Greening the European Semester – Resource and Pollution Taxes

Under framework contract No ENV.01/FRA/2023/0006

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Context and objectives

This study supports the European Commission (DG Environment) in **strengthening its knowledge base on environmental taxation**, with a focus on pollution and resource taxes, to better reflect both their potential and limitations in the current and future cycles of the European Semester. The study does **not** aim to inform EU-wide tax proposals, nor to recommend harmonised tax rates. Instead, it provides **analytical insights that may help identify issues to explore in national contexts**, fully recognising that Member States differ markedly in their economic structures, environmental pressures and political constraints.

Environmental taxation is one of several instruments that can help internalise environmental costs, influence behaviour and, when well designed, contribute to competitiveness, fiscal resilience and social fairness. Across the EU, however, the use of non-energy pollution and resource taxes remains limited. They account for less than 5% of all environmental tax revenues, and the scale, coverage and rates of existing taxes vary substantially among Member States. As such, this report focuses on taxes targeting pollution and natural resource use, outside the energy and transport sectors.

Current state of implementation of pollution and resource taxes across the EU

Environmental taxation in the EU has grown in absolute terms over the past fifteen years, yet its relative weight in national tax systems has declined. In 2023, EU-27 environmental tax revenues amounted to €317 billion, or approximately 2 per cent of GDP, down from 2.3 per cent in 2009. **Pollution and resource taxes remain a small component of this total**. Pollution taxes generated €11.1 billion and resource taxes €2.3 billion in 2023, together representing just over 4% of all environmental tax revenues. **Although revenues from these instruments have increased in nominal terms since 2009, they have not kept pace with economic growth**. This confirms that, at EU level, any meaningful shift from labour to pollution taxes has not yet materialised, notwithstanding isolated advances in some Member States.

The mapping undertaken for this study identified **151 pollution taxes and 93 resource taxes** currently in force across the EU. **Their design, coverage and economic significance vary considerably across countries and sectors.** Wastewater, waste disposal and a broad set of “other pollution” taxes account for more than three-quarters of pollution tax revenues. Water abstraction charges dominate resource taxation, contributing over 75 per cent of revenues, although their levels and structures differ widely. By contrast, taxes on air pollutants, pesticides, fertilisers and agricultural emissions are far less common, often reflecting administrative complexity and political sensitivity, particularly in relation to farm income, consumer prices, competitiveness concerns, and strategic positioning related to food security.

The evidence shows that **where pollution and resource taxes are well designed and applied at meaningful rates, they can generate substantial behavioural and environmental effects**. Landfill taxes are the most consistently effective example, with marked reductions in landfilling observed in Member States that have raised rates over time and invested in complementary recycling infrastructure. Plastic bag and packaging taxes have also delivered large and rapid reductions in single-use plastics. Air pollution taxes, applied in countries such as Sweden and Czechia, have reduced emissions, although **their effectiveness depends strongly on clear tax bases, robust monitoring and alignment with regulatory standards**. Water abstraction charges perform inconsistently across the EU, largely because rates in many Member States remain too low to influence behaviour. Where sufficiently high, as in the Netherlands, measurable efficiency gains have been observed.

Administrative capacity and governance arrangements play an important role in shaping the scope and performance of environmental taxes. In federal and decentralised systems, significant responsibilities rest with regional and local authorities, contributing to divergent approaches and making cross-country comparison more difficult. In some Member States, reliance on fees or charges rather than unrequited taxes also complicates the visibility of environmental taxation in official statistics. Furthermore, small-scale taxes or those embedded in broader fiscal instruments are often not reported in national tax lists, limiting transparency.

Despite these challenges, **several Member States have developed noteworthy practices**. Ireland’s plastic bag levy and landfill tax, Denmark’s differentiated pesticide tax, France’s use of abstraction rates linked to water resource stress, or Latvia’s consolidated natural resources tax illustrate the range of workable approaches that can be adapted to national circumstances. At the same time, some jurisdictions have scaled back or repealed existing taxes where they overlapped with other policy tools or were judged to impose disproportionate burdens without commensurate environmental benefit.

Overall, **the current landscape is characterised by substantial diversity in design and ambition, different coverage of key pollution sources, and significant untapped potential**. While Member States’ starting points differ markedly, the analysis suggests that cost-effective and environmentally meaningful expansion of pollution and resource taxation remains feasible in many national contexts. This study therefore provides a clearer understanding of existing practices, identifying where further progress is possible, and suggesting possible options that respect national circumstances while strengthening the implementation of the ‘polluter pays’ principle. These findings are discussed in detail in Section 3.

Approach to estimating potential impacts

The study models the possible environmental and fiscal effects of applying two stylised benchmark scenarios for 2030 and 2035. These benchmarks draw, where possible, on existing national practice, on previous analytical work and subsequent sector-specific studies. They are not intended as policy proposals, nor do they imply that Member States could or should converge towards uniform tax levels. **Their purpose is solely analytical: to illustrate broad orders of magnitude and to support comparison across countries using a consistent and transparent method**. Moreover, the results should be interpreted with caution, as the analysis relies on simplified assumptions and does not fully capture country-specific institutional settings, behavioural responses, distributional effects or interactions with other policy instruments. Further work, including more detailed modelling, improved data and sector-specific assessment, would be needed to better understand the potential environmental, economic and social impacts of the taxation instruments discussed.

Scenario A applies benchmark rates broadly aligned with levels already used in at least some Member States or recommended in earlier analytical work. In this sense, “higher” rates denote values that are representative of the upper range observed in current EU practice or of rates identified in the literature as being commensurate with marginal environmental damage or with the price signals required to influence behaviour. Where relevant, these rates were adjusted for purchasing power parity or, in the case of water abstraction, for resource pressure indicators such as the Water Exploitation Index.

Scenario B applies substantially lower rates, typically between one-quarter and one-half of those in Scenario A. These were selected simply to illustrate a more moderate order of magnitude and to reflect the likelihood that politically and administratively feasible reforms may begin at lower levels. They are not anchored to specific empirical benchmarks, but provide a useful contrast for assessing the sensitivity of results.

The identification of “best practices” for the purpose of defining Scenario A relied on a review of Member State tax regimes, existing evaluations, and academic evidence on tax effectiveness. **Instruments were considered good practice where international experience showed that similarly designed taxes had delivered measurable environmental improvements, operated with manageable administrative cost, or offered a credible benchmark for assessing potential impacts in other contexts**.

The modelling relies on elasticity-based behavioural responses and simplified assumptions that necessarily abstract from the heterogeneity of national tax systems, regulatory settings and political realities. The study also assesses possible effects on sectoral competitiveness, innovation, market functioning and implementation feasibility, drawing on Eurostat and European Environment Agency data, sectoral gross value added and a limited body of prior macroeconomic modelling, based on a small number of theoretical frameworks. As a result, findings derived from this strand of the analysis should be interpreted as indicative rather than conclusive. Any discussion of sector-specific impacts, especially those related to agricultural production, should therefore be interpreted with caution, as the underlying analysis does not allow firm conclusions on competitiveness, price effects or wider strategic considerations such as food security. Key limitations are presented in Section 2.

Main results and their interpretation

The study also reviewed evidence on how environmental taxes operate when introduced as part of a broader system rather than as isolated instruments. Many modelling exercises examine packages of taxes applied simultaneously, meaning that reported impacts for individual instruments often reflect interactions with other taxes. **This highlights the importance of considering environmental taxation as part of an integrated policy mix rather than a series of standalone measures**.

Across the literature, **combined environmental tax systems are generally associated with reductions in pollutant emissions, improvements in waste and water management, and, where revenues are recycled effectively, limited or even positive macroeconomic effects**. Evidence from multi-country studies suggests that increases in environmental taxes can reduce CO_2 emissions, improve indicators of energy and resource efficiency, and support the shift to renewable energy, although **results vary significantly across Member States depending on tax design, coverage and enforcement**. **Where pollution and resource taxes have delivered weaker outcomes, this is often linked to low rates, extensive exemptions or poor implementation capacity.**

The relationship between environmental taxes and economic performance remains mixed. Negative short-term effects on growth are generally observed in cases where environmental taxes are introduced as part of broader fiscal consolidation and the overall tax burden rises. In such circumstances, the impact reflects the higher aggregate tax pressure rather than the environmental tax itself. By contrast, studies consistently find that environmental tax reforms can support employment and competitiveness when revenues are recycled to reduce labour or production taxes or used in ways that lower pre-existing economic distortions. **Evidence from countries with long-standing green fiscal reforms suggests that well-designed environmental tax systems can**

strengthen both environmental quality and economic performance. At firm and sector level, concerns about competitiveness impacts remain, though empirical assessments indicate that these are generally modest and can be mitigated through careful tax design and transitional support.

Overall, **the evidence shows that environmental taxes tend to be most effective when deployed as part of coherent reform packages, supported by strong monitoring systems, revenue use that supports social objectives and complementary regulatory measures**. They can deliver meaningful environmental improvements with manageable economic impacts, but outcomes depend critically on tax rate calibration, scope, administrative capacity and the broader policy context in which they are implemented.

Fiscal impacts

The modelling suggests that well-designed pollution and resource taxes could have substantial revenue potential. Under the more ambitious benchmark scenario (Scenario A), the eight taxes examined — taxes on air pollution, fertilisers, pesticides, water abstraction, waste incineration, landfilling, waste water and mining — are estimated to raise up to around €65 billion per year by 2030. This figure should be interpreted as an upper-bound, illustrative estimate, derived from a highly stylised modelling framework and therefore subject to considerable uncertainty. In this scenario, pollution and resource taxes would account for around 20% of environmental tax revenues recorded in 2023. The composition of revenues is likewise indicative and should be interpreted with caution. The prominence of water-related instruments in the results reflects the assumed tax bases and benchmark rates, but the analysis does not robustly account for downstream behavioural, technological or structural adjustments that could significantly reduce taxable bases over time. Such second-round effects — including changes in production processes, input substitution, reduced activity levels or interaction with existing regulatory measures — could materially affect both the level and distribution of revenues across instruments. As these feedback mechanisms are only partially captured in the modelling framework, the relative contributions of individual taxes should be seen as illustrative rather than as firm projections.

Under the more moderate benchmark scenario (Scenario B), total additional revenues seem to be lower but still significant, at around €26 billion by 2030. This might almost double current pollution and resource tax revenues and increase their share to roughly 12% of all environmental tax receipts. The composition of revenues remains broadly similar, with effluent and abstraction charges together representing around four-fifths of the total. **In both scenarios, fiscal impacts differ markedly across Member States, reflecting differences in initial tax levels, the size of the taxable base and the extent of rate increases.** Member States with low starting points or large underlying bases – such as Italy, Romania, Portugal, Ireland and several Central and

Eastern European countries – could see the largest potential percentage increases in revenues, while countries that already apply relatively high environmental tax rates seem to experience more modest gains.

A key reason for the scale and persistence of revenues is that many of the activities taxed – such as water abstraction, wastewater discharges, waste generation and the use of minerals – relate to essential services or basic production inputs whose demand cannot fall rapidly even when prices rise. As a result, these taxes might provide a relatively robust and predictable revenue base. At the same time, this might also means that higher tax levels can have a more visible impact on households and businesses and their competitiveness, unless accompanied by appropriate support measures or revenue recycling. For agricultural taxes, food security should also be considered. The balance between environmental ambition, fiscal stability and affordability will therefore be an important consideration for Member States when designing future reforms.

Overall, **the results suggest substantial scope to strengthen fiscal resilience through green tax reform, particularly where pollution and resource taxes are currently underused**. Additional details on fiscal impacts are provided in Sections 5.1 and 5.2.

Environmental impacts

Both scenarios point towards measurable reductions in environmental pressures, with the scale of impact closely linked to the ambition of tax rates and the size of the taxable base. Under Scenario A, the combined package seem to yield substantial double-digit reductions in most of the targeted pollutants and resource uses by 2030. Air pollution taxes on NO_x, SO_2 and $PM_{2.5}$ reduce emissions from taxed sectors by around 30%, translating into a possible 18% cut relative to total emissions from all sectors covered. Fertiliser and pesticide taxes reduce fertiliser use potentially by almost a quarter and pesticide use by around 6%, with a corresponding 13% decline in the Harmonised Risk Indicator 1 (HRI 1) by 2035, indicating lower overall pesticide risk. Water abstraction charges could lower withdrawals by around one quarter in the most affected Member States, particularly where water scarcity is acute, while wastewater taxes might reduce biochemical oxygen demand (BOD_5) loads by close to 10% at EU level. Landfill and mineral taxes seem to produce sizeable reductions in waste landfilled (around 18% in 2030) and mineral extraction (around 13%), complementing more modest changes in waste sent to incineration. Other potential effects linked to reduced use of resources, such as changes in absolute production levels or impacts on competitiveness, have not been analysed in this modelling exercise.

Scenario B delivers the same pattern of change but at a lower magnitude. Environmental improvements are clearly smaller: reductions in emissions, discharges and resource use are typically in the low single-digit to high single-digit range. For example, air pollution seem to fall by around 4 %, fertiliser and pesticide use by about 6 % and 3 % respectively, wastewater discharges by around 5 %, and landfill disposal by almost 9 % at EU level. **These results illustrate that while even moderate tax increases can deliver environmental benefits, larger and more targeted price signals are needed to achieve transformative reductions in pollution and resource use.** In both scenarios, the strongest environmental gains occur where large taxable bases coincide with high environmental pressures – notably in water, waste and mineral extraction – underscoring the importance of prioritising these areas. Additional details on environmental impacts are provided in Sections 5.1 and 5.2.

Distributional and wider economic impacts

The distributional analysis, drawing on existing macroeconomic modelling, seems to indicate that the broader economic and social effects of pollution and resource taxes are generally modest and manageable. Across a range of case studies covering taxes on NO_x, fertilisers, pesticides, water use, wastewater discharges and landfill, overall employment effects could be small. In most cases, there is no clear pattern of progressivity or regressivity across income quintiles; the impacts are effectively distributionally neutral. **Where effects do arise, these are largely confined to specific sectors, such as agriculture or waste management, and relate to higher input costs, marginal reductions in output or profitability, or limited adjustments in productivity**. Even in these sectors, the magnitude of the impacts seems to remain small based on the existing macroeconomic modelling; however, **any firm conclusion on their scale should be treated with caution, as these findings reflect the limitations and assumptions of past modelling exercises**. Localised pressures on firms or households could be mitigated through targeted fiscal transfers or transitional support measures, ensuring that the burden is manageable and socially equitable.

A consistent finding from these studies is that distributional outcomes depend critically on how revenues are used. Scenarios in which net revenues are simply used to reduce public debt tend to show slightly more negative impacts on real incomes and employment, albeit still small in absolute terms. By contrast, when revenues are used to reduce labour taxes, make targeted transfers to vulnerable households, or invest in environmental infrastructure, adverse effects could be largely offset and, in some cases, turned into modest gains. For example, **revenue-neutral shifts from labour to environmental taxes can marginally increase employment and support low-income households if designed appropriately**. In the context of this study, most of the benchmark tax rates – particularly under Scenario B – are at or below those examined in the underlying macroeconomic assessments, suggesting that the associated distributional impacts would be similarly small or smaller. This ultimately would depend on national contexts. Only in cases where higher water-related taxes are envisaged (notably effluent and abstraction charges in some Member States under Scenario A) might effects become more noticeable, reinforcing the case for complementary fiscal measures to safeguard social fairness and political acceptability. Additional details on distributional effects are provided in Section 5.3.

