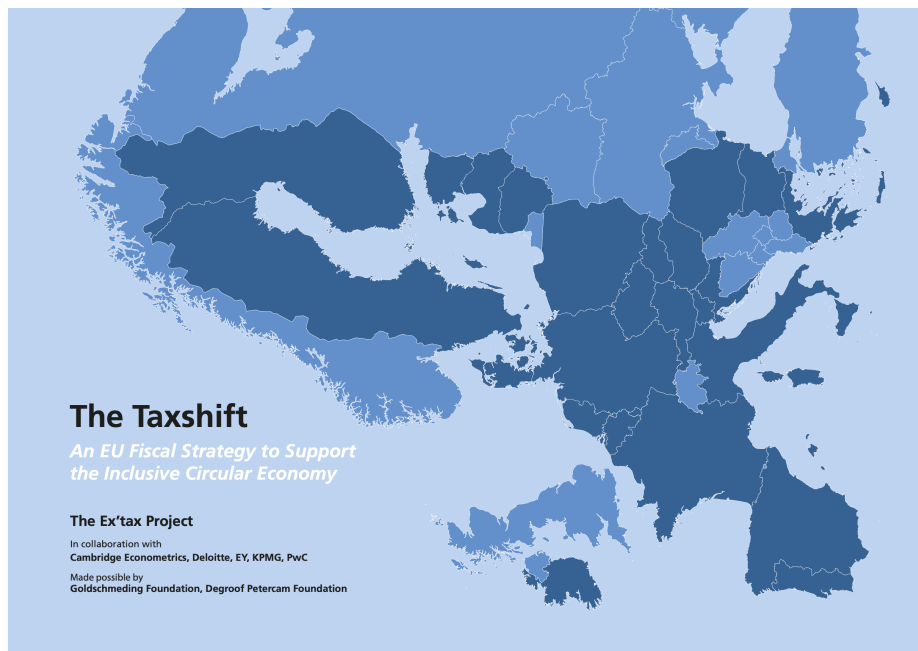


The Taxshift

An EU fiscal strategy to support the inclusive circular economy

Country case study results

Luxembourg



April 2023

The Ex'tax Project Foundation
www.ex-tax.com



Executive summary

The European Green Deal includes a commitment to shift the tax burden from labour to pollution and resource use. The 2022 study titled *'The Taxshift. An EU fiscal strategy to support the inclusive circular economy'* presents a roadmap for such a rebalancing of the tax mix, both at national levels and in an EU context. For each of the 27 Member States Cambridge Econometrics has modelled the impacts of a set of example taxshift measures that could shift the tax burden from labour to resource use and pollution.

This document provides information on the scenario and its key impacts in the case of Luxembourg, as reviewed and adjusted based on consultations with the Sustainable Development Committee of Luxembourg (*Conseil Supérieur pour un Développement Durable*) and on additional national statistics provided by STATEC with regard to the Luxembourgish context of frontier work.

Among EU Member States, Luxembourg has the second lowest share of environmental taxes, at 1.4% of GDP. And while green taxes provide only 3.8% of total tax revenues, labour taxes provide 47.3% of total tax revenues. A mere 0.03% of tax revenues are based on resource use and pollution. This means that the Polluter Pays Principle is not consistently applied.

The scenario under review is broad-based and includes 20 measures, each with their own dynamics and impacts. Some of the measures increase costs for business sectors and consumers, as pollution and resource use are priced at increasing rates. Other measures reduce labour taxes, which lowers costs for employers and enhances spending power, especially for the lowest two income quintiles. The net results of these two forces prove to have a positive impact on the economy, society and the environment.

In the scenario, GDP levels in the Luxembourg in 2025 are 0.5% higher and employment levels are 1.4% higher than business as usual. At the same time, CO₂ emissions have fallen by 11.6%. In 2025, compared to baseline, the scenario increases output in all broad sectors except Energy and Utilities (-1.8%). This negative impact is more than compensated by increases in output in other sectors.

Over a five-year period, the scenario shifts a total of €7.3 billion in tax revenues (non-discounted) in Luxembourg. Key cumulative impacts are (compared to the baseline):

- Adding €0.4 billion to GDP
- Adding 23,500 person years of employment (almost half of which (11,200) are likely to be filled by cross-border workers).
- Investing €183 million in infrastructure.
- Saving 3.8 million tonnes of carbon dioxide emissions.
- Saving €0.5 billion on the energy import bill.

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. GDP and employment continue to increase after 2025 in the scenario, albeit at lower rates than the period between 2021 and 2025.

The results indicate that a budget-neutral taxshift is an effective strategy to align the tax system with the goals of green and inclusive economic growth.

Sustainability is becoming a race to the top, with more and more countries and businesses committing to circularity and climate neutrality. Half of all greenhouse gas emissions are related to materials management activities and the competitiveness of economies will increasingly depend on their resource efficiency. Companies that 'do more with less' will gain a competitive advantage in the current climate. A taxshift levels the playing field for inclusive and circular businesses.

The Taxshift scenario was designed in an EU context. As a next step, the general principle could be taken, and adapted to national circumstances. For Luxembourg, a country-specific scenario and roadmap could be drawn to map suitable policy options and to allow for a macro-economic modelling exercise by the designated national research agencies.

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1. Introduction

Luxembourg and the other 26 Member States of the European Union are facing unprecedented challenges. Saving energy and reducing fossil fuel and materials import dependence are at the top of the agenda, as they are critical to solving both the energy crisis and the climate crisis. At the same time, governments are facing major socio-economic challenges including soaring inflation, rising labour costs, poverty and social unrest. Integrated solutions will be needed, tackling environmental and socio-economic issues simultaneously.

The Ex'tax Project Foundation, in collaboration with Cambridge Econometrics and fiscal experts of Deloitte, EY, KPMG and PwC, has explored opportunities to align the tax system by reallocating the tax burden, shifting towards higher taxes on natural resource use and pollution and using the revenues to lower the tax burden on labour and increase smart public investments (the 'taxshift'). The European Green Deal includes a commitment to shift the tax burden from labour to green taxes, and the principles are supported by, amongst others, the United Nations, the OECD, the World Bank and the IMF. Box 1 presents a selection of quotes.

Box 1: Support for the taxshift is growing

A selection of quotes¹

The European Green Deal:

"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."

OECD:

"Lowering taxes on labour and capital, in favour of taxing environmentally harmful consumption and production, can stimulate job creation and investment, improving economic efficiency."

World Business Council for Sustainable Development (WBCSD):

"Shift the burden of taxation from "goods" (eg., employment) to "bads" (eg., pollution)."

World Bank:

"(...) taxing economic "bads" (in this case carbon emissions) and using the revenues to reduce distortionary taxes on economic "goods" (labor and capital) should increase the efficiency of the overall tax system. The increase in efficiency from broader tax reform has the potential to provide a double dividend, both improving environmental outcomes and increasing overall economic activity."

**U.N. Secretary-General
António Guterres:**

"Solutions exist. First, let's shift taxes from salaries to carbon. We should tax pollution, not people. Second, stop subsidizing fossil fuels."

**IMF Managing Director
Kristalina Georgieva:**

"What we want to see is, very simply, to move the revenue raising objectives of governments from taxing people, taxing labour, to taxing pollution."

The 2022 'Taxshift' report² presents a roadmap for such a rebalancing of the tax mix, both at national levels and in an EU context. Based on the Ex'tax Toolkit (Annex 1 and Annex 2), it also assesses the impact of 20 example taxshift measures that decrease the tax burden on labour while increasing taxation of resource use and pollution. Cambridge Econometrics modelled the results for the 27 EU Member States, including Luxembourg, applying the E3ME model. E3ME is one of the ten most used models for European Commission assessments. Over the 2021-2025 period, the results of the scenario for all Member States indicate higher GDP, higher employment levels, lower carbon emissions and lower energy import dependency.³

Based on in-depth discussions with the Sustainable Development Committee of Luxembourg (*Conseil Supérieur pour un Développement Durable* or CSDD) and additional national statistics provided by STATEC, this report provides insights in the results of the scenario in Luxembourg. It is meant as a starting point for a debate around the role of taxation in achieving the goals of the circular economy in Luxembourg and provides some recommendations for the development of national scenarios for tax reform.

It's important to note that this paper covers only a selection of aspects. The measures have been assessed based on the availability of publicly available European data and modelling limitations. In case of implementation of any of the proposals, it will be necessary to assess more country-specific data, contexts and needs. National statistics and planning bureaus will be able to provide guidance based on more granular and more consistent data sets.

2. Relevance to Luxembourg

This section will provide a selection of indicators to illustrate the relevance of a taxshift from labour to pollution and resources in Luxembourg.

Energy, climate and circular economy goals

If the global population lived like the inhabitants of Luxembourg, 7.8 earths would be needed.⁴ This large footprint is related to particular characteristics of the economy, such as the scale of 'fuel tourism'⁵ and cross-border work.⁶ These characteristics raise the bar for achieving the country's key environmental goals. Luxembourg and the European Union have high ambitions in the field of sustainability. Luxembourg's National Energy and Climate plan (NECP) presents several objectives, including a 2030 national climate target of 55% (compared to 2005).⁷ According to the IEA (2020):

*"Luxembourg is pushing for net-zero GHG emissions and 100% renewable electricity by 2050. Its ambitious energy sector targets (especially the 50-55% GHG reduction by 2030) will require a significant shift in its carbon-intensive energy mix, particularly in relation to the heavy reliance on oil in the transport sector."*⁸

In 2021, the share of energy from renewable sources was only 11.7% in Luxembourg. This was the lowest share in the EU27.⁹ By 2030, Luxembourg aims to cover over a third of electricity demand with renewables.¹⁰ The energy mix, according to the International Energy Agency (IEA), is unsustainable:

*"Low energy prices for consumers are creating a barrier to the investments needed in energy efficiency and renewables. And the country has a fossil fuel-intensive energy mix driven by a high demand for transportation fuels, notably from transiting freight trucks. (...) Low taxes result in low electricity, natural gas and heating oil prices providing little incentive to invest in renewables and energy efficiency. Low fuel prices decrease the advantage of EVs and higher efficiency vehicles and encourage non-residents to fuel in Luxembourg."*¹¹

In addition to clean energy targets, Luxembourg is also committed to transitioning to a circular economy.¹² Much like the rest of the EU, Luxembourg still has a long way to go to achieve a regenerative and circular economy. A few indicators:

- 9.2 million tonnes of waste are generated each year.¹³
- Food waste is 147 kg per capita per year (the seventh highest in the EU).¹⁴
- The external costs of air pollution and greenhouse gas emissions are estimated at €3 billion per year.¹⁵

Socio-economic challenges

With unemployment as low as 4.8% in February 2023,¹⁶ job creation may not be as high a priority in policy making as in other EU Member States. However, some other indicators suggest that socio-economic challenges still deserve the attention of policy makers in Luxembourg:

