CO2 intensity and the labour market characteristics. When comparing results at Member State level, one should bear in mind that the measures have a different weight in each country. Figure 8 provides an overview of three indicators per Member State: changes in CO2 emissions, employment and GDP compared with the baseline, for the period 2021 to 2025.

- **The GDP increase ranges from 0.2% (Denmark) to 3.5-4% (Portugal, Estonia, Latvia, Lithuania, Poland, Slovenia, Bulgaria).** The only exception is Malta, where GDP has fallen slightly in 2025 (0.2%).
- **The employment increase ranges from 1.4% (Denmark) to 6.6% (Lithuania, Bulgaria).** Despite the ageing of the population, the 27 EU Member States have enough potential workers to meet the increasing demand for labour in the scenario.
- **CO2 emissions fall between 2.0% (Malta) and 11.6% (Luxembourg).** Energy savings vary between 0.9% in Malta and 9.9% in Luxembourg.
- **The reduction in personal income tax per person ranges from 1.8% in Denmark to as much as 86.0% in Bulgaria.**

Output impact per sector: winners and losers

As with any reform, the costs and benefits are not evenly distributed, as they depend on the labour and resource intensity of businesses and sectors. At the aggregate sector level, the following effects are observed. Compared with the baseline, output increases in 2025 in all sectors, except for agriculture (-0.5% or -€2.2 billion) and energy and utility companies (-0.3% or -€3.6

billion). The highest output growth is observed in construction (2.9% or €53 billion), engineering (1.7% or €61 billion) and business services (1.8% or €152 billion). Figure 9 shows the deviation from the baseline in percentages and below follows a brief explanation:

- In agriculture, food prices increase in the scenario because of the ammonia tax and the carbon tax. There is some substitution away from food consumption (inelastic demand though). There is also some increase in imports over domestic production.
- In energy and utilities, two main impacts are observed. In the fossil fuel sector, output decreases due to lower fuel consumption in road transport. In addition, the water tax leads to a decrease in water consumption and therefore also in water supply.
- The construction sector benefits from additional investments in public transport infrastructure and the energy sector, in response to an increased demand for electricity and the expansion of renewable energy capacity.
- In other sectors, impacts on consumer demand play a role.

Employment increases in all sectors

In terms of employment, in the taxshift scenario, all aggregate sectors show positive growth rates in 2025 compared with the baseline. Growth rates vary from 0.3% in agriculture and 2.4% in wholesale and retail, to 4.3% in basic manufacturing and 4.8% in public services (see Figure 9). Employment increases as a result of 1) broad-based consumer spending; 2) the income generated by the new taxes is used to reduce labour costs across the economy; and 3) lower labour costs partially offset the sectors most affected by the taxes. There is a relative shift from resource-intensive and highly polluting activities to more labour-intensive activities in the economy.

Results at company level

Within each sector there are of course 'winners' and 'losers', as some companies have made more progress than others in developing and implementing their social and environmental strategies. Within each sector, a taxshift is likely to be of greater benefit to companies that adopt innovative, sustainable, companies that adopt innovative, sustainable, and inclusive business models.

Figure 8: EU27 scenario impacts 2021-2025
(Difference to baseline, E3ME)

The amount of pollution these companies account for will cost less than that of their competitors, while inclusive companies will benefit more from a reduction in payroll costs.

How sensible are measures to help polluters and laggards?

In practice, governments may choose to support innovation at high-polluting companies or laggards through direct or indirect subsidies. However, such measures have an adverse effect on the budget available for reducing labour taxes. This reduces the overall economic, social and environmental impact of a taxshift. Even without a taxshift, companies would need to step up their game to respond to all the changes in the world. In each sector, companies are examining their business models and how to meet the challenges of the environmental and social mega-trends mentioned in section 1.1. A taxshift makes sustainable innovations more competitive and scalable and will therefore accelerate innovation processes.

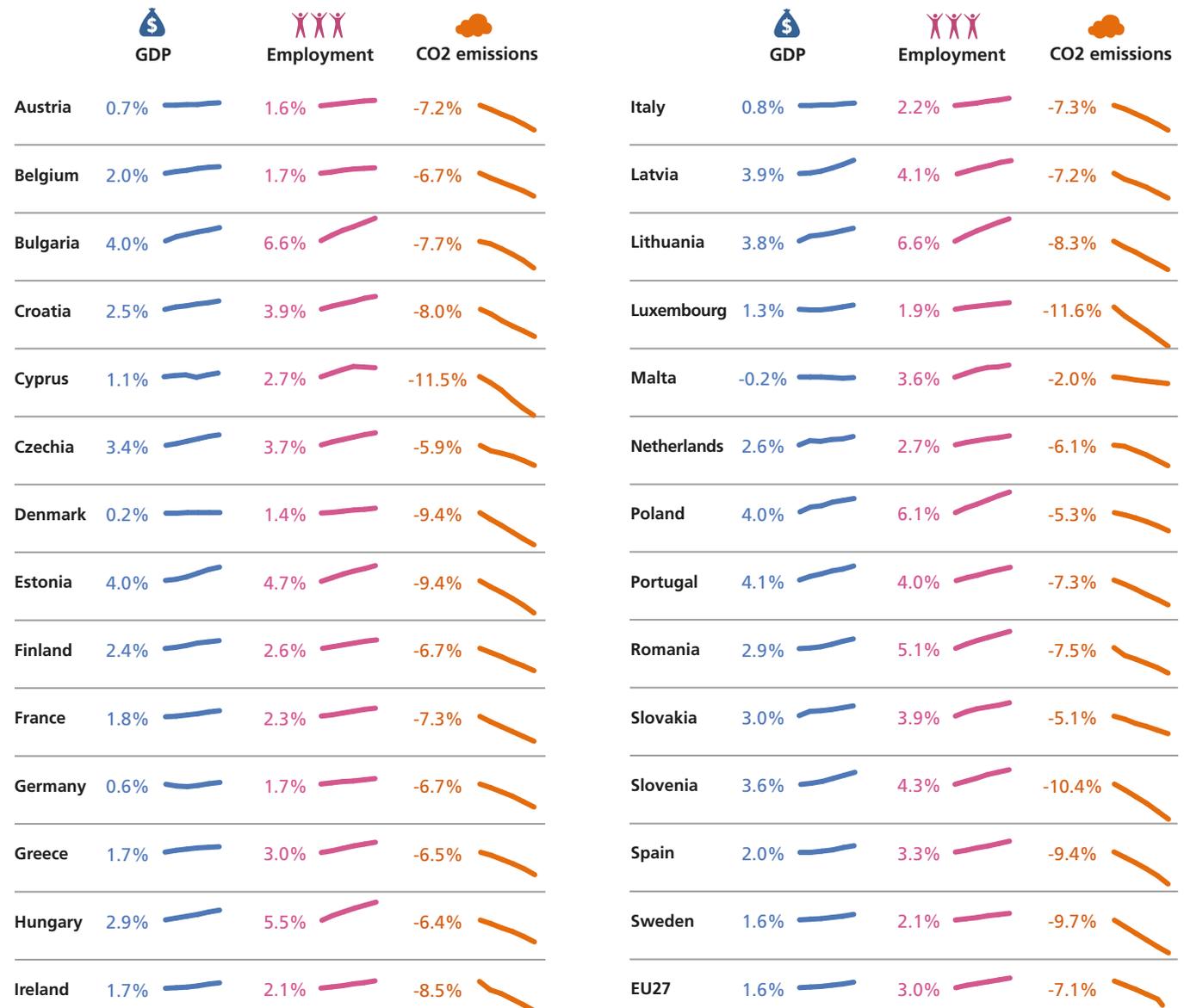
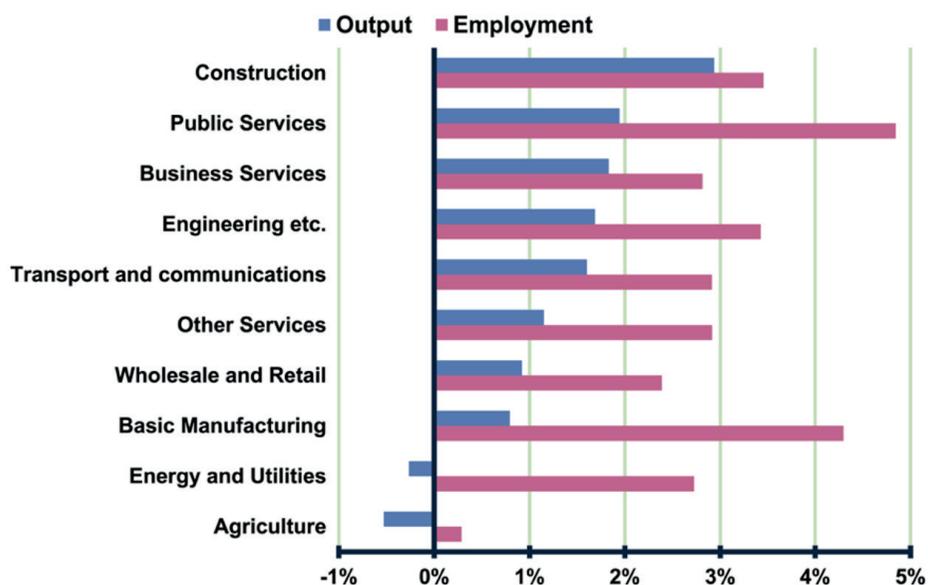


Figure 9: Sectoral output and employment in 2025, EU27
(Difference to baseline, E3ME)



Pressure on government budgets due to COVID-19 crisis

Government debts have been growing rapidly as a result of the COVID-19 pandemic. At some point in the future, there will be pressure to counter budget deficits with higher taxes. However, the analysis shows that a budget-neutral taxshift can contribute effectively to economic recovery on all fronts.

In the next section, some of the most frequently asked questions about the modelling results are answered.

3.3. FAQ about the modelling results

Below, Hector Pollitt (the former Chief Economist at Cambridge Econometrics, see inset) will answer five of the most frequently asked questions about the modelling results.



Hector Pollitt is Senior Economist at the World Bank. As Chief Economist at Cambridge Econometrics, Hector conducted the modelling for this study. He is a research fellow at the Cambridge Centre for Environment, Energy and Natural Resource Governance at the University of Cambridge. His research focuses on integrating non-linear complex processes with existing macroeconomic frameworks.

Hector is a post-Keynesian economist and has worked with the global E3ME macroeconomic model for more than 17 years. Using E3ME, he has contributed to several high-level EU policy Impact Assessments, including the analysis of the EU's 55% emission reduction target.

1. Green taxes are bad for business, aren't they? Why does the scenario show such positive results?

One key point is that the adjustments in the scenario are engineered to increase employment. There is excess capacity of labour in the economy (e.g., unemployed workers and underemployed workers). Such capacity can be drawn into productivity in the scenario. In addition, the measures reduce imports of energy products, which improves the trade balance. Other key effects include a shift in the economy from profits to wages (which would be bad for some businesses), leading to economic multiplier effects because of the higher spending by households. It is also important to note that when you look at macro levels the results are positive, but underneath it is a disruptive process. As with any transition, there will be winners and losers.

2. What's the difference between E3ME and other models?

In some ways, E3ME is similar to neoclassical Computable General Equilibrium (CGE) models; for example, they use the same data and same accounting principles. However, the assumptions about human behaviour are quite different. E3ME draws from the post-Keynesian school of economics. It is an empirical simulation tool in which behaviour is estimated based on historical time-series data. In contrast, CGE models assume that households and companies optimise their behaviour, and markets operate without friction. This means that all available resources are used and there is no excess capacity. Under such conditions, any stimulus effects will cause inflation rather than economic growth and the results from the model become negative. By allowing the possibility for spare capacity, the E3ME modelling framework comes closer to the observed reality.

3. How realistic are the income distribution effects? Isn't VAT a regressive tax?

In this exercise, we estimate the impact of the tax shift on real incomes (i.e., changes in wage receipts net of changes in product prices). The assumption that VAT is a regressive tax is often based on the fact that low-income households spend a relatively large part of their income instead of saving it. Therefore, they pay VAT on a relatively larger part of their real income. The assumption is also made that higher income groups save more, and therefore pay VAT on a relatively smaller part of their real income. Savings, however, are generally transformed into consumption over time. And then VAT is still paid. Therefore, in practice, VAT can have a progressive effect, as OECD research has shown.³⁴⁶ Modelling distributional impacts is complicated by the limited availability of relevant data. But by including a measure that specifically targets low-income groups, progressive results are certainly possible – at least in relative terms.

4. What happens if the economy is slower or faster to recover from the COVID crisis? Will the results still apply?

The baseline follows the short-term OECD projections, with GDP growth returning to pre-crisis levels in 2022. The scenario looks at the difference

from the baseline, which is largely independent of the values in the baseline itself. The benefits of the taxshift are expected to apply regardless of whether the recovery is faster or, indeed, slower than projected in the baseline. If the recovery did take more time, politically, it would be difficult to impose additional costs on sectors such as the aviation sector.

5. Isn't economic growth the cause of the problem? Why do we want more?

There is an ongoing debate about the limits to economic growth. However, there is broad agreement that we must make better use of the resources available to us. This scenario provides such an example, with reductions in resource use despite higher levels of economic activity.



4

Roadmap and next steps 2022-2030

4.1. National level: roadmap

Where there's a will, there's a way

The scenario under review shows what the future could look like. To realise that future, various measures are needed both at a national and a European level. It is a complex matter, but where there's a will, there's a way. The Dutch 'Delta Plan' (see Box 6) is a useful example of the implementation of a large-scale, intergenerational plan. After the devastating North Sea floods of 1953, the Netherlands embarked upon a legislative and infrastructural process that was planned and executed by 23 consecutive cabinets. What decades ago seemed an immense challenge now offers protection against rising sea levels and is a source of national pride. The transition to a circular and social economy requires an equally ambitious, step-by-step approach. This chapter presents a roadmap to help set priorities. The scenario, as explained earlier, includes a selection of over 100 tax bases and more than 250 concrete policy options. The roadmap below (in Figure 10 and Figure 11) puts a number of these options into perspective as well as into a timeline.

Budget neutrality: generating revenues on the one hand...