Impacts on competitiveness and the Single Market

The modelling assumes that all Member States introduce the full suite of benchmark taxes at broadly similar rates. This creates a stylised environment in which relative cost increases are spread across the EU economy, allowing a cleaner comparison of environmental and fiscal effects. In practice, however, such coordinated and simultaneous action is unlikely. Member States are expected to move at different speeds, to introduce different tax designs, or in many cases not to introduce new taxes at all. This distinction is important when interpreting potential impacts on competitiveness, food security and the functioning of the Single Market.

Under the modelled scenarios, the estimated competitiveness effects appear modest at EU level within the narrow scope of the modelling framework, but these results are subject to significant uncertainty. Cost increases are concentrated in activities that use water intensively or rely on resource extraction, notably manufacturing, agriculture, food processing, construction and mining, with the largest impacts driven by taxes on water abstraction, wastewater effluent and minerals. For agriculture in particular, the results should be interpreted with considerable caution. The assumed reductions in fertiliser use — on the order of 25% in scenario A — imply potentially substantial changes in production practices, input costs and yields, which are not fully captured by the model. The analysis abstracts from key sector-specific features, including heterogeneity in farm structures, limited short-term adjustment options, pass-through to output prices, yield effects, trade responses and the role of existing support schemes.

As a result, the conclusion that competitiveness effects would be limited should not be read as a firm finding, especially for agriculture and agri-food value chains. While the assumption that all Member States implement similar taxes would, in principle, preserve relative competitive positions within the EU, material impacts on absolute competitiveness, production levels or investment decisions cannot be ruled out. The results therefore illustrate a stylised, long-run comparison under harmonised policy assumptions rather than providing a robust assessment of real-world competitiveness outcomes.

However, a more realistic scenario would involve heterogeneous adoption. **The literature shows that where environmental taxes differ markedly between jurisdictions, cost asymmetries can create both competitive**

disadvantages and advantages, depending on sector and geography. If only a subset of Member States introduces higher pollution or resource taxes, firms located there may face higher input costs than competitors in Member States without equivalent reforms. This could weaken their position in intra-EU trade, especially in sectors with tight margins and high trade exposure such as agriculture, chemicals, basic manufacturing and certain food-processing activities. Empirical studies of unilateral energy and carbon taxes find that competitiveness effects are generally modest but can become more pronounced for energy-intensive industries when neighbouring jurisdictions do not follow suit. These findings are transferable to pollution and resource taxes, particularly those with large base effects such as water abstraction or mineral extraction charges.

Conversely, asymmetric adoption can also lead to positive competitiveness effects over the longer term. Firms facing stronger environmental price signals tend to innovate earlier, adopt cleaner technologies more rapidly and improve resource efficiency. Evidence from the Porter hypothesis and subsequent ex post studies indicates that such adjustments can strengthen productivity and export performance over time. Member States that move earlier may therefore gain an innovation advantage, although this depends on the availability of capital, the structure of domestic industries and the credibility of long-term policy commitments.

The scale of trade distortions depends on whether the relevant competition takes place primarily within the EU or with global competitors. **For globally traded goods and raw materials, unilateral environmental taxation brings additional risks, since firms may face increased competition from non-EU producers that are not subject to similar taxes**. Although pollution and resource taxes usually represent a small share of total production costs, disparities between jurisdictions could nonetheless influence investment decisions, especially when combined with other structural pressures.

Overall, while the scenarios used in the modelling suggests limited competitiveness risks, this outcome rests on an assumption — all Member States implementing pollution and resource taxes at similar rates — that is unlikely to materialise in practice. In a more plausible setting characterised by uneven or slow progress across Member States, competitive effects would be more heterogeneous. Some Member States and sectors may face higher short-term adjustment pressures, whereas others may benefit from first-mover advantages in innovation and resource efficiency. **These dynamics underline the importance of policy coordination, transparent communication and the use of targeted support measures to alleviate disproportionate impacts in sectors or regions that experience higher cost increases.** Additional details on impacts on competitiveness and the Single Market are provided in Sections 5.4 to 5.7.

Administrative costs and long-term viability of the taxes

The introduction of the benchmark taxes would result in administrative and compliance costs for both public authorities and taxpayers, although these are expected to be moderate in scale relative to the overall functioning of national tax systems. In most cases, the taxes would be implemented through existing administrative structures, particularly where Member States already operate analogous taxes or reporting systems. For pollutants such as NO_x, SO_2 and $PM_{2.5}$, many regulated facilities already monitor and report emissions under the Industrial Emissions Portal Regulation, meaning that substantial elements of the required data infrastructure are already in place. Similarly, for water-related taxes, abstraction volumes and wastewater discharges are often monitored under environmental permitting regimes or water management legislation, reducing the need for new systems.

Nevertheless, **where taxes are newly introduced, authorities would need to establish rules on measurement, reporting and verification, manage the registration of liable entities, and ensure adequate enforcement capacity**. For resources such as minerals or waste streams, administrative demands could increase, particularly in Member States where extraction volumes or waste flows are currently recorded in less detail. Operators would incur additional compliance costs linked to measuring taxable quantities, submitting declarations and maintaining records for audit purposes. **These costs are likely to be proportionately greater for smaller firms, although the overall burden would remain modest relative to the wider cost structure of the sectors concerned**.

The administrative implications would also depend heavily on the design of each instrument. A simple **tax structure with clear definitions, predictable rates and limited exemptions would minimise compliance burdens**. Conversely, more complex schemes involving differentiated rates, numerous exemptions or extensive revenue recycling mechanisms would increase administrative effort. Overall, while administrative costs are unavoidable, they appear manageable and should not pose a barrier to implementation.

The long-term viability of environmental taxes is closely linked to their behavioural effects, the stability of their tax bases and the flexibility of their design. A common concern relates to whether revenues will decline over time as environmental performance improves. While this dynamic is present across many environmental taxes and is often regarded as a sign of successful policy, the modelling results suggest that the benchmark taxes would continue to generate significant revenues well into the 2030s. This is particularly true for water abstraction, water effluent and minerals, where natural constraints, consumption patterns and sectoral demand tend to limit the pace of behavioural change. **Even with gradual reductions in harmful activities, the size of the tax bases remains large, allowing revenues to be maintained at stable levels**.

Environmental taxes also tend to be more robust than other categories of taxation because they target activities that are relatively inelastic in the short term. This limits sudden declines in the tax base and provides predictable revenue streams that can support fiscal planning. Over time, if revenues fall as behaviour adjusts, Member States retain the flexibility to revise tax rates, broaden tax bases or adjust complementary policies to ensure that the 'polluter pays' principle continues to be applied effectively. Moreover, the long-term incentives created by such taxes encourage investment in cleaner technologies, which can reduce compliance costs for firms and strengthen economic resilience, increasing the likelihood that the taxes remain both politically and economically sustainable.

Well-designed revenue use strategies can also enhance long-term viability by increasing public acceptance. Where revenues are used to reduce other distortionary taxes or to finance environmental investments, households and firms may perceive the reforms as more equitable, especially if targeted measures address distributional impacts. Clear communication and predictable implementation pathways are critical to sustaining support over time, particularly in sectors facing higher adjustment costs.

Finally, the viability of the benchmark taxes will depend on their integration within broader EU and national policy frameworks. **As environmental standards become more stringent and technological options expand, taxes may need to be adapted to ensure they remain effective and aligned with long-term policy goals.** Their ability to act as stable, transparent and economically efficient instruments positions them well within evolving policy landscapes, provided that Member States maintain coherent implementation and monitor performance over time. Additional details on administrative costs and long-term viability of the taxes are provided in Section 5.8.

Policy implications and recommendations

Environmental taxation remains an underused but effective tool for reducing environmental pressures and strengthening fiscal resilience. Pollution and resource taxes today represent only around 0.2 per cent of EU GDP. The analysis suggests that, if Member States were to apply benchmark rates similar to those modelled, revenues could reach close to 0.5 per cent of GDP, generating between €40 and €60 billion annually. These gains arise while achieving measurable environmental improvements, particularly through reductions in wastewater discharges, water abstraction and mineral extraction. Although the modelling scenarios assume coordinated implementation across all Member States, this is unlikely to occur in practice**. The results should therefore be interpreted as illustrating the scale of what environmental taxation can achieve rather than as forecasts of what will happen.**

Water-related taxes have high environmental and fiscal potential, but reforms in this area require careful sequencing and strong political judgement. Benchmark water abstraction and wastewater effluent taxes account for the bulk of additional revenues in both scenarios and deliver the most significant reductions in pressure on water bodies. However, unlike marginal efficiency improvements, shifting away from unsustainable water use in water-scarce regions may require transformational changes in production systems, crop choices and long-standing land-use patterns. The empirical evidence on whether taxation alone can induce such structural shifts is limited. Reforms may therefore impose significant adjustment costs on households, farmers and SMEs, especially in more water-scarce regions such as in southern and south-eastern Europe. Any future water-pricing reform would need to be gradual, coupled with investment support and drought-resilience strategies, and accompanied by sustained stakeholder engagement. The political-economy barriers in this area are well documented and remain considerable.

Reform options need to balance environmental externalities with wider policy objectives, including those of the agricultural sector. While the modelling highlights substantial tax bases in sectors such as agriculture, mineral extraction and industrial wastewater discharges, taxation must consider both negative and positive externalities. Agriculture in particular provides environmental and social public goods, including landscape management, biodiversity benefits and rural cohesion. A narrow focus on negative externalities would risk overlooking these wider contributions. This is one reason why the study **does not prescribe sector-specific tax increases** but rather presents quantitative evidence on potential orders of magnitude. Further engagement with agricultural and rural development authorities would be needed before drawing any operational conclusion.

Revenue use will strongly influence the fairness, efficiency and public acceptability of environmental taxes. Higher taxes on essential services such as water and waste are likely to have visible effects on households and firms unless revenues are recycled in a transparent and socially balanced manner. Using part of the proceeds to reduce distortionary taxes, to support low-income households, or to finance efficiency-enhancing investments can soften adjustment costs and improve distributional outcomes. The evidence from previous modelling exercises shows that socially beneficial use of revenues substantially reduces the economic impacts of environmental taxation and can, in some cases, generate net employment or income gains. Clear communication on how revenues are used is therefore crucial.

Gradual, predictable and well-sequenced implementation is essential to limit adjustment costs and enhance feasibility. Phasing-in higher tax rates over several years gives firms and households time to adapt and allows authorities to monitor impacts and adjust policy design. This approach is particularly important in sectors with thin margins or long investment cycles, such as agriculture, manufacturing and water management. Administrative readiness also varies significantly across Member States; those with less developed monitoring or permitting systems may need longer transition periods or accompanying capacity-building support.

Governance and administrative capacity will determine the credibility and effectiveness of reforms. Environmental taxation works best where rate trajectories are stable, tax bases are clearly defined, and enforcement is consistent. Improving data availability for water abstraction, effluents, waste and pollution, and strengthening monitoring systems would support more robust implementation and provide a stronger foundation for future adjustments. Coordination between fiscal and environmental authorities at national level is essential.

The European Semester can inform, but not coordinate, environmental taxation reforms. The Semester's mandate is economic and social policy coordination, not environmental tax setting. Its contribution lies instead in improving the evidence base and informing the Semester's analytical tools, including the environmental annex. Better information on the environmental and fiscal effects of taxes can support Member States' policy development without presupposing coordinated action or convergence of tax rates.

The overall economic impacts of environmental taxation must be interpreted with caution, particularly in the likely scenario of heterogeneous adoption across Member States. The modelling assumes simultaneous implementation across the EU. Under such conditions, competitive effects are modest and the economy-wide impacts on employment and income are small. However, real-world reforms would be heterogeneous. If only a few Member States introduce higher pollution or resource taxes, firms in those countries may face higher costs relative to competitors in Member States without equivalent reforms. In such cases, economic impacts may be larger than those shown in the harmonised scenarios. This reinforces the importance of policy design, gradualism and well-targeted mitigation measures.

Concluding remarks

Well-designed environmental taxation can contribute meaningfully to reducing environmental pressures and strengthening fiscal systems, but effective implementation requires nuance, realism and sustained dialogue. The study confirms that environmental taxes can generate substantial and predictable revenues while achieving measurable environmental improvements. Yet their success depends on credible governance, transparent use of revenues, realistic timelines, and a considered approach to the distributional and competitiveness impacts, especially in regions or sectors facing structural vulnerabilities.

Environmental taxation should therefore be seen as one important element within a wider policy toolkit. When implemented carefully and accompanied by supportive measures, it can help advance the EU's transition to a low-carbon, resource-efficient and socially fair economy. The findings of this study can also support future discussions within the European Semester, while recognising that they do not imply any prescription for coordination or harmonisation of tax policy.

1. Introduction

This study is designed to **support the European Commission** in strengthening its **knowledge base on environmental taxation**, with the aim of informing future cycles of the **European Semester**, including its 2026 iteration. The study contributes to broader EU policy objectives by examining the potential for fiscal measures — specifically environmental taxes — to support a **just, inclusive and effective green transition**.

Environmental taxation is part of a wider **policy toolbox** that includes **fees and charges for environmental services**, and the **phasing out of environmentally harmful subsidies**. These instruments can all contribute to behavioural change, revenue generation, and the internalisation of environmental costs. This assessment focuses specifically on pollution and resource taxes, as defined in the study's scope, and complements existing knowledge on related policy tools.

The European Semester is the EU's principal framework for coordinating economic and social policies among Member States since 2011. It has evolved to respond to major transitions — environmental, digital, and demographic — while reinforcing strategic EU initiatives. The 2026 cycle of the European Semester is structured across the key priority of improving Europe's competitiveness, leveraging on the Competitiveness Compass ([1]) as the main framework to guide the policy priorities.

Taxation policy has featured prominently in the European Semester from the outset. It has gained increasing attention as a tool to support environmental objectives, economic resilience, and social fairness. In this context, several **Country-Specific Recommendations (CSRs)** ([2]) have directly or indirectly encouraged Member States to **shift the tax burden away from labour**, **broaden the tax base**, and **enhance environmental taxation**. A summary of these recommendations for the period 2019-2025 is provided in 0.

([1]) Competitiveness Compass – https://commission.europa.eu/topics/eu-competitiveness/competitiveness-compass_en

([2]) Country-Specific Recommendations provide guidance to EU Member States on macro-economic, budgetary and structural policies in accordance with Articles 121 and 148 of the Treaty on the Functioning of the European Union (TFEU). Source: https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/624404/IPOL_BRI(2018)624404_EN.pdf

The study builds on previous work by the European Commission, including the **Euro Area Recommendation** ([3]), the **Joint Employment Report** ([4]), and past **Spring Package country reports** ([5]), which have all pointed to the potential for environmental taxes to support the EU's transition goals. The analysis also draws from the **'polluter pays' principle** enshrined in **Article 191 of the Treaty on the Functioning of the European Union (TFEU)** ([6]), which underpins much of EU environmental law and policy.

The main objective of this study is to assess the state of play and the prospects for implementing pollution and resource taxes across EU Member States, thereby informing Commission inputs for the 2026 European Semester cycle.

The **methodology** for information gathering and analysis is outlined in **Section 2**. **Section 3** presents the overall state of implementation of environmental taxes across the EU, while **Sections 4 to 6** offer a more detailed analysis of **pollution taxes**, **waste taxes**, and **resource taxes**. **Annex I** contains country factsheets that provide a concise overview of implementation in each Member State.