- In 2022 (the latest available data), youth unemployment was almost four times as high as overall unemployment, at 17.6% versus 4.6%.¹⁷
- The unmet need for employment (the so-called 'labour market slack') is 11.1% of the extended labour force, representing 38,000 people.¹⁸
- 109,000 citizens (18% of the population) are at risk of poverty or social exclusion.¹⁹
- The tax wedge (the difference between an employer's total wage costs and the employee's net wage) is 31.8% for low wage workers.²⁰ This means that for every euro an employer pays in labour costs, only €0.68 ends up in the pocket of the employees. According to the OECD, "The average tax wedge measures the extent to which tax on labour income discourages employment."²¹

The IMF country report 2022 mentions high housing costs as a key topic in Luxembourg, as well as income inequality, construction sector labour shortages, the need for re-skilling of workers and labour market opportunities for older workers.²²

EU tax systems are still aligned with the linear economy

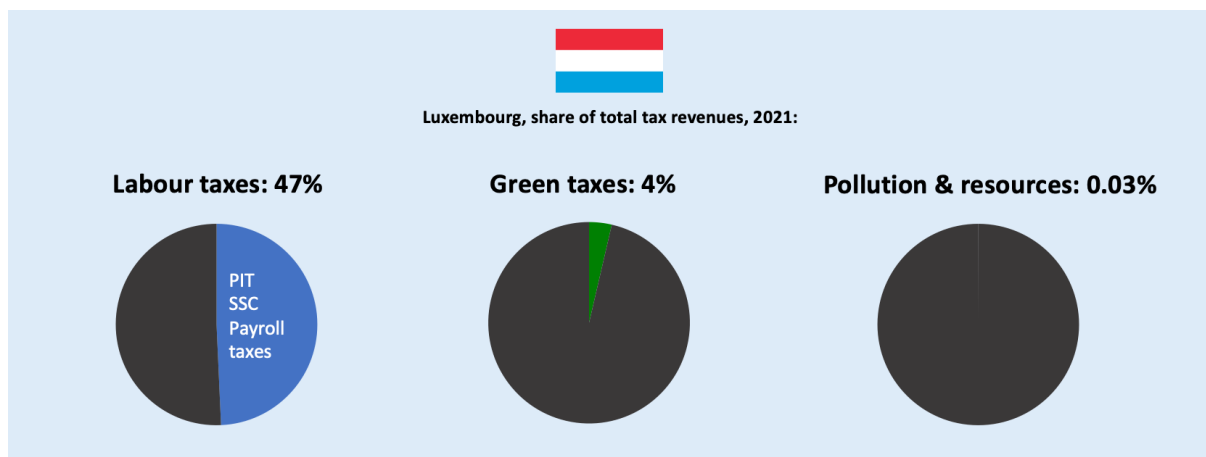
The challenge will be to develop tax systems that support the environmental ambitions while serving social societal needs. Among EU Member States, Luxembourg has the second lowest share of environmental taxes, at 1.4% of GDP. And while green taxes provide only 3.8% of total tax revenues, labour taxes (personal income tax, social security contributions and payroll taxes) provide 47.3% of total tax revenues in Luxembourg. A mere 0.03% of tax revenues are based on resource use and pollution (see Figure 1).²³ Annexes 3 and 4 provide a comparison to other EU Member States.

Circular business models tend to be more labour intensive than linear business models. It takes more time, attention, and innovative thinking to redesign, repair, recycle and refurbish products. In construction, for example, circular builders know how to 'harvest' materials such as wood and steel from buildings. This retains the value of the materials. It is, however, more labour-intensive -and therefore more costly- than demolition.²⁴ In a tight labour market, especially, this is a significant competitive disadvantage. Similar issues arise 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.²⁵

Shifting the tax burden from labour to resource use and pollution (the 'taxshift') is therefore a key element in the EU Green Deal:

"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." (European Commission 2019)²⁶

Figure 1: Tax structure Luxembourg



The IMF staff report 2021 on Luxembourg advised on several key issues related to the taxshift:

"Luxembourg should continue to explore ways to diversify revenues. These include increasing environmental levies (such as the low transport taxes) and housing taxation (such as outdated property valuations). (...) Environmental taxes provide an attractive revenue source for Luxembourg (...) The scope for increasing fuel taxes is limited, however, by the high elasticity of fuel demand, related to the price-sensitive sales to commuters and transit traffic. Alternative environmental levies can be exploited more, such as vehicle taxes, congestion charges, and taxes on electricity. (...) As the recovery gains strength, the focus of labor market policies should shift from protecting existing jobs to facilitating labor reallocation to new and expanding firms and sectors."²⁷

The scenario under review in this study ties in with several of these key issues, as will be discussed in the next sections.

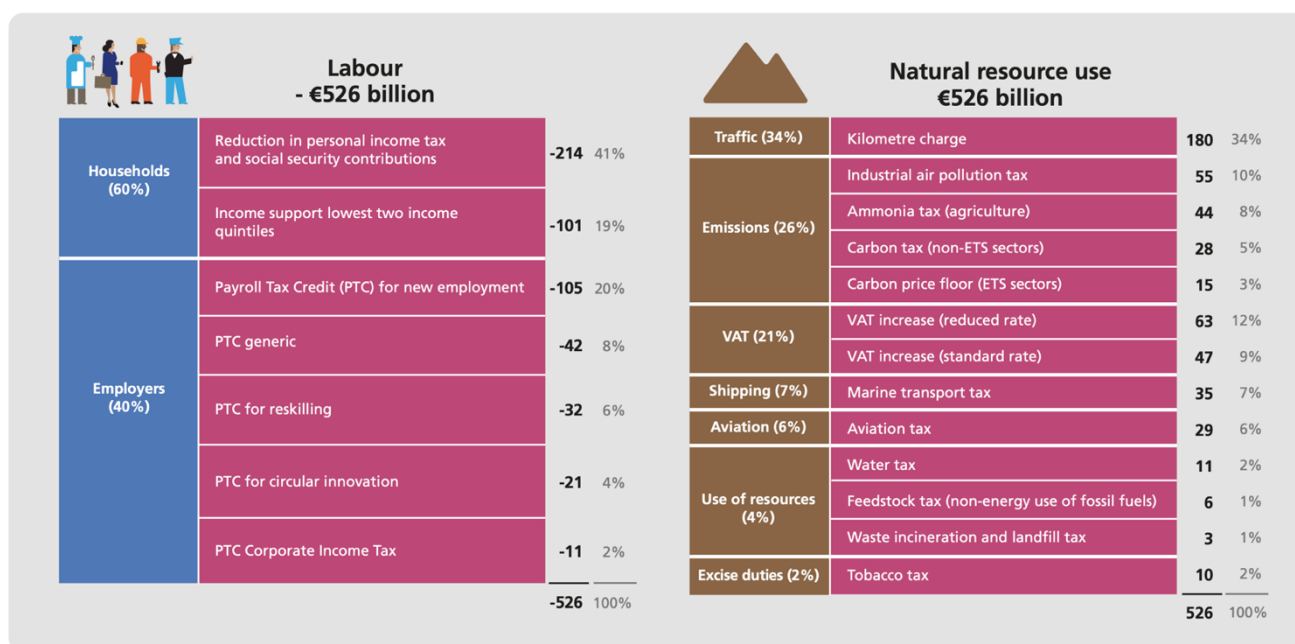
3. The scenario under review

The scenario under review is broad-based and includes 20 measures (Figure 2). Some of the measures raise tax revenues, including a kilometre charge, taxes on carbon and other harmful emissions by industry, aviation, shipping and agriculture, a VAT increase and an additional excise duty on tobacco. Also, taxes are raised on water usage, waste incineration, landfill and feedstock (non-energy use of fossil fuels). The scenario is structured to be budget neutral. In the modelling, all revenues are recycled for social impact. The majority (60%) of the revenues is used to lower the tax burden on labour for households, through a reduction in income tax and social contributions and by providing tax credits or direct income support to the lowest two income quintiles. Employers benefit from several payroll tax credits (PTCs); a generic PTC for all employers, a PTC for employers who increase labour demand (new hires), a PTC for vocational training and retraining, and a PTC for labour costs in circular innovation. Also, a PTC is applied to corporate income tax, for those companies that use (an increase in) profits towards an increase in employment.



Figure 2: Taxshift scenario EU27

(€ billion, in 2025, E3ME)²⁸



Box 2: Key EU27 results

Cambridge Econometrics used the E3ME model to assess the impacts. The modelling results indicate that in the scenario, GDP levels in the EU in 2025 are on average 1.6% higher. Employment levels are 3.0% higher than business as usual. At the same time, CO2 emissions have fallen by 7.1%.

Compared with the baseline, cumulative impacts over the five-year period are: adding €600 billion to GDP, adding more than 16 million person years of employment, enabling €182 billion investment in infrastructure, saving 533 million tonnes in CO2 emissions and saving more than €60 billion on the joint energy import bill.

Real incomes are higher than in the baseline and the results suggest a progressive impact, with more benefits (in relative terms) for lower income households is possible.

Table 1 below provides an overview of the revenue raising measures, their pricing levels and rationale. **Table 2** provides an overview of the use of revenues. Note that all measures are phased in in the model over a five-year period, in each of the 27 Member States.

Table 1: Measures in the scenario – raising revenues

More details are provided in the Taxshift report (www.ex-tax.com/taxshift).