Figure 10 illustrates some of the measures that could be taken to generate tax revenues based on pollution and natural resource use. In this case, the perspective of the Netherlands was used as an example.³⁴⁷ Based on their national priorities, all Member States could draw up such a roadmap. For each category (industry & production, traffic & transport, and consumption), it indicates which steps need to be taken and which policy options could be phased in within one to two years. These are so-called 'low-hanging fruit' options, ranked by scale. This is followed by several options that could be phased in over a period of three to four years. Finally, measures are presented that would take more than four years to put in place. The majority of the measures in this last category would require European legislation.

... use of revenues on the other

Depending on the speed at which the revenue-generating measures are introduced, financial room for tax reductions would develop. Figure 11 puts into perspective some practical policy options for the use of new revenues. A division has been made between a lower tax burden for households and employers, and subsidies and tax expenditures.

The roadmap forms the basis for changes to the system, where slowly but surely taxes on the extraction of value are increased and those on the addition of value for society are reduced. After 2025, this system should continue to be adapted to meet the changing needs of society and the economy at large.

Box 6: The Dutch 'Delta Plan': example of an intergenerational plan

Delta Committee: On February 1, 1953, the North Sea floods claimed almost 2,000 lives in the Netherlands. Within three weeks, a Delta Committee had been set up to advise the government on the measures needed to prevent another catastrophic flood. This national committee consisted of government representatives and experts from science and business.

Delta plan: The set of recommendations made by the Delta Committee became known as the Delta Plan. The Delta Plan was subsequently converted into a bill, which went to the Lower House on November 16, 1955.

Delta Act: On May 8, 1958, the Delta Act was signed into law. Comprising just ten articles, the Delta Act was no more than a legislative framework which created the flexibility needed to implement the projects.

Delta Service: Divided into several directorates, the Delta Service was set up in 1956 to implement the Delta Plan. Given the complexity of the works, input was required from many different fields of expertise.

Delta Works: Based on the Delta Plan, a series of construction projects – the Delta Works – were completed one by one between 1954 and 1997. Twenty-three different government cabinets came and went during the plan's implementation.

Delta Commissioner: The Netherlands has had a Delta Commissioner since 2011. This government official is the independent commissioner for the national Delta Programme, which is designed to protect the country against flooding, and to ensure that there is sufficient fresh water and the country is climate proof. Various authorities and organisations work on the programme under the leadership of the Delta Commissioner.

Figure 10: Taxshift Roadmap – Revenues

Phasing in of tax policy options for a social and circular economy (the Netherlands)

Phasing in 2022-2023						2024-2025	> 2025	
Sector	Base	Objective	Policy options <€0.5bln/year		Policy options >€0.5bln/year		Policy options	Policy options
Industry & production	Natural resources	Taxation of resource use	Water tax households and large-scale users	Waste tax (landfill and incineration)	Non-energy use of fossil fuels	Land use: abolish property tax exemptions (e.g., roads, waterways, railways, cultivated land)	Tax primary materials built environment (e.g. wood, cement, steel)	EU minimum tax rates for range of resources
	Energy & pollution	Uniform taxation of climate impact	Tax on fluorinated greenhouse gases	Use ETS auction revenue for lower labour taxes	CO2 emissions non-ETS sectors	CO2 floor price ETS sectors	Lower ETS emissions ceiling, phase out free allowances, increase auctioning	Carbon Border Adjustment Mechanism
		Uniform taxation for pollution of water, soil and air	Tax on pesticides	Tax on discharge of waste heat and flaring of landfill gas	Industrial air pollution	Agricultural ammonia emissions	Fertiliser tax*	Roll-out of integral EU approach to circular agriculture (including soya, antibiotics, palm oil)
		Direct and indirect subsidies for fossil fuels abolished	Energy tax: abolish reduced rates and exemptions	Abolish coal tax exemption	Increase energy tax on natural gas	Increase energy tax on electricity	See aviation and shipping	Research the taxation of private benefits of ecosystem services
Traffic & transport	Road traffic	Transition to smart kilometre charge	Abolish vehicle registration tax and road tax exemptions for government vehicles	Road tax for mopeds	Vehicle registration tax with CO2 basis for vans	Increase fuel excise duties	Kilometre charge, abolish road tax, invest in public transport*	EU-wide kilometre charge
	Aviation & shipping	EU coalition on taxation of aviation & shipping	Increase ticket tax rates	VAT on flight tickets*	Aviation tax (through e.g., ticket tax, freight, noise, emissions)	Shipping tax (emissions, freight)	Shipping under ETS	Abolish excise duty and VAT exemption in aviation and shipping (intra- and extra-EU)
Consumption	Products & services	Taxation of resource use	Floricultural products to standard VAT rate	Tobacco excise duty increase	VAT reduced rate 12%	VAT standard rate 22%	Tax/deposit scheme for e-waste with EU list of critical raw materials	VAT may be reduced if targeted user charges increase

 Included in the scenario. Member States can start national implementation, while seeking coordination within the EU so that the measure can reach its full potential.

 Adaptation of EU legislation or international conventions required.

* Measure has technical or data challenges.

Figure 11: Taxshift Roadmap – Use of revenues

Phasing in of tax policy options for a social and circular economy (the Netherlands)

Use of Revenues 2022-2025							>2025
Lower tax burden on labour	Households	Reduction of income tax and social security contributions	Income support for the lowest income groups	Adjustment of tax credits, social security contributions and allowances ³⁴⁸	Reduce nominal healthcare contribution	Increase national minimum wage	
	Employers	Payroll tax credit for new labour demand	Generic payroll tax credit	Payroll tax credit for training and retraining	Payroll tax credit for circular process innovation	Payroll tax credit in corporate income tax	
Subsidies and tax expenditures		Apply a job-related investment discount for circular investments	Increase budgets for energy/environmental investment allowances, deductions and depreciation (EIA, MIA, Vamil)	Subsidy for renewable energy and energy saving for SMEs and households	Subsidy for purchasing or leasing electric delivery vans	Make public transport cheaper	
		Mobilise National Growth Fund for circular and inclusive activities	Corporate income tax facility for circular innovation	Free days of childcare for 0–4-year olds	Broaden scope of income tax exemption for green investments	Capital gains tax with reduced rate for green activities	

 Included in the scenario.

4.2. EU coordination: next steps

EU tax policy coordination is key

It goes without saying that the kind of step-by-step, comprehensive reform described in Figure 10 and Figure 11 is challenging. And, as mentioned in section 1.2, taxation is in principle a matter of national competence: many steps must be taken at national level. However, far-reaching changes to a tax system of a Member State could create differences between Member States that have an impact on the Single Market. Therefore, tax policy coordination within the EU and the application of the taxshift principles on a Europe-wide basis would need to be carefully considered. At a national level, Member States can start gradually implementing the first tax policy options: the low-hanging fruit. While they develop and implement unilateral steps, the preconditions could be created for the next, bigger steps. These should be taken together with neighbouring countries, in coalitions between Member States (if necessary, through the enhanced cooperation procedure)³⁴⁹ as well as jointly with the EU27. The proverb 'if you want to go fast, go alone. If you want to go far, go together' applies here.

Taxshift ties in with current EU programmes

There are compelling reasons for the EU to set an example on tax reform to enable a circular and social economy. First, "the polluter should pay" is a key principle in the founding Treaties of the European Union.³⁵⁰ Second, Europe aims to become the first carbon-neutral continent, eradicating carbon emissions and becoming fully circular by 2050. And third, the taxshift principles support many current EU programmes and action plans, including the Green Deal, the Fit for 55 package, the Zero Pollution Action Plan, the Farm to Fork strategy, the Waste Framework Directive, and the European Pillar of Social Rights Action Plan.

Connecting local and global

Moving from unanimity to qualified majority voting on tax policy could help in achieving effective tax policy reform (see page 19). But even without this, individual Member States, groups of Member States, the EU institutions and policy makers could and should start aligning their tax systems to meet the

needs and demands of the 21st century. They should also work together internationally (e.g., within the UN, IMF, G20, OECD/Inclusive Framework) to put the issue higher on the agenda and address potential border impacts outside the EU. After all, global issues need global solutions.

A step-by-step approach

The necessary reforms cannot be achieved by a single Directorate General or spread across departments, because they cut across policy areas such as tax, economy, social affairs, public health, infrastructure, climate and environment. Different government institutions and departments need to work together on a comprehensive approach together with the business community. This requires agile leadership in order to respond to changing circumstances at home and abroad. Finally, it is important that the broader social implications of each measure are considered, including the health and environmental impacts. This requires a process analogous to the Dutch Delta Plan (see Box 6): a longer-term approach that benefits multiple generations. This way, the EU can build a future-proof economy and corresponding tax system. To set the necessary wheels in motion, Figure 12 provides recommendations for concrete next steps.

Taxshift: critical strategy for green and inclusive recovery

The complexity of tax reform does not mean the impact of a taxshift would only become visible in the long term. This study assesses the macroeconomic impacts in the EU Member States of a set of 20 example measures. The analysis shows that the implementation of a well-considered, broad-based tax reform could lead to more jobs, more economic growth, fewer emissions and less dependence on imports within just a few years. The taxshift is thus a critical strategy for a green and inclusive recovery.

When it comes to tax reform, stakeholders need to focus on the long-term perspective and the interests of society at large, rather than getting bogged down in the details of specific measures and interests. The EU Green Deal includes a firm commitment to broad-based tax reforms, shifting the tax burden from labour to pollution. This study explores how such a taxshift could be organized and implemented, and its potential impacts. Now is the time to develop consistent, step-by-step tax policies that bring financial incentives in line with the EU's commitments to social inclusion and sustainability.

Figure 12: Recommendations

Key steps towards an integrated European fiscal strategy to accelerate the Green Deal objectives		
Step 1: Organisation (2022-2023)	Step 2: Implementation (2024-2025)	Step 3: Adaptation (>2025)
<ul style="list-style-type: none"> Establishing an EU Taxshift Coalition An informal coalition composed of like-minded Member States committed to applying the Polluter Pays and Making Work Pay principles. The Taxshift Coalition is led by the Ministers of Finance (akin to the Coalition of Finance Ministers for Climate Action)³⁵¹ and fosters dialogue as well as the exchange of knowledge and experiences. It also develops proposals for coordinated taxshift policies in the EU. 	<ul style="list-style-type: none"> Establishing minimum tax rates for resource use and pollution The Commission and Parliament should identify external costs and minimum tax rates for a broad range of resource uses, including water, non-energy use of fossil fuels, industrial air pollution and NOx emissions from aviation and shipping (see the Ex'tax Toolkit in section 2.1). 	<p>Adapting tax systems to meet the changing needs of societies</p> <p>A continuous process of evaluation and adaptation to challenges that arise in the global economy, environment and labour market.</p>
<ul style="list-style-type: none"> Developing an EU Policy Tracker A public database mapping relevant tax policies under review in Member States, as well as progress on policy implementation. This information is gathered by a centre of expertise such as the International Bureau of Fiscal Documentation (IBFD)³⁵² or a consortium of market parties. The Policy Tracker supports Member States in coordinated action and fosters consistent policy making. 	<ul style="list-style-type: none"> Focusing on the use of revenues for social impact The Commission and Parliament should issue recommendations on the use of revenues from new green taxes to lower labour taxes and make a positive social impact. To support the internal market and effective social policies, ensure that labour tax competition is minimized. 	
<ul style="list-style-type: none"> Establishing an Expert Group on Tax Dynamics in Business A taskforce composed of CEOs, entrepreneurs, tax specialists and other financial experts (akin to the High-Level Expert Group on sustainable finance (HLEG)).³⁵³ The group advises the Commission on how a taxshift might impact sustainable and social impact investment decisions, including the preferred sustainable activities under the EU taxonomy.³⁵⁴ EU financial institutions and investment facilities should play a key role in this research. 	<ul style="list-style-type: none"> Developing coherent tax mix targets The Commission and Parliament should develop guidelines and recommendations on shifting the tax burden, including a coherent set of quantitative (country-specific) tax mix targets, to be used in the European Semester. Ultimately such targets are to be converted into binding obligations. If unanimous agreement remains unviable, a group of Member States could decide to move ahead under the enhanced cooperation procedure. 	
<ul style="list-style-type: none"> Establishing an EU Taxshift Inter-Service Group A group composed of all relevant Directorates-General of the European Commission (akin to the Inter-Service Group on Public Administration Quality and Innovation (IGPA)).³⁵⁵ The Taxshift Inter-Service Group is led by the Commission's Directorates-General for Taxation and Customs Union (DG TAXUD) and for Economic and Financial Affairs (DG ECFIN). The group focuses on dilemmas and progress on taxshift principles and integrating taxshift policies in EU programmes. It facilitates cooperation and in-depth research and debate on taxshift scenarios and opportunities in consultation with relevant legislative and administrative bodies, tax experts, think tanks, businesses, and NGOs. 	<ul style="list-style-type: none"> Seeking international cooperation High-level tax diplomacy (including within the UN, IMF, OECD, G20 and the Inclusive Framework) is required to put the taxshift higher on the agenda and address potential border impacts outside the EU. 	

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^[110] **"The OECD's Environmental Linkages model indicates that if revenues from an eco-tax are used to lower labour taxes, employment gains of nearly 2 per cent are possible by 2030, as compared to a business-as-usual scenario."** Château, Saint-Martin and Manfredi (2011) cited in Montt, G., Fraga, F., Harsdorff, M. (2018), The future of work in a changing natural environment: Climate change, degradation and sustainability. ILO.

^[111] **"This analysis assesses the potential employment and economic impacts on the EU, and other parts of the world, of a transition towards a low-carbon economy by 2030. (...) In the EU, the two headline measures of gross domestic product (GDP) and employment show growth of 1.1% and 0.5% respectively. The most positive results for both these measures are found in China and the EU. The United States, however, experiences a drop in GDP of 3.4%, with employment falling by 1.6%. While overall the energy scenario implies more employment in Europe, much of the employment created is at the bottom and the middle of the wage distribution. (...) While this scenario includes additional government revenues from carbon pricing mechanisms and vehicle taxes, as well as costs such as investment in energy efficiency, subsidies for renewables and compensation for stranded assets, the overall budget balance is maintained through changes in income tax, social security contributions and value-added tax (VAT) rates."** Eurofound (2019), Energy scenario: Employment implications

of the Paris Climate Agreement, Publications Office of the European Union.