([3]) Euro Area Recommendation – https://economy-finance.ec.europa.eu/economic-and-fiscal-governance/euro-area-recommendation_en

([4]) 2025 European Semester: Proposal for a Joint Employment Report – https://commission.europa.eu/publications/2025-european-semester-proposal-joint-employment-report_en

([5]) European Semester Spring Package – https://commission.europa.eu/business-economy-euro/european-semester/european-semester-timeline/european-semester-spring-package_en

([6]) Article 191 TFEU – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012E191

2. Methodology

2.1. Environmental taxes in scope

The definition of a tax follows the standard approach used in the System of National Accounts (SNA) ([7]) and the System of Environmental-Economic Accounting (SEEA) ([8]), as well as in OECD methodologies. **A tax is considered a compulsory, unrequited payment, in cash or in kind, made by individuals or institutions to the government.** The term "unrequited" means that the taxpayer does not receive a direct benefit in proportion to the payment made (OECD, 2008). This distinguishes taxes from **fees and charges**, which **are payments for specific government-provided services**.

An environmental tax is a subset of general taxation that is specifically levied on activities or products that have a proven, specific, negative impact on the environment (United Nations et al., 2014). According to the OECD, **an environmental tax is defined as a tax whose base is a physical unit of something that negatively affects the environment**. These taxes aim to influence behaviour by increasing the cost of environmentally harmful activities, encouraging businesses and individuals to adopt greener alternatives. While in theory, an environmental tax should reflect the external costs of pollution or resource depletion, in practice, the definition is based on the tax base rather than the motivation behind the tax. This means that even if a tax is not explicitly intended to address environmental concerns, it can still be considered an environmental tax if it is levied on activities like fuel consumption, pollution emissions, or resource extraction (OECD, 2023a).

The term *environmentally related tax* is often used instead of environmental tax to highlight the broad range of taxes that are linked to environmental factors but may not necessarily be designed as environmental policy tools. For instance, fuel taxes are primarily intended to raise revenue, but by increasing fuel prices they can indirectly reduce energy consumption and thus lower associated

([7]) "A statistical framework that provides a comprehensive, consistent and flexible set of macroeconomic accounts for policy-making, analysis and research purposes. It has been produced and is released under the auspices of the United Nations, the European Commission, the Organisation for Economic Co-operation and Development, the International Monetary Fund and the World Bank Group". Source: https://unstats.un.org/unsd/nationalaccount/docs/sna2008.pdf

([8]) "A framework that integrates economic and environmental data to provide a more comprehensive and multipurpose view of the interrelationships between the economy and the environment and the stocks and changes in stocks of environmental assets, as they bring benefits to humanity. It contains the internationally agreed standard concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics and accounts". Source: https://seea.un.org carbon emissions. Only when fuel taxes are explicitly differentiated by carbon content do they act directly as a carbon-pricing instrument. Unlike strict environmental taxes, which aim to internalise environmental externalities, environmentally related taxes include a wider array of taxation mechanisms that impact environmental outcomes (OECD, 2023a).

In summary, taxation serves as a mechanism for raising government revenue, while environmental taxes are a category designed to address environmental concerns through price signals. Environmentally related taxes encompass all taxes linked to environmentally relevant activities, regardless of their explicit policy intent.

The mapping of the most effective types of environmental taxes (Task 1) aims to identify instruments that could contribute meaningfully to the EU's environmental objectives. In this report, the term *environmental taxes* is used as a shorthand for *environmentally related taxes*, in line with the Eurostat and OECD definition. **The focus of this study is on environmental(ly related) taxes *excluding* those related to energy and transport.** Based on this framing, **the analysis focused on taxes targeting pollution and natural resource use outside the energy and transport sectors**.

To identify environmental taxes in scope and assess their implementation status across the EU, a combination of methods was employed, including literature review, targeted online surveys, systematic screening of tax databases, and data mining from the websites of national, regional and international fiscal authorities.

This work led to the identification of 244 environmental taxes currently in place across EU Member States. These were categorised following Eurostat's environmental tax classification: pollution taxes and resource taxes. For analytical purposes, the following subgroups were defined:

- Pollution taxes
    - Taxes on agricultural activities
    - Taxes on NOx, SOx, and other pollutant emissions
    - Taxes on plastic bags and packaging
    - Taxes on polluting products
    - Taxes on noise emissions
    - Other pollution taxes
    - Taxes on waste disposal
    - Taxes on wastewater
- Resource taxes

  - Taxes on mining
  - Taxes on tree felling
  - Taxes on hunting and fishing
  - Taxes on water abstraction / water use
  - Taxes on land use
  - Other resource taxes

By contrast, the following instruments were considered out of scope for this study, either because they fall within the excluded sectors or because they do not constitute environmental taxes as defined:

- Tax on domestic use of coal and biomass – excluded due to its classification as an energy tax
- Air passenger tax – excluded as it falls under the transport sector.
- Charges on high-pollution vehicles in low-emission zones – excluded for the same reason.
- Extended Producer Responsibility (EPR) schemes – excluded as they are instruments different from environmental taxes.Assessment of the state of implementation of environmental taxes in the EU

2.2. Literature review

The literature review adopted a structured approach to identifying and assessing the most effective environmental taxes that can support the EU's environmental objectives. The process began with defining the scope of the review, ensuring that the search for relevant literature was guided by clear research questions. These were:

- RQ1: What (non-energy) (non-transport) environmental taxes can be implemented to reduce environmental externalities?
- RQ2: What environmental externalities are addressed by each environmental tax?
- RQ3: How effective are the identified environmental taxes in internalising and ultimately reducing externalities? What is their potential to change individual and corporate behaviours?
- RQ4: What is their short-term and long-term potential of generating revenues?
- RQ5: How much of the identified environmental taxes are being passed on to consumers (pricing behaviour)?

- RQ6: What is the price elasticity of the demand for the products and services involved?
- RQ7: What is the price elasticity of the supply for the products and services involved?
- RQ8: What are the indirect effects of the identified environmental taxes?
- RQ9: How are the environmental taxes' revenues used?
- RQ10: What are the costs of the identified environmental taxes?
- RQ11: What is the cost-benefit ratio of these environmental taxes?
- RQ12: What are the impacts of the identified environmental taxes on countries' competitiveness?
- RQ13: What are the impacts of the identified environmental taxes on sectoral competitiveness?
- RQ14: What are the factors limiting the effective application of the tax?

The next stage involved identifying and collecting relevant academic and grey literature from various sources, including peer-reviewed journals, reports from international organisations, and national studies. The team used keywords informed by the research questions and built several search strings also considering variations in terminology (e.g. "fee", "charge", "duty" and "levy" instead of "tax"). The team then filtered sources to ensure relevance and quality. In addition, snowballing was employed to discover additional sources by analysing citations within key documents.

This resulted in the short-listing of 160 documents for further investigation. The findings have been synthesised and reported in a structured manner (Sections 3 to 5). The analysis of information focused on the effectiveness of different environmental taxes in achieving policy goals, taking into account factors such as price elasticity, cost-benefit ratios, and impacts on competitiveness. The strength of evidence for each finding was also evaluated on the basis of the quality and consistency of available research.

2.3. Online survey

The research questions also informed the development of a questionnaire to run an online survey of national competent authorities and researchers. The survey run between 3 February and 7 March and received 12 responses from 9 different Member States. Four responses were provided by regional competent authorities within the same Member State. The questionnaire and the analysis of the responses are presented in Annex 2.

2.4. Data mining on the implementation of environmental taxes across the EU

The gathering of information on the implementation of environmental taxes across the EU started by extracting data from three key databases:

- The National Tax Lists – individual taxes, updated 22 January 2025 ([9]): these lists provide full detail of the national classification of taxes and social contributions and must be provided in accordance to Regulation (EU) No 125/2022 of the European Parliament and of the Council of 19 November 2021 on amending Annexes I to V to Regulation (EU) No 691/2011 of the European Parliament and of the Council on European environmental economic accounts.
- The Taxes in Europe Database v4 ([10]). This database covers the main taxes (personal income taxes, corporate income taxes, value added taxes, EU harmonised excise duties, and other taxes yielding at least 0.1% of Gross Domestic Product) in force in the EU Member States.
- The Policy Instruments for the Environment (PINE) Database ([11]) "includes information on taxes and fees, subsidies, tradable permits and offsets, deposit-refund schemes and voluntary approaches relevant to 22 environmental domains. The information in the PINE database is collected via a network of country experts (including government agencies, research institutes and international organisations)".

The findings were then complemented by screening the websites of national and, where relevant, regional competent authorities and by searching for government reports and other grey literature to account for recent developments across Member States ([12]).

2.5. Categorisation of environmental taxes

Eurostat uses the same definition of environmental tax as the OECD, the European System of Accounts (ESA) and the SEEA, and therefore the emphasis is placed on the tax base rather than the legislator's stated purpose,

([9]) https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Tax_revenue_statistics

([10]) https://ec.europa.eu/taxation_customs/tedb/#/home

([11]) https://www.oecd.org/en/data/datasets/policy-instruments-for-the-environment-pine-database.html

([12]) The search was performed in all EU official languages by machine-translating the search strings used in English.

the tax’s name, or whether the revenue is earmarked for environmental use. This is because many taxes serve multiple objectives, including revenue generation and behaviour modification, making purpose-based classification unreliable. **The environmental effect of a tax is considered to result from its impact on the cost of environmentally harmful activities and the prices of related products, as well as on the availability and relative costs of alternative products or activities**. This, in turn, influences behaviour by making polluting activities more expensive and encouraging cleaner alternatives. In practice, taxes classified as environmental can include those on pollution, resource extraction, energy consumption, and transport, as long as their tax base aligns with environmentally harmful activities.

Eurostat’s classification further distinguishes environmental taxes from other fiscal instruments such as fees, charges, and subsidies. It excludes general taxes on income and labour, as well as value-added taxes (VAT), even if they apply to environmentally relevant goods. Similarly, resource rent taxes, which capture the economic value of natural resource extraction rather than the environmental harm caused, are also excluded from Eurostat’s classification.

Another important consideration is the legal or policy-driven dedication of tax revenue to a particular purpose (earmarking or hypothecation). Not all earmarked taxes are considered environmental taxes unless they are levied on an environmentally harmful activity. Likewise, many environmental taxes are not necessarily earmarked but are instead absorbed into general government revenues. Consequently, while earmarking provides transparency and a direct link between taxation and environmental action, it does not influence whether a tax is classified as environmental in Eurostat’s statistical framework (Eurostat, 2024).

To supplement the definition of environmental taxes, a structured list of environmentally relevant tax bases has been established by Eurostat, in collaboration with the European Commission, the OECD, and the International Energy Agency (IEA). This classification ensures a harmonised and objective approach to identifying environmental taxes by focusing on the tax base rather than the stated purpose of the tax. The environmental tax bases are grouped into four main categories: energy taxes, transport taxes, pollution taxes, and resource taxes. Each category includes specific tax bases that are considered to have a direct or indirect negative impact on the environment.

Table 2-1 presents the main categories of environmental tax bases. While the table includes energy and transport taxes for completeness, these two categories are out of scope for this study, which focuses only on pollution and resource taxes.

Table 2-1: Categories of environmental taxes by tax bases

Categories	Tax bases
Energy taxes	Unleaded petrol, leaded petrol, diesel, liquefied natural gas (LNG), liquefied petroleum gas (LPG), natural gas, kerosene, fuel oil, light fuel oil, heavy fuel oil, coal, coke, biofuels, electricity consumption and production, district heating consumption and production, carbon content of fuels, emissions of greenhouse gases (including proceeds from emission permits)
Transport taxes	Import or sale of motor vehicles (one-off taxes), registration or use of motor vehicles (recurrent annual taxes), road use (motorway tolls, congestion charges), other means of transport (ships, aircraft, railways), transport infrastructure (ports, harbours, airports, roads, rail, pipelines), flight and flight ticket taxes, vehicle insurance (excluding general insurance taxes)
Pollution taxes	Emissions to air (measured or estimated NO_x, SO_x, particulate matter, volatile organic compounds), ozone-depleting substances (CFCs, halons), effluents to water (measured or estimated effluents of oxidisable matter, biological oxygen demand (BOD), chemical oxygen demand (COD), and other pollutants), solid waste management (collection, treatment, disposal), taxes on specific products (packaging, beverage containers, plastic bags, batteries, tyres, lubricants, hazardous waste), noise pollution (aircraft take-offs and landings), other pollution sources (paints, solvents, personal care products, radiation)
Resource taxes	Water abstraction, harvesting of biological resources (e.g. timber, hunted and fished species), extraction of raw materials (e.g. minerals, sand, gravel), landscape changes (deforestation, urban sprawl), conversion of land for agriculture, forestry, infrastructure development, mining

The classification of environmental taxes under these categories ensures consistency across EU Member States. However, borderline cases exist, requiring further assessment to determine whether a tax qualifies as an environmental tax:

- A major borderline issue arises in transport taxation. Taxes on motor fuels used for road transport are classified as energy taxes, while vehicle registration taxes and annual road taxes, if based on vehicle characteristics such as engine size or CO_2 emissions, are typically classified as transport taxes. Similarly, congestion charges and city tolls are considered environmental taxes, but are generally classified as transport taxes (rather than pollution taxes), provided they meet the definition of a tax under national accounts.

- In pollution taxation, distinguishing between environmental taxes and regulatory fees is a common challenge. Taxes on air and water pollution are classified as environmental, but some charges, such as wastewater treatment fees, may be considered payments for services rather than taxes. Similarly, taxes on lubricating oils, which do not serve an energy function, may be considered pollution taxes if their main environmental impact is related to water or soil contamination.

- For resource taxes, payments related to sub-soil resource extraction, such as royalties on oil, gas, and mineral extraction, are excluded from environmental tax statistics as they are considered property income rather than taxes. However, specific taxes on water abstraction, deforestation, or land conversion are included, as they directly impact natural resource depletion.

2.6. Selection of the most effective types of environmental taxes

This section explains the conceptual and economic foundations that inform the selection of the most effective environmental taxes. It outlines key principles of tax design that balance environmental effectiveness, economic efficiency, and social fairness. The section then sets out the criteria used in this study to assess different tax instruments.

2.6.1. Economic principle for environmental tax design

The concept of a Pigouvian tax originates from the work of the British economist Arthur Cecil Pigou, who introduced the idea in his book “The Economics of Welfare” (1920). A Pigouvian tax is designed to correct negative externalities, which occur when the actions of individuals or firms impose costs on society that are not reflected in market prices. In the context of environmental taxation, a Pigouvian tax is imposed on activities that cause environmental harm, such as pollution or excessive resource consumption, to ensure that the full social cost of these activities is accounted for in their market price. The objective is to internalise the external costs, meaning that the price of a good or service reflects not only its private production cost but also its environmental impact.

In a theoretical “first-best” world — absent other market distortions — the optimal Pigouvian tax would equal the marginal social cost of the externality. However, in practice, most economies operate under a “second-best” setting, where other distortions (e.g. from existing labour or capital taxes) already affect economic behaviour. As shown by Lans Bovenberg & de Mooij (1994), introducing a Pigouvian tax in such a context may in fact exacerbate the inefficiencies of the overall tax system, particularly if it narrows the tax base or further distorts labour supply. In these cases, the optimal environmental tax may be lower than the marginal external cost, reflecting a trade-off between internalising the externality and minimising the excess burden of taxation.

The Ramsey rule, developed by the economist Frank Ramsey in 1927, provides an alternative framework for setting taxes efficiently, though it was not originally designed for environmental taxation. Ramsey’s rule states that optimal taxation should minimise economic distortions by setting higher tax rates on goods and services with inelastic demand — that is, those for which consumers are less responsive to price changes. The reasoning behind this is that when demand is inelastic, taxation creates smaller inefficiencies because people continue purchasing the taxed good despite the higher price.

In the context of environmental taxes, the Ramsey rule suggests that tax rates should not only reflect the environmental harm of an activity (as in the Pigouvian approach) but should also take into account the responsiveness of consumers to price changes. If demand for a polluting good is highly inelastic, a higher tax rate could be justified from an economic efficiency perspective, as it would generate revenue with minimal impact on overall economic activity. Conversely, if demand is highly elastic, a high tax rate might lead to significant behavioural changes, potentially causing economic disruptions or unintended consequences, such as shifts to unregulated markets.