Measure	Details	Rationale
A 'smart' kilometre charge	<p>Rates are differentiated by type of vehicle, weight and fuel use. Part of the revenue is invested in public transport. Annual vehicle tax is abolished.²⁹</p> <p><i>“The price of transport must reflect the impact it has on the environment and on health.” – The European Green Deal³⁰</i></p>	<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. e. Reducing (fossil fuel) import dependency. f. Incentivising more efficient (e.g., smart routing) and cleaner mobility and transport (e.g., public transport). g. Incentivising short supply chains (circular economy) and discouraging excessive transportation (e.g., of livestock).</p> <p>Plus:</p> <ul style="list-style-type: none"> - Taxing use rather than ownership. - Investing in future-proof taxation, considering the loss of revenues from fuel taxes due to electrification. <p>The electrification of road transport, as envisioned by the Fit for 55 Package, will be a game-changer for fuel sales in the EU. By 2035, new petrol and diesel cars may no longer be sold in the EU.³¹ Fuel tourism accounts for an average 75% of fuel sales in Luxembourg.³² In a bid to fight climate change, the Luxembourgish government aims to end fuel tourism,³³ which will significantly impact taxes collected from fuel sales.</p>
An aviation tax	<p>Based on 1) the abolition of aviation fuel duty exemption and 2) climate costs.³⁴</p>	<p>See a, b, c, d, e, f in the previous section, plus:</p> <ul style="list-style-type: none"> - 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. <p>The external costs of aviation in the EU27 are €38 billion per year.³⁵ Luxembourg is the 5th largest freight airport in Europe.³⁶</p>
A shipping tax	<p>Based on part of the external costs of CO2 and NOx emissions.</p>	<p>This measure does not raise revenues in Luxembourg.</p>
A carbon price floor for ETS sectors	<p>A minimum price of €60/tCO2e applied to ETS sectors.³⁷ The price of EU ETS permits has ranged between €5/t in 2017 and €98/t in 2022.³⁸</p>	<p>See a, b, c, d and e.</p>
A carbon tax for non-ETS sectors	<p>A price of €60/tCO2e, applied to the construction sector, agriculture, non-ETS industries and services sectors.³⁹</p>	<p>See a, b, c, d and e.</p>

Air pollution tax (industries)	A tax on industrial air pollution (nitrogen oxides (NOx), sulphur dioxides (SO2) and particulate matter (PM2.5)), based on the external costs. ⁴⁰	See a, b, c and d.
A tax on ammonia emissions to air by the agricultural sector	At 50% of the external costs. ⁴¹ Due to the precarious situation of the sector, other external costs (e.g., water pollution, biodiversity loss) are not yet included in the scenario.	See a, b, c and d. 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. ⁴²
An increase in water taxation	Raising the price of fresh water by 25%. ⁴³	See c and d, plus: internalising external costs. Water scarcity affects 100 million Europeans every year. ⁴⁴ In a circular economy, water and other resources are used in closed loops, retaining their value.
A tax on non-energy use of fossil fuels ('feedstock') in the chemical industry	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 untaxed although significant negative impacts occur in the production, life cycle and end-of-life stages of the materials. In the scenario, a target levy of €1.88/GJ is included. ⁴⁵	See b, c and d, plus: - Levelling the playing field between (finite) fossil resources and secondary, renewable and biobased resources. Policies tend to revolve around end-of-pipe solutions, such as recycling targets, standards and EPR schemes. 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'.
An increase in incineration and landfill tax	The measure is modelled as a cost increase for the waste processing sector at an average rate of 2% of gross output. Of all material resources used in EU economies, only 11.7% comes from recycled products and recovered materials. ⁴⁶ The EU is depending on imports for more than 80% of the raw materials needed for its industry and economy. ⁴⁷	See b, c, d and e. A financial incentive to salvage natural resources. Landfilling, incineration, and incineration with energy recovery are often cheaper than the reuse or recycling of materials. ⁴⁸ The measure improves the business case for the recovery and high-quality reuse of waste streams such as metals and wood. At 793 kilo per capita, Luxembourg has the second highest municipal waste generated in the EU. ⁴⁹
Raising the standard VAT rate	Raising the standard VAT rate to 22% in every Member State. 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. ⁵⁰	<ul style="list-style-type: none"> - Higher taxation of consumption and, therefore, the use of resources in general. - Disincentive to waste products, materials and food. - Creating fiscal space to lower the tax burden on labour. - Simplifying the rate structure and administrative costs for the benefit of the internal market.
Raising the reduced VAT rate (or rates)	Raising the reduced VAT rate (or rates) to 12% in every Member State. Zero-rated items remain so.	See the 'standard VAT rate' section. The measure would raise food prices. It's important to keep in mind, though, that in the EU, every year, 126 million tonnes of food are wasted. This means that there is potential for efficiency gains. ⁵¹ Food waste is responsible for 8% of global GHG emissions. ⁵² Experts agree that reduced VAT-rates are an ineffective tool for income distribution, as high-income groups also benefit from reduced rates. ⁵³
An increase in excise duties on tobacco products	An increase in excise duties related to environmental damage caused during the product life cycle. ⁵⁴	See b and d, plus: discouraging the use of these products. ⁵⁵

Table 2: Measures in the scenario – use of revenues

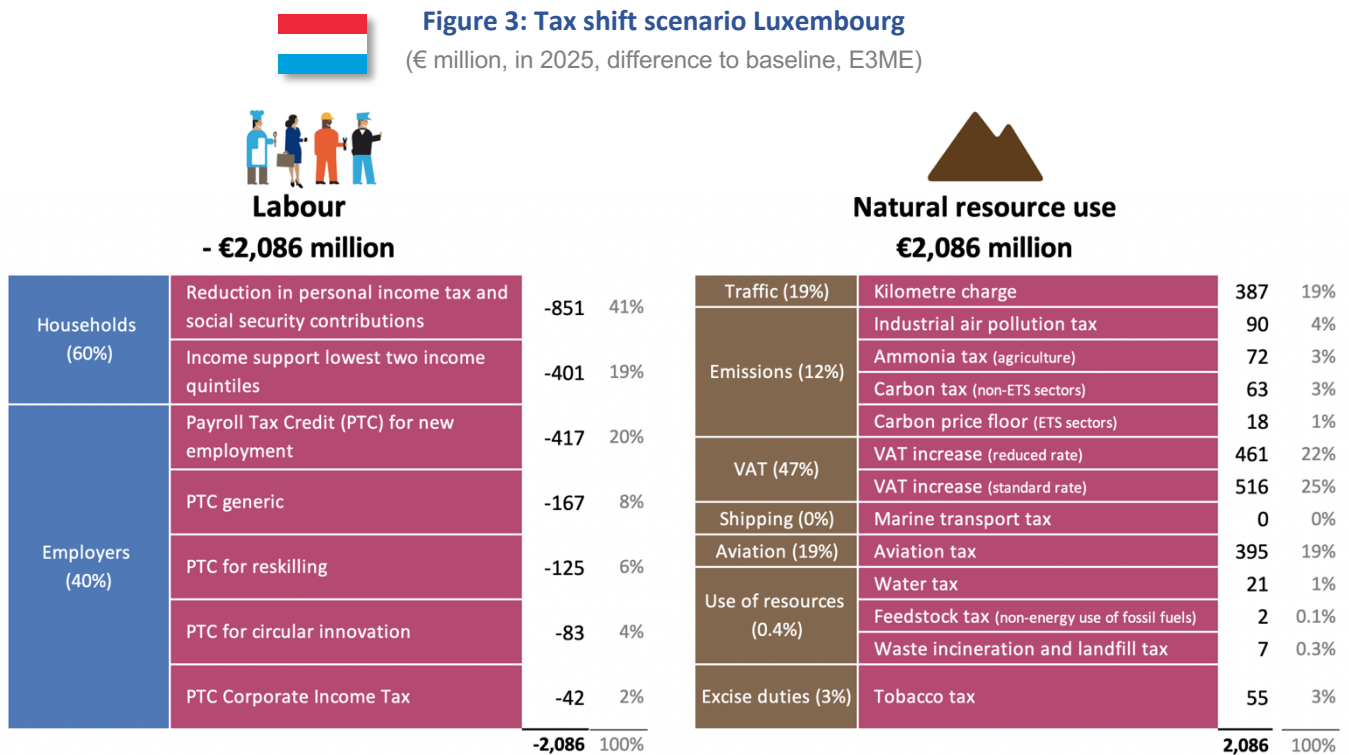
More details are provided in the Taxshift report (www.ex-tax.com/taxshift).

Measure	Details	Rationale
A reduction in personal income tax (PIT) & 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.	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.
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.	See A, B and C above. In Luxembourg, where GDP per capita is the highest in the world, 18% of the population was at risk of poverty or social exclusion in 2021. ⁵⁶ 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%’.
Payroll Tax Credit (PTC) 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.	See A and B. In addition, employers can afford more labour input. In Q3 of 2022 27.4 million Europeans experienced an ‘unmet need for employment’. ⁵⁷
PTC 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.	See the PTC for new employment.
PTC for reskilling	A tax credit to foster investment in human capital. In the modelling the budget is dispersed to sectors based on the shifts in employment.	See B. This budget allows employers to support employees to transition to new jobs or sectors (a ‘skills bridge’).
PTC 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.	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.
PTC 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. In the modelling the budget is dispersed among sectors based on the increase in labour demand.	See B and C. In boardrooms, the attention CIT receives is disproportionate to that given to the employment-related tax take.

4. Impacts in Luxembourg

4.1 Shifting €2.1 billion in taxes in 2025

In 2025, in Luxembourg, the scenario shifts a total of €2.1 billion in taxes as shown in Figure 3:



The Luxembourg results differ in some ways from the other 26 EU Member States. Compared to other Member States, the scenario leans more heavily on the increase in VAT rates, the aviation tax and the kilometre charge, and less on the other resource pricing mechanisms. This is due to a few key characteristics in the case of Luxembourg. The three most important ones are:

- Low VAT rates.** At 17%, Luxembourg has the lowest standard VAT rate in the EU27. The EU average is 21.5%. Luxembourg applies reduced VAT rates of 3%, 8% and 14% to a number of goods and services. The country ranks 26th on consumption taxes as a percentage of GDP.⁵⁸ This explains the larger share of VAT revenues in the scenario.
- GDP largely based on services.** The services sector provides 79.2% of GDP in Luxembourg, 11.3% comes from industry, while agriculture contributes only around 0.23% to the GDP of Luxembourg.⁵⁹ This means that pricing of externalities may raise lower levels of revenues in comparison to Member States with higher shares of agricultural and/or industrial output.
- Energy is imported.** Luxembourg's energy system is characterized by high import dependence and reliance on fossil fuels. In 2018, 95% of its energy supply was imported; 100% of oil, natural gas and biofuels and 86% of electricity were imported.⁶⁰ Since the vast majority of electricity is imported, the associated carbon emissions are accounted for in other countries (which in turn reduces the observable impacts of a carbon tax applied in Luxembourg). The same goes for the footprint of other imported consumer products.

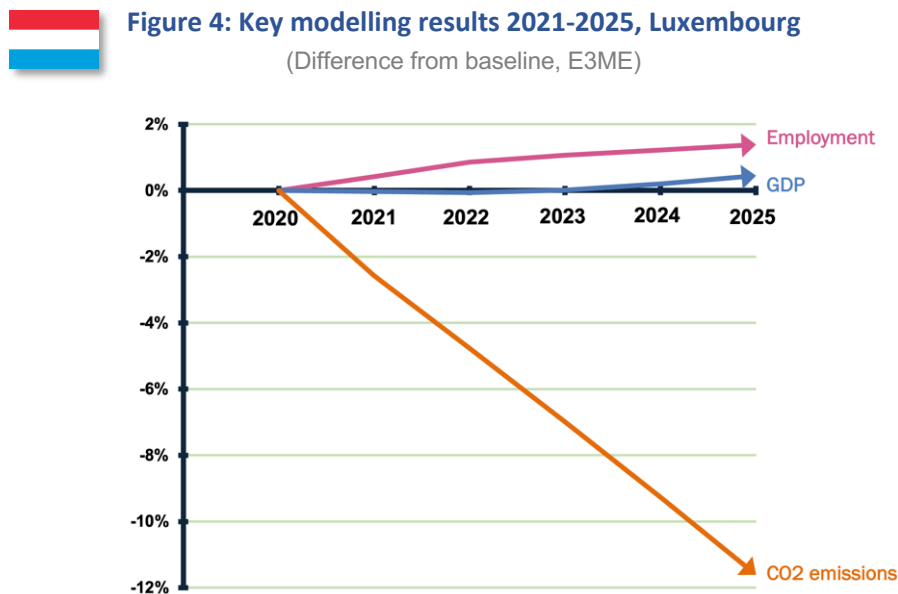
Luxembourg differs from other Member States in another key aspect: cross-border workers represent a much larger proportion of the workforce than in other Member States. In 2021, the share of non-

residents in employment was over 45%. In this analysis, the dynamics in E3ME were adjusted to account for cross-border workers. This was done through estimating the proportion of wage and social security income, in Luxembourg, which accrues to these workers.⁶¹ This is important to capture because whilst additional income for these workers provides positive income effects within the EU, it is a 'leakage' from the Luxembourg economy. Similarly, spending in Luxembourg (e.g., on food and consumer services) by this group is not treated as consumption domestically within Luxembourg, but as an export from Luxembourg to the country of residence of the specific worker.