^[112] **"If a price on CO2 emissions was imposed, and if the resulting revenues were used to cut labour taxes, then employment would rise by 0.5 per cent by 2014. This is equivalent to over 14.3 million net new jobs for the world economy as a whole."** International Institute for Labour Studies (2010), World of Work Report 2009. The global jobs crisis and beyond. Torres, Raymond (Ed). ILO.

^[113] **"Recent evidence is broadly supportive of the double dividend hypothesis. Pereira, Pereira, and Rodrigues (2016) examined the implementation of a carbon tax in Portugal using a dynamic CGE model and found strong evidence for a double dividend in the presence of tax cuts; Allan et al. (2014) got a similar result when examining this question for Scotland. Further, a recent review found that once structural employment is accounted for, a double dividend is more likely than previously believed (Pigato 2019). In general, the more inefficient the jurisdiction's taxation system before introducing a carbon price, the more likely that carbon revenues could deliver a double dividend. To the extent that taxation systems are more distorted in developing countries than developed countries, this result implies a double dividend may be more likely in developing countries. Older studies, including Takeda (2007) and Glomm, Kawaguchi, and Sepulveda (2008), found little evidence for the double dividend. This may be because in some cases, the reduction in real wages from carbon pricing outweighs the increase in real wages from tax cuts, leading to an overall reduction in labor supply. This effect suggests that tax reforms should be carefully designed to increase the likelihood that a double dividend can be achieved."** World Bank (2019), Using Carbon Revenues. Partnership for Market Readiness Technical Note; No. 16. <https://openknowledge.worldbank.org/handle/10986/32247>

^[114] **"Limiting global warming to 2°C or less requires policy measures on an ambitious scale, such as an immediate global carbon tax that will rise rapidly to \$75 a ton of CO2 in 2030. (...) The revenue from such a tax (1.5 percent of GDP in 2030, on average, for the Group of Twenty [G20] countries) could be redistributed, for example, to assist low-income households, support disproportionately affected workers or communities (for example, coal-mining areas), cut other taxes, fund investment in clean energy infrastructure or United Nations Sustainable Development Goals, reduce fiscal deficits, or pay an equal dividend to the whole population. This Fiscal Monitor compares such uses of the revenues in terms of economic efficiency and impact on income distribution. For example, carbon pricing combined with an equal dividend to the whole population rather than an income tax cut redistributes income to favor lower-income groups but forgoes gains in economic efficiency. An intermediate approach compensating, say, the poorest 40 percent of households, as well as vulnerable workers and communities, leaves three quarters of the revenues for other goals such as productive investments or cuts in income taxes. The shift from fossil fuels will not only transform an economy but also profoundly change the lives of**

households, businesses, and communities. Importantly, the shift would generate additional and immediate domestic environmental benefits, such as lower mortality from air pollution (725,000 fewer premature deaths in 2030 for a \$75 a ton tax for G20 countries alone). Businesses that deploy new technologies would earn profits and create jobs, which in the renewables sector already reached 11 million globally in 2017.” IMF (2019), Fiscal Monitor: How to Mitigate Climate Change.

^[115] “A meta-study of 69 different simulations from 40 studies using General Equilibrium models showed 55% of simulations achieved both environmental and economic dividends. 90% of the studies that reduced social security contributions achieved such double dividend. The majority of simulations that recycled via labor incomes, capital taxes and other taxes achieved a double dividend. Recycled revenues towards lump-sum transfers were least successful in achieving a double dividend across these studies.” González, J.F. (2018), Environmental taxation and the double dividend hypothesis in CGE modelling literature: A critical review. Journal of Policy Modeling. Volume 40, Issue 1, January-February 2018, pp. 194-223.

“A meta-study reviewed 699 simulations using different models and methodologies, from 100 papers on the effects of different taxes that have in common that they are applied to one or more energy products, in most cases with an environmental rationale and part of wider tax reform schemes. 95% of the simulations reported decreases in emissions with respect to the business-as-usual scenario. The effects, on average, were positive on GDP, employment and consumer prices, and negative on energy demand, energy prices and welfare.” Gago, Alberto, Labandeira, Xavier, Lopez-Otero, Xiral (2014), A Panorama on Energy Taxes and Green Tax Reforms. Revista Hacienda Pública Española. Volume 208, pp. 145-190. 10.7866/HPE-RPE.14.1.5.

“Patuelli, Nijkamp and Pels (2005) looked at a total of 186 model simulations from 61 separate studies. On average, all of the different groupings of studies predicted net job creation with significant reductions in CO2 emissions.” Patuelli, Roberto, Nijkamp, Peter, Pels, Eric (2005), Environmental tax reform and the double dividend: A meta-analytical performance assessment. Ecological Economics, Elsevier, volume 55(4), pp. 564-583, December, cited in Aarhus University, Eunomia (2015), Study on Environmental Fiscal Reform Potential in 14 EU Member States: Appendices. Final Report to DG Environment of the European Commission.

^[116] The Ex'tax Project (2019), Tax as a force for good. Aligning tax systems with the SDGs and the inclusive circular economy. Case study Bangladesh. In cooperation with Cambridge Econometrics.

ACCA (2018), Tax as a force for good: Rebalancing our tax systems to support a global economy fit for the future. Author: Femke Groothuis, President of The Ex'tax Project. Foreword by Pascal Saint-Amans, Director of the Centre for Tax Policy and Administration, OECD.

The Ex'tax Project, Green Budget Europe, Institute for European Environmental Policy (IEEP), Cambridge Econometrics (2018), Aligning Fiscal Policy with the Circular Economy Roadmap in Finland.

The Ex'tax Project (2016), New era. New plan. Europe. A fiscal strategy for an inclusive, circular economy. In cooperation with Deloitte, EY, KPMG Meijburg, PwC, Cambridge Econometrics and Trucost. Foreword by Feike Sijbesma, CEO Royal DSM, Co-chair Carbon Pricing Leadership Coalition (CPLC) convened by the World Bank.

The Ex'tax Project, Deloitte, EY, KPMG Meijburg and PwC (2014), New era. New plan. Fiscal reforms for an inclusive, circular economy. Case study the Netherlands. Foreword by H.R.H. Prince Carlos de Bourbon de Parme.

^[117] European Commission (December 11, 2019), The European Green Deal.

^[118] European Commission (2021), Annual Report on Taxation 2021.

^[119] The European Economic and Social Committee consists of 329 employers, trade unionists and representatives of social, occupational, economic and cultural organisations. European Economic and Social Committee (EESC) (2020), New Circular Economy Action Plan.

^[120] United Nations (June 30, 2019), Secretary-General's remarks to Climate Summit Preparatory Meeting. António Guterres. Abu Dhabi.

^[121] Friends of Europe (September 16, 2020), In Conversation with Kristalina Georgieva (Managing Director of the IMF) on pursuing a green economic recovery. Video. (13:01).

^[122] SMEs tend to operate in local markets, and since they depend on local labour inputs, they are particularly susceptible to high labour costs and do not have as many opportunities to shift production to low-income countries. “In the OECD area, SMEs are the predominant form of enterprise, accounting for approximately 99% of all firms. They provide the main source of employment, accounting for about 70% of jobs on average”. “Furthermore, certain aspects of business taxation, including asymmetric treatment of profits and losses, the distribution of taxation between capital and labour income and the design of R&D tax credits and incentives, can unintentionally disadvantage some young and small firms (OECD 2015c).” OECD (2017), Enhancing the Contributions of SMEs in a Global and Digitalised Economy, Meeting of the OECD Council at Ministerial Level Paris, 7-8 June 2017.

^[123] European Commission (2021), Annual Report on Taxation 2021.

^[124] European Commission (2021), 'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality.

^[125] European Commission (July 14, 2021), European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions. Press release.

^[126] European Commission (2020), 2020 European Semester: Country-specific recommendations.

^[127] European Commission (September 29, 2015), Smart Taxation – A winning strategy. Video.

^[128] **“The serious economic and social problems the Community currently faces are the result of some fundamental inefficiencies: an ‘under-use’ of the quality and quantity of the labour force, combined with an ‘overuse’ of natural and environmental resources. (...) The tax burden must be redistributed so as to lighten the burden on labour and increase the burden on the use of natural resources. (...) The twin challenge of unemployment/environmental pollution is to be addressed, a trade off can be envisaged between lower labour costs and higher pollution charges.” (...) An important dimension of the proposal concerns the widely advocated shift towards a more intensive use of indirect taxation, as well as a widening and balancing of the tax base for energy products. In the Community these proposals enjoy popular support: about 60% of European citizens are in favour of such a tax.”** European Commission (1993), Growth, competitiveness and employment. Challenges and the ways forward into the 21st century.

^[129] **“In the 1990s and early 2000s, seven European countries took steps to shift the tax burden from labour to energy and transportation: Sweden (initial year of the reforms: 1991), Denmark (1993), the Netherlands (1996), Finland (1997), Slovenia (1997), Germany (1999) and the UK (2001). In total, these reforms increased green tax revenues by more than €25bn annually, for a corresponding decrease in labour taxes. The impacts have been analysed and the associated reductions of carbon emissions have been documented in several studies. The burden for specific energy-intensive industries remained modest (1%-2% increase in energy costs) and the tax shifts generally had a positive effect on economic activity, depending on how the revenues from the green taxes were recycled. Also, the reforms caused employment in some of the countries to increase by as much as 0.5%.”** Andersen, Mikael Skou (2007), Competitiveness Effects of Environmental Tax Reforms (COMETR). Final Report to the European Commission.

^[130] Cambridge Econometrics (2013), Modelling Milestones for Achieving Resource Efficiency: Economic Analysis of Waste Taxes. Draft Report for the European Commission.

^[131] European Commission (2014), Taxation Trends in the European Union, 2014 edition.

^[132] **“In 2008, the province [of British Columbia] implemented North America’s first broad-based carbon tax, proving that it is possible to reduce emissions while growing the economy. (...) In Canada, the federal government implemented a coordinated nation-wide carbon price, beginning at \$20 per tonne of carbon dioxide equivalent**

emissions (tCO₂e) in 2019 and rising to \$50 per tonne. As of 2019, over 70 jurisdictions, representing about 20% of global GHG emissions, have put a price on carbon. (...) On April 1, 2019, B.C.’s carbon tax rate rose from \$35 to \$40 per tCO₂e. (...) New revenues generated from increasing the carbon tax will be used to provide carbon tax relief and protect affordability, maintain industry competitiveness, encourage new green initiatives.” Government of British Columbia (Accessed January 20, 2021), British Columbia’s Carbon Tax.

“All revenues are recycled through tax cuts on both labour and capital. An additional tax credit for low-income households has made the carbon tax progressive.” Beck et al. 2014 in Fay (et al.) (2014), Decarbonising Development. Three Steps to a Zero-Carbon Future.

“By designing the carbon tax as revenue-neutral, B.C. also realizes an opportunity to reduce personal and corporate income taxes. This reduces the drag on the economy by enabling the government to reduce taxes on ‘desirables’ such as income and capital and instead impose tax on an ‘undesirable’ such as emissions.” UNFCCC (Accessed January 20, 2021), Revenue-Neutral Carbon Tax Canada.

“(...) the economy has grown by an average of nearly 2 percent a year, despite a big national recession through 2009, outpacing the rest of Canada. The use of gasoline, coal and other carbon-based fuels has dropped 16 percent during the same period, reducing greenhouse gas pollution.” Scientific American (December 1, 2015), A Tax on Carbon Pollution Can Benefit Business.

^[133] Harvie, Alan (et al) (December 15, 2020), Canada to increase carbon taxes by 467%.

^[134] **“In late 2012, Colombia approved a tax reform (Law 1607), which reduced the tax burden on the labor factor, or payroll taxes, in order to stimulate formal employment and enhance productivity. The loss in revenues resulting from these measures was neutralised with an adjustment to the corporate income tax and a simplification of VAT rates. The reform increased formal employment and reduced the unemployment rate, while increasing revenues as a result of enhanced growth.”** IADB (2015), Fiscal Policy and Management Sector Framework Document.

^[135] World Bank (2019), Using Carbon Revenues. Partnership for Market Readiness Technical Note; No.16.

^[136] World Bank (2021), State and Trends of Carbon Pricing 2021.

^[137] January 2, 2017, and February 7, 2022, respectively. Ember-climate.org (Accessed April 3, 2022), EUA Price.

^[138] OECD (October 27, 2021), G20 economies are pricing more carbon emissions but stronger globally more coherent policy action is needed to meet climate goals, says OECD.

^[139] European Commission (July 15, 2020), An action plan for fair and simple taxation supporting the recovery strategy.

^[140] European Commission (January 15, 2019), Towards a more efficient and democratic decision making in EU tax policy. COM/2019/8 final.

^[141] Taxation is also one of the few policy areas where decisions are still taken by means of a special legislative procedure. The European Parliament has a mere consultative role. **“Excluding the directly elected European Parliament from decision-making in such an important policy area as taxation, is at odds with the democratic goals of the Union.”** European Commission (January 15, 2019), Towards a more efficient and democratic decision making in EU tax policy. COM/2019/8 final.

^[142] European Commission (2021), Business Taxation for the 21st Century.

^[143] CDP (2021), Putting a price on carbon. The state of internal carbon pricing by corporates globally.

^[144] Unilever (Accessed January 31, 2021), Unilever plc CDP Climate Change Questionnaire 2020 Wednesday, August 26, 2020.

^[145] CDP (2020), Cleaning up their act. Are companies responding to the risks and opportunities posed by water pollution?

^[146] World Economic Forum (WEF) (October 27, 2021), CEO Climate Alliance to world leaders: We support you in taking decisive climate steps at COP26.

^[147] WBCSD (2021), Vision 2050: Time to transform.

^[148] The survey (Circulair Belastingstelsel) was conducted between September 29 and November 30, 2020, by The Ex'tax Project and ABN AMRO Bank. Respondents represented various sectors, including (financial) services (32% of respondents), industry (14%), real estate (7%) and technology, media & telecom (8%). 43% of respondents worked in a company of less than 10 people, 25% for a company of more than 250 employees, 17% for a company of between 10 and 49 employees, and 15% for a company of between 50 and 250 employees. More details (in Dutch): The Ex'tax Project (et al.) (2021), *Deltaplan Belastingen voor een Circulaire en Sociale Economie. Routekaart 2021-2030* [Deltaplan Taxation for a Circular and Social Economy. Roadmap 2021-2030].