The difference between Pigouvian and Ramsey taxation lies in their primary objectives. Pigouvian taxes aim to correct market failures by making polluters bear the full cost of their actions, whereas Ramsey taxes focus on revenue generation with minimal economic distortions. In practice, environmental taxes often incorporate elements of both approaches. While they are intended to reduce environmental harm, policymakers also consider factors such as tax efficiency, revenue stability, and economic competitiveness. This explains why environmental tax rates often deviate from the theoretical Pigouvian level and may be adjusted based on broader fiscal policy concerns.

Despite the theoretical differences, both concepts contribute to the design of effective environmental taxation. A well-structured environmental tax system considers both the marginal damage caused by pollution (Pigouvian logic) and the economic impact of taxation on market behaviour (Ramsey logic). This balance ensures that environmental objectives are met while minimising unnecessary economic distortions.

2.6.2. Role of revenue use and earmarking

Another important consideration — though distinct from the logic of Pigouvian taxation itself — is how environmental tax revenues are used. In some cases, revenues are earmarked or hypothecated for specific environmental purposes, such as pollution control, renewable energy projects, or conservation programmes. While such earmarking does not affect the core effectiveness of the tax in correcting market failures (which derives from its impact on relative prices and behaviour), it may enhance public and political acceptance, reinforce the perceived fairness of the measure, and help secure funding for complementary environmental investments. However, from an economic perspective, the destination of tax revenues should be assessed separately from the environmental effectiveness of the tax instrument.

One example of a well-earmarked environmental tax is the Dutch water pollution tax, which is used to finance sanitation and wastewater treatment activities (Eurostat, 2024). Similarly, fuel taxes in some countries are partially earmarked to fund improvements in public transport infrastructure, reducing reliance on fossil-fuel-powered vehicles. In the case of carbon taxes, some governments dedicate part of the revenue to supporting energy efficiency programmes or compensating households affected by higher energy costs.

Despite the advantages of earmarking, such as ensuring stable funding for environmental initiatives and increasing public acceptance of taxes, there are also challenges. One major concern is that rigid earmarking can limit fiscal flexibility, preventing governments from reallocating funds in response to changing economic or environmental priorities. Moreover, while a successful environmental tax should lead to behavioural change and a reduction in environmentally harmful activities, this very success may also cause a decline in revenue over time. This is, of course, a positive outcome from an environmental perspective, as it reflects the tax's effectiveness. However, it may complicate the long-term financing of any programmes that rely on a steady revenue stream from the tax.

2.6.3. Criteria for assessing environmental taxes

The criteria presented below were developed to guide a structured and multi-dimensional assessment of environmental taxes, balancing economic, administrative, social, and environmental considerations. While not all criteria could be applied quantitatively due to data limitations, they were used systematically as an analytical framework throughout the assessment. The aim was to identify the types of environmental taxes that are not only cost-effective, but also more broadly effective in delivering tangible environmental outcomes, and therefore to consider instruments that can both influence behaviour and contribute meaningfully to the achievement of the EU's environmental objectives.

For each tax instrument reviewed, the analysis considered:

- C1: Elasticity and potential to **change behaviours** of individuals and corporations. When designing taxes, accounting for variations in elasticity is crucial to effectively target and alter behaviour.
- C2: Potential to generate **environmental benefits** / reduce environmental externalities. An externality is the cost of an activity that is not borne by the party responsible for the activity but by society at large. To internalize the externality involves passing the cost back to the party responsible for creating the damage. Environmental taxes set at a level equal to the marginal cost of abatement will bring about the internalization of an externality if the marginal damages are at least as high as those costs. As the 2023 Annual Taxation Report notes: "Environmental taxes are effective if they correct the price so that this reflects the marginal costs of an activity to society."
- C3: Long-term **revenues**, potential to use revenues to deliver the objectives of the 8th EAP.

- C4: **Competitiveness** benefits and/or costs at different levels (e.g., sectors).
- C5: Impacts on the **single market.**
- C6: C**ost/benefit** ratio.
- C7: Factors limiting the effective application of the tax: **administrative complexity**.
- C8: Factors limiting acceptability and application: **distributional impacts** in terms of social fairness. Environmental taxes are eventually passed on to the final users of the taxed goods and services. Without compensatory measures, this may lead to a reduction in real income for households and other agents in the economy. Although environmental taxes are often viewed as regressive, the literature presents mixed findings. Some studies argue that they can exacerbate inequality (Prakash & Potoski, 2006), while others suggest they can be designed in ways that support equity goals (Noubissi Domguia et al., 2022). Compensation does not necessarily require reducing other taxes — it can also take the form of direct transfers, such as lump-sum rebates or targeted support to low-income households. These mechanisms can be more effective in preserving fairness and public acceptance, and should be considered carefully when designing or reforming environmental tax policies.
- C9: Extent to which the tax is effective in delivering the **EU's environmental objectives**.
- C10: Tax evasion potential.

2.7. Methodology for the assessment of the impacts on revenues and the environment of the implementation of new environmental taxes in the EU

2.7.1. Estimating tax revenues and environmental impacts

This section outlines the methodology applied to estimate potential revenues, emission reductions and other environmental impacts that could result from the introduction of new environmental taxes in all EU Member States. To keep the analysis tractable and ensure comparability across countries, a stylised scenario is simulated in which Member States apply certain benchmark tax rates to selected environmental pressures. This does not imply a legislative harmonisation of tax systems, but serves solely as an analytical benchmark to assess potential orders of magnitude of effects.

The methodology differs according to the type of environmental pressure and resource considered. The analysis covers eight categories:

- Air pollution
- Fertilisers
- Pesticides
- Water abstraction
- Waste incineration
- Landfill
- Water effluent/wastewater
- Minerals

A central element of the modelling approach concerns the selection of tax rates for the pollution and resource taxes assessed in this study. These benchmark rates draw directly on the work of Hogg et al. (2016), which remains the most comprehensive and methodologically robust EU-wide investigation of environmental fiscal reform options. Although almost a decade old, it continues to provide the most complete cross-Member-State assessment of feasible tax bases, indicative tax levels, and expected behavioural responses. Its recommendations were therefore used as the starting point for defining tax rates in this study, with appropriate adjustments for inflation, purchasing power disparities and updated sectoral data. Relying on this source ensures methodological consistency across tax types and supports comparability with earlier Commission analyses.

Due to data limitations, it has not been possible to estimate revenues for other areas such as packaging, forestry, and hunting or fishing. Even within the selected categories, several simplifying assumptions were required. The accompanying Excel files present the detailed results, assumptions and calculation procedures.

2.7.1.1. Air pollution

Emissions data for **NOx**, **PM**, and **SO_2** are available for all Member States. If a tax were introduced, the change in revenue in the first year would be calculated as:

$$\Delta R_1 = (T_1 - T_0)E_0$$

Where *R* refers to revenue, *T* to tax rate and *E* to emissions, with subscripts referring to time periods.

Over subsequent years, emissions are expected to decline in response to the tax while also being influenced by other regulations and economic factors. The baseline trajectory of emissions has been projected under the assumption that recent annual percentage changes continue until 2035, unless evidence suggests otherwise. The estimated effects of taxation on emissions are derived from **elasticities** reported in the literature, as detailed in **0**.

Revenues are then obtained by multiplying the applicable tax rates by the corresponding (adjusted) emissions. It is assumed that the full behavioural response to the tax will be realised gradually over five years, with effects increasing linearly between years 1 and 4. Accordingly, the change in revenue in year t is expressed as:

$$\Delta R_t = T_t E_t - T_0 E_T$$

Two benchmark tax rates were applied in the study. In Scenario A we started with the rates proposed by Hogg et al. (2016) of €1,000 per ton of SO2, €1,000 per ton of NOx and €2,000 per ton of PM10 (or €3,000 per ton of PM2.5). In Scenario A we took €1,000 for all three pollutants (SO2m NO2 and PM2.5) and increased them by 30% to allow for inflation between 2016 and 2025. This gave rates €1,000. A lower rate was applied for PM2.5 after discussion in the team. In Scenario B a rate equal to 25% of those in Scenario A were set (i.e., €325 per ton). These were chosen after discussion within the team and with the Commission as representing a more modest increase that may be acceptable.

2.7.1.2. Fertilizers

At present, no Member State applies a general fertiliser tax. The Netherlands previously had a tax on surplus fertiliser, but this was withdrawn, as was the case in Sweden. Belgium applies a manure tax; however, this is distinct from a fertiliser tax.

Data on fertilizer application by Member State are generally available. The applicable tax rates were defined and applied, with adjustments for purchasing power parity — as in Hogg et al. (2016) — to ensure that countries with lower agricultural price levels were not disproportionately affected.

A specific complication arose in two Member States — Belgium (Flanders region) and the Netherlands — where existing levies apply not to the total quantity of fertilisers used but specifically to manure. These taxes target surplus nitrogen (N) and phosphorus (P) generated on farms. Calculation of the payable amount in these cases requires assessing each farm's nutrient absorption capacity and identifying any surplus produced, which makes administration and comparability more complex. Consequently, a general fertiliser tax was modelled in parallel with the existing manure taxes for these countries.

The tax rates applied for fertilizers were as follows. For Scenario A the starting point was the Hogg et al (2016) rate of €200/ton of N applied. However, this rate was varied across Member States to reflect differences in in relative price levels of the various national agricultural sectors, giving rates that varied from €50 per ton of N (Estonia, Latvia and Malta), to €400 per ton of N (Greece). We increased all these rates by an inflation factor of 30% to make them in 2025 prices and kept the same structure across Member States as in Hogg et al. (20169. This gave a central rate of €260/ton of N. The tax, however, applies to the **nitrogen content** of fertilisers, which varies by product type (European Commission, 2019). Urea, which constitutes approximately **56%** of fertiliser applications, contains **46% nitrogen**, while the remaining **44%** of applications consist primarily of nitrates (ammonium nitrate, calcium ammonium nitrate, calcium nitrate and urea ammonium nitrate), with an average nitrogen content of **26.5%**. This yields an overall weighted average nitrogen content of **37.3%**, which was used to calculate the tax per unit of fertiliser.

For Scenario B, the central rate was reduced by a quarter to €65/ton of N this was agreed with the Commission as a plausible more modest rate.

2.7.1.3. Pesticides

The analysis of pesticides was more complex than for other pollutants, as it required accounting for variations in toxicity across different substances. Taxes should ideally be structured to discourage the use of the most harmful pesticides relative to those with lower toxicity.

Pesticide data were primarily retrieved from Eurostat, comprising two main datasets:

(a) Annual sales of pesticide product (in kg) in each Member State, disaggregated by type (e.g. insecticides, herbicides, fungicides) and further by sub-type according to the class of active ingredient (AI) — for instance, “Conazole fungicides” or “Imidazole fungicides” ([13]).

(b) Total annual sales of pesticide products (kg) in each Member State by the categorisation of active substances used for the Harmonised Risk Indicator 1 (HRI 1). This dataset does not distinguish between specific AIs, AI classes or pesticide types. It only provides total quantities of pesticide products containing active substances within the four HRI 1 groups:

   (i) Group 1 - low-risk active substances

(13) https://ec.europa.eu/eurostat/databrowser/view/aei_fm_salpest09__custom_18126823/default/table

(ii) Group 2 - active substances

(iii) Group 3 - active substances candidates for substitution

(iv) Group 4 - non-approved active substances

As Eurostat reports quantities of pesticide product rather than the quantities of active substances they contain, supplementary data from Udias et al. (2023) were used to estimate the proportion of active substance within total pesticide product. Udias et al. (2023) compiled data from eight Member States ([14]) for various years between 2011 and 2017 and produced estimates of the use of around 150 active substances across all EU Member States. These estimates represent average conditions "around 2015".

The Udias et al. (2023) data were merged with Eurostat's pesticide product sales data (2011–2017) to calculate the percentage of active substance per kilogram of pesticide product for each substance category. Instances where the modelled active substance content exceeded 100% of product weight were excluded from the dataset to remove inconsistencies. The resulting dataset provided, for each Member State and year, the estimated proportions of active substance by pesticide sub-type, which were then aggregated to derive weighted averages at the overall pesticide level.

These weighted averages were found to be broadly consistent across years and countries. The 2011–2017 averages were therefore taken forward as conversion factors specific to each Member State, allowing the transformation of Eurostat's pesticide sales data (expressed in kg of product) into quantities of active substance (kg) adjusted to reflect national use patterns.

The resulting Member State-specific conversion factors were applied to Eurostat data on annual pesticide product sales by HRI 1 category for the years 2017-2022. This yielded estimates of the total quantity of active substances (kg) used in each Member State within each HRI 1 group:

- Group 1 - low-risk active substances
- Group 2 - active substances
- Group 3 - active substances candidates for substitution
- Group 4 - non-approved active substances

Finally, forward projections were developed by first calculating, for each year, the distribution of total active substance use across the four HRI 1 groups at EU-27 level. Total pesticide use across all groups was projected using a simple rolling average of preceding years, as annual pesticide consumption fluctuates significantly due to weather, cropping patterns, and other factors, with no clear

([14]) Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Spain upward or downward trend. The resulting baseline projections are summarised in the table below.

Table 2-2: Distribution of active substances between HRI groups at EU27 level in the baseline

Baseline projections

Year	Group 1 - low-risk active substances	Group 2 - active substances	Group 3 - active substances candidates for substitution	Group 4 - non-approved active substances	Total quantity of active substance used (000Tons)
'Actual' values (based on kg. to kg. AI conversion)					
2017	0.32%	73.87%	14.75%	11.06%	126.04
2018	0.34%	73.74%	15.49%	10.43%	136.97
2019	0.34%	73.16%	15.12%	11.38%	134.99
2020	0.40%	80.34%	13.29%	5.96%	143.16
2021	0.54%	82.04%	14.39%	3.03%	142.11
2022	0.65%	83.10%	15.27%	0.98%	130.01
	Forecast trend under the baseline	**A function of forecasts for other groups**	**Forecast trend under the baseline**		**Forecast trend under the baseline**
2023	0.72%	85.06%	14.22%	0.0%	135.55
2024	0.79%	85.07%	14.14%	0.0%	137.13
2025	0.86%	85.09%	14.05%	0.0%	137.16
2026	0.93%	85.11%	13.96%	0.0%	137.52
2027	1.01%	85.12%	13.87%	0.0%	136.58
2028	1.08%	85.14%	13.78%	0.0%	135.66
2029	1.15%	85.16%	13.69%	0.0%	136.60
2030	1.22%	85.17%	13.61%	0.0%	136.78
2031	1.29%	85.19%	13.52%	0.0%	136.72
2032	1.36%	85.21%	13.43%	0.0%	136.64
2033	1.43%	85.22%	13.34%	0.0%	136.50
2034	1.51%	85.24%	13.25%	0.0%	136.48
2035	1.58%	85.26%	13.17%	0.0%	136.62

Source: Own elaboration

For the tax rates on these pesticides, we took as the point of departure for Scenario A the figure from Hogg et al. (2016) who set tax centred around a benchmark rate of €10 per kilogram of active ingredient, adjusted to reflect differences in the relative price levels of national agricultural sectors. The adjustment index was based on the effective Common Agricultural Policy (CAP) support per hectare of utilised agricultural area in each Member State, as derived from the CAPRI model. To account for inflation between 2016 and 2025, these rates were increased by 30%, consistent with the adjustments applied to other taxes based on Hogg et al. (2016). This gave a benchmark rate of €13 per kilogram of active ingredient. **Error! Reference source not found.** presents the resulting tax rates by Member State and the corresponding EU average. The rates for different groups were then set as a percent of the benchmark rate. For Group 1 pesticides it was set at zero as these are not considered toxic. For Group 2 it was set at 10% of the benchmark rate, for Group 3 at 50% of the benchmark rate and Group 4 at 100% of the benchmark rate. These variations were agreed within the team as providing

For Scenario B an agreed lower benchmark rate of €5 per kilogram of active ingredient was applied.