Despite these characteristics, the taxshift scenario still impacts the Luxembourg economy, employment and the environment in similar ways to other Member States, as will be explained below. It's important to note that in an open and import-dependent economy, collaboration and coordination with neighbouring countries and on EU level will be key to avoid intra-EU border effects.

4.2 Overall impact: green growth and inclusive growth

As mentioned before, the scenario under review is broad-based and includes 20 measures, each with their own dynamics and impacts. Some of the measures increase costs for business sectors and consumers, as pollution and resource use are priced at increasing rates. Other measures reduce labour taxes, which lowers costs for employers and enhances spending power. The net results of these two forces prove to be positive for the economy, society and the environment. As the measures are phased in over the 2021-2025 period, the modelling results demonstrate a further absolute decoupling of GDP and resource use (Figure 4). The economy in Luxembourg shifts towards green growth as it becomes less energy-intensive and less carbon-intensive per million euro of GDP. Also, job growth is larger than GDP growth. This is an indicator of inclusive growth, as per million euro of production, more people find a place in the labour market. The employment and GDP trends are less marked than in other Member States, but still clearly visible. The observed reduction in carbon emissions, on the other hand, is most significant of all Member States.



Observed impacts in Luxembourg in 2025

In its fifth year (2025), on average throughout Luxembourg, the scenario has the following impacts (see Table 3):



Table 3: Key modelling results in 2025, Luxembourg

(Difference from baseline in 2025, E3ME)

GDP	0.5%
Consumption	0.4%
Investment	0.7%
Employment	1.4%
Imports	0.0%
Exports	0.1%
Carbon emissions	-11.6%
Fossil fuel consumption	-11.2%

- **GDP levels are 0.5% higher than in the baseline, adding a total of €298 million (in the year 2025).**

The positive effects of the reduced labour taxes and the associated increased employment offset the negative effects of the price increases. In general, by lowering direct income tax, households have more disposable income to spend. This leads to higher demand for goods and services in the economy.

The magnitude of the GDP effect is smaller than other countries. This is attributable to the fact that many of the line items are minimal for Luxembourg and raise little revenue (given the absence of any substantial industry). Further, the cross-border worker dynamic means that ‘leakage’ from the Luxembourg economy in the taxshift scenario is much higher than in other Member States: a substantial portion of additional wage income, and associated GDP benefits, accrue to workers who reside outside Luxembourg, and therefore their wage income, and a substantial proportion of their spending, accrues to other Member States. Nonetheless, a positive effect on GDP is observed. In 2025, compared to baseline, the scenario increases output in all sectors except Energy and Utilities (more sectoral information is provided below).

- **Employment levels are 1.4% higher, meaning that 6,600 more people can be in employment.**

The increase in jobs is attributable to the payroll tax credit measures specifically designed for new employment. In each sector, employment levels are higher than in the baseline (more details below).

There are enough spare resources (in terms of potential labour force) available in Luxembourg to fulfil the growth in labour demand in the scenario. With a population of 626,108 inhabitants, Luxembourg is Europe's second smallest country.⁶² Before the COVID-19 crisis, in 2019, unemployment stood at relatively low levels at 5.6% (17,000 people).⁶³ The indicator ‘unmet need for employment’ (‘labour market slack’), however, was more than twice as high, at 38,000 people in 2019.⁶⁴ By the fourth quarter of 2022, 38,000 people still experienced an unmet need for employment.⁶⁵

In Luxembourg, the cross-border workforce from neighbouring countries plays an important part. Around 70% of the country's workforce is composed of immigrants or cross-border workers. Some 200,000 cross-border commuters are working in Luxembourg. Representing 50% of that workforce, France provides the largest contingent, followed by Belgium (25%) and Germany (25%). 45% of domestic employment is thus accounted for by cross-border workers. There are also some 10,000 international officials and civil servants.⁶⁶

Although the current level of unemployment is high enough to fill the new jobs, it is likely that new jobs will also accrue to countries within commuting distance. This analysis assumes that the ratio of resident to cross-border workers within each sector, is the same in the new employment opportunities created as in existing employment. Of the 6,600 new jobs, 3,500 jobs are therefore estimated to be filled by Luxembourg residents. The higher proportion of additional jobs which are filled by Luxembourg residents, the larger the benefits to the Luxembourg economy are likely to be.

The imposition of a kilometre charge would affect the cost of commuting via personal road transport (and potentially public road transport). This might impact the decision of frontier workers to seek employment in their country of residence, versus in Luxembourg. It is not clear, *a priori*, that this would necessarily discourage cross-border workers: commuting distance to employment within country of residence may be further than commuting to Luxembourg. Examination of this is beyond the scope of this work.

- **A substantial proportion of the Taxshift is used to target those at the lower income deciles in order to promote a progressive impact, which is observed in other Member States.**⁶⁷
- **Personal income taxes and employee social contributions are reduced by €1.1 billion.** Representing a 9.5% reduction compared to the baseline.
- **Employers' labour taxes are down by €0.8 billion.** On average, the saving per employee is around €1,800 in 2025. Note that the way social security is financed changes; the social protection base does not change.
- **Fossil fuel consumption is down by 11.2%, mainly caused by a reduction in road transport activity.**
- **CO2 emissions are 11.6% lower, which means 1.2 million tons of CO2 emissions are avoided annually.**⁶⁸ This is driven by the reduction in freight and passenger kilometres following the kilometre charge, given that transport makes up such a high proportion of emissions.
- **No aggregate loss of export value.** Higher prices in production create a competitive disadvantage compared to regions outside of the EU. However, increases in export prices are small due to the fact that 1) the additional resource and consumption taxes are compensated by lower labour costs; 2) key export sectors for Luxembourg are service sectors, which are not greatly affected by the taxes; and 3) for sectors strongly affected (e.g., air transport), prices are increasing across the EU as the tax reform is taken up by all Member States, so the loss of relative competitiveness is minimized. Further, a share of additional income accruing to cross-border workers is likely to be spent in Luxembourg. In the scenario, a minor 0.1% increase in export value is observed.
- **No net change in imports. Fossil fuel import is reduced by 7.1%.** While demand and imports of manufactured fuels are reduced, other imports grow slightly due to an increase in economic activity.

4.3 Cumulative results

Cumulative results over the 2021-2025 period are provided in Table 4. As mentioned before, the tax shift scenario assumed a gradual introduction of policy measures from 2021 to reach the full measures by 2025 and remain the same beyond 2025. Since the E3ME model doesn't assume return to equilibrium, GDP and employment continue to increase after 2025 in the scenario, albeit at lower rates than the period between 2021 and 2025. Note that the effects of the *Payroll Tax Credit for Circular Innovation* are not yet included in the results as the impact of innovation efforts during the period 2021-2025 is expected to occur beyond 2025.



Table 4: Key cumulative results 2021-2025, Luxembourg

2021-2025, difference to baseline, E3ME)

Over a five-year period, in Luxembourg, the scenario would shift a total of **€7.3 billion** in tax revenues (non-discounted) with the following cumulative impacts:

- Adding **€0.4 billion** to GDP
- Adding **23,500 person years of employment** (11,200 of which are likely to be filled by cross-border workers)
- Investing **€183 million** in infrastructure
- Saving **3.8 million tonnes** of carbon dioxide emissions
- Saving **€0.5 billion** on the energy import bill.

4.4 Sectoral results

As with any reform, the benefits and costs are not spread evenly, as they depend on the labour-intensity and resource-intensity of businesses and sectors. On an aggregate sectoral level, the following impacts are observed:

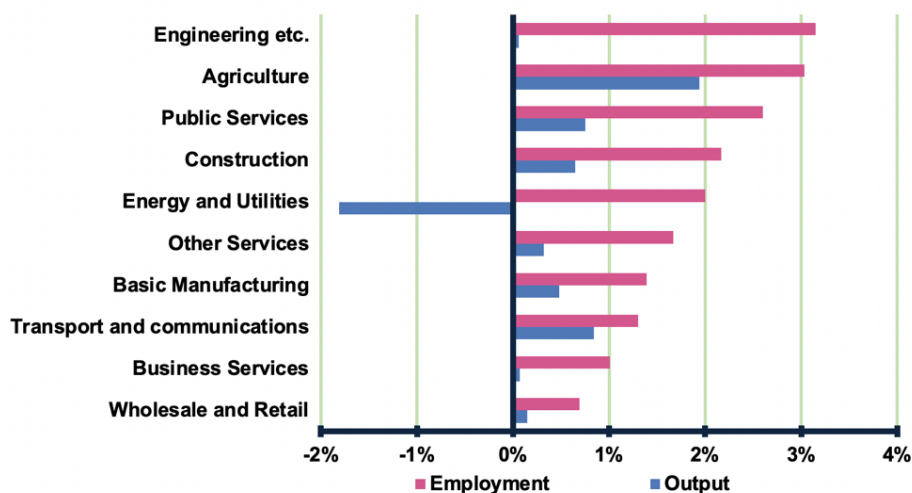
- **Output effects differ across sectors.**

In 2025, compared to baseline, the scenario increases output in all broad sectors except Energy and Utilities (-1.8% or minus €14.9 million). This negative impact is more than compensated by increases in output in other sectors. Business Services grow by 0.1% (€89.9 million), Public Services by 0.8% (€36 million), Transport and Communications by 0.8% (€201 million) and Agriculture by 1.9% (€9 million). The output growth rates are presented in Figure 5.



Figure 5: Sectoral employment and output in 2025, Luxembourg

(Difference from baseline, E3ME)



The main drivers of output growth are consumer expenditure, investment, and exports. Total consumer expenditure is higher, given higher real income. In Luxembourg, this greater expenditure is seen in the consumption (by residents) and exports (consumption by cross-border workers) components of GDP. Consumption increases across several consumption categories following higher total expenditure and substitution away from petrol and diesel. Output increases a similar percentage across most aggregate sectors. This makes sense given a broad-based increase in

consumer expenditure. The main outlier is Energy & Utilities. Demand decreases for water supply and gas supply because of the water and carbon taxes.