^[149] Timmermans, Frans (European Commission Executive Vice-President) (September 14, 2021), European Parliament Plenary Debate on Fit for 55 after presentation of IPCC Report. Speech.

^[150] CPB, PBL (2020), Kansrijk mobiliteitsbeleid 2020 [Promising mobility policy 2020].

^[151] All euro values in the modelling results are in real term 2018 prices.

^[152] In 2020, revenue from taxes and social contributions in the EU were €5,531 billion. Eurostat (Accessed February 3, 2022) Tax revenue statistics.

^[153] **Tariffs.** In the scenario, the tariffs for passenger cars and motorbikes have, where possible, been differentiated according to weight class and type of fuel. No account has yet been taken of differentiation by place and/or time. Diesel and petrol: 9 ct/km (econ), 11 ct/km (mid) and 13 ct/km (lux); hybrid: 5 ct/km; LPG: 8 ct/km; electric: 3 ct/km, motorcycles: 8 ct/km (econ) and 10 ct/km (lux). Average tariff for vans: 15ct/km; trucks: 29ct/km. In practice, these tariffs could also be differentiated according to weight class and type of fuel. Electric or hydrogen-powered trucks could be (temporarily) exempted from the kilometre charge. **Road tax.** In the scenario, road tax for passenger cars is abolished. Due to data limitations, road tax for vans and lorries has not changed. **Other features.** In the modelling, 10% of the total annual revenue is set aside for implementation and execution costs. In addition, 20% of the net revenue from passenger cars is invested in public transport. Due to data limitations, the available kilometres driven by vehicles per country of registration has been used for vans and lorries, rather than the country in which the kilometres were driven. The vehicle registration tax, excise duties and the addition for private use remain unchanged in the modelling.

^[154] The measure combines 1) an excise duty of €0.33 (the current minimum tariff in the Energy Tax Directive) and 2) a climate levy of €120/tCO₂. The current effective costs of ETS emission rights paid by the aviation sector have been deducted. The scenario does not yet include the application of VAT in aviation. Aircraft noise pollution (and its impact on health, wellbeing and spatial planning) has not yet been considered. Because of the effects of carbon emissions at altitude ('radiative forcing'), a factor 2 was applied to a €60/tCO₂ price level used in the other measures in the scenario. This factor is based on: CE Delft (2018), *Economische en duurzaamheidseffecten vliegbelasting* [Economic and sustainability effects of aviation tax].

CE Delft (2019), Handbook on the External Costs of Transport

^[155] The mechanism is based on pricing NO_x and CO₂ emissions. For NO_x, the scenario applies a rate of €17.35/kg NO_x (50% of the external costs of NO_x). (CE Delft (2017), *Handboek Milieuprijzen 2017* [Environmental Prices Handbook 2017].

In accordance with the other measures, the scenario applies a rate of €60 per ton CO₂. Other harmful emissions are not yet included in the scenario. The measure applies to inland water transport and maritime transport, including cruise ships. Norway, Sweden and Denmark already apply a tax on NO_x emissions in shipping:

“An example of emission taxes in the context of maritime transport is the Norwegian NOX emission tax introduced in 2007. The tax applies to all NOx exhaust gas emissions whether on land or at sea and is calculated based on kg NOX emitted (Table 4). Even if Baltic Sea coastal countries such as Sweden and Denmark have similar taxes on NOX emissions in place, the Norwegian version is different as it also covers both maritime transport and aviation. At sea the Norwegian NOX tax covers all maritime transport (domestic and foreign) within the territorial waters of Norway, traffic between Norwegian ports as well as traffic of Norwegian flagged vessels in traffic within the Norwegian Exclusive Economic Zone (EEZ).” The rate in 2020 was 22.69 Norwegian kroner (around €2.07) per kilo NOx. Businesses in Norway have the option of paying this tax or a fee towards an NOx investment fund. The latter is lower than the tax but rises at a faster rate. A reduced fund rate is applied for shipping, fishery, land industry, rail and aviation. A higher fee is paid by the oil and gas industry on the Norwegian continental shelf. Traficom (2020), Economic incentives to promote environmentally friendly maritime transport in the Baltic Sea region.

^[156] European Commission (2021), Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union’s increased climate ambition.

^[157] CE Delft (2019), Handbook on the External Costs of Transport. (Table 64).

^[158] European Commission (December 11, 2019), The European Green Deal.

^[159] Applying, for example, excise duties, carbon taxes, VAT rates, one-off vehicle purchase or registration taxes, periodic taxes on the ownership of vehicles, distance-based charges (tolls) and time-based charges (vignettes or congestion charges). CE Delft (2019), Transport taxes and charges in Europe. An overview study of economic internalisation measures applied in Europe.

^[160] IEA (2021), Net Zero by 2050: A Roadmap for the Global Energy Sector.

^[161] Eurostat (Accessed April 11, 2022), Air passenger transport by reporting country.

^[162] Eurostat (Accessed April 11, 2022), freight and mail air transport by reporting country.

^[163] European Commission (Accessed August 13, 2021), Reducing emissions from aviation.

^[164] Data available for the year 2016. The external costs related to air pollution are not available. The following categories are included: accidents, climate, noise, congestion, well-to-tank emissions, and habitat damage. The total external costs of these categories are €48 billion per year in the EU28. For the EU27, an estimate is made based on the UK share in the fuel exemption tax expenditures (21%) (Table 68). CE Delft (2019),

Handbook on the External Costs of Transport.

^[165] European Commission (2021), Regulation of the European Parliament and of the Council on ensuring a level playing field for sustainable air transport.

^[166] Morgan, Sam (July 7, 2020), Commission chews over changes to aviation emissions rules. Euractiv.

^[167] Based on 2015. Abolishing the exemption of excise duty on aviation fuel would increase aviation-related fiscal revenue by €26.9 billion in the EU28 (Table 48). UK revenue represents €7.3 billion (Table 47). CE Delft (2019), Taxes in the field of aviation and their impact.

^[168] A joint political statement was signed by the Netherlands, Belgium, Bulgaria, Denmark, France, Germany, Italy, Luxembourg and Sweden. **“We believe that more coordination on pricing of negative externalities of aviation could ensure that the polluter pays a fairer price for the use of aviation transport.”** Morgan, Sam (November 7, 2019), Nine EU countries urge new Commission to tax aviation more. Euroactiv.com.

In July 2021, Austria, Belgium and Luxembourg called to end the exemption on jet fuel: **“Specifically, we are referring to the Energy Taxation Directive’s exemption on jet fuel for aviation. This exemption must come to an end if we are to fully and fairly implement the European Green Deal and in particular, respect for the ‘polluter pays principle’.”** **“In order to include international aviation, the EU should launch an initiative to remove exemptions for jet fuel taxation in international aviation relations at UN level. Future mandates to negotiate EU level aviation agreements with third countries should not provide for exemptions for jet fuel taxation.”** Signed on behalf of Austria: Leonore Gewessler (Federal Minister for Climate Action, Environment, Energy, Mobility, Innovation and Technology), Magnus Brunner (State Secretary in the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology); Belgium: Georges Gilkinet (Deputy Prime Minister and Minister of Mobility); Luxembourg: François Bausch (Deputy Prime Minister, Minister of Defence, Minister for Mobility and Public Works) (July 6, 2021), Jet Fuel Taxation – *lettre commune*.

^[169] Estimates of aviation tax revenues (2015): Italy €1.5 billion, Germany €1.3 billion, France €0.7 billion, Sweden €200 million, Austria €65 million. These countries, plus Spain and Greece, also generate VAT revenues on internal flights. CE Delft (2019), Taxes in the field of aviation and their impact.

The revenue in the UK from Air Passenger Duty was GBP 3.8 billion (about €4.1 billion) in 2019. Statista.com (Accessed October 31, 2020), Tax revenue from Air Passenger Duty in the United Kingdom (UK) 1997-2019.

In 2021, the Netherlands introduced a ticket tax of €7.45 per passenger, which is estimated to raise €200 million per year. Dutch government (November 13, 2020), *Wijziging wetsvoorstel vliegbelasting naar Raad van State* [Proposal to amend law on aviation tax to the Council of the State].

The original legislative proposal included taxation of freight as well, but this was not implemented. Dutch government (May 14, 2019), *Wetsvoorstel nationale vliegbelasting ingediend* [Submitted bill on national aviation tax].

^[170] Aircraft fuel, for commercial operations, is exempt from excise duty under the Energy Tax Directive 2003/96/EC (Article 14(1)(b)). Member States may abolish this exemption for **domestic flights**. They may abolish this exemption for **intra-EU flights** based on a bilateral agreement between Member States. It's more difficult to avoid the exemption for **extra-EU flights** under the 1944 ICAO Chicago Convention. This international agreement stipulates that fuel which is on board on arrival and retained on board on departure shall be exempt. This implies that the jet fuel tax exemption only applies to the taxation of fuel that is already on board an aircraft, but not on the intake of fuel in another state. However, ICAO Policy Document 8632 states that it is common practice to exempt the intake of fuel, on a basis of reciprocity. This is explicitly mentioned in many bilateral air service agreements. CE Delft (2019), Taxes in the field of aviation and their impact.

^[171] As of April 1, 2022, the lowest rate in the UK is GBP 13 per passenger, for up to 2,000-mile journeys, and for seat pitches of less than 1.016 metres. The highest rate of GBP 554 per passenger is applied to journeys of more than 2,000 miles in planes of 20 tonnes or more, equipped to carry fewer than 19 passengers. Gov.uk (Accessed August 13, 2021), Rates for Air Passenger Duty.

^[172] European Commission (2020), 2019 Annual Report on CO2 Emissions from Maritime Transport (SWD(2020) 82 final).

^[173] **“The EU has a legislative framework in place that covers all greenhouse gas emissions except from maritime transport, for which the current regulation focuses solely on monitoring, reporting and verification of emissions.”** European Commission (September 17, 2020), The 2030 Climate target plan.

^[174] Clear Seas Centre for Responsible Marine Shipping (Accessed August 17, 2021), Marine fuels: what is heavy fuel oil?

^[175] Relative to 2018. IMO (2020), Fourth IMO GHG Study 2020. CE Delft.

^[176] Based on 2016 and the categories accidents, air pollution, climate, noise, congestion, well-to-tank emissions, and habitat damage. For the EU28, the external costs are €98 billion for maritime and €2.9 billion for inland shipping. CE Delft (2019), Handbook on the External Costs of Transport.

^[177] Estimates by T&E using fuel sales data reported to UNFCCC (2017) and national taxes applicable to diesel for road vehicles in each EU country in 2019. Transport & Environment (T&E) (2019), EU shipping's €24 billion-a-year fossil tax holidays.

^[178] International abolition of the exemption from excise duty for navigation on inland waterways requires amendments to the Revised Mannheim Act of 1868. Dutch Ministry of Finance (2020), *Fichebundel policy options. Bouwstenen voor een betere belastingstelsel*.

^[179] **“Approximately 3.5 million sheep and goats, 4.3 million head of cattle, 33.4 million pigs, and 1 000 million poultry were traded alive between EU countries in 2018. Belgium, Ireland, Greece, Spain, France, and Italy exchanged more than 1.8 million head of cattle. The reason behind over 70 % of animal transfers within the EU was the production cycle, in the case of cattle and pigs, and slaughtering, in the case of sheep and goats. The import and export of live animals with third countries represents less than 10 % of intra-EU trade.”** European Parliamentary Research Service (EPRS) (2020), EU trade and transport of live animals.

^[180] Four arguments mentioned by the Dutch Ministry of Finance. Ministerie van Financiën (2020), *Fichebundel beleidsopties. Bouwstenen voor een beter belastingstelsel* [Building blocks for a better tax system].

^[181] European Commission (September 17, 2020), The 2030 Climate target plan.

^[182] The maritime transport could be taxed based on distance: **“carbon emissions released on any given shipping route — including routes crossing international waters or on the high seas — should be taxed by the country of destination and on a distance basis (...) Under this proposed rule, emissions would be allocated according to the distance any given product travels in such a way that every parcel would carry a carbon footprint. (...) A uniform carbon price on international shipping would eliminate the international tax competition involving carbon taxes and attribute correct and complete prices to products traded globally. Basing the rule on the domestic carbon price overcomes the need for an international agreement.”** Falcão, Tatiana (August 31, 2020), Taxing Carbon Emissions on the High Seas. Tax Notes International.

^[183] **“A central element in the EU policy for internalisation of external costs is the so-called Eurovignette Directive 1999/62/EC, which provides the basis for the EU charging policy for heavy goods vehicles. (...) This Directive enables Member States to charge the full infrastructure costs and, since its 2011 revision, also some external costs (air pollution and noise). In addition, charges can be differentiated to some extent, in order to reduce road congestion or to provide incentives to use cleaner vehicles. In 2017 the European Commission presented a proposal to amend the Eurovignette Directive again, among other things, by extending its scope to buses/-**

coaches and light commercial vehicles and by enabling the modulation of charging according to CO2 emissions (EC, 2017a).” CE Delft (2019), Transport taxes and charges in Europe. An overview study of economic internalisation measures applied in Europe.

The Eurovignette file has been approved by the EP plenary on 17 February 2022, which paves the way to a final decision by the Council. **“The agreement strengthens the ‘user/polluter pays’ principle, future charges for lorries and buses will address CO2, as well as pollutant emissions. This translates into a general phase-out of vignettes for trucks on the core TEN-T network and a shift to distance-based charging.** European Parliament (Accessed March 25, 2022), Revision of the directive 1999/62/ec on charging of heavy-goods vehicles for the use of certain infrastructures, as regards certain provisions on vehicle taxation.

^[184] See note 183, and: European Council (June 16, 2021), EU road charging rules (Eurovignette) – Presidency reaches informal deal with the Parliament. Press release.

^[185] **“A combination of measures is required to tackle rising emissions in road transport to complement emissions trading. Stronger CO2 emissions standards for cars and vans will accelerate the transition to zero-emission mobility by requiring average emissions of new cars to come down by 55% from 2030 and 100% from 2035 compared to 2021 levels. As a result, all new cars registered as of 2035 will be zero-emission.”**

European Commission (July 14, 2021), European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions. Press release.