2.7.1.4. Water abstraction

For this category, an initial estimate of abstraction volumes was required. Data were obtained from Eurostat, providing information on total water abstraction by Member State.

In practice, abstraction charge rates vary widely within countries — by region, aquifer type, and between groundwater and surface water sources. However, due to the limited availability of disaggregated data, it was not feasible to model these variations. Instead, an average rate was calculated for each Member State to obtain the current average taxes. As detailed in subsequent sections, these average rates were calculated by dividing total reported revenues from water abstraction by the corresponding abstraction volumes.

The calculations of the taxes for the two scenarios were made as follows. Hogg et al. (2016) took as its point of departure, the Danish scheme, considered to be good practice for households, and the Dutch scheme, as good practice for businesses, with the lowest business rate applied in the Netherlands also applied to agricultural abstraction. A weighted combination of the rates in these countries were adjusted for each country to allow for differences in PPP and water scarcity to obtain rates by Member State. We could not follow this procedure in full as data on abstraction by different uses was not available. Hence we used the current Danish average rate as a benchmark and adjusted rates for each Member States according to differences in PPP and water scarcity as in Hogg et al. (2016). This gave an average rate across all Member States of €0.154/M3. Details of rates for different Member States are given in Table 510. In Scenario B the benchmark rate was set equal to the current average charage for water abstraction, which was estimated at €0.024/M3. This was applied to all Member States that were below that level. Individual rates for Member States were further adjusted from that rate to allow for PPP and water scarcity as in Scenario A.

2.7.1.5. Waste incineration

Historical data on waste incineration by Member State were obtained from Eurostat, distinguishing between hazardous and non-hazardous waste. Information on existing incineration tax rates was compiled from recent European Environment Agency and national reports. As these rates vary within some Member States, average values were applied where ranges were reported.

The analysis incorporated evidence from the literature on how changes in incineration taxes affect waste flows, recognising that municipal and industrial waste respond differently to price signals. These relationships were represented through elasticity estimates derived from relevant studies.

The tax rates for the two scenarios were set as follows. For Scenario A, we took as the point of departure the rate proposed by Hogg et al. (2016) of €15/ton. Adjusting for inflation this becomes €19.5/ton. This was applied to all Member States. In Scenario B we took the current average rate across all Member States of €8.1/MT and applied it as a benchmark to all states that were below that level.

Baseline rates and the impacts of the simulated tax on both revenues and the quantity of waste incinerated were then estimated following the same methodological approach used for the other categories.

2.7.1.6. Landfill

Data on landfill disposal volumes were obtained from Eurostat for the period 2004–2022.

Applicable tax rates were derived from current national rates and from Hogg et al. (2016). These rates vary according to the type of waste (e.g. higher for hazardous than for non-hazardous waste), the type of landfill (e.g. higher for unauthorised sites in France) ([15]), and the degree of waste separation (e.g. in Slovakia). In countries with regionally differentiated landfill taxes, population-weighted national averages were calculated to ensure comparability.

([15]) "152 EUR/t for non-authorized landfills or non-authorized waste in authorized landfills (A); The maximum fee is intended to penalize the illegal operation of an unauthorized waste disposal site. Non-authorized [landfills] once identified, are subject to: an administrative procedure to lead to their regularization, either by obtaining an authorization, or by closure with measures (restoration, containment of waste, etc); possibly, a penal procedure; possibly, a tax adjustment with application of the increased." *Source:* EEA (2022). Early warning assessment related to the 2025 targets for municipal waste and packaging waste. France country profile. Available at: https://www.eea.europa.eu/en/analysis/publications/many-eu-member-states/early-warning-assessment-related-to-the-2025-targets-for-municipal-waste-and-packaging-waste

The tax rates for the two scenarios were set as follows. For Scenario A, we took as the point of departure the rate proposed by Hogg et al. (2016) of €50/ton. Adjusting for inflation this becomes €65/ton. This was applied to all Member States. In Scenario B we took the current average rate across all Member States of €36.2/MT and applied it as a benchmark to all states that were below that level.

Baseline rates and the fiscal impacts on both revenues and landfill volumes were then estimated following the same methodological approach applied in the other categories.

2.7.1.7. Water Effluent / Wastewater

This category presented particular challenges due to the limited availability of quantitative data on wastewater volumes. For the analysis, data from the European Environment Agency (EEA) for 2020 were used, providing information on annual discharges (in million cubic metres) for each Member State.

Member States operate within diverse frameworks of water effluent taxation, which are distinct from the charges applied for wastewater collection and treatment services. The absence of a harmonised dataset on pollutant loads complicates cross-country comparison and the modelling of potential tax revenues. To address these limitations, two main approaches were considered: a levy based on specific pollutant loads (e.g. kilograms of biochemical oxygen demand, BOD, per unit volume), or a volumetric tax on total wastewater discharge.

For this analysis, the first approach was adopted. For Scenario A, the same approach as in Hogg et al. (2016) was adapted. They modelled a tax only on BOD, which is set at the Dutch tax rate for BOD, €2.47 per kg BOD in 2013. The rate applied in each Member State was adjusted for relative purchasing power in the different countries. We adjusted this for inflation to get an average of €2.06/BOD5/Kg. Note that this average includes some Member States rates that are above the benchmark rate. For Scenario B, we applied the current average rate of €1.524/BOD5/Kg to all Member States that were below this figure. That gave an average rate of €2.13/BOD5/Kg.

Baseline rates and the resulting impacts of the tax on revenues and wastewater discharges were then estimated following the same methodological framework applied in the other categories.

2.7.1.8. Minerals

Data on mineral extraction by category were obtained from Eurostat for the period 2009-2022, with some data gaps for specific materials and countries.

These data formed the basis for projecting aggregate extraction for 2025, 2030 and 2035, under the assumption that past trends would continue.

Following Hogg et al. (2016), a tax on aggregates extracted from the ground was modelled to encourage material reuse and reduce construction and demolition waste sent to landfill. In this analysis, a minimum benchmark tax rate was applied to several mineral categories, including ornamental and building stone, slate, limestone and gypsum, and sand and gravel. For Scenario A the rate proposed was €2.4/MT, which adjusted for inflation becomes was €3.12/MT. This applies for Member States that have rates below this level giving an average across all Member States of €3.38/MT. For Scenario B we applied the current average rate of €0.94/MT to all Member States that were below this figure. That gave an average rate of €1.55/MT.

Baseline rates and the impacts of the simulated tax on both revenues and extraction volumes were then estimated using the same methodological approach applied to the other categories. In Member States without an existing mineral tax, the initial rate was set to zero.

2.7.2. Hypothetical tax reforms

Two tax reform scenarios were considered in the analysis:

- **Scenario A** — a relatively ambitious reform based on the proposals by Hogg et al. (2016), updated to reflect inflation in the EU since that time and incorporating several methodological adjustments described in this report.
- **Scenario B** — a less ambitious reform following broadly similar design principles as Scenario A.

2.7.2.1. Scenario A

For Scenario A, Table 2-3 presents the current average and the benchmark tax rates for each of the eight categories discussed above.

Table 2-3: Scenario A tax rates

Item Taxed	Current Average	Current Maximum (and Member State)	Benchmark tax rate	National differences for benchmark tax?
Air Pollution NOx	€186/MT	€2,670/MT (SE)	€1,300/MT	No
Air Pollution SO2	€71/MT	€4,500/MT (SE)	€1,300/MT	No
Air Pollution PM2.5	€21/MT	€52/MT (LT)	€1,300/MT	No

Item Taxed	Current Average	Current Maximum (and Member State)	Benchmark tax rate	National differences for benchmark tax?
Water Abstraction	€0.042/M3	€0.573/M3 (HR)	€0.145/M3	Yes (1)
Water Effluent	€1.524/BOD5/Kg	€6.64/BOD5/Kg (AU)	€1.524/BOD5/Kg	Yes (2)
Waste to Landfill	€36.2/MT	€65.0/MT (BE)	€102.0/MT	No
Waste Incineration	€8.1/MT	€75.0/MT (DK)	€19.5/MT	No
Fertilizers	€0.0/Kg	€0.0/Kg	€260/MT N	Yes (2)
Pesticides	€0.14/Kg	€3.90/Kg (SE)	€13/Kg	Yes (2)
Minerals	€0.94/MT	€7.36/MT (DE)	€3.38/MT	No

Source: Own elaboration - Notes: (1) Adjusted for differences in water scarcity and purchasing power; (2) Adjusted for differences in purchasing power

As noted, the analysis builds on the benchmark tax proposals developed by Hogg et al. (2016), updated to reflect inflation since that time. Some of the resulting tax increases are relatively modest — for instance, those relating to waste sent to landfill and waste incineration — while others are more substantial, particularly for air pollution, water abstraction, fertilisers and pesticides. In most cases, a common benchmark tax rate was applied across all Member States. However, exceptions were made for water abstraction, water effluent, fertilisers and pesticides. For these four categories, Hogg et al. (2016) adjusted the rates to account for differences in purchasing power, given the potential distributional impacts on farmers' incomes and food prices. In the case of water abstraction, relative water scarcity was also taken into consideration.

Pesticide tax – Scenario A

Regarding pesticides, Hogg et al. (2016) investigated a tax centred around a benchmark rate of €10 per kilogram of active ingredient, adjusted to reflect differences in the relative price levels of national agricultural sectors. The adjustment index was based on the effective Common Agricultural Policy (CAP) support per hectare of utilised agricultural area in each Member State, as derived from the CAPRI model. To account for inflation between 2016 and 2025, these rates were increased by 30%, consistent with the adjustments applied to other taxes based on Hogg et al. (2016). **Error! Reference source not found.** presents the resulting tax rates by Member State and the corresponding EU average.

Table 2 4: Benchmark pesticide taxes by Member State €/Kg active ingredient

Member State	Tax €/kg	Member State	Tax €/kg
Belgium	22.75	Lithuania	6.50
Bulgaria	6.50	Luxembourg	16.25
Czechia	9.75	Hungary	13.00
Denmark	19.50	Malta	19.50

Member State	Tax €/kg	Member State	Tax €/kg
Germany	19.50	Netherlands	22.75
Estonia	3.25	Austria	13.00
Ireland	16.25	Poland	6.50
Greece	26.00	Portugal	9.75
Spain	9.75	Romania	6.50
France	16.25	Slovenia	13.00
Croatia	13.00	Slovakia	6.50
Italy	16.25	Finland (1)	13.00
Cyprus	13.00	Sweden	13.00
Latvia	3.25	Average EU	13.12

Source: own elaboration

Such a tax, however, would not fully achieve the primary objective of a pesticide tax — namely, to reduce the environmental risks and impacts associated with pesticide use by introducing financial incentives that encourage farmers and other users to adopt less harmful alternatives. These alternatives may include pesticides formulated with less hazardous active ingredients, or non-chemical approaches such as cultural practices and biological controls implemented within an Integrated Pest Management (IPM) framework.

Designing a tax capable of achieving these objectives is inherently complex. It requires balancing administrative simplicity with sufficient precision to ensure that the price signal is effectively directed towards discouraging the use of the most environmentally damaging pesticides and applications, while avoiding undue burden on those that are less harmful.

Previous studies have shown that applying a uniform tax per kilogram of active substance across all pesticides, regardless of their relative environmental hazard, can lead to unintended behavioural responses. In particular, such a tax may prompt a partial shift towards cheaper products, which are not necessarily less harmful, and in some cases may be more damaging. The likelihood of this outcome increases with higher tax levels. In essence, a uniform tax risks sending the wrong price signal, potentially encouraging substitution towards lower-cost but more hazardous products.

A practical response to this problem is to differentiate, or “band”, the tax. The purpose of a differentiated or banded tax structure is to adjust the relative prices of individual pesticides so that, as far as possible, less harmful active ingredients and products become more financially attractive than those that pose greater environmental risks.

In an ideal system, tax rates would be tailored precisely to the measured environmental damage caused by each pesticide. However, the absence of detailed dose-response data, the wide diversity and spatial distribution of pesticide applications, and the monitoring effort required to measure actual impacts make such precision impractical. As a result, it is necessary to rely on proxy indicators of environmental hazard or predicted dose-damage response, as implemented for example in Denmark.

A truly robust dose-damage response function would account for the multiple risk factors that together determine the variation in exposure, effect, and resulting environmental damage from pesticide applications. For most of these risk factors, there are differences between pesticides in terms of their intrinsic properties. Although each factor is, in principle, measurable, developing a generalised prediction of dose-damage response across pesticides is complicated by the fact that many of these factors are not spatially consistent. It is therefore necessary to focus on variations between pesticides that are both measurable and spatially consistent, while accepting that some location-specific variation cannot practically be incorporated into the modelling.

By analysing pesticide product and active ingredient data in relation to these risk factors, it becomes possible to design a predictive dose-damage function that estimates the relative environmental impact of one pesticide compared with another. This in turn allows for the introduction of a banded tax structure, whereby more harmful products are subject to higher rates and less harmful ones to lower rates. Denmark applies such an approach.

However, when developing banding mechanisms and the underlying risk expressions, there is an inherent trade-off between accuracy and administrative simplicity. While greater model complexity may improve the precision of predictions, all models remain proxies for actual damage functions. Furthermore, increasing complexity does not necessarily yield proportionate improvements in accuracy, particularly when some risk factors cannot be fully captured. Ultimately, a model’s reliability is constrained by the weakest data point or assumption on which it relies.

In the context of this illustrative tax, neither the data nor the resources available allowed for the development of a complex “Denmark-type” model applicable across all Member States. However, a simplified banding structure comparable in spirit to such systems can be constructed using the Harmonised Risk Indicator 1 (HRI 1). As noted earlier, HRI 1 classifies pesticides and active substances into four groups:

- Group 1 - low-risk active substances
- Group 2 - active substances
- Group 3 - active substances candidates for substitution
- Group 4 - non-approved active substances

The analysis modelled the effects of applying a differentiated pesticide tax based on these four bands, using the average base rates investigated by Hogg et al. (2016) for each Member State, updated for inflation. The applied differentiation was structured as follows:

- Group 1: Low risk active substances: Zero Rate
- Group 2: Medium risk active substances: 10% above average base rate
- Group 3: Higher risk active substances: 50% above average base rate
- Group 4: Highest risk active substances: 100% above average base rate ([16]).

The resulting tax rates by Member State are presented in **Error! Reference source not found.**. The analysis of the effects of these taxes is more complex than for the other sectors examined in this report, as it requires accounting not only for the direct impact of the tax on pesticide use but also for the indirect effects arising from changes in the relative prices of different pesticide categories. The former is determined by the *own-price elasticity* of demand, while the latter depends on the *cross-price elasticity*.

The own-price elasticity of demand was set at **-0.3**, consistent with estimates reported in the literature (Möckel et al., 2021); (OECD, 2006)([17]). The cross-price elasticity was set at **0.5**, based on the findings of Liang & Coble (2009) and Muñoz-Piña & Avila (2004). Liang & Coble estimated elasticities using a translog function for fertilisers, herbicides and pesticides in the United States, finding relatively low cross-price elasticities between herbicides and insecticides (around 0.02-0.03). In contrast, Muñoz-Piña & Avila argued that a value close to 1.0 is reasonable. The mid-point value of **0.5** was therefore adopted for this analysis.