- **Employment increases in all sectors.**

In terms of employment, by 2025, all sectors show positive growth rates compared to baseline, ranging from 0.7% in Wholesale and Retail to 3.2% in Engineering (Figure 5). In absolute terms, most jobs are created in the services sector with an increase in employment of 4,700 in 2025. The employment values are mainly driven by the payroll tax credit measures for new employment.

Impact on a business level

Sustainability is becoming a race to the top, with more and more countries and businesses committing to circularity and climate neutrality. Half of all greenhouse gas emissions are related to materials management activities⁶⁹ and the competitiveness of economies will increasingly depend on their resource efficiency. Companies that 'do more with less' will gain a competitive advantage in the current climate.

A taxshift levels the playing field for inclusive and circular businesses, which currently have a double competitive disadvantage. They need to put more time and effort into changing their supply chains and invest in new technologies. At the same time, they need to compete with firms that do not pay for externalities such as health and environmental impacts of their activities.

Every sector represents corporations that have made more progress than others in developing and implementing their social and environmental strategies. Within each sector, a tax shift will likely be of more benefit to businesses that apply innovative, sustainable and more inclusive business models than their competitors; as their pollution bill will go up less than their competitor's, while inclusive businesses will benefit more from the payroll costs reduction.

Governments could opt for additional subsidies for specific lagging or resource-intensive sectors to help them innovate. Such measures would however erode the overall budget to reduce employment costs and would therefore lower the overall economic and social benefits of the scenario. Also, it's worth noting, that even with or without a tax shift, corporations need to adapt to the fast-changing circumstances in the world today. In every sector corporations are reconsidering their business models, in the face of global market challenges, as well as the aforementioned ecological and social megatrends. The tax shift will likely speed up the process of sustainable business model innovation.

5. Recommendations for country-specific scenario planning

Bridging the gap between national and EU policy

Taxation is, in principle, a 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. The Taxshift report provides several tools to support country-specific scenario planning, including the Toolkit (in Annex 1 and Annex 2), the example measures in the scenario (in Figure 3), and a roadmap for the Netherlands as an example.⁷⁰

As indicated, the Taxshift scenario was designed at the EU level, to examine a potential shift in taxation from labour to resource use and pollution. In a next step, the general principle could be taken, and adapted to national circumstances. For Luxembourg, a country-specific scenario and roadmap could be drawn to map suitable policy options and to allow for a macro-economic modelling exercise by the designated national research agencies.

Key learnings from this study

This study indicates that in the case of Luxembourg, the analysis is sensitive to the assumptions regarding, amongst others:

1. The eligibility of Luxembourg non-residents to access the benefits of the revenue uses, e.g., employment created by a potential payroll tax credit for new employment or reskilling program.
2. The proportion of new employment, which would be met by cross-border workers or Luxembourg residents.
3. Design of the kilometre charges. Each EU citizen would pay for kilometres driven, but which government they pay when travelling on foreign territory would need to be discussed (e.g., a French resident driving in Luxembourg might be liable to pay taxes to either the French or Luxembourgian government).
4. Emissions reporting methodology. The modelling attributing emissions according to geography of point of sale or final consumption.

The first two assumptions are directly relevant to the employment results for Luxembourg residents. We have assumed in this work that policies are implemented largely without prejudice to residence status (e.g., Luxembourg businesses use the payroll tax credit for reskilling to create opportunities for both residents and non-residents). This study assumed that new employment follows the same ratio of cross-border workers to resident workers.

If the first assumption is adjusted, so that policies are enacted in such a way that businesses and employees can only benefit if employment is fulfilled by a resident, then employment effects for Luxembourg residents would be more positive. If the second assumption is adjusted, so that a higher proportion of new employment is met by residents, then employment effects would again be more positive for Luxembourg residents. The macroeconomic results would also be more positive, the higher the proportion of new employment which is fulfilled by Luxembourg residents. The energy and emissions results would only be affected to a very limited extent.

The economic results are also sensitive to the assumption of the proportion of kilometre charge taxes which are paid by Luxembourg residents and non-residents. Kilometre charges could be paid to governments dependent on territory of driving, or registration of vehicle (e.g., a French resident, in a car registered in France, driving in Luxembourg could pay the French or Luxembourgian government). This study assumes that taxes for passenger cars are paid according to country of registration. If taxes were paid based on territory of driving, Luxembourg would likely benefit more substantially, given the high level of cross-border travel by non-Luxembourg residents.⁷¹

The emissions results are sensitive to the emissions reporting methodology. This study attributes emissions from fuel combustion according to geography of sale, rather than geography of combustion, etcetera. That is, emissions arising from passenger road transport activity of non-residents, where fuel is bought in Luxembourg, is attributed to Luxembourg. This is consistent with the reporting methodology used by STATEC.

Addressing country-specific challenges

Last but not least, a country-specific scenario will be able to target country-specific challenges. Measures could be designed to resolve specific socio-economic challenges, such as rising income inequality, high housing costs, construction sector labour shortages and labour market opportunities for older workers.⁷²

6. Concluding remarks and recommendations

As mentioned in the Taxshift report, taxation is in principle a 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, especially in the case of an open economy such as Luxembourg. 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 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.

The complexity of tax reform does not mean the impact of a taxshift would only become visible in the long-term. This study demonstrates that the implementation of a well-considered, broad-based tax reform could lead to more jobs, higher economic growth, fewer emissions and less dependence on imports within just a few years.

Figure 6 provides some of the key steps to be taken in the European Union towards an integrated fiscal strategy to accelerate the Green Deal objectives. Luxembourg could take the lead in such activities, for example by developing and sharing knowledge and analyses, by leading by example and by joining forces with other countries in a coalition of Member States whose governments are explicitly committed to applying the taxshift principles, such as the Netherlands, Belgium and Finland.⁷³

The taxshift offers a unique opportunity to develop consistent, step-by-step tax policies that align financial incentives with Luxembourg's commitments to sustainability and inclusive growth.

Figure 6: Key EU steps

Towards an integrated fiscal strategy to accelerate the Green Deal objectives

Step 1: Organisation

(2022-2023)

Establishing an informal coalition composed of Member States committed to applying the Polluter Pays and Making Work Pay principles.

The coalition fosters dialogue and develops proposals for coordinated taxshift policies in the EU.

Developing an EU Policy Tracker: mapping relevant tax policies under review in MS, as well as progress on policy implementation. Such public Tracker supports MS 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 activities under the green EU taxonomy.

Establishing an EU Taxshift Inter-Service Group composed of all relevant DGs. 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.

Step 2: Implementation

(2024-2025)

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.

Step 3: Adaptation

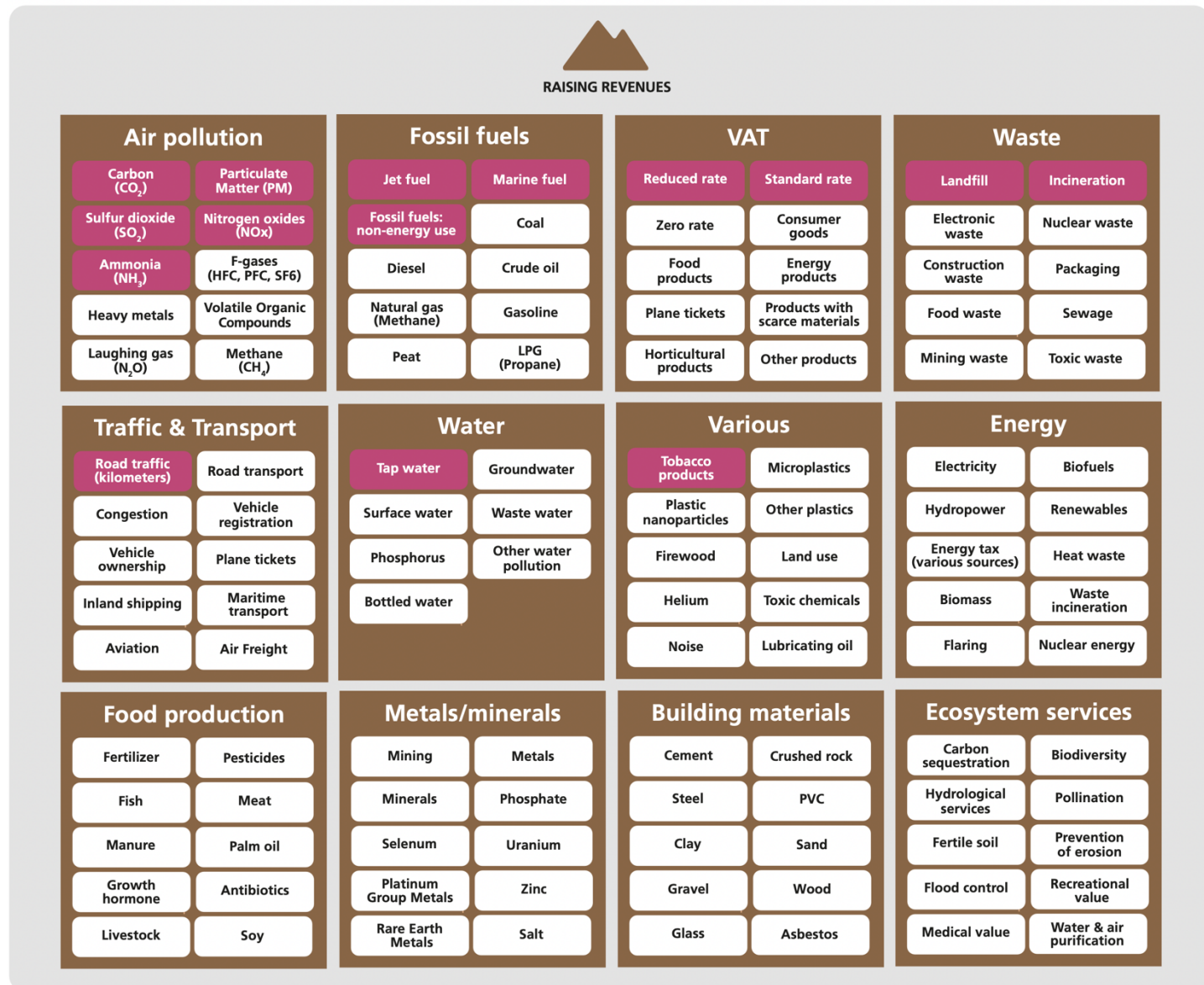
(2025-)

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.