^[186] **“The preferred policy options allows to maintain the competitiveness of the air transport industry and leads to a significant reduction of well-to-wing CO2 emissions in the aviation sector, i.e. by around 60-61% by 2050, compared to the baseline scenario. Air pollutant emissions decrease by around 9% by 2050 relative to the baseline. Overall, environmental costs of aviation (related to CO2 emissions and air pollutants emissions) are reduced by around €87-88 billion compared to the baseline, expressed as present value over 2021-2050 period. SAF production capacity increases by an additional 25.5-25.6Mt by 2050. SAF emergence on the market leads to a large reduction of aviation’s reliance on fossil jet fuel, which consumption reduces by 65% by 2050 compared to the baseline. (...) The preferred policy options lead to net job creation in the EU, i.e. around 202,100 additional jobs compared to the baseline. Finally, the reduction in air pollution has positive effects on public health (i.e. external costs from air pollution decrease by about €1.5 billion over the period 2021 to 2050, compared to the baseline).”**

“Practices such as ‘fuel tankering’ occur when aircraft operators uplift more aviation fuel than necessary at a given airport, with the aim to avoid refuelling partially or fully at a destination airport where aviation fuel is more expensive. (...) This measure aims to prevent fuel tankering. It consists of obliging airlines to refuel before

departure at every EU airport, with an amount of jet fuel corresponding to that necessary to operate the next flight (e.g. between 90% and 110% of the fuel necessary to operate the next flight – fuels safety margins being respected). This prevents airlines from carrying excessive amounts of jet fuel from one airport to another with the aim to avoid higher fuel costs, which leads to additional fuel burn and emissions, while undermining the level playing field between airlines.” European Commission (2021), Regulation of the European Parliament and of the Council on ensuring a level playing field for sustainable air transport.

^[187] European Commission (July 14, 2021), Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC as regards aviation’s contribution to the Union’s economy-wide emission reduction target and appropriately implementing a global market-based measure.

^[188] The proposed 10-year transition phase represents €35 billion in lost tax revenue. Transport & Environment (T&E) (2021), Energy Taxation Directive: Ending one of aviation’s most unfair tax privileges.

^[189] Shipping companies would have to surrender 100% of their verified emissions as of 2026. European Commission (2021), Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757.

^[190] European Commission (2021), Questions and Answers – Sustainable transport, infrastructure and fuels.

Renewable and low-carbon fuels are to represent between 6 and 9% of the international maritime transport fuel mix in 2030 and between 86 and 88% by 2050. European Commission (2021), Proposal for a Regulation of the European Parliament and of the Council on the use of renewable and low-carbon fuels in maritime transport and amending Directive 2009/16/EC.

^[191] Higher and middle-income groups tend to live further away from their workplace and drive the most kilometres, which is one of the reasons these groups are most affected by a price increase. CPB, PBL (2020), *Kansrijk mobiliteitsbeleid 2020* [Promising mobility policy 2020].

^[192] MuConsult, Revnext, 4Cast, Significance (2020), *Effecten varianten betalen naar gebruik* [Pay as you use impact assessment].

^[193] **“The transport sector had the lowest share of renewable energy in 2015, with only 6%. By 2030, this has to increase to around 24% through further development and deployment of electric vehicles, advanced biofuels and other renewable and low**

carbon fuels as part of a holistic and integrated approach. A smart combination of vehicle/vessels/aircraft efficiency improvements, fuel mix changes, greater use of sustainable transport modes and multi-modal solutions, digitalisation for smart traffic and mobility management, road pricing and other incentives can reduce greenhouse gas emissions and at the same time significantly address noise pollution and improve air quality.” European Commission (September 17, 2020), The 2030 Climate target plan.

^[194] CPB, PBL (2020), *Kansrijk mobiliteitsbeleid 2020* [Promising mobility policy 2020].

^[195] “High-income households are more likely to fly and spend larger portions of their income on air travel, as air transport is in much higher demand in higher-income households, and therefore larger portion of its emissions can be attributed to higher-income households. (...) The modelling shows that household impacts are mainly due to recycling of auctioning revenues. Policy options with higher auctioning shares, most prominently A1FULL, the option with immediate full auctioning, are more likely to yield positive impacts to low income households in the form of lower income taxes or income transfers.” European Commission (July 14, 2021), Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC as regards aviation's contribution to the Union's economy-wide emission reduction target and appropriately implementing a global market-based measure.

^[196] “With increased auctioning revenues, for instance, governments could reduce taxes, which would result in increased spending across different sectors of the economy. Options with more positive outcomes on value added and employment are generally those with a larger volume of projected revenues from the EU ETS. Due to decrease of demand for air transport, a negative impact on employment in the sector is to be anticipated. However, the impact is estimated to be negligible (-0.13%) even in Option COWIDE, where the impact is strongest.” European Commission (July 14, 2021), Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC as regards aviation's contribution to the Union's economy-wide emission reduction target and appropriately implementing a global market-based measure.

^[197] “If the [shipping] sector were a country, it would be the 6th highest [GHG] emitter in the world. (...) The sector does, however, have significant potential to reduce this committed emissions figure without premature scrappage through a combination of slow speeds, operational and technical efficiency measures, and the timely retrofitting of ships to use zero-carbon fuels. Here, it is shown that if mitigation measures are applied comprehensively through strong and rapid policy implementation in the 2020s, and if zero-carbon ships are deployed rapidly from 2030, it is still possible for the ships in the EU MRV system to stay within 1.5 °C carbon budgets.” Bullock, S., Mason, J., Broderick, J. & Larkin, A. (2020), Shipping and the Paris climate agreement:

a focus on committed emissions. BMC Energy, volume 2.

“(..) up to one third of the EU's shipping's GHG could be eliminated by energy efficiency alone. This includes both technical options (e.g. wind-assist, hull air lubrication, etc) but also operational measures (most notably slow steaming).” Transport & Environment (2021), Decarbonising European Shipping: Technological, operational and legislative roadmap.

^[198] “99% of the voyages made in 2015 could be powered by hydrogen with only minor changes to fuel capacity or operations, by replacing 5% of cargo space with more hydrogen fuel or by adding one additional port of call to refuel. (43% of 2015 voyages could be completed with no changes at all.)” International Council on Clean Transport (ICCT) (2020), Liquid hydrogen refueling infrastructure to support a zero-emission U.S.-China container shipping corridor.

^[199] Euractiv.com, AFP (June 3, 2021), Maersk favours carbon tax for shipping. Euractiv.

^[200] Despite the challenges, such a high-quality technical system should be implementable. New cars already remain digitally connected with their manufacturer.

“Vehicles are increasingly connected to satellite constellations tracking locations and collecting data about greenhouse gas emissions. Licensing and registration databases can be linked to individual payment accounts. Systems are being developed that let authorities fine-tune prices based on levels of congestion or air pollution.” Tirone, Jonathan (October 1, 2020), Congestion Pricing, the Route More Cities Are Taking. Bloomberg.

In the Netherlands, the one-off costs of implementing a kilometre charge are estimated to be between €2.3 and €2.5 billion. CPB, PBL (2020), *Kansrijk mobiliteitsbeleid 2020* [Promising mobility policy 2020]. Arcadis (2020), *MKBA betalen naar gebruik* [SCBA payment based on use].

Dutch agencies expect implementation (in the Netherlands) to take at least five years. CPB, PBL (2020), *Kansrijk mobiliteitsbeleid* [Promising mobility policy].

Dutch Ministry of Finance '2020' Letter to the House of Representatives, interim report on the Pay as you Use study.

^[201] European Commission (Accessed August 13, 2021), Reducing emissions from aviation.

^[202] Henbest, Seb (October 19, 2020), BNEF Talk 2020: New Energy Outlook 2020. BloombergNef on Vimeo.

^[203] As advocated by a Dutch research committee. Adviescollege Stikstofproblematiek (Commissie Remkes-II) (2020), *Niet alles kan overal* [There is no one size fits all].

^[204] The rate of €60/tCO₂ is based on the ‘midpoint’ OECD benchmark: **“Two benchmark values are applied, EUR 30/tCO₂, a low-end estimate of the carbon costs today, and EUR 60/tCO₂, a midpoint estimate of the carbon costs in 2020 and a low-end estimate for 2030.”** OECD (2018), Effective Carbon Rates 2018.

^[205] Non-ETS sectors include the construction sector, agriculture, non-ETS industries and service sectors. In the scenario, carbon emissions in the transport sector, excepting rail, are priced through the kilometre charge, aviation tax and shipping tax. The rail industry is taxed if running on fossil fuels. €60 per ton translates as approximately €0.14-0.16 per litre for kerosene, petrol and diesel and €0.13 per cubic meter of natural gas. The measure could be implemented as a tax on fossil fuels (‘upstream approach’) similar to the German non-ETS carbon pricing system. See: Clean Energy Wire (December 16, 2019), Germany’s carbon pricing system for transport and buildings.

^[206] Dutch Emissions Authority (NEa) (Accessed June 25, 2021), Emissions Trading in Europe.

Since February 2021, China operates the world’s largest emissions trading system. World Bank (2021), State and Trends of Carbon Pricing 2021.

^[207] European Commission (Accessed June 25, 2021), EU Emissions Trading System (EU ETS).

^[208] EEA (Accessed June 23, 2021) EU Emissions Trading System (ETS) data viewer. Emissions of nitrous oxide (N₂O) perfluorocarbons (PFCs) are also included in the data.

^[209] January 2, 2017, and February 7, 2022, respectively. Ember-climate.org (Accessed April 3, 2022), EUA Price.

^[210] **“(…) the explicit carbon-price level consistent with achieving the Paris temperature target is at least US\$40–80/tCO₂ by 2020 and US\$50–100/tCO₂ by 2030”.** CPLC (2017), Report of the High-Level Commission on Carbon Prices. World Bank.

^[211] Kikstra, Jarmo, Waidelich, Paul (et al.) (September 6, 2021), The social cost of carbon dioxide under climate-economy feedbacks and temperature variability. Environmental Research Letters, Volume 16, Number 9. _

^[212] 77% of these revenues were used (or planned to be used) for climate and energy related purposes, which is well above the 50% required by legislation. European Commission (2020), Carbon market report: Emissions from EU ETS stationary installations fall by over 9%.

^[213] CE Delft (2021), Additional profits of sectors and firms from the EU ETS 2008-2019.

^[214] European Commission (Accessed June 25, 2021), EU Emissions Trading System (EU ETS).

EEA (2021), Greenhouse gas emission targets, trends and Member States MMR projections in the EU, 1990-2050.

^[215] Climate Action Tracker (September 22, 2020), EU country summary.

^[216] **Portugal (€25/tCO₂)**. World Bank (2020), State and trends of carbon pricing 2020.

Finland (€62/t, exempting oil refineries). PWC (2020), *Speelveldtoets 2020. De impact van het voorgenomen klimaatbeleid op het speelveld van de Nederlandse industrie [Playing field test 2020]*. [The impact of the proposed climate policy on the playing field of Dutch industry].

The Netherlands (€125/t by 2030, with exemptions, dispensation and price is applied only for companies that do not achieve their targets). Tax Plan 2021, Dutch government. Dutch government (September 15, 2020), *Belastingplan 2021: beter, eerlijker en duurzamer uit de crisis*.

Dutch government (Accessed November 11, 2020), *Invoering CO₂-heffing industrie vanaf 2021* [Introduction of a CO₂ tax for industry].

Norway (€200/t, announced for 2030). Buli, Nora and Adomaitis, Nerijus (January 8, 2021), Norway’s plans to raise carbon tax draw oil industry ire. Reuters.

^[217] The **Effort Sharing Regulation (ESR)** covers GHG emissions that are not covered by the EU ETS nor by the **Regulation on Land-Use, Land-Use Change and Forestry (LULUCF)**. It sets national emission reduction targets, which for 2030 vary between 0% and 40% compared to 2005 mainly based on economic capacity, i.e., GDP per capita. European Commission (Accessed August 25, 2021), Effort sharing 2021-2030: targets and flexibilities.

The ESR covers 59% of non-ETS/LULUCF emissions. University of Cambridge Institute for Sustainable Leadership, CLG Europe (2021), Fit for 55 Package: Initial analysis against the 10 principles of the business letter.

^[218] European Commission (Accessed August 25, 2021), Effort sharing: Member States’ emission targets.

^[219] European Commission (2021), Proposal for a Regulation of the European parliament and of the Council amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement.

^[220] In Germany, the initial price of €25/tCO₂ in 2021 is to be increased to €55/t in 2025. **“What and who will be priced? Transport and heating fuels such as petrol, diesel, heating oil, natural gas and coal; covers heating emissions in buildings sector and of energy and industry facilities not covered by EU ETS; covers transport emissions except for air transport; does not cover non-fuel emissions (e.g. methane in**

agriculture); participants are not emitters themselves, but companies that put fuels into circulation or suppliers of the fuels (upstream approach); government says this currently means about 4,000 companies will participate; to avoid a double burden from the national system and the ETS, fuel deliveries to ETS facilities are exempt from the national price; where this leads to disproportionate administrative needs, there will be compensation". Wettengel, Julian (December 16, 2019), Germany's carbon pricing system for transport and buildings. Cleanenergywire.org.

"Austria presented plans to introduce a carbon price for non-ETS sectors with the form of the carbon pricing initiative yet to be determined. (...)"

"Luxembourg announced its plan to introduce a €20/tCO₂e (US\$22/tCO₂) carbon tax in 2021 as part of the National Integrated Energy and Climate Plan to meet Luxembourg's GHG emission reduction target of 55 percent below 2005 levels in the sectors not covered by the EU ETS.⁷⁰ The tax should rise to €25/tCO₂e (US\$27/tCO₂) in 2022 and €30/tCO₂e (US\$33/tCO₂) in 2023. Rates will be regularly reviewed to ensure alignment with the Paris Agreement. The expected revenues could be split between measures to combat climate change and social measures, such as a tax credit."

"[In Portugal,] non-ETS emitters are taxed for the fuel oil and natural gas used to generate electricity in 2020 at 25 percent and 10 percent of the carbon tax rate [of €25/tCO₂], respectively, whereas they were previously fully exempted."

World Bank (2020), State and Trends of Carbon Pricing 2020.

France: €45/tCO₂ in 2018.

Sweden: €113/tCO₂ in 2018 for the transport sector and the built environment. PWC (2020), *Speelveldtoets 2020. De impact van het voorgenomen klimaatbeleid op het speelveld van de Nederlandse industrie* [Playing field test 2020. The impact of the proposed climate policy on the playing field of Dutch industry].