The application of these elasticities in estimating changes in pesticide demand is detailed in **Annex 3**.

([16]) As this group is being banned, it is not assumed to be affected by the tax.

([17]) Möckel et al. (2021) consider price elasticities of demand of between -0.2 and -0.4 for Germany. OECD (2006) estimates of between -0.2 and -1.1. As the elasticity with respect to a percent tax increase will be less than the price elasticity of demand as a percent tax increase is less than a percent increase in the price.

Table 2 5: Tax Rates by Risk Category and MS (€/Kg)

	Member State	Group 1 - low-risk active substances	Group 2 - active substances	Group 3 – high risk active substances	Group 4 - non-approved active substances
Base Tax €/kg (from report)	**Tax Adjustment**	**No tax**	**10%**	**50%**	**100%**
€ 22.75	**Belgium**	€ 0.00	€ 25.03	€ 34.13	€ 45.50
€ 6.50	**Bulgaria**	€ 0.00	€ 7.15	€ 9.75	€ 13.00
€ 9.75	**Czechia**	€ 0.00	€ 10.73	€ 14.63	€ 19.50
€ 19.50	**Denmark**	€ 0.00	€ 21.45	€ 29.25	€ 39.00
€ 19.50	**Germany**	€ 0.00	€ 21.45	€ 29.25	€ 39.00
€ 3.25	**Estonia**	€ 0.00	€ 3.58	€ 4.88	€ 6.50
€ 16.25	**Ireland**	€ 0.00	€ 17.88	€ 24.38	€ 32.50
€ 26.00	**Greece**	€ 0.00	€ 28.60	€ 39.00	€ 52.00
€ 9.75	**Spain**	€ 0.00	€ 10.73	€ 14.63	€ 19.50
€ 16.25	**France**	€ 0.00	€ 17.88	€ 24.38	€ 32.50
€ 13.00	**Croatia**	€ 0.00	€ 14.30	€ 19.50	€ 26.00
€ 16.25	**Italy**	€ 0.00	€ 17.88	€ 24.38	€ 32.50
€ 13.00	**Cyprus**	€ 0.00	€ 14.30	€ 19.50	€ 26.00
€ 3.25	**Latvia**	€ 0.00	€ 3.58	€ 4.88	€ 6.50
€ 6.50	**Lithuania**	€ 0.00	€ 7.15	€ 9.75	€ 13.00
€ 16.25	**Luxembourg**	€ 0.00	€ 17.88	€ 24.38	€ 32.50
€ 13.00	**Hungary**	€ 0.00	€ 14.30	€ 19.50	€ 26.00
€ 19.50	**Malta**	€ 0.00	€ 21.45	€ 29.25	€ 39.00
€ 22.75	**Netherlands**	€ 0.00	€ 25.03	€ 34.13	€ 45.50
€ 13.00	**Austria**	€ 0.00	€ 14.30	€ 19.50	€ 26.00
€ 6.50	**Poland**	€ 0.00	€ 7.15	€ 9.75	€ 13.00
€ 9.75	**Portugal**	€ 0.00	€ 10.73	€ 14.63	€ 19.50
€ 6.50	**Romania**	€ 0.00	€ 7.15	€ 9.75	€ 13.00
€ 13.00	**Slovenia**	€ 0.00	€ 14.30	€ 19.50	€ 26.00
€ 6.50	**Slovakia**	€ 0.00	€ 7.15	€ 9.75	€ 13.00
€ 13.00	**Finland**	€ 0.00	€ 14.30	€ 19.50	€ 26.00
€ 13.00	**Sweden**	€ 0.00	€ 14.30	€ 19.50	€ 26.00

2.7.2.2. Scenario B

For **Scenario B**, a less ambitious set of tax rates was defined. Following discussions with the European Commission, it was agreed that, where feasible, the same benchmark rate would be applied across all EU Member States equivalent to the current average rate. This approach was feasible for taxes on water abstraction, waste incineration, landfill, water effluent/wastewater and minerals.

For air pollution, the number of Member States currently applying such taxes is too limited for an average rate to be meaningful. In **Scenario A**, a tax rate of €1,300 per tonne was used, based on Hogg et al. (2016). In **Scenario B**, a rate equal to 25% of that value — €325 per tonne — was applied. The choice of applying 25% of the Scenario A rate in Scenario B is not anchored in empirical evidence on optimal or likely future rates. It is an arbitrary downscaling intended solely to create a more cautious, politically plausible variant of Scenario A rate, reflecting that significantly lower levels of ambition may be more realistic for initial implementation in several Member States.

For fertilisers, as no Member State currently applies a tax, no average rate could be established. Scenario A used a rate of €25 per kilogram, again drawing on Hogg et al. (2016). Scenario B therefore applied a rate equal to 25% of that amount, i.e. €6.25 per kilogram.

For pesticides, only Denmark and Sweden currently impose such taxes, and comparable data on effective rates are not readily available. In Scenario A, a rate of €13.25 per kilogram of active ingredient was used (noting that active ingredients do not represent 100% of product content). Based on discussions with the Commission, a rate of €5 per kilogram of active ingredient was adopted for Scenario B.

The taxes in Scenario B are summarised in Table 2-4: Scenario B tax rates

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Table 2-4: Scenario B tax rates

Item Taxed	Current Average	Current Maximum (And Member State)	Benchmark tax rate	National differences for benchmark tax?
Air Pollution NO_x	€186/MT	€2,670/MT (SE)	€325/MT	No
Air Pollution SO_2	€71/MT	€4,500/MT (SE)	€325/MT	No
Air Pollution $PM_{2.5}$	€21/MT	€52/MT (LI)	€325/MT	No
Water Abstraction	€0.042/M^3	€0.573/M^3 (HR)	€0.042/M^3	Yes (1)
Water Effluent	€1.524/BOD5/Kg	€6.64/BOD5/Kg (AU)	€1.524/BOD5/Kg	Yes (2)
Waste to Landfill	€36.2/MT	€65.0/MT (BE)	€36.2/MT	No
Waste Incineration	€8.1/MT	€75.0/MT (DK)	€8.1/MT	No
Fertilizers	€0.0/Kg	€0.0/Kg	€65/MT N	Yes (2)
Pesticides	€0.14/Kg	€3.90/Kg (SE)	€5/Kg	Yes (2)
Minerals	€0.94/MT	€7.36/MT (DE)	€0.94/MT	No

Source: Own elaboration - Notes: (1) Adjusted for differences in water scarcity and purchasing power; (2) Adjusted for differences in purchasing power

For both scenarios, tax revenues and emission impacts were calculated for the years **2030** and **2035**. In the absence of additional information, such as forthcoming legislative changes affecting emissions, baseline emissions without the introduction of new taxes were projected on the assumption that current trends will continue to those years. Accordingly, if emissions have been declining (or increasing) at a rate of *X% per annum* between 2009 and 2023, the same trend was assumed to persist. Given the scope and timeframe of this study, developing a more complex projection of emissions was not feasible.

2.8. Overview of the methodological approach to assess impacts on competitiveness

The baseline reflected the situation currently observed in each Member State with respect to environmental taxation, namely the existence of relevant tax instruments and the rates at which they are applied. This information was drawn from the Member State factsheets. The assessment then considered the implementation of the environmental taxes at the rates examined under Scenarios A and B across all Member States. Where no comparable tax existed, this implied the introduction of a new instrument. Where national rates were already higher than the benchmark, it was assumed that the higher domestic rate would prevail.

The analysis began by comparing the benchmark rates in Scenarios A and B with those in force in each Member State. For every Member State, a table was prepared indicating whether a similar tax was already applied, the current rate, the benchmark rate, and the difference between them. The table also reported the expected revenue from the benchmark tax as a share of total pollution and resource tax revenues. This exercise helped identify the Member States likely to be most affected by the introduction of the benchmark rates. An illustrative example for Bulgaria is provided in

.

Table 2-5: Comparing tax regimes for each Member State – Example: Bulgaria

Tax	Tax in force	Tax rate currently implemented	Benchmark tax rate	Difference between current and new tax rate	Estimates of revenue from the implementation of the new tax as a percentage of total pollution and resource tax revenue in 2030	Notes
Air pollution tax	*None currently implemented*	*None currently implemented*	*€,1300 per million tonne for SO_2, NOx and $PM_{2.5}$*	*€1,300*	*398.1%*	*Tax revenue will be almost four times the original amount*

Secondly, to assess the impact on economic sectors, information was required on the taxpayers, the sectors in which they operate, and the potential effects on supply chains. A table was prepared for each taxation instrument (see Table 2-6), identifying the sectors expected to bear the cost of the tax and outlining the likely impacts along the supply chain.

Table 2-6: Comparing tax regimes for each tax

Benchmark tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
Tax on SO_2 emissions into the environment	*Taxpayers include both companies and individuals responsible for emission sources. Individual sources of emission include technological processes, industrial plants, devices and facilities from which SO_2 is discharged into the air.*	*Increasing transportation and production costs*

Third, the analysis assessed the economic significance of the affected sectors at both Member State and EU levels. Using Eurostat data on gross value added (GVA) and income by main industry ([18]), the share of GVA generated by the sector subject to each tax was calculated as a percentage of total GVA for each sector at the EU level (see Table 2-7). We also compared the *estimated revenues* associated with each taxation instrument, as a percentage of the affected sectors GVA to provide further context on their significance. Due to data limitations, Level 1 NACE categories were used. These are fairly broad aggregations and may not fully correspond to the sectors identified in Table 2-6. This was acknowledged as a methodological limitation. For each Member State and taxation instrument, a dedicated table was produced, along with data at the EU level.

Table 2-7: Sector analysis

NACE Rev.2 Sector – Level 1	GVA as a percentage of total GVA	Number of enterprises as a percentage of total enterprises
Manufacturing	*13.0%*	*10%*

The assessment of competitiveness, single market, and long-term viability was then carried out for each investigated environmental tax. This consisted of a qualitative impact assessment evaluating the direction (positive or negative) and magnitude of the potential impacts, using the tables presented below. Attention was given to Member States and sectors identified as being most likely to experience significant effects based on the preceding analysis.

([18]) https://ec.europa.eu/eurostat/databrowser/view/nama_10_a10__custom_17902175/default/table

2.9. Assessment of potential competitiveness impacts

The potential impacts on economic competitiveness resulting from the introduction of the new taxes were first considered. For each tax, the competitiveness impacts were assessed as presented in Table 2-8: Cost and price competitiveness checklist

, Table 2-9, Table 2-10, **Error! Reference source not found.**. This assessment was conducted at EU level, drawing on the significant sectoral impacts identified in the earlier analyses (

, Table 2-6, Table 2-7).

Table 2-8: Cost and price competitiveness checklist

Costs and price competitiveness component	Relevance to current assessment?	Notes
Cost of inputs	++	The taxes considered will likely by definition affect input prices (or other costs of production – see below) depending on how the tax is levied. The precise input, and sector(s) affected depends on the tax instrument.
Cost of capital	**+/O**	Cost of capital could be a relevant issue where investment in new capital is necessary/incentivised via the tax, but this appears unlikely to be a material factor in the majority of cases and or a direct consequence of the tax(es).
Cost of labour	**+/O**	As above, costs of labour could be a relevant issue where specialist skills and expertise may be required, but this appears unlikely to be a material factor in the majority of cases and or as a direct consequence of the tax(es).
Other compliance costs (e.g. reporting obligations)	**+/O**	The taxes may impose some additional reporting and other administrative burdens to industry (and authorities); however, this is less likely to be a material factor when compared to costs of inputs/outputs.
Cost of production, distribution, after-sales services	**++**	The taxes considered will likely by definition affect costs of production (or cost of inputs, as above – depending on how the tax is levied). The precise change and sector(s) affected depends on the tax instrument.
Price of outputs	**++**	A key issue is to what extent any cost increase resulting from the taxes affect business behaviour. This may include incentives to invest (e.g., in new abatement technology) and the extent to which those new costs are aborded and/or passed on to customers in the form of higher prices.
Key: ++: Likely to be relevant and potentially significant +: Likely to be relevant but impact appears marginal O: Not expected to be relevant or significant		

The analysis also considered the implications of the benchmark taxes for the capacity and incentives of affected industries to innovate. A table was prepared for each tax (Table 2-9), outlining the potential effects on innovation. In this context, the taxes were expected to have a positive influence on innovation by altering incentives for investment and technological development.

Table 2-9: Capacity to innovate checklist

Component	Relevance to current assessment?	Notes
Capacity to produce and bring R&D to the market	**O**	Primarily this relates to potential impacts on the supply of skills needed by the sectors affected and/or any impact on efficiency of protection of intellectual property rights. Neither are likely to be affected as a result of the taxes.
Capacity for product innovation	**++**	Relates to a sector's capacity for and incentives to bring to the market new products and/or improve current ones. This depends both on access to technical skills and the application of new technologies. The former is unlikely to be affected, but the taxes may materially change the incentives to develop, invest and or adopt new technologies.
Capacity for process innovation	**++**	This relates to capacity and incentives to innovate processes and product related services, including distribution, marketing, and after-sales services. As above, depend on how the taxes are levied, they may affect the incentives to develop, invest and or adopt new production processes.
Access to risk capital	**O**	The ability of affected companies to access risk capital is unlikely to be affected.
Key: ++: Likely to be relevant and potentially significant +: Likely to be relevant but impact appears marginal O: Not expected to be relevant or significant		

Third, the potential effects on EU-wide economic competitiveness were assessed. This involved comparing the key differences in impacts experienced by EU firms relative to non-EU firms. The analysis drew on the findings presented in Table 2-7, which identified the EU sectors most affected by the benchmark taxes. For example, consideration was given to the extent to which the taxes might inadvertently exempt products manufactured outside the EU but imported and placed on the EU market. Where such risks were identified, the potential implications for investment, including the relocation of economic activity outside the EU, were evaluated (see Table 2-10). A table was prepared summarising these potential effects (**Error! Reference source not found.**).

Table 2-10: International competitiveness checklist

Component	Relevance to current assessment?	Notes
Market shares (single market)	++	To what extent will the taxes affect the competitive position of EU firms with respect to non-EU competitors and the associated balance on EU/non-EU market shares and investments? The likelihood of this occurring depends on the nature of the tax design, its scope and the nature of the affected activity and supply chain. There appears to be a risk of some adverse effects, for instance additional charges associated with intensive agriculture may adversely affect price competitiveness of EU foodstuffs, landfill / pay as you throw charges may affect incentives for non-EU waste disposal.
Market shares (external markets)	++	
Key: ++: Likely to be relevant and potentially significant +: Likely to be relevant but impact appears marginal O: Not expected to be relevant or significant		

A key aspect of economic competitiveness concerned the nature and extent of competition within the affected markets. Conclusions were also drawn on the potential impacts for different types of market actors (as shown in **Error! Reference source not found.**). A table was prepared evaluating effects thematically at EU level.

Table 2 13: Competition checklist

Component	Notes
Limiting the number or range of suppliers and producers	The taxes have the potential to raise the cost of entry for, where these are, for example, levied on manufacturing/production processes and/or where product prices are materially affected within specific supply chains. Such risks are expected to be identified the analysis above.
Limiting the ability of suppliers and producers to compete	As above, but likely to be limited effect (no taxes would be expected to treat incumbents differently than new entrants for example).
Reducing the incentive of suppliers or producers to compete	Taxes would seek to incentivise innovation and support commercialisation of new technologies. However, depends on sectors targeted and/or exemptions.
Limiting the choices and information available to customers	No significant effects likely.

Component	Notes
Based on the preceding analysis, we will draw together the nature and extent and likelihood of effects (-/+) on existing firms, impacts on entry of new firms into relevant markets; Impacts on consumer prices (and/or quality of products); and impact on up and downstream markets.	