Annex 1: 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



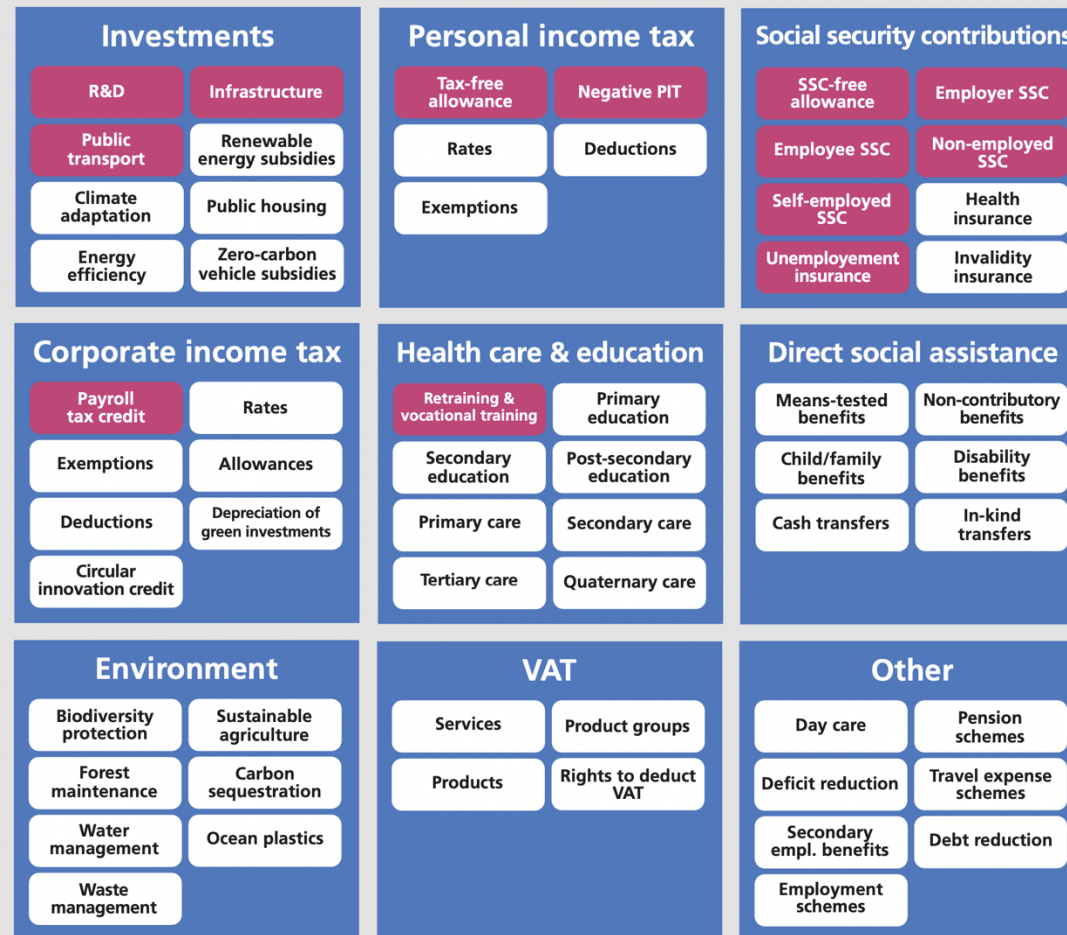
Annex 2: Ex'tax Toolkit - Use of revenues

Policy options for social and environmental impact



USE OF REVENUES

- Tax base option
- Included in scenario



Annex 3: Environmental taxes

European Commission (Accessed 24 March 2023), [Data on Taxation](#)

Table 64: Environmental taxes as % of total taxation - Total

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Difference 2011-2021 (pp)	Ranking 2021	Revenue 2021 (million EUR)
EU-27	6.2	6.2	6.3	6.2	6.2	6.2	6.2	6.2	6.1	6.0	5.9	5.6	5.5	-0.8		325 837
EA-19	6.0	6.0	6.1	6.1	6.1	6.1	6.0	6.1	6.0	5.9	5.8	5.5	5.4	-0.7		273 333
Belgium	5.5	5.6	5.8	5.6	5.5	5.6	5.7	6.0	6.0	6.0	6.1	5.8	5.7	-0.1	19	12 537
Bulgaria	10.6	10.8	10.5	10.2	10.2	10.0	10.2	10.2	9.4	8.8	9.8	9.9	9.1	-1.4	2	1 979
Czechia	7.1	6.9	6.9	6.4	6.0	6.2	6.0	6.0	5.7	5.4	5.7	5.4	5.1	-1.8	21	4 373
Denmark	8.9	8.9	8.9	8.7	8.9	8.2	8.6	8.5	8.0	8.2	7.0	6.7	6.0	-2.9	15	9 704
Germany	5.8	5.8	5.8	5.5	5.4	5.2	5.0	4.8	4.6	4.5	4.4	4.3	4.4	-1.4	26	64 714
Estonia	8.4	8.8	8.6	8.6	8.1	8.3	8.2	8.9	8.7	8.3	9.6	7.2	6.8	-1.8	10	717
Ireland	8.1	8.8	8.8	8.4	8.6	8.3	8.1	8.0	7.8	7.0	6.4	6.0	5.5	-3.3	20	4 953
Greece	6.8	8.3	8.6	9.2	10.2	10.3	10.5	9.8	10.2	9.5	9.8	9.7	10.0	1.4	1	7 136
Spain	5.5	5.3	5.1	4.9	5.8	5.5	5.7	5.5	5.4	5.3	5.1	4.7	4.6	-0.5	24	21 265
France	4.4	4.5	4.4	4.4	4.5	4.4	4.7	4.9	5.0	5.1	5.1	4.8	4.8	0.4	23	54 421
Croatia	7.8	8.4	7.6	7.1	7.8	8.7	9.1	9.3	9.4	9.4	9.2	8.9	8.7	1.1	4	1 816
Italy	6.7	6.7	7.4	8.0	7.9	8.3	7.9	8.3	8.0	7.9	7.7	7.1	6.9	-0.5	9	53 383
Cyprus	8.8	8.7	8.7	8.1	8.6	9.1	9.2	9.1	9.0	8.6	7.4	7.0	6.5	-2.2	13	562
Latvia	9.6	10.5	10.6	10.3	10.8	11.3	11.7	11.7	11.2	10.9	9.6	9.8	9.0	-1.6	3	918
Lithuania	6.7	6.5	6.2	6.1	6.2	6.3	6.4	6.5	6.5	6.6	6.2	6.2	5.8	-0.4	18	1 045
Luxembourg	6.6	6.3	6.3	6.1	5.7	5.2	5.1	4.7	4.5	4.3	4.4	3.6	3.8	-2.5	27	1 048
Hungary	6.7	7.2	7.0	6.5	6.3	6.3	6.4	6.5	6.4	6.2	6.2	6.0	5.9	-1.1	16	3 096
Malta	9.7	9.0	9.6	8.8	8.2	8.7	9.1	8.6	8.4	8.2	8.2	7.7	6.5	-3.1	14	289
Netherlands	9.9	9.8	9.6	9.1	9.0	8.9	9.0	8.7	8.6	8.6	8.6	8.0	7.8	-1.8	6	26 419
Austria	5.7	5.7	5.9	5.7	5.6	5.6	5.5	5.6	5.7	5.4	5.3	5.0	5.0	-0.9	22	8 775
Poland	8.5	8.7	8.3	8.1	7.6	8.1	8.2	8.1	7.8	7.7	7.2	7.1	7.8	-0.5	5	16 590
Portugal	8.2	8.0	7.2	6.9	6.5	6.6	7.0	7.6	7.6	7.4	7.3	6.7	6.6	-0.6	12	5 025
Romania	7.1	8.0	6.9	7.2	7.5	8.7	8.8	9.3	7.8	7.6	8.1	7.3	7.4	0.5	7	4 730
Slovenia	9.3	9.5	9.2	10.1	10.4	10.3	10.3	10.3	9.8	9.1	8.9	7.9	7.3	-1.9	8	1 453
Slovakia	6.8	7.4	8.4	8.3	8.2	8.0	7.7	7.6	7.5	7.3	7.3	7.1	6.7	-1.7	11	2 383
Finland	6.2	6.6	7.2	7.0	6.7	6.6	6.6	7.1	6.9	6.9	6.6	6.5	5.8	-1.4	17	6 289
Sweden	6.3	6.2	5.8	5.7	5.5	5.2	5.0	5.0	4.8	4.8	4.8	4.7	4.4	-1.4	25	10 218
Iceland	5.8	6.5	6.2	6.4	5.9	5.4	5.7	3.8	5.5	5.4	5.3	5.1	4.3	-1.9		326
Norway	6.4	6.3	5.9	5.6	5.8	6.0	6.1	6.2	5.9	5.5	5.2	5.2	4.0	-1.9		6 984

Table 63: Environmental taxes as % of GDP - Total

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Difference 2011-2021 (pp)	Ranking 2021	Revenue 2021 (million EUR)
EU-27	2.4	2.4	2.4	2.4	2.5	2.5	2.4	2.5	2.4	2.4	2.4	2.2	2.2	-0.2		325 837
EA-19	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	-0.2		273 333
Belgium	2.4	2.4	2.6	2.5	2.5	2.5	2.5	2.7	2.7	2.7	2.6	2.5	2.5	-0.1	11	12 537
Bulgaria	2.8	2.7	2.7	2.6	2.9	2.8	3.0	3.0	2.8	2.6	3.0	3.0	2.8	0.1	7	1 979
Czechia	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	1.9	1.8	-0.5	23	4 373
Denmark	4.0	4.0	4.0	4.0	4.1	4.0	4.0	3.9	3.7	3.6	3.3	3.2	2.9	-1.1	6	9 704
Germany	2.3	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.8	1.8	1.8	1.7	1.8	-0.4	24	64 714
Estonia	2.9	2.9	2.7	2.7	2.6	2.7	2.7	3.0	2.9	2.7	3.2	2.4	2.3	-0.4	15	717
Ireland	2.3	2.5	2.5	2.4	2.5	2.4	1.9	1.9	1.8	1.6	1.4	1.2	1.2	-1.3	27	4 953
Greece	2.1	2.7	3.0	3.3	3.7	3.7	3.8	3.8	4.0	3.8	3.9	3.8	3.9	0.9	1	7 136
Spain	1.6	1.6	1.6	1.6	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	0.2	25	21 265
France	1.9	1.9	1.9	2.0	2.0	2.0	2.2	2.2	2.3	2.4	2.3	2.2	2.2	0.3	16	54 421
Croatia	2.8	3.0	2.6	2.5	2.8	3.1	3.3	3.4	3.5	3.5	3.4	3.3	3.1	0.5	2	1 816
Italy	2.8	2.8	3.0	3.5	3.4	3.6	3.4	3.5	3.3	3.3	3.2	3.0	3.0	0.0	4	53 383
Cyprus	2.8	2.7	2.7	2.6	2.7	3.1	3.0	2.9	3.0	2.8	2.5	2.4	2.3	-0.4	14	562
Latvia	2.6	3.0	3.1	3.0	3.2	3.3	3.5	3.6	3.5	3.4	2.9	3.0	2.7	-0.4	9	918
Lithuania	2.0	1.8	1.7	1.6	1.7	1.7	1.9	1.9	1.9	2.0	1.9	1.9	1.9	0.2	22	1 045
Luxembourg	2.4	2.3	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.7	1.8	1.4	1.4	-0.9	26	1 048
Hungary	2.6	2.6	2.5	2.5	2.4	2.4	2.5	2.5	2.4	2.3	2.3	2.2	2.0	-0.5	18	3 096
Malta	3.1	2.8	3.1	2.8	2.6	2.7	2.7	2.6	2.5	2.5	2.4	2.3	1.9	-1.2	20	289
Netherlands	3.5	3.5	3.4	3.2	3.3	3.3	3.3	3.4	3.3	3.3	3.4	3.2	3.1	-0.3	3	26 419
Austria	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.3	2.4	2.3	2.3	2.1	2.2	-0.2	17	8 775
Poland	2.7	2.7	2.7	2.6	2.4	2.6	2.7	2.7	2.7	2.7	2.5	2.5	2.9	0.2	5	16 590
Portugal	2.4	2.4	2.3	2.2	2.2	2.3	2.4	2.6	2.6	2.6	2.5	2.4	2.3	0.0	13	5 025
Romania	1.8	2.1	1.9	1.9	2.1	2.4	2.5	2.4	2.0	2.0	2.1	1.9	2.0	0.1	19	4 730
Slovenia	3.5	3.6	3.4	3.8	3.9	3.9	3.9	3.9	3.7	3.4	3.3	2.9	2.8	-0.6	8	1 453
Slovakia	2.0	2.1	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4	0.0	12	2 383
Finland	2.5	2.7	3.0	3.0	2.9	2.9	2.9	3.1	3.0	2.9	2.8	2.7	2.5	-0.5	10	6 289
Sweden	2.8	2.7	2.4	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.0	1.9	-0.5	21	10 218
Iceland	1.8	2.1	2.1	2.2	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.8	1.5	-0.6		326
Norway	2.6	2.6	2.5	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.1	2.0	1.7	-0.8		6 984