^[221] CPB, PBL (2019), *Economische effecten van CO₂-beprijzing: varianten vergeleken* [Economic effects of carbon pricing: a comparison of various options].

^[222] European Commission (2021), Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU).

^[223] European Commission (2021), Proposal for a Regulation of the European Parliament and of the Council: establishing a carbon border adjustment mechanism.

^[224] European Commission (July 14, 2021), European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions. Press release.

^[225] European Commission (Accessed August 25, 2021), Increasing the ambition of the

EU's Effort Sharing Regulation.

^[226] European Commission (2021), Proposal for a Council Directive: restructuring the Union framework for the taxation of energy products and electricity (recast).

^[227] As there are many small emitters in these sectors, the emission allowances shall be auctioned upstream: to suppliers rather than households or car drivers. No free allocation will be provided. European Commission (2021), Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union g greenhouse gas emission trading scheme and Regulation (EU) 2015/57.

^[228] **"The Fund shall provide support to Member States, so that they could finance a coherent set of measures, including temporary direct income support, and investments considered necessary to meet the climate targets of the Union and, in particular ensuring affordable and sustainable heating, cooling, and mobility. The support should reflect the diverse situation of Member States and their regions, taking into account regional energy poverty maps and maps of poorly connected by road or rail, remote and rural areas. Those measures and investments, including the temporary direct income support shall benefit households, micro-enterprises and transport users, which are vulnerable and particularly affected by the emissions trading for buildings and road transport as regulated entities are expected to pass through costs to final consumers."**

"The financial envelope of the Fund is EUR 23.7 billion for the years 2025-2027 and EUR 48.5 billion for the years 2028-2032 (Article 9), which corresponds in principle to 25% of the expected revenues to be accumulated from the auctioning of allowances within the emissions trading for buildings and road transport."

"Member States should finance at least 50% of the total costs of the Social Climate Plans. They are to use part of their expected revenues from the inclusion of buildings and road transport into the scope of application of the ETS Directive for this purpose, without prejudice to the start of the Fund in 2025."

"Each Member State should submit to the Commission a Social Climate Plan ('the Plan'). Those Plans should pursue two objectives. Firstly, they should provide vulnerable households, vulnerable micro-enterprises and vulnerable transport users the necessary resources to finance and carry out investments in energy efficiency, decarbonisation of heating and cooling, in zero- and low-emission vehicles and mobility. Secondly, they should mitigate the impact of the increase in the cost of fossil fuels on the most vulnerable and thereby prevent energy and transport poverty during the transition period until such investments have been implemented."

“The Fund should apply one year before the introduction of carbon price under the new ETS.”

European Commission (2021), Proposal for a Regulation of the European Parliament and of the Council Establishing a Social Climate Fund.

^[229] Research shows that these effects tend to be limited. See for example: **“Carbon leakage is limited to 16% of the emission reductions in pioneering regions”**.

Arroyo-Currás, T., Bauer, N., (et al.) (2015), Carbon leakage in a fragmented climate regime: The dynamic response of global energy markets, Technological Forecasting and Social Change, volume 90 (Part A), January, pp. 192-203.

“The decision to locate, relocate, or decrease production or investment in any company, is rarely based on just one factor, however. Researchers who have examined the degree to which carbon pricing has an impact on these decisions have consistently found it to be one among many factors, and not the most important. Many studies conclude that other variables—corporate tax rates, energy prices, wage rates, labor availability, infrastructure, geographic location, cost of capital, exchange rates, prices for commodities and materials—exert a stronger influence on most industry decisions to locate or invest. The same is true of other forms of environmental taxation.” CPLC (2019), Report of the High-Level Commission on Carbon Pricing and Competitiveness. World Bank.

“Countries that implement stringent environmental policies do not lose export competitiveness when compared against countries with more moderate regulations”. OECD (2016), Tougher environmental laws do not hurt export competitiveness – OECD study.

“The risk of carbon leakage declines as more countries take concrete actions to prevent climate change. International cooperation through carbon pricing instruments and climate finance can help redress the existing asymmetry in carbon pricing signals, reduce concerns about their impact on competitiveness, and eliminate the need for protection of firms.” World Bank (2015), State and Trends of Carbon Pricing 2015.

^[230] Bruegel (2021), Carbon price floors: an addition to the European Green Deal.

^[231] **“150 million allowances issued under the new emissions trading system for roadtransport and buildings will be made available to the Innovation Fund to stimulate the green transition”**. European Commission (2021) Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU).

^[232] In the scenario, a tax is applied to the three most prevalent types of air pollution

and to the sectors ‘Chemical industries’, ‘Other industries’. The rates are based on external cost estimates by CE Delft (€34.70/kgNO_x, €24.90/kgSO₂, €79.50/kgPM_{2.5}, ‘Milieuprijs – midden [Environmental price - middle]’). CE Delft (2017), *Handboek Milieuprijzen 2017* [Environmental Prices Handbook 2017].

See also: CPB (2019), *Een belasting op luchtvervuiling in de Nederlandse industrie* [A tax on air pollution in Dutch industry].

^[233] A tax on NH₃ emissions in the agricultural sector, at a rate of €15.25/kg NH₃. This is 50% of the external costs of NH₃ emissions (€30.50/kgNH₃, ‘Milieuprijs – midden’ [Environmental price - middle]). CE Delft (2017), *Handboek Milieuprijzen 2017* [Environmental Prices Handbook 2017].

The impact of NH₃ emissions depends on the location. Close to Natura 2000 or densely populated areas the impacts are more severe. In practice, the measure could be regionally targeted, although this would raise administrative and reinforcement issues. Another option is to tax inputs which lead to NH₃ emissions (artificial fertilizer and concentrates). Such taxes would be easier to administer than emissions. CPB (2020), *Kansrijk belastingbeleid* [Promising tax policy].

^[234] **“Since the 1950s (...) the intensification and specialisation of the agricultural sector has increasingly contributed to ongoing biodiversity loss (...) Despite the introduction of provisions for the more sustainable management of natural resources and climate action (25) in recent reforms of the common agricultural policy (CAP), these have not significantly reduced the negative effects of agriculture on biodiversity and have not substantially contributed to the conservation and restoration of species and landscapes. This is acknowledged in both the EU Biodiversity Strategy for 2030 and the Farm to Fork strategy (EC, 2020b, 2020c).”** EEA (2020), State of nature in the EU.

^[235] European Commission (2013), Impact Assessment of the clean air policy package, SWD(2013) 531.

^[236] European Commission (2021), Pathway to a Healthy Planet for All. EU Action Plan: ‘Towards Zero Pollution for Air, Water and Soil’.

^[237] In 1992, Sweden introduced a tax on NO_x emissions caused by large combustion plants. The rate was set at approximately €4 per kilogram. Denmark started taxing NO_x in 2007, applying a price of €0.70 per kg to NO_x emissions by stationary installations in energy intensive industries and power generation. CPB (2019), *Instrumenten voor beprijzing van luchtvervuiling in de Nederlandse industrie* [Instruments for pricing air pollution in Dutch industry].

CPB (2019), *Effecten van een belasting op luchtvervuiling voor drie sectoren* [Effects of a tax on air pollution for three sectors].

^[238] Manure from livestock farming is responsible for more than 70% of all ammonia emissions in Europe. The use of mineral fertilizer in agriculture contributes 20% to

these emissions. Traffic, industry and people make up the other 10%. United Nations Economic and Social Council, Economic Commission for Europe (March 8, 2021), Assessment report on ammonia.

^[239] European Commission (January 8, 2021), The second clean air outlook.

^[240] Based on 2019 data: 143 million pigs, 77 million bovine animals and 74 million sheep and goats. Eurostat (Accessed July 1, 2021), Agricultural production - livestock and meat.

400 million laying hens: European Parliamentary Research Service (EPRS) (2019), The EU poultry meat and egg sector.

^[241] European Commission (2021), Pathway to a Healthy Planet for All. EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'.

^[242] **"(...) the damage due to the remaining European agricultural ammonia emissions in 2030 would amount to almost €60 billion per year (€35 billion to €85 billion). 47 This is 15 per cent of the total agricultural output and more than 50 per cent of the annual income (net value added) from agricultural activity in the European Union."** European Commission (2021), Pathway to a Healthy Planet for All. EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'.

^[243] Unlike 'downstream' taxation, at the end of the supply chain ('end of pipe'), such as meat or slaughter taxes or higher VAT rates on meat products.

^[244] European Commission (2021), Pathway to a Healthy Planet for All. EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'.

^[245] Including the Biodiversity Strategy, the Farm to Fork strategy and the Common Agricultural Policy. Such analysis is beyond the scope of this study.

^[246] European Commission (2020), Farm to Fork strategy.

^[247] Research shows that these effects tend to be limited. See for example: **"Carbon leakage is limited to 16% of the emission reductions in pioneering regions"**. Arroyo-Currás, T., Bauer, N., (et al.) (2015), Carbon Leakage in a Fragmented Climate Regime: The Dynamic Response of Global Energy Markets, Technological Forecasting and Social Change, volume 90 (Part A), January, pp. 192-203.

"The decision to locate, relocate, or decrease production or investment in any company, is rarely based on just one factor, however. Researchers who have examined the degree to which carbon pricing has an impact on these decisions have consistently found it to be one among many factors, and not the most important. Many studies conclude that other variables—corporate tax rates, energy prices, wage rates, labor availability, infrastructure, geographic location, cost of capital, exchange rates, prices for commodities and materials—exert a stronger influence on most industry decisions to locate or invest. The same is true of other forms of environmental taxation.⁶"

CPLC (2019), Report of the High-Level Commission on Carbon Pricing and Competitiveness. World Bank.

"Countries that implement stringent environmental policies do not lose export competitiveness when compared against countries with more moderate regulations". OECD (2016) Tougher environmental laws do not hurt export competitiveness – OECD study.

"The risk of carbon leakage declines as more countries take concrete actions to prevent climate change. International cooperation through carbon pricing instruments and climate finance can help redress the existing asymmetry in carbon pricing signals, reduce concerns about their impact on competitiveness, and eliminate the need for protection of firms." World Bank (2015), State and Trends of Carbon Pricing 2015.

^[248] [translated] **"A tax at the rate of external costs to society will make the use of existing technologies, such as filters, more economical to companies. It is cheaper to use a filter to stop the emissions than to pay for those emissions through the tax system."** CPB (2020), *Kansrijk belastingbeleid* [Promising tax policy].

^[249] Ministry of Finance of the Netherlands (2020), *Fichebundel beleidsopties. Bouwstenen voor een beter belastingstelsel* [Building blocks for a better tax system].

^[250] Max Planck Institute (October 27, 2020), Air pollution as co-factor of COVID-19 mortality. Study estimates 15% of COVID-19 deaths worldwide could be attributed to air pollution.

^[251] In Dutch: **"Meekoppelkansen met de klimaataanpak zijn er in de vorm van reductie van methaan, als bijvangst van de reductie van ammoniak uit mest."** Adviescollege Stikstofproblematiek (Commissie-Remkes II) (2020), *Niet alles kan overal* [There is no one size fits all].

^[252] United Nations Economic and Social Council, Economic Commission for Europe (March 8, 2021), Assessment report on ammonia.

^[253] Consistent recent EU data on tap and ground water use is lacking. Therefore, this measure has been modelled based on the sales of water companies. Access to water is a basic need. Water taxation could be structured so that the basic needs of households are met without taxation. According to the UN, between 50 and 100 litres of water per person per day are needed to ensure that most basic needs are met. United Nations (Accessed July 7, 2021), Water.

^[254] A price is applied to the non-energetic use of fossil fuels (feedstock) at a rate of €1.88 per GJ (which translates roughly as €0.07/L of crude oil and €0.07/m³ of natural gas in current price terms). The tax does not apply to 'dual use' (processes in which a fossil fuel is used partly as a resource and partly as an energy source).

^[255] Due to data limitations, the measure is modelled as a cost increase for the waste processing sector at an average rate of 2% of gross output.

^[256] Based on 2014. EEA (August 30, 2018), Water use in Europe – Quantity and quality face big challenges.

^[257] United Nations Office for Disaster Risk Reduction (2021), GAR Special Report on Drought 2021.

^[258] Official Journal of the European Union (May 25, 2020), Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse.

^[259] Based on 2017. EEA (2021), Indicator assessment: Use of freshwater resources in Europe.

^[260] Based on 2018. Eurostat (Accessed July 8, 2021), Water statistics.

^[261] **“The design of fiscal instruments in water services is complex, thus leading to the mixing of different concepts, whether in academic, technical or dissemination publications: taxes, tariffs, public prices and other charges are applied to a variety of water users and services”.** IWAP (2019), Analysis of irrigation water tariffs and taxes in Europe.

^[262] European Parliament and the Council (October 23, 2000), Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Official Journal of the European Union.

^[263] EEA (2016), Environmental taxation and EU environmental policies.

^[264] Leflaive, Xavier, Hjort, Marit (June 25, 2020), Addressing the social consequences of tariffs for water supply and sanitation - Environment Working Paper No. 166.

^[265] Such non-energy use of fossil fuels is not covered by the Energy Taxation Directive. **“In the energy tax, there is an exemption for the non-energy use of natural gas. This is natural gas that rather than being used to generate electricity or heat, is used as a raw material. (...) Moreover, no excise duty is levied on mineral oils that are used for non-energy purposes, such as raw materials for the production of non-excised goods. (...) The exemption for non-energy use can be divided into three parts: 1) natural gas (in particular fertiliser), 2) dual consumption of coal (coking plants, iron and steel industry) and 3) oil products (conversion of oil products into chemical products). The non-energy use of energy products does not fall within the scope of the Energy Tax Directive; Member States are therefore free to tax or not to tax this use.”** Dutch Ministry of Finance (2020), *Fichebundel beleidsopties. Bouwstenen voor een beter belastingstelsel* [Building blocks for a better tax system].

^[266] **1) During the production process:** The environmental damage in the Netherlands from the non-energy use of fossil and non-fossil raw materials in the plastics and fertiliser sectors (excluding dual use) is estimated to be €3.8 billion. This mainly relates to emissions of CO₂, NO_x, PM_{2.5} and SO₂ during the production process. PBL (2017), *Fiscale vergroening: belastingverschuiving van arbeid naar grondstoffen, materialen en afval* [Fiscal greening: tax shift from labour to resources, materials and waste. An exploration of taxes to stimulate the circular economy].