2.10. Assessment of contribution to the single market of national tax reforms with similar instruments and rates

This sub-task focused on assessing the potential contribution to the functioning of the single market of national tax reforms leading to a convergence in tax rates across the EU27. Although Member State-led reforms do not necessarily lead to convergence in tax rates, the assessment of the contribution to the single market was carried out from the perspective of the modelling exercise, which assumes the introduction of pollution and resource taxes with similar rates across all EU27 Member States. This harmonised-rate assumption allows the analysis to isolate the potential effects of reduced fiscal divergence on the functioning of the single market. It does not imply that such convergence would occur organically through national reforms, but rather provides a coherent analytical framework for comparing outcomes across scenarios.

Information from

was used to identify the differences between the baseline and the benchmark tax rates in scenarios A and B in each Member State. This provided the basis for assessing the potential benefits and costs of the benchmark taxes for the single market by highlighting existing divergences. For each benchmark tax, Table 2-11: Single market benefits checklist

and Table 2-12 were completed to capture benefits and costs respectively, drawing key insights for individual Member States. As with the competitiveness assessment, the analysis was conducted at EU level, with additional detail provided for sectors or Member States where the effects were expected to be more significant.

Table 2-11: Single market benefits checklist

Issue	Relevance?	Potential benefits of national tax reforms leading to increased convergence
Trade creation	++	Increased convergence of input prices/production costs across Member States may contribute towards increased trade between Member States and the integration of value chains, particularly in border regions.
More competitive markets	++	There may potential for higher quality and lower prices for consumers, for example where innovation is happening at scale with associated assurance of continuity of supply.
Efficiency gains / productivity	+	May support economies of scale and scope.
Innovation	++	May support increases in/creates sufficient demand to recuperate development cost for product and process innovation.
Free movement of people	+	May support job opportunities in other Member States/labour mobility, reflecting any effect on trade creation/movement of capital.
Free movement of capital	++	Increased scale/number of investment opportunities or scope for investment diversification
Policy influence and synergies, cooperation and coordination	++	Synergies from common approaches / coordination of policies, (addresses coordination failures)
Key: ++: Likely to be relevant and potentially significant +: Likely to be relevant but impact appears marginal O: Not expected to be relevant or significant		

Table 2-12: Single market costs checklist

Issue	Relevance?	Potential costs of national tax reforms leading to increased convergence
Trade diversion	++	Preference to trade within EU rather than with outside world (share of trade with non-EU countries).
Adaptation cost	+	Cost for companies from greater competition. Possible unemployment in non-competitive sectors.
Employment and companies	+	Potential for loss of employment in uncompetitive sectors/companies (at least in short term), bankruptcy of underperforming companies.
Impact on national budgets	O	Tax arbitrage, tax avoiding schemes; unemployment benefits for redundant workers (as above).
Costs for EU/national budget	++	New taxation instruments may require some additional administrative capacity within national authorities, particularly where new monitoring, reporting or enforcement processes are introduced. This does not imply the creation of new EU-level bodies, as the instruments assessed are Member State-led. Any additional administrative costs could be partly offset where revenues are earmarked or reinvested in implementation.
Administrative costs	+	Costs for companies to comply with new administrative obligations.
Adjustment costs	+	Cost of applying national rules.
Key: ++: Likely to be relevant and potentially significant +: Likely to be relevant but impact appears marginal O: Not expected to be relevant or significant		

2.11. Assessment of the long-term viability and cost of implementation

Implementing the taxes investigated under either scenario requires administrative and, in some cases, legislative changes within the Member States. This report does not examine in detail the processes necessary to introduce such changes or assess their feasibility. However, Hogg et al. (2016) reviewed this issue.

In general, many Member States consulted in that study considered that a number of the pollution taxes investigated under Scenario A could be implemented, given sufficient time (see Table 1-7-3 in Hogg et al.). At that time, most Member States believed this could be achieved within approximately five years. A smaller number of Member States, however, expressed the view that some of the modelled tax reforms could not be implemented. These included air pollution taxes (nine Member States), landfill taxes (eight), aggregates or minerals taxes (eleven), water abstraction taxes (eleven), pesticide taxes (eleven), and wastewater taxes (seven). Only one Member State considered that a fertiliser tax would not be feasible to implement. While these views may have evolved since 2016, they highlight the importance of further discussions with Member States on implementation challenges and of considering a less ambitious set of benchmark taxes. For this reason, **Scenario B** was developed.

This sub-task examined the long-term viability of the revenues generated by the investigated environmental taxes. For each tax, a table was prepared (Table 2-13). Information on tax elasticities, revenue estimates, and data drawn from the factsheets were used to complete the table against the defined criteria (and additional criteria outlined below the table).

A qualitative narrative was then developed for each investigated tax, describing its long-term viability and highlighting the key factors influencing revenue stability over time. This analysis was presented in the form of a multi-criteria assessment, using a red-amber-green system to evaluate and summarise each tax type against the established criteria. An example of this assessment is shown in Table 2-13.

Table 2-13: Long-term viability of tax revenues

ARCHETYPE	ASSESSMENT CRITERIA			
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	**…**
Tax on NOx – Industrial emissions	Many cost-effective measures to abate NOx in industry are likely to have been taken through decades of industrial regulation and permitting, in particular under the IED. Hence installations may lack cost-effective solutions that can be taken rapidly to reduce emissions. ***Low risk to viability - downwards***	If tax on peg is tied to quantity of emissions, this will be influenced by underlying economic growth and sector output. ***Medium risk to viability could be downward or upward***	Over time, industry is being continually encouraged to reduce air pollution, in particular through the new IED 2.0 which will encourage permit setters to define more ambitious limits. Some new technologies are emerging for a number of sectors, with hydrogen also being explored as an alternative fuel. However, many of these technologies take many years to become commercialised. ***Low risk to viability – downwards***	

The criteria applied in assessing long-term viability were defined as follows:

- **Continued behavioural change** – This criterion assessed whether behavioural responses to a new tax would be predominantly immediate, as in the sharp fall in plastic bag use following the Plastic Bags Directive, or more gradual, as seen with changes in travel patterns in response to low-emission zones and related charges. The distinction reflects both the elasticity of demand and the availability and cost of alternative options. Where low-cost substitutes exist, rapid behavioural adjustment is more likely, leaving limited scope for further change over the medium to long term. Where alternatives are less accessible or more expensive, behavioural shifts are expected to take place more slowly, unfolding as technologies improve and additional response options emerge.

- **Change in the parameter to which the tax was pegged** – This criterion examined the extent to which external changes in the underlying taxed parameter (for example, fossil fuel prices in the energy or transport sectors) could influence both behaviour and tax revenues. Increases in base prices could accelerate behavioural change, leading to a faster decline in revenues from an additional tax. The long-term viability of a tax therefore also depended on whether it was defined in relative terms (as a percentage of the base price) or in absolute terms (as a fixed rate per unit).
- **Changes in underlying technology and availability of alternatives** – This criterion assessed the extent to which technological developments could influence behavioural responses and, in turn, tax revenues. For example, in the case of landfill taxes, advances in sorting technologies and the wider availability of high-quality recycling and composting facilities can enable households and firms to shift away from landfilling more quickly. As these alternatives become cheaper and more accessible, the behavioural response to the tax strengthens and landfill volumes — and therefore revenues — decline over time. This factor also links to expected innovation effects, as higher disposal costs may accelerate investment in recycling infrastructure and waste-prevention technologies. This factor also linked to the expected innovation effects.
- **Hypothecation of taxes** – The long-term viability of a tax was also influenced by the use of the revenues it generated. Where revenues were reinvested in measures that supported the transition targeted by the tax (for example, using landfill tax proceeds to finance recycling infrastructure), progress towards environmental goals could accelerate, thereby hastening the eventual decline in tax revenues.
- **Political acceptability** – The durability of any tax depended partly on its political acceptability over time. Political acceptance was influenced by several factors, including the extent of hypothecation, the effectiveness of communication and public engagement, and the implementation of mitigation measures to address distributional impacts. Experience from existing environmental taxes indicated that declining political support could lead to significant reductions in revenues or even the repeal of a tax.

Long-term viability was understood as the extent to which the short-term revenue estimates could be sustained or were expected to increase or decline over the medium and longer term. The starting point for this analysis was the short-term revenue estimates (for 2030). For the purposes of this study, the long-term horizon was provisionally defined as **2035**.

2.12. Limitations

OECD (2023a) acknowledges the difficulty in distinguishing at all times taxes from fees and charges, which are requited payments made to the government in exchange for specific services or the granting of certain rights. The difficulty arises from the strength of the link between the payment and the service provided. In some cases, a levy may appear to be a fee because it is linked to the provision of a service. However, if the amount paid significantly exceeds the cost of providing that service, **the excess portion may be considered a tax** under international statistical standards, as it constitutes a compulsory payment without a direct quid pro quo. For example, vehicle licence fees are widely recognised as taxes, even though they are linked to vehicle registration, because they are often set at levels that go beyond merely covering administrative costs.

Certain borderline cases further complicate classification. For instance, environmental levies and pollution charges can be treated as either taxes or fees depending on their structure. If the levy serves purely as a cost recovery mechanism for government services (such as waste disposal), it is more likely to be classified as a fee. However, if it is imposed to discourage environmental harm without a direct service being provided in return, it would be classified as a tax.

The concept of **tax-like fees and charges** also emerges in cases where a levy is legally or economically similar to a tax but is not formally classified as one. These payments often resemble taxes in that they are compulsory and unrequited, but they may be earmarked for a specific policy objective or be presented as fees for services that are not truly proportional to the cost of provision. Examples include certain broadcasting licence fees, road tolls, or levies imposed on specific industries to fund regulatory oversight.

In practice, the classification of a payment as a tax, fee, or charge often depends on national tax administration practices, international classification standards, and the economic context in which the levy is applied. National legislation may define taxes based on specific legal provisions, which can vary significantly between jurisdictions. Some payments classified as taxes under national law may not be considered taxes under the national accounts framework. Conversely, some payments that are not legally defined as taxes may be recorded as such for statistical purposes if they meet the criteria of a compulsory, unrequited payment.

A good example of this distinction is found in environmental taxation. Certain levies, such as charges for pollution permits or environmental fees, may be classified as taxes in national accounts if they are compulsory and unrequited, even if they are legally described as fees in national legislation. Similarly, some government revenues that are legally defined as taxes, such as resource rent payments for the extraction of natural resources, may be excluded from national accounts taxation statistics because they are considered property income rather than taxes. OECD (2023b) recommends following predominant international practices to ensure consistency, particularly in cases where the distinction is unclear.

Another borderline case is represented by **land taxes**. Most land taxes are property taxes, typically levied on the value or ownership of land and real estate. These taxes are classified under the ESA category D.51 (taxes on income and wealth) rather than as environmental taxes. Since they do not directly target environmental harm or resource depletion, they are excluded from environmental tax statistics. Their purpose is often fiscal, aiming to generate revenue rather than influencing land use in an environmentally beneficial way.

In contrast, some land taxes are explicitly designed to discourage environmental degradation, such as deforestation, habitat destruction, or soil sealing. These taxes may be included as resource or pollution taxes if they meet the criteria of having a tax base linked to environmental harm. Examples include:

- Taxes on land conversion or deforestation: Some governments impose taxes on converting forests, wetlands, or natural habitats into agricultural or urban land. These taxes aim to preserve biodiversity, prevent soil erosion, and mitigate climate change impacts.
- Taxes on soil sealing and urban sprawl: Certain local governments impose taxes on paving over natural land, which reduces groundwater absorption, increases flood risks, and contributes to urban heat islands.
- Environmental levies on protected areas: Some countries impose special taxes on development in environmentally sensitive areas, such as national parks, coastal zones, or protected wetlands.

A major difficulty in classifying land taxes as environmental is that land use and taxation policies vary widely between countries. Some taxes that could be considered environmental may not be recorded separately in tax revenue statistics, making data collection and classification inconsistent across jurisdictions. Additionally, some land-related taxes are only indirectly linked to environmental objectives, making their classification as environmental taxes less clear-cut.

To ensure consistency in international comparisons, Eurostat generally excludes land taxes from environmental tax statistics, unless they are explicitly linked to environmental objectives such as land conservation, biodiversity protection, or pollution prevention. In such cases, these taxes may be classified as resource taxes or pollution taxes, depending on their specific design and impact (Eurostat, 2024).

A further borderline case is represented by **payments to the government on the extraction of sub-soil assets, such as oil, gas, minerals, and other natural resources**. These are generally not classified as environmental taxes but rather as rents under national accounts. This distinction is based on ESA and international statistical guidelines, which define taxes as compulsory, unrequited payments, whereas rents represent payments for the use of a natural asset owned by the government.

The key reason for classifying these payments as rents rather than taxes is that they reflect the economic value of extracting a non-renewable resource rather than an attempt to modify behaviour or reduce environmental harm. In many cases, governments act as owners of natural resources and charge companies for the right to exploit these resources. This revenue is considered property income (ESA category D.45) rather than tax revenue because it represents a compensation payment to the government as the resource owner rather than a fiscal instrument designed to influence market behaviour.

Although these payments may be legally defined as “royalties” or “resource taxes”, they are generally not classified as environmental taxes in national accounts, as they are considered **property income** rather than taxes. This is because they represent payments for the use of a natural resource owned by the government, rather than unrequited levies on environmentally harmful activities. However, if a charge on resource extraction is levied specifically on an environmentally relevant tax base — such as the volume of extracted material, emissions, or land degradation — it may be classified as an environmental tax under international guidelines, regardless of its legal label. The distinction depends not on the legal form or intended use of the revenue, but on the nature of the tax base and whether the payment is unrequited.

However, specific cases may arise where resource extraction levies include both a rent component and an environmental tax component. For example, if a government imposes a charge specifically on the environmental impact of mining activities, such as soil degradation, water pollution, or habitat destruction, this charge could be classified as an environmental tax rather than a resource rent. In contrast, payments linked purely to the value or quantity of extracted resources remain classified as rents.

In practice, excluding resource rents from environmental tax statistics improves cross-country comparability. Countries with large natural resource endowments may generate substantial revenue from extraction payments, and including these as taxes could distort comparisons with countries that rely on other economic activities. Furthermore, different legal and administrative systems govern how resource rents are collected, making direct comparisons difficult.

The exclusion of resource rents does not imply that resource extraction has no environmental impact. However, the statistical framework focuses on taxes that alter behaviour rather than payments that compensate for resource ownership. Environmental policy tools such as carbon taxes, pollution levies, and resource depletion taxes are designed to address environmental harm directly, whereas resource rent payments primarily reflect the commercial value of natural resource exploitation.

3. Assessment of the state of implementation of environmental taxes in the EU

3.1. Overview on environmental taxes

In 2023, the aggregated Gross Domestic Product of the EU27 amounted to 15,630 billion euros in real terms. Total environmental tax revenue in the EU27 reached 317 billion euros in real terms in 2023 ([19]) (**Error! Reference source not found.**), which corresponds to around 2% of the EU27 GDP. This is an increase of 29.4% in absolute terms over 15 years (2009-2023). However, as GDP-ratio, the total environmental tax revenue decreased by 13.4% ([20]) (Figure 3-2).