Annex 4: Taxes on labour

European Commission (Accessed 24 March 2023), [Data on Taxation](#)

Table 44: Taxes on labour as % of total taxation - Total

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Difference 2011-2021 (pp)	Ranking 2021	Revenue 2021 (million EUR)
EU-27	53.2	52.6	52.2	52.2	52.4	52.2	51.7	51.6	51.6	51.8	51.9	53.3	51.4	-0.8		3 036 289
EA-19	53.7	53.3	52.8	52.7	52.8	52.6	52.2	52.0	52.0	52.1	52.4	53.9	52.0	-0.8		2 630 593
Belgium	55.5	54.5	54.5	53.5	53.0	52.9	52.6	51.2	50.5	50.0	50.6	52.8	50.3	-4.2	12	110 307
Bulgaria	33.9	33.2	33.0	32.7	33.1	34.5	33.8	33.8	34.9	36.6	36.4	37.7	36.0	3.0	26	7 868
Czechia	50.8	51.9	51.0	50.7	50.3	51.4	50.2	50.7	51.3	52.8	53.4	56.3	53.6	2.6	5	45 797
Denmark	55.4	50.5	50.6	50.0	52.8	52.1	51.1	50.3	50.3	51.6	49.5	51.2	50.5	-0.1	11	81 681
Germany	56.7	56.3	55.3	55.7	56.2	56.4	56.1	56.1	56.5	56.7	57.4	58.9	56.1	0.8	2	829 222
Estonia	51.9	53.4	52.0	50.8	51.1	50.7	49.8	50.0	51.1	50.7	50.6	53.2	51.7	-0.3	7	5 444
Ireland	44.1	43.9	45.4	45.2	44.6	43.9	42.1	42.6	42.7	42.5	43.3	44.2	42.2	-3.2	22	37 922
Greece	42.8	42.6	40.3	43.7	40.9	40.2	40.2	39.5	41.4	41.4	41.5	44.9	43.5	3.2	20	31 132
Spain	55.1	53.1	53.7	51.9	50.2	49.7	48.0	48.2	48.5	48.4	50.5	53.8	50.9	-2.8	8	235 921
France	52.8	52.5	51.8	51.9	52.5	52.8	52.4	52.5	51.9	52.1	51.0	51.4	50.8	-1.0	10	573 803
Croatia	42.7	42.4	41.5	40.6	39.7	40.7	38.7	37.0	36.2	36.2	36.0	37.7	35.9	-5.6	27	7 456
Italy	51.6	52.0	51.3	50.0	50.0	49.7	49.3	48.9	49.5	50.2	50.9	52.3	50.9	-0.4	9	392 198
Cyprus	34.9	35.6	35.8	36.2	33.9	33.8	34.8	34.9	35.0	35.3	39.1	42.1	40.6	4.8	24	3 516
Latvia	52.3	50.7	48.7	48.0	47.0	46.4	45.8	45.1	46.0	46.6	48.9	49.5	49.7	1.0	14	5 091
Lithuania	50.4	49.9	49.6	49.0	49.5	49.7	49.5	50.1	50.1	51.1	50.9	51.3	50.2	0.6	13	9 098
Luxembourg	45.0	44.3	45.2	45.4	46.7	46.2	48.4	47.6	46.6	45.4	46.4	49.3	47.3	2.1	17	13 203
Hungary	48.0	47.0	46.9	47.1	46.7	46.1	45.7	46.4	46.0	45.8	45.7	44.9	43.0	-3.9	21	22 392
Malta	32.9	32.0	34.1	34.3	34.7	33.8	33.5	34.3	34.5	36.0	36.7	41.5	41.5	7.4	23	1 856
Netherlands	55.4	54.8	56.3	57.3	56.7	54.0	54.0	52.7	51.9	50.9	49.7	51.5	49.0	-7.3	16	166 412
Austria	56.2	56.3	56.1	56.5	56.5	57.0	56.6	55.7	55.4	55.5	55.4	57.6	55.9	-0.2	3	98 162
Poland	38.0	37.8	38.0	39.3	40.9	41.1	40.8	40.8	40.4	40.1	40.4	40.3	38.5	0.5	25	81 478
Portugal	42.7	41.4	41.2	40.0	43.2	43.4	43.0	42.7	42.2	42.2	42.9	46.3	45.9	4.7	18	34 833
Romania	44.1	41.7	39.4	39.9	40.2	39.1	36.7	38.7	43.0	46.9	46.2	49.2	45.6	6.2	19	29 055
Slovenia	52.1	51.6	51.8	51.6	50.2	49.4	49.5	49.9	50.0	50.5	50.5	53.5	52.2	0.4	6	10 410
Slovakia	52.2	51.7	50.5	52.2	51.9	51.1	51.0	52.4	52.6	53.4	54.0	54.7	53.8	3.3	4	19 000
Finland	54.3	52.1	51.2	52.4	51.4	51.9	51.6	51.4	49.7	49.5	49.8	49.3	49.0	-2.2	15	53 061
Sweden	58.3	56.4	57.3	58.9	58.9	58.3	57.4	58.0	58.3	58.4	58.1	58.1	56.6	-0.7	1	129 969
Iceland	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
Norway	42.7	41.3	40.5	41.3	43.8	45.9	49.0	49.3	47.4	45.5	46.9	51.7	43.0	2.5		74 513

Table 43: Taxes on labour as % of GDP - Total

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Difference 2011-2021 (pp)	Ranking 2021	Revenue 2021 (million EUR)
EU-27	20.3	20.0	20.0	20.5	20.8	20.8	20.5	20.6	20.6	20.7	20.7	21.3	20.9	0.9		3 036 289
EA-19	20.5	20.3	20.4	20.9	21.2	21.1	20.9	20.8	20.9	21.1	21.1	21.8	21.4	1.0		2 630 593
Belgium	24.0	23.7	24.2	24.2	24.4	24.2	23.7	22.6	22.6	22.4	22.0	22.9	22.0	-2.2	7	110 307
Bulgaria	9.1	8.4	8.4	8.5	9.3	9.8	9.8	9.9	10.4	10.9	11.1	11.5	11.1	2.7	26	7 868
Czechia	16.5	17.0	17.3	17.5	17.5	17.6	17.2	17.8	18.2	19.0	19.2	20.2	19.2	1.9	13	45 797
Denmark	24.9	22.7	22.8	22.9	24.4	25.5	23.7	23.0	23.0	22.9	23.3	24.2	24.3	1.5	1	81 681
Germany	21.9	21.0	20.8	21.4	21.6	21.6	21.7	22.0	22.2	22.6	23.0	23.3	23.0	2.2	4	829 222
Estonia	18.2	17.7	16.4	16.1	16.2	16.3	16.6	16.8	16.8	16.7	16.9	17.7	17.3	0.9	15	5 444
Ireland	12.4	12.2	12.7	12.8	12.8	12.7	9.8	10.1	9.6	9.5	9.5	8.8	8.9	-3.8	27	37 922
Greece	13.2	13.7	13.8	15.9	14.7	14.6	14.7	15.4	16.3	16.6	16.4	17.4	17.1	3.3	16	31 132
Spain	16.4	16.6	16.8	16.8	16.6	16.8	16.3	16.2	16.4	16.8	17.5	19.9	19.5	2.7	10	235 921
France	22.3	22.2	22.5	23.1	23.9	24.1	24.0	24.0	24.1	24.1	23.1	23.4	22.9	0.4	5	573 803
Croatia	15.4	15.1	14.4	14.4	14.3	14.8	14.1	13.6	13.3	13.5	13.4	13.8	12.8	-1.6	23	7 456
Italy	21.4	21.5	21.1	21.6	21.6	21.3	21.1	20.6	20.7	20.9	21.5	22.3	22.0	0.9	6	392 198
Cyprus	11.1	11.3	11.3	11.5	10.8	11.4	11.5	11.2	11.5	11.7	13.4	14.3	14.6	3.3	20	3 516
Latvia	14.3	14.3	14.2	13.9	13.8	13.8	13.6	13.8	14.3	14.4	15.0	15.3	15.1	0.9	19	5 091
Lithuania	15.2	14.1	13.5	13.2	13.3	13.6	14.3	14.8	14.7	15.4	15.4	15.8	16.2	2.7	18	9 098
Luxembourg	16.4	15.8	16.4	16.6	16.9	16.7	16.9	16.9	17.1	17.9	18.4	18.8	18.3	1.9	14	13 203
Hungary	18.6	17.3	17.1	18.4	18.0	17.7	17.7	18.2	17.5	16.9	16.6	16.2	14.6	-2.5	21	22 392
Malta	10.5	9.9	10.8	10.8	10.9	10.6	9.9	10.5	10.4	10.9	10.9	12.2	12.4	1.6	24	1 856
Netherlands	19.5	19.5	20.0	20.4	20.4	20.0	20.0	20.2	20.1	19.7	19.5	20.5	19.4	-0.6	11	166 412
Austria	23.1	23.1	23.1	23.6	24.2	24.4	24.4	23.3	23.2	23.5	23.7	24.2	24.2	1.1	3	98 162
Poland	11.9	11.9	12.2	12.7	13.3	13.3	13.3	13.7	13.8	14.1	14.2	14.3	14.2	2.0	22	81 478
Portugal	12.7	12.6	13.3	12.7	14.7	14.8	14.8	14.5	14.4	14.6	14.8	16.3	16.2	2.9	17	34 833
Romania	11.1	10.8	10.6	10.6	11.1	10.8	10.3	10.2	10.8	12.1	12.0	12.8	12.1	1.5	25	29 055
Slovenia	19.4	19.6	19.4	19.6	18.8	18.5	18.6	18.8	18.7	18.9	18.9	20.1	19.9	0.5	9	10 410
Slovakia	15.0	14.4	14.6	14.9	16.0	16.2	16.5	17.3	17.8	18.1	18.5	18.9	19.3	4.7	12	19 000
Finland	22.2	21.1	21.4	22.2	22.3	22.6	22.4	22.5	21.3	21.0	21.0	20.6	21.1	-0.3	8	53 061
Sweden	25.5	24.2	24.1	24.8	25.0	24.6	24.5	25.6	25.7	25.6	24.9	24.6	24.2	0.1	2	129 969
Iceland	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
Norway	17.5	17.2	16.9	17.1	17.4	17.7	18.8	19.1	18.3	17.9	18.7	20.0	18.0	1.1		74 513