This type of environmental damage is taxed in the scenario via the CO₂ and air pollution measures.

2) During the service life and waste phase: “The chemical compounds [in fossil fuels] are converted in the plastics industry into a product, such as plastic packaging. The packaging then contains the [remaining energy] from the crude oil in the form of CH compounds, which together form the plastic. The plastic thus retains the original energy (feedstock) and this ‘remainder’ is therefore non-energy use. If this product is incinerated in the waste phase, it is considered energetic use.” Vollebergh, Herman et al. (2017), *Fiscale vergroening: belastingverschuiving van arbeid naar grondstoffen, materialen en afval. Verkenning van belastingen voor het stimuleren van de circulaire economie* [Fiscal greening: tax shift from labour to resources, materials and waste. An exploration of taxes to stimulate the circular economy]. Milieubelastingen en Groene Groei Deel IV. PBL.

^[267] Based on 2019 data for EU28 plus Norway and Switzerland. PlasticsEurope (2020), Plastics – the Facts 2020. An analysis of European plastics production, demand and waste data.

^[268] According to EuRIC, a trade association representing the European recycling industries. Frédéric, Simon (August 26, 2020), Chemical recycling ‘promising’ for circular economy, EU official says. Euractiv.

^[269] Tradingeconomics.com (Accessed April 3, 2022), Crude oil. 1983-2021 data.

^[270] **“The Spanish legislature has approved a new tax on non-reusable plastic packaging, which will take effect as of 1 January 2023. The new tax has a very broad scope, tax rate of €0.45 per kg of non-recycled plastic packaging and is envisaged to collect approximately €724m of revenue annually for the Government. It is configured similarly to the new plastic packaging tax approved in Italy, which is also expected to enter into effect on 1 January 2023.”** EY (April 13, 2022), Spain introduces new indirect tax on non-reusable plastic packaging as of 1 January 2023.

^[271] In Dutch: **“Belasten van het gebruik van fossiele bronnen als grondstof (...) zal duurzamer materiaalgebruik en alternatieve grondstoffen (biobased en gerecycled materiaal) bevorderen.”** Dutch government (2020), *Naar een economie zonder afval*.

Brede maatschappelijke heroverweging [Towards an economy without waste. Broad social reassessment].

^[272] Based on 2018. Eurostat (Accessed June 29, 2021), Generation of waste by waste category, hazardousness and NACE Rev. 2 activity.

^[273] Waste treated in the EU (some 2,169 million tonnes in 2018) **“does not include exported waste but includes the treatment of waste imported into the EU. The reported amounts are therefore not directly comparable with those on waste generation.”** Eurostat (Accessed August 23, 2021), Waste statistics.

^[274] Eurostat (November 25, 2021), EU’s circular material use rate increased in 2020.

^[275] European Commission (2020), Study on the EU’s list of Critical Raw Materials (2020), Final Report.

^[276] International Resource Panel (IRP) (2019), Global Resources Outlook 2019: Natural Resources for the Future We Want. UNEP.

^[277] European Commission (2020), Circular Economy Factsheet.

^[278] In Dutch: **“Met het verhogen van de afvalstoffenbelasting wordt recycling aantrekkelijker. Het tarief kan worden bijgesteld [van €32/t] richting de redelijkheidsgrens voor recycling (momenteel €205/t), (...). Deze maatregel geeft niet alleen een prikkel aan afvalverwerkers maar ook aan producenten om producten recyclebaar te maken. (...) zal tot extra transactiekosten voor producenten en importeurs leiden, maar ook tot minder milieuschade.”** Dutch government (2020), *Naar een economie zonder afval. Brede maatschappelijke heroverweging* [Towards an economy without waste. Broad social reassessment].

^[279] **“The new Water Reuse Regulation will encourage circular approaches to water reuse in agriculture. The Commission will facilitate water reuse and efficiency, including in industrial processes.”** European Commission (2020), Circular Economy Action Plan.

“The Union’s ability to respond to the increasing pressures on water resources could be improved by wider reuse of treated waste water, limiting extraction from surface water bodies and groundwater bodies, reducing the impact of discharge of treated waste water into water bodies, and promoting water savings through multiple uses for urban waste water”. European Parliament and the Council (May 25, 2020), Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse. Official Journal of the European Union.

^[280] Drift (2019), *Onderzoek ‘Afvalprikkel’*. Een onderzoek naar huidige prikkels voor het storten, verbranden en nuttig toepassen van afval in Nederland [‘Waste Incentives’ Study. A study into the landfilling, incineration recovery of waste in the Netherlands].

^[281] CPB (2020), *Kansrijk belastingbeleid* [Promising tax policy].

“Door verbranden en storten zwaarder te belasten, wordt het in beginsel aantrekkelijker om producten te hergebruiken en afvalstromen beter te sorteren en/of te recyclen.” Dutch Ministry of Finance (2020), *Syntheserapport Bouwstenen voor een beter belastingstelsel* [Synthesis report: Building blocks for a better tax system].

^[282] European Parliament (Accessed July 9, 2021), Revision of the drinking water directive. Legislative Train. 2018-02.

The revision of the **Urban Waste Water Treatment Directive** will explore the possibility of introducing permanent monitoring of health-relevant parameters in wastewater. European Commission (2021), Pathway to a Healthy Planet for All. EU Action Plan: ‘Towards Zero Pollution for Air, Water and Soil’.

^[283] EEA (2016), Environmental taxation and EU environmental policies.

^[284] Directives: The **Directive on Single Use Plastic Products**, the **Plastic Bags Directive**, the **Delegated Regulation on plastic waste shipments**, and the **Packaging and Packaging Waste Directive**. Strategies: The **EU Plastics strategy**, **Circular Economy Action Plan** and **Zero Pollution Action plan**. European Commission (2021), Pathway to a Healthy Planet for All. EU Action Plan: ‘Towards Zero Pollution for Air, Water and Soil’.

^[285] **“A uniform call rate of €0.80 per kilogram will be applied to the weight of plastic packaging waste that is not recycled, with a mechanism to avoid excessive contributions from less wealthy Member States.”** European Commission (Accessed August 23, 2021), Plastics own resource.

^[286] Council of the European Union (2020), Proposal ST 10025 2020 INIT of the Presidency of 29 July 2020 for a Council Decision on the system of Own Resources of the European Union.

^[287] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

^[288] European Parliament and Council of the European Union (May 30, 2018), Amending Directive 2008/98/EC on waste.

^[289] In Dutch: **“Na het storten van biologisch afbreekbaar afval komt er gedurende lange tijd methaan uit stortplaatsen vrij (stortgas). De afname van de emissie van dit gas sinds 1990 kan worden verklaard door de verminderde hoeveelheid organisch afval in het huishoudelijk restafval dat wordt gestort. Dit wordt met name veroorzaakt door het gescheiden inzamelen van groente- fruit- en tuinafval (GFT-afval). Daarnaast is in toenemende mate sprake van het affakkelen van stortgas en wordt stortgas gebruikt om energie op te wekken.”** Compendium voor de Leefomgeving

(CLO) (19 mei 2009), *Emissie van methaan uit stortplaatsen, 1980-2007* [Emission of methane from landfill sites, 1980-2007].

^[290] The increase is only applied to Member States that applied a standard VAT rate of less than 22% in 2020. If the standard rate in a particular Member State was higher than 22%, in the scenario this rate remains unchanged.

^[291] The increase only applies to Member States that had a reduced VAT rate of below 12% in 2020. If a Member State's reduced VAT rate was already 12% or higher in 2020, it remains unchanged. If a Member State has several reduced VAT rates, these are all increased to 12% in the calculation. The 0% rate remains unchanged.

^[292] Due to a lack of data, a target levy is included in the scenario that increases the product prices (before VAT) by 5% in each Member State in 2025.

^[293] Eurostat (Accessed April 11, 2022), Main national accounts tax aggregates.

^[294] Eurostat (Accessed April 11, 2022), Main national accounts tax aggregates.

^[295] Your Europe (Accessed July 20, 2021), VAT: rules and rates.

^[296] In 2021. European Commission (2021), Taxation trends in the European Union. Data for the EU Member States, Iceland, Norway and United Kingdom: 2021 edition.

^[297] European Commission (2018), Analysis of the Euro Area economy. Accompanying the document Recommendation for a Council Recommendation on the economic policy of the Euro Area. Commission Staff Working Document.

^[298] **“These special rates apply to EU countries that were applying them on 1 January 1991. They were originally meant to be transitional arrangements for a smoother shift to the EU VAT rules when the Single Market came into force on 1 January 1993, and were intended to be gradually phased out.”** Your Europe (Accessed August 10, 2021), VAT rules and rates.

^[299] **“(…) many of the reduced rates introduced to support low-income households, such as reduced rates on food and on energy products, do increase the purchasing power of these households. Nonetheless, it also clearly shows that reduced VAT rates are a poorly targeted and costly way of achieving this aim. At best, rich households receive as much benefit from a reduced rate as do poor households. At worst, rich households benefit much more than poor households. In some cases, the benefit of reduced VAT rates to rich households is so large that they actually have a regressive effect — benefiting the rich more not only in absolute terms, but also as a proportion of expenditure. This is generally the case for most reduced rates introduced to help meet social, cultural and other objectives. (…)** support to low-income households can be better achieved through more direct mechanisms such as income-tested cash transfers (i.e. benefits).” OECD (2015) in European Commission (2015), Tax Reforms in

EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.

“(…) over the last decades, an overwhelming body of legal and economic evidence has built up against the use of multiple VAT rates structures. Applying more than one rate of VAT gives rise to significant legal difficulties, creates economic distortions, and it is at best unclear whether it actually has the social and distributional effects that it aims to achieve.” De la Feria, Rita, Walpole, Michael (December 4, 2020), The Impact of Public Perceptions on General Consumption Taxes. *British Tax Review*. 67/5, 637-669.

See also:

Thomas, A. (2020), Reassessing the regressivity of the VAT, OECD Taxation Working Papers, No. 49.

EPRS (2021), Value added tax – VAT gap, reduced VAT rates and their impact on compliance costs for businesses and on consumers.

^[300] Consultancy.eu (August 4, 2020), A smoking milestone: EU cigarette consumption below 500 billion.

^[301] European Commission (Accessed August 17, 2021), Tobacco.

^[302] European Commission (May 20, 2021), Public Health: EU Tobacco Products Directive is delivering but stronger action is needed. Press release.

^[303] Zafeiridou M, Hopkinson N.S., Voulvoulis N. (2018), Cigarette smoking: an assessment of tobacco's global environmental footprint across its entire supply chain, and policy strategies to reduce it. World Health Organization.

^[304] Novotny, T.E., Slaughter, E. (2014), Tobacco Product Waste: An Environmental Approach to Reduce Tobacco Consumption. *Curr Envir Health Rpt*, volume 1,

^[305] **“Firstly, differences in standard and reduced rates, exemptions and VAT registration thresholds lead to uneven competition in the EU internal market as they de facto subsidise products and industries that are subject to non-standard rates. Secondly, the current system of multiple VAT rates increases the compliance burden which distorts competition in the internal market further.4 Thirdly, the diversification of VAT rates creates an incentive to exploit price differences across countries by shifting consumption to Member States with lower VAT rates. Finally, the diversified VAT systems distort revenue collection by governments and thus potentially lead to tax competition among Member States.”** EPRS (2021), Value added tax – VAT gap, reduced VAT rates and their impact on compliance costs for businesses and on consumers.

^[306] European Commission (Accessed August 20, 2021), Action Plan on VAT.

^[307] European Commission (2018), Proposal for a Council Directive amending Directive 2006/112/EC as regards rates of value added tax.

^[308] The proposal includes changing the current positive list (which goods or services may be subject to a reduced rate) to a negative list (which goods or services must be subject to the standard rate). The proposal also includes allowing for a third reduced rate of below 5%. European Parliament (June 24, 2021), Modernised VAT rate regime in the European Union. 2018-01. Legislative Train.

^[309] Wichman, Sam (February 17, 2021), Are New VAT Rate Freedoms Coming for EU Member States in 2022? Sovos.

^[310] European Commission (2021), Business Taxation for the 21st Century.

^[311] European Commission (2021), Excise duty tables. Part III - Manufactured Tobacco. Situation as at 01/07/2021.

^[312] **“On 19 October 2020, the European Commission published its work programme for 2021. In the annexes accompanying the work programme, the Commission announces a revision of the Council Directive 2011/64/EU on excise rules for tobacco. The revision is foreseen for the fourth quarter of 2021 and will be accompanied by an impact assessment.”** European Parliament (October 23, 2020), Tobacco Directive Revision / 2020-10.

“The evaluation shows a low degree of coherence of the Directive with other EU policies and the need to develop synergies. There is a need to have a more comprehensive and holistic approach, taking on board all aspects of tobacco control including public health, taxation, the fight against illicit trade and environmental concerns. More coherence is also needed in view of the EU agenda in the fight against cancer.” “The European Commission has identified tobacco filters among the top five most common pieces of litter found on beaches⁶⁴. With the adoption of the single use plastics Directive and the introduction of an Extended Producer Responsibility scheme manufacturers are expected to cover the costs of waste management and clean-up, as well as awareness raising measures for tobacco products with filters (such as cigarette butts). The Single Use Plastics Directive⁶⁵ also foresees that Member States should promote a wide range of measures to reduce litter from post-consumption waste of tobacco products with filters containing plastic.”

European Commission (2020), Evaluation of the Council Directive 2011/64/EU of 21 June 2011 on the structure and rates of excise duty applied to manufactured tobacco.

“Tobacco taxation is seen as the most cost-effective instrument to reduce tobacco consumption and prevalence. The high number of smokers in the EU remains a major concern with 26% of adults and 29% of young people smoking, and with price gaps between EU countries fuelling unintended cross-border shopping. (...) This initiative is part of the EU’s beating cancer plan. It will take a comprehensive approach that in

addition to taxation addresses public health, illicit trade and environmental concerns.” European Commission (Accessed November 8, 2020),

^[313] European Parliament (Accessed July 22, 2021), Reduction of food waste. Legislative train.

^[314] **“Global food loss and waste generate annually 4.4 GtCO₂ eq, or about 8% of total anthropogenic GHG emissions (5). This means that the contribution of food wastage emissions to global warming is almost equivalent (87%) to global road transport emissions (6)”**. FAO (Accessed July 22, 2021), Food wastage footprint & Climate Change.

^[315] European Commission (2021), Excise duty tables. Part III - Manufactured Tobacco. Situation as at 01/03/2021.

^[316] European Commission (2021), Annual Report on Taxation 2021.

^[317] European Commission (Accessed February 3, 2022), Data on Taxation. Data updated in February 2021, including tax revenue data up to 2019. Table EU-27.1: Tax Revenue.

^[318] Eurostat (Accessed April 12, 2022), Tax rate on low wage earners: Tax wedge on labour costs.

^[319] **“The risk of poverty or social exclusion in the EU involves a combination of three main factors: monetary poverty, severe material deprivation and/or very low work intensity. Monetary poverty was the most prevalent form of poverty and social exclusion in 2019, with 16.5 % of the EU-27 population (72.4 million persons) being at risk of poverty, to a rather small extent combined with one or both of the other two factors.”** European Parliament Members’ Research Service (2021) Demographic outlook for the European Union 2021.

^[320] Eurostat (2020), Over 20% of EU population at risk of poverty or social exclusion in 2019.

^[321] Eurostat (2020), Over 20% of EU population at risk of poverty or social exclusion in 2019.

^[322] Eurostat (2018), Living conditions in Europe: 2018 edition.

^[323] European Commission (December 11, 2019), The European Green Deal.

^[324] European Commission (2021), The European Pillar of Social Rights Action Plan.

^[325] The measures should not be based on the wage bill, as higher incomes would then weigh more heavily.

^[326] Eurostat (Accessed April 11, 2022), Labour market slack by sex and age - quarterly data.

^[327] Eurostat (Accessed April 11, 2022), Labour market slack by sex and age - quarterly data.

“Labour market slack refers to all unmet needs for employment, including unemployment according to the ILO definition as well as three supplementary indicators.

The exact definitions of these three indicators are as follows: - Underemployed part-time workers are people working part-time who wish to work additional hours and are available to do so. Part-time work is recorded as self-reported by individuals. - Jobless persons seeking a job but not immediately available for work are the sum of people neither employed nor unemployed who: (a) were actively seeking work during the last 4 weeks but not available for work in the next 2 weeks; or (b) found a job to start in 3 months or less and are not available for work in the next 2 weeks; or (c) found a job to start in more than 3 months, or (d) were passively seeking work during the last 4 weeks and are available for work in the next 2 weeks. - Jobless persons available for work but not seeking it are people neither employed nor unemployed who want to work, are available for work in the next 2 weeks but are not actively seeking work." Eurostat (Accessed April 11, 2022), Labour market slack - annual statistics on unmet needs for employment.

^[328] Eurofound (2021), Living and working in Europe 2020, Publications Office of the European Union, Luxembourg.

^[329] "In 2013, there were 4.5 million internships in Europe: 60% of them were unpaid; 40% didn't even include a formal contract with employers; and over half (51%) of those interns who were paid said the amount was not sufficient to cover their basic living costs." Debating Europe (September 21, 2015), Are young Europeans doomed to a life of internships?

HEC (2017), The Problem of Unpaid Internships: Legal Guide to Complaints Under the European Social Charter.

^[330] European Commission (2021), The European Pillar of Social Rights Action Plan.

^[331] "Europe must strive to (...) decrease the rate of young people neither in employment, nor in education or training (NEETs) aged 15—29 from 12.6% (2019) to 9%, namely by improving their employment prospects." European Commission (2021), The European Pillar of Social Rights Action Plan.

^[332] European Commission (2021), The European Pillar of Social Rights Action Plan.

^[333] World Economic Forum (2020), The future of jobs report 2020.

^[334] European Commission (2020), 2020 EU Industrial Research and Development Scoreboard: EU companies remain robust and increase investment amidst stiff global competition.

^[335] In Dutch: *Wet Bevordering Speur- en Ontwikkelingswerk (WBSO)*. Accountancy Morgen (5 juni 2020), *Vorig jaar 1,2 miljard euro voordeel behaald uit WBSO-regeling*. [€1.2 billion in benefits from WBSO arrangement last year]

^[336] Ministry of Finance of the Netherlands (2020), *Fichebundel beleidsopties. Bouwstenen voor een beter belastingstelsel* [Building blocks for a better tax system].

^[337] European Commission (2021), The European Pillar of Social Rights Action Plan.

^[338] Adults aged 25-64. European Commission (2020), European Skills Agenda for Sustainable Competitiveness, Social Fairness and Resilience.

^[339] European Union (Accessed October 14, 2021), Contribution to the Green Deal and the Just Transition Scheme

^[340] European Commission (2021), Business Taxation for the 21st Century.

^[341] "The top ten models (PRIMES, GEM-E3, PIRMES-TREMOVE, GAINS, TREMOVE, PROMETHEUS, POLES, QUEST, E3ME and CAPRI, see Figure 4) were used in two thirds (114, or 66%) of the total number of IAs supported by models (see also Annex 7.1)." Acs, S., Ostlaender, N., et al. (2019), Modelling for EU Policy support: Impact Assessments, EUR 29832 EN, Publications Office of the European Union.

^[342] Stepping up Europe's 2030 climate ambition - Investing in a climate-neutral future for the benefit of our people' (commonly known as the 2030 EU Climate target plan). European Commission (2020), Stepping up Europe's 2030 climate ambition - Investing in a climate-neutral future for the benefit of our people.

"The Impact Assessment accompanying this Communication demonstrates that an emissions reduction of 55% by 2030, compared to 1990 levels, is both economically feasible and beneficial for Europe, with proper policies in place. (...) The Commission's Impact Assessment shows that a 55% cut in emissions achieved through increased use of carbon pricing, while recycling revenues to low income households can address income impacts for these households and at the same time still stimulate a switch to low-carbon technologies. (...) The Impact Assessment indicates that in particular in situations where the economy is performing below capacity, GDP will increase due to the investment stemming from increased climate ambition. Similarly, the use of carbon revenues in general could lead to a reduction of labour taxation with positive effects on employment. Investing in a modern, circular economy will help provide durable and new green jobs in a climate constrained world. (...) economic impacts will be more positive if the regulatory tools allow for appropriate price signals and a tax shift, with carbon pricing revenues being used to reduce distorting taxes or to invest in innovation and modernisation towards a green economy." European Commission (September 17, 2020), The 2030 Climate target plan.

"Three modelling tools sharing this common baseline are used to assess the macroeconomic impacts of the increased level of climate ambition for 2030: the Joint Research Centre's JRC-GEM-E3, Cambridge Econometrics' E3ME and DG ECFIN's EQUEST. (...) "Under the standard setup of the JRC-GEM-E3 model, wages are fully flexible and unemployment remains at the level of the baseline, which means that aggregate employment is not affected at all. The model can nevertheless represent imperfections in the labour market and involuntary unemployment. In such a setting, together with

the lump-sum redistribution of carbon revenue to households, the 55% fragmented action scenario generates a small negative effect on aggregate employment by 2030, equivalent to a loss of around 494 000 jobs (0.26%) in 2030. However, if carbon revenues are used instead to reduce labour taxation, the reduction in associated distortions and impact on labour costs is susceptible to generate a limited positive impact on aggregate employment under the 55% fragmented action scenario, equivalent to an increase of around 110 000 jobs (0.06%) in 2030 (Table 22).” European Commission (September 17, 2020), Impact Assessment. Commission Staff working document.

^[343] European Commission (2018), The 2018 Ageing Report. Economic & Budgetary Projections for the 28 EU Member States (2016-2070).

European Commission (2016), EU Reference Scenario 2016. Energy, transport and GHG emissions Trends to 2050.

OECD (2020), OECD Economic Outlook. Volume 2020 Issue 1.

With regard to mitigation (innovation) towards low-carbon technologies, the sectors are calibrated to the PRIMES baseline. A number of sectors are not calibrated to PRIMES. These are the sectors solved by the Future Technology Transformation (FTT) modules, namely: power generation, passenger road transport, iron & steel, and residential heating. The EU ETS baseline price has been constructed using the approximate growth rate of the EU ETS price in the PRIMES 2016 Reference Scenario (2020-2030 price increase in Reference Scenario applied to the historical 2019 ETS price to calculate estimated baseline 2030 price). The price level was not used, given the substantial increase in the baseline price over the years since 2016. The baseline E3ME inflation rate was used to inflate the real price presented in the Reference Scenario.

€/ tCO ₂	2018	2019	2020	2021	2022	2023	2024
Baseline	15.79	24.84	26.67	28.63	30.73	32.99	35.42
Scenario	15.79	24.84	26.67	31.36	36.88	43.38	51.02

€/ tCO ₂	2025	2026	2027	2028	2029	2030
Baseline	38.02	40.82	43.82	47.04	50.50	54.21
Scenario	60.00	61.17	62.41	63.68	64.98	66.31

^[344] Computable general equilibrium (CGE) models are built on the premise that unemployment is always temporary and voluntary, and that after every policy measure the economy eventually springs back to the previous equilibrium (for example, in terms of unemployment). This is because it is assumed, among other things, that when labour is scarce, the trade union movement ensures that wages rise, which in turn reduces the demand for labour. A number of recent phenomena, such as lower union

membership rates (in the Netherlands, for example, in 2019, only 18% of the employed population was a member of a union) and widespread involuntary, low-paid temporary and informal work, do not fit in with these assumptions. Another disadvantage of general equilibrium models is that the theoretical basis under the equilibrium models does not take into account negative externalities such as health effects from air pollution, and the negative effects of, for example, climate change (rising sea levels, drought, flooding, salinisation, etc.). Also, such models cannot cope with the assumption that tax reform will allow companies to use labour-intensive activities more profitably versus resource-intensive activities, and that this may structurally increase the demand for labour. A shift to circular business models and services therefore does not fit in these models.

^[345] The same labour tax reduction applies to self-employed persons.

^[346] Thomas, A. (2020), Reassessing the regressivity of the VAT, OECD Taxation Working Papers, No. 49.

^[347] The Ex'tax Project (et al.) (2021), *Deltaplan Belastingen voor een Circulaire en Sociale Economie. Routekaart 2021-2030* [Deltaplan Taxes for a Circular and Social Economy. Roadmap 2021-2030].

^[348] The Dutch system of social security contributions, income allowances and tax credits is complicated to the extent that households lack clarity as to their disposable income and employers face highly complex payroll administration requirements. A simpler system would benefit everyone involved, including the tax authorities. A first step could be to use the income in the previous year as the starting point for the benefits system. This would prevent the situation in which households are faced with unexpected claims. Secondly, the tax credits could be gradually abolished, in which case they would be more than compensated by tax cuts (e.g., through a negative income tax). Thirdly, the social security contributions and employee insurance contributions could be simplified and – in conjunction with the changes proposed in this report – increasingly paid from general resources. This would create a basic insurance for all Dutch citizens which is less dependent on employment history, and thus also a more level playing field between employees, flex workers and the self-employed. The employer's share of employee contributions could be simplified and reduced by setting general minimum percentages, applicable to all sectors and for all types of work (permanent, temporary or flexible). This would also establish the minimum amount paid by flex workers and the self-employed, so that costs and benefits are more evenly distributed.

^[349] This is “a procedure where a minimum of 9 EU Member States are allowed to set up advanced integration or cooperation in a particular field within the EU, when it has become clear that the EU as a whole cannot achieve the goals of such cooperation within a reasonable period.” EUR-lex (Accessed July 10, 2021), Enhanced cooperation.

^[350] **“Community policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Community. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay. Environmental protection requirements must be integrated into the definition and implementation of other Community policies.”** Article 130R(2), EC Treaty, as amended by the Maastricht Treaty of 7 February 1992.

“Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.” Article 191(2) of the Consolidated version of the Treaty on the Functioning of the European Union.

^[351] **“The Coalition of Finance Ministers for Climate Action brings together fiscal and economic policymakers from over 60 countries in leading the global climate response and in securing a just transition towards low-carbon resilient development. (...) Since its launch, finance ministers from over sixty countries have signed on to the ‘Helsinki Principles’, a set of six principles that promote national climate action, especially through fiscal policy and the use of public finance. (...) The Coalition will help countries mobilize and align the finance needed to implement their national climate action plans; establish best practices such as climate budgeting and strategies for, green investment and procurement; and factor climate risks and vulnerabilities into members’ economic planning.”** Coalition of Finance Ministers for Climate Action (Accessed February 9, 2022), Website.

Helsinki Principle 3 states: **“Carbon pricing mechanisms are typically best implemented as part of wider environmental tax reforms, while being mindful of the distributional impacts and using the revenues to support development objectives.”** The Coalition of Finance Ministers for Climate Action (December 9, 2019), Overview of the Santiago Action Plan for 2020.

^[352] Established in 1938, the International Bureau of Fiscal Documentation (IBFD) is a non-profit foundation that has developed the largest collection of up-to-date tax legislation in over 200 jurisdictions. IBFD (Accessed February 9, 2022), Website.

^[353] **“The HLEG comprised 20 senior experts from civil society, the finance sector, academia and observers from European and international institutions. The group was mandated to provide advice to the Commission on how to steer the flow of public and private capital towards sustainable investments, identify the steps that financial institutions and supervisors should take to protect the stability of the financial**

system from risks related to the environment [and] deploy these policies on a pan-European scale.” European Commission (July 3, 2020), High-Level Expert Group on sustainable finance (HLEG).

^[354] European Commission (Accessed February 9, 2022), EU taxonomy for sustainable activities. What the EU is doing to create an EU-wide classification system for sustainable activities.

^[355] **“DG REFORM chairs the Inter-Service Group on Public Administration Quality and Innovation (IGPA), which is a network that provides a platform for Commission services’ coordination and sharing of knowledge on public administration and governance.”** European Commission (Accessed February 9, 2022), Public Administration and Governance policy making.

In December 2021, an Expert Group on Public Administration and Governance was established, which will advise the Commission and ‘be a forum for dialogue with EU Member States on reforms’. The Director-General of the Commission’s Structural Reform Support (DG REFORM) will chair the expert group, and all relevant Directorates-General of the European Commission will be involved in the group’s operations. Members will also include representatives from the national ministries and local and regional level administrations, international organisations, EU bodies and research networks. European Commission (December 17, 2021, Commission decides to set up a group of experts on public administration and governance.

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