Annex 4: References

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³⁵ 2016 and the categories: "Accidents, Air Pollution, Climate, Noise, Congestion, Well-to-Tank, Habitat damage." The external costs of air pollution are not available. CE Delft (2019), Handbook on the external costs of transport. <https://www.cedelft.eu/en/publications/2311/handbook-on-the-external-costs-of-transport-version-2019> (Table 68).

³⁶ Statista (Accessed 13 April 2023), Volume of airfreight processed by Europe's leading airports in 2020, by airport. <https://www.statista.com/statistics/434381/airfreight-volumes-in-europe-by-airport/>

³⁷ Based on the 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. <https://www.oecd.org/tax/tax-policy/effective-carbon-rates-2018-brochure.pdf>

³⁸ 2 January 2017 and 18 August, 2022, respectively. Ember-climate.org (Accessed 23 January, 2023), EUA Price. <https://ember-climate.org/data/data-tools/carbon-price-viewer/>

³⁹ 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.

⁴⁰ 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].

⁴¹ 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].

⁴² Adviescollege Stikstofproblematiek (Commissie-Remkes II) (2020), Niet alles kan overal [There is no one size fits all].

⁴³ 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.

⁴⁴ 2014. EEA (August 30, 2018), Water use in Europe. Quantity and quality face big challenges.

<https://www.eea.europa.eu/signals/signals-2018-content-list/articles/water-use-in-europe-2014>

⁴⁵ In the scenario, 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).

⁴⁶ Eurostat (Accessed January 24, 2023), EU's circular material use rate decreased in 2021.

<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20221213-1#:~:text=In%202021%2C%20the%20EU's,came%20from%20recycled%20waste%20materials>.

⁴⁷ European Commission (2020), Study on the EU's list of Critical Raw Materials (2020), Final Report.

<https://op.europa.eu/en/publication-detail/-/publication/c0d5292a-ee54-11ea-991b-01aa75ed71a1/language-en>

⁴⁸ Drift (2019), Onderzoek 'Afvallprikkels'. Een onderzoek naar huidige prikkels voor het sorteren, verbranden en nuttig toepassen van afval in Nederland ['Waste Incentives' Study. A study into the landfilling, incineration recovery of waste in the Netherlands].

⁴⁹ Latest available data 2021. Eurostat (Accessed January 24, 2023), Municipal waste statistics.

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Municipal_waste_statistics

⁵⁰ 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.

⁵¹ "In the EU, food waste has been estimated at approximately 89 million tons (or 180 kilograms per capita) per year and is expected to rise to about 126 million tons a year by 2020. Households produce the largest share of EU food waste (42%), followed by agriculture/ food processing (39%), food service/catering (14%), and retail/wholesale (5%)." European Parliamentary Research Service (EPRS) (January 22, 2014), Tackling food waste. The EU's contribution to a global issue.

[http://www.europarl.europa.eu/RegData/bibliotheque/briefing/2014/130678/LDM_BRI\(2014\)130678_REV1_EN.pdf](http://www.europarl.europa.eu/RegData/bibliotheque/briefing/2014/130678/LDM_BRI(2014)130678_REV1_EN.pdf)

⁵² Based on 2011. FAO (Accessed November 11, 2020), Food wastage footprint & Climate Change.

https://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/FWF_and_climate_change.pdf

⁵³ "(...) 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](#).

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

49. <https://doi.org/10.1787/b76ced82-en>

⁵⁴ 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.

⁵⁵ "Cigarette butts and other tobacco product wastes (TPW) are the most common items picked up in urban and beach cleanups worldwide. TPW contains all the toxins, nicotine, and carcinogens found in tobacco products, along with the plastic nonbiodegradable filter attached to almost all cigarettes sold in the United States and in most countries worldwide. Toxicity studies suggest that compounds leached from cigarette butts in salt and fresh water are toxic to aquatic micro-organisms and test fish. Toxic chemicals have also been identified in roadside TPW. 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, T.E., Slaughter, E. (2014), Tobacco Product Waste: An Environmental Approach to Reduce Tobacco Consumption. *Curr Envir Health Rpt*, volume 1, pages 208–216.

<https://doi.org/10.1007/s40572-014-0016-x>

“The environmental damage that tobacco causes, on top of its negative health, social and economic impacts, makes it incompatible with the global development agenda.”

Zafeiridou M, Hopkinson NS, 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. <https://www.who.int/fctc/publications/WHO-FCTC-Enviroment-Cigarette-smoking.pdf>

⁵⁶ Latest available data 2021. Eurostat (Accessed January 23, 2023), At-risk-of-poverty rate by poverty threshold, age and sex - EU-SILC and ECHP surveys.

https://ec.europa.eu/eurostat/databrowser/view/ILC_LI02/default/table

⁵⁷ Eurostat (Accessed January 24, 2023), Labour market slack by sex and age - quarterly data [lfsi_sla_q]. Last update: 20/01/2023. <https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>

⁵⁸ European Commission (2020), Taxation trends in the European Union. Data for the EU Member States, Iceland and Norway: 2020 edition. <https://op.europa.eu/en/publication-detail/-/publication/c0b00da7-c4b1-11ea-b3a4-01aa75ed71a1>

⁵⁹ <https://www.statista.com/statistics/380275/luxembourg-gdp-distribution-across-economic-sectors/#:~:text=In%202019%2C%20agriculture%20contributed%20around,percent%20from%20the%20services%20sector.>

See also: https://ec.europa.eu/eurostat/statistics-explained/index.php/National_accounts_and_GDP#Developments_for_GDP_in_the_EU-27:_growth_since_2014

⁶⁰ IEA (March 2020), Luxembourg 2020 Energy Policy Review. Country Report.

<https://www.iea.org/reports/luxembourg-2020>

⁶¹ For this analysis, STATEC has supplied Cambridge Econometrics with national statistics. The proportion of employment in each sector for resident versus non-resident used the STATEC data ‘5b Emploi salarié par secteur d’activité, nationalité et pays de résidence’. The share of wages accruing to non-resident workers used STATEC data from ‘Total wage bill’ and ‘Wages paid to the rest of the world’ as a share of ‘Total wage bill’. The share of the social security receipts paid in Luxembourg accruing to frontier workers uses the value for ‘share of cross-border workers in social benefits (pecuniary)’ from the ‘CBW Cosoc Prest’ STATEC data. The estimate of non-resident expenditure in Luxembourg uses the STATEC data ‘HFCE_COICOP2’, specifically ‘dépenses des non résidents’. The estimate of income to non-residents from Luxembourg uses the STATEC data value for disposable income of frontier workers ‘disposable income (rdmenfrin)’. Expenditure change in the scenario, of non-residents in Luxembourg, is attributed as exports to Luxembourg. The expenditure is allocated to E3ME sectors using expenditure value shared to consumption categories (shares from the ‘HFCE_COICOP2’ 2019 data).

⁶² <https://www.worldometers.info/population/countries-in-the-eu-by-population/>

⁶³ Eurostat (Accessed February 16, 2021), Unemployment by sex and age – annual data.

https://ec.europa.eu/eurostat/databrowser/view/une_rt_a/default/table?lang=en

⁶⁴ Eurostat (Accessed January 24, 2023), Labour market slack by sex and age - annual data.

https://ec.europa.eu/eurostat/databrowser/view/lfsi_sla_a/default/table?lang=en

⁶⁵ Latest available data 2022-Q4. Eurostat (Accessed 13 April 2023), Labour market slack by sex and age - quarterly data.

https://ec.europa.eu/eurostat/databrowser/view/LFSI_SLA_Q_custom_5777970/default/table?lang=en

⁶⁶ Le Gouvernement Luxembourgeois (Accessed February 16, 2021), Overview of the labour market. An international and multicultural working environment <https://adem.public.lu/en/marche-emploi-luxembourg/panorama-marche-emploi.html>

⁶⁷ Income distribution effects, taking account of dynamics of resident and frontier workers, are not calculated for Luxembourg in this project.

⁶⁸ Note that the carbon tax introduced in Luxembourg in 2021 is not yet included in the modelling. JCA (2020), STATEC expects CO2 tax to reduce emissions but not enough to meet climate objectives. Luxembourg Chronicle.

<https://chronicle.lu/category/environment/34736-statec-expects-co2-tax-to-reduce-emissions-but-not-enough-to-meet-climate-objectives>

⁶⁹ International Resource Panel (IRP) (2019), Global Resources Outlook 2019: Natural Resources for the Future We Want. UNEP. <https://www.resourcepanel.org/reports/global-resources-outlook>

⁷⁰ The Ex'tax Project (et al.) (June 2022), The Taxshift. An EU fiscal strategy to support the inclusive circular economy. In collaboration with Cambridge Econometrics, Deloitte, EY, KPMG, PwC. Author: Femke Groothuis. <https://ex-tax.com/taxshift/> Parts of the content are reflected in this document.

⁷¹ Note that the study scenario required data for vehicle kilometres travelled by freight, vans and passenger vehicles. Many data points needed to be estimated.

⁷² IMF (June 3, 2022), Luxembourg: Selected Issues. Country Report No. 2022/153. <https://www.imf.org/en/Publications/CR/Issues/2022/06/02/Luxembourg-Selected-Issues-518544>

⁷³ Netherlands: <https://www.linkedin.com/pulse/new-dutch-government-more-tax-pollution-less-femke-groothuis/>

Finland: <https://ex-tax.com/extax-recommendations-in-finnish-government-programme/>

Belgium: De Croo, Alexander, Magnette, Paul (September 30, 2020), Formatienota. Voor een welvarend, solidair en duurzaam België. <http://newsroom.roularta.be/static/30092020/regeerakkoord.pdf>