Figure 3-1: Total environmental tax revenue in the EU27 (2009-2023) in billion euros - *Source: Eurostat - Environmental taxes (env_eta)*

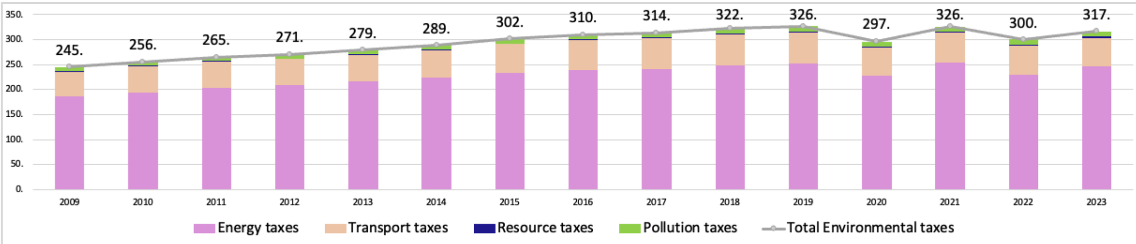


Figure 3-2 illustrates how the revenues from environmental taxes in the EU27 have evolved over the period 2009-2023. The blue bars show the percentage change in revenues in absolute real terms, while the yellow bars show the change as a share of GDP. The figure presents the change in real GDP (on the left) and the results for total environmental tax revenues as well as for each main category: energy, transport, resource and pollution taxes (from left to right).

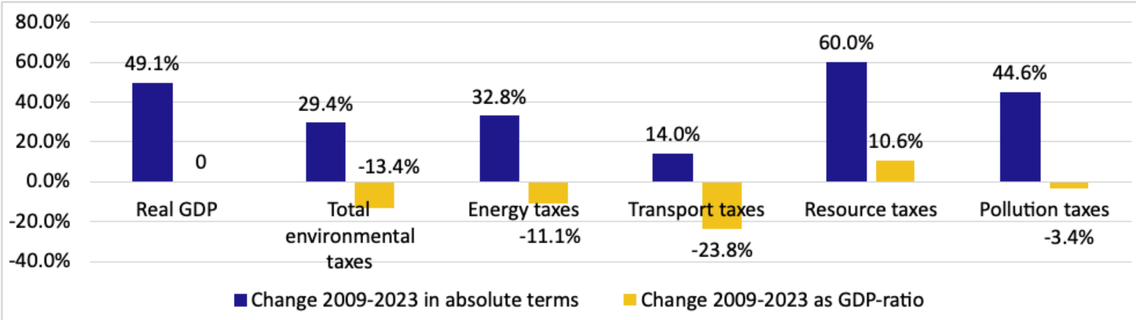
This graph provides a clear visual comparison of trends in both absolute revenue levels and their relative importance in the economy. It shows whether revenues from environmental taxes have grown in real terms and whether they have kept pace with overall economic growth. The figure highlights that, despite an increase in revenues in real terms, their share of GDP has declined over the period, indicating that environmental taxation has not increased proportionally to

([19]) Revenues are expressed in real (inflation-adjusted) terms to allow for meaningful comparison over time. Using nominal values would overstate growth due to the effect of inflation, whereas real terms reflect the actual change in purchasing power and fiscal weight of the revenues.

([20]) Eurostat, Environmental taxes (env_eta).

economic output. The only exception is resource taxes, which revenues have increased by 60% in absolute terms and by 10.6% as GDP-ratio. However, resource tax revenues amount only to 0.01% of the EU27 GDP.

Figure 3-2: Fifteen-year (2009-2023) change in absolute terms and change as GDP-ratio of the revenues of energy taxes, transport taxes, resource taxes, pollution taxes and total environmental taxes - *Source: Own elaboration on Eurostat data*



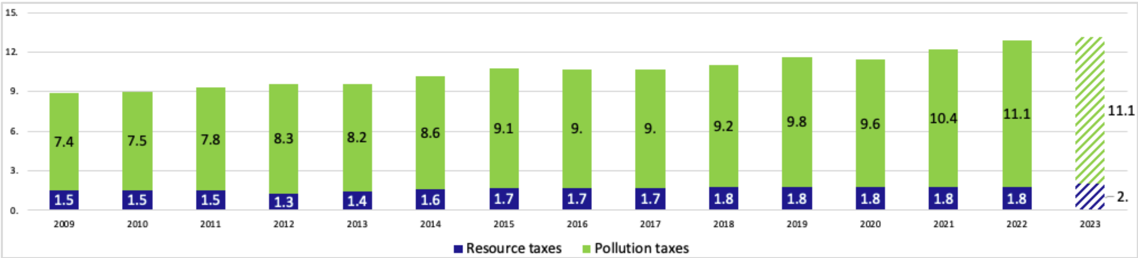
In 2023, total tax revenue (including net social contributions) accounted for 43.8% of the EU GDP. The tax-to-GDP ratio was 39.6% in 2009. In 2023, environmental taxes accounted for 4.6% of total tax revenue (including net social contributions). The environmental tax-to-total tax ratio was 5.9% in 2009. As ratio of total tax revenues, environmental tax revenues dropped by 21.4% in the period 2009-2023, with the strongest decrease in transport tax revenues (-30.8%). This trend may be partly explained by the reduced transport activity during the COVID-19 pandemic, especially in 2020 and 2021, when lockdowns, mobility restrictions, and work-from-home measures sharply curtailed vehicle use, fuel consumption, and air travel — key sources of transport-related tax revenue. However, the fact that transport tax revenues have not rebounded fully in subsequent years may also point to structural changes, such as the increased fuel efficiency of vehicles, a shift to electric mobility (often taxed less), and reforms in vehicle taxation systems in some Member States.

The decline in the environmental tax-to-total tax ratio between 2009 and 2023 may reflect a combination of factors. One possible explanation is a relative contraction of environmentally intensive sectors, such as transport and energy, within the overall economy, leading to a reduced tax base. Another factor could be policy-driven reductions in tax rates, such as vehicle registration fee reforms or shifts towards incentives for cleaner technologies. It is also possible that behavioural change — partly driven by the taxes themselves — has led to lower consumption of taxed goods (e.g. fuel), which, while environmentally positive, reduces revenue. Finally, the decrease may also reflect a relative increase in other forms of taxation (e.g. income or corporate taxes), diluting the share of environmental taxes in the overall mix. These trends suggest that, at EU level, the long-discussed shift from labour to environmental taxation has not materialised in aggregate terms. The declining share of environmental taxes in total tax revenue, combined with relatively stable overall tax-to-GDP ratios, implies that any substitution of environmental taxes for labour taxes has been limited at best. However, this aggregate picture may conceal important differences across Member States. A closer examination of tax structures at national level is needed to assess whether any such shifts have occurred in individual countries — this is addressed in the accompanying country sheets.

In 2023, pollution and resource tax revenues reached respectively 11.1 and 2.3 billion euros. Compared to 2009, this represents a **growth of 44.6% and 60% respectively in nominal terms** over the 15-year period (2009–2023). However, in terms of GDP-ratios, pollution taxes decreased by 3.4% while resource taxes increased by 10.6% (**Error! Reference source not found.**). In 2023, pollution and resource tax revenues accounted for — respectively — 3.4% and 0.8% of the total environmental tax revenues.

Pollution taxes, as used here, include taxes on waste, air and water emissions, and other environmentally harmful discharges.

Figure 3-3: Resource and pollution tax revenues in the EU27 (2009-2023) in billion euros. ***Note: the share between pollution and resource taxes in 2023 was estimated as the weighted average of past years – Source: Eurostat - Environmental taxes (env_eta)***



Environmental taxation forms part of the broader policy mix used to address pollution, waste management, and resource conservation in the European Union. While the scale and effectiveness of such taxes vary across Member States, they can be important instruments at national or regional level, depending on how they are designed and implemented. The following subsections provide a comprehensive overview of the different types of environmental taxes levied across Member States, highlighting their financial impact and distribution within each category.

Although transport and energy taxes fall outside the primary focus of this study, their implementation across the EU offers valuable insights. Experience with these taxes highlights the importance of clear price signals, robust monitoring systems, and careful policy design to minimise regressive effects — lessons that can equally inform the effective design and deployment of pollution and resource taxes. Where relevant, some transport and energy taxes are discussed to inform the implementation of pollution and resource taxes.

3.2. Pollution taxes

Pollution taxes (Table 3-1) encompass a wide range of levies aimed at mitigating environmental harm caused by emissions, industrial activities, and polluting products. They are imposed on activities that result in harmful emissions to air, soil, and water, as well as waste and noise pollution. Their core purpose is to internalise the external costs of environmental damage, sending price signals that encourage polluters, both businesses and individuals, to change behaviour and adopt cleaner practices (OECD, 2023).

Given their wide scope — spanning sectors such as industry, transport, and agriculture — this report organises them in the following subgroups:

- Taxes on agricultural activities
- Taxes on NO_x, SO_x, and other pollutant emissions
- Taxes on plastic bags and packaging
- Taxes on polluting products
- Taxes on noise emissions
- Taxes on waste disposal
- Taxes on waste water
- Other pollution taxes

A total of 151 pollution taxes have been identified across the EU, generating over €11.1 billion in revenue in 2023. The list of identified pollution taxes implemented in the EU Member States, along with their main characteristics — including tax base, tax rate, scope and coverage, and years of entry into force where available — are presented in Table A2-1 of 0. A visual mapping of what Member States implement which pollution taxes is presented in Table A2-3 of Annex 2.

The most significant sources of income within this category include taxes on wastewater, waste disposal and other pollution-related levies ([21]), accounting for a combined share of over 77% of total pollution tax revenues. Taxes on NO_x, SO_x, and other air pollutants, as well as those imposed on polluting products, contribute to a smaller yet notable share of the overall revenue stream.

([21]) “Other pollution taxes” may be aggregates of environmental taxes implemented within some of the Member States reporting this category to NTL.

Table 3-1: Pollution taxes in the EU

Tax Name	Member States implementing these taxes	No. of taxes identified in the EU	Revenue (€ million) in 2023	As share of all pollution tax revenues
Pollution tax		**151**	**11.158.20**	
Other pollution taxes	BE, HR, FR, IT, MT, NL, ES	10	3,483.97	31.2%
Taxes on waste water	CY, CZ, DK, LU, NL, PT, SK, SI	19	3,464.34	31.0%
Taxes on waste disposal	AT, BE, BG, HR, CZ, DK, FI, HU, IE, IT, LV, MT, NL, PL, RO, SK, SI, ES, SE	48	1,697.32	15.2%
Taxes on plastic bags and packaging	BE, DK, EE, FI, GR, IE, MT, NL, PL, PT, ES	20	1,422.97	12.8%
Taxes on NO_x, SO_x and other pollutant emissions	BE, BG, HR, CY, CZ, DK, EE, HU, IT, LT, PL, SK, ES, SE	20	649.95	5.8%
Taxes on polluting products	DK, FI, HU, MT, PL, RO, SE	23	315.21	2.8%
Taxes on agricultural activities	BE, DK, NL, SE	8	110.27	1.0%
Taxes on noise emission	IT, NL, PT	3	14.16	0.1%

Source: Eurostat – National Tax Lists

Taxes on NO_x, SO_x and other pollutant emissions and taxes on noise emission

Taxes on pollutant emissions such as nitrogen oxides (NO_x), sulphur oxides (SO_x), and noise aim to internalise the environmental and health costs associated with industrial activity, energy production, and transport. These taxes create direct financial incentives for polluters to adopt cleaner technologies, reduce emissions at source, or shift to less harmful practices. While relatively few in number across the EU, emission-based taxes are often considered among the most efficient environmental taxes, given their close link to actual environmental harm. NO_x and SO_x taxes, where implemented, typically target large combustion plants, ships, and industrial facilities, reflecting their contribution to air pollution, acidification, and respiratory disease. Noise taxes, applied more rarely, tend to focus on aircraft or road transport and seek to mitigate health and quality-of-life impacts in densely populated areas. Despite their potential, these instruments face challenges related to accurate measurement, and monitoring infrastructure.

Taxes on agricultural activities

This category includes a range of tax instruments aimed at reducing GHG emissions, water and soil pollution, and excessive chemical use:

- Tax on methane and nitrous oxides in agriculture levied on their CO_2 equivalent values
- Tax on CO_2 equivalent emissions from production of meat and other food
- Taxes on pesticides
- Taxes on fertilizers
- Taxes on manure
- Charge on non-point source pollution

GHG-related taxes (e.g., methane, meat) aim to mitigate climate impacts and at the same time encourage shifts to more sustainable diets. Pesticide and fertilizer taxes focus on reducing environmental degradation from excessive chemical inputs — improving water quality and limiting nitrous oxide emissions, which are both local pollutants and potent greenhouse gases.

The main barrier to adoption is concern over impacts on farm profitability. However, the literature emphasises that design features — such as targeted exemptions, gradual phase-ins, or revenue recycling into sustainable farming support — can increase acceptability and policy success.

Several country examples highlight both challenges and innovations in tax design:

- **Denmark**: Noteworthy for its multi-tier pesticide tax, which varies by health and environmental risk. The nitrogen tax, however, exempts most farmers due to a generous threshold, limiting its impact.
- **Sweden**: Imposed a fertilizer tax that reduced nitrogen use by 6% at its peak but was later abolished during the financial crisis due to perceived inefficiency and competitiveness concerns.
- **Belgium**: Applies agricultural pollution taxes at the regional level, with Wallonia and Flanders adopting different approaches. Flanders provides incentives for sustainable manure management, while Wallonia exempts small producers.
- **The Netherlands**: Targets nutrient pollution with a manure surplus levy, directly linked to land carrying capacity — a model of targeted environmental taxation.
- **France**: Replaced its pesticide tax with a non-point source pollution fee. It varies by product toxicity and is complemented by a broader levy on agricultural inputs.

Taxes on food products have not been deployed, although they are discussed in the scientific literature.

Taxes on waste disposal

Landfill taxes

Landfill taxes serve not only to discourage environmentally harmful disposal practices, but also to provide a steady source of funding for waste system improvements. Although detailed revenue breakdowns are scarce, the European Commission (2021) reports that landfill taxes make moderate contributions to overall environmental tax revenues and are especially important for financing the waste management sector.

In Italy, landfill taxes accounted for 38% of total environmental revenues at the time of assessment (Nicolli and Mazzanti, 2013), highlighting their role in funding subnational environmental services. The Hogg et al. (2016) modelling estimated that an EU-wide tax of €50/ton for non-hazardous waste (excluding construction and demolition waste) could yield €2.75 billion annually by 2030. A much lower rate of €2.40/ton applied to C&DW was estimated to generate €70 million. Together these two amount to an estimated 0.01% of GDP and 6.5% of all revenues from pollution and resource taxes.

While landfill tax rates vary widely across the EU, they remain a valuable fiscal instrument—particularly when designed to escalate over time and paired with complementary investments in recycling and composting infrastructure.

Key Insights

Landfill taxes can provide reliable, dedicated funding for local and national waste systems while helping reduce dependence on the least sustainable waste treatment option. To avoid tax evasion via illegal dumping or exports, gradual rate increases, regional harmonisation, and robust enforcement systems are key.

Tax of incineration of waste

Incineration taxes aim to discourage the combustion of recoverable materials and to shift waste treatment up the waste hierarchy. According to Hogg et al. (2016), a uniform tax of €15 per ton of incinerated waste applied across the EU28 would generate €1.32 billion annually by 2030, equivalent to 0.006% of GDP and 3% of all revenues from pollution and resource taxes.

While this is a relatively modest figure, it reflects the smaller share of waste typically treated via incineration in comparison to landfill or material recovery. In practice, national policies vary widely. Some countries, like Sweden and the Netherlands, have historically exempted incineration from heavy taxation due to its role in energy production, while others, including France and Denmark, have moved to increase taxes to encourage material recycling.

Key Insights

Incineration taxes can help redirect waste away from combustion and toward recycling, but they require careful calibration to avoid unintended consequences, such as reliance on landfilling or waste exports. Effective policies must be accompanied by expanded recycling capacity and market development for secondary raw materials.

Pay-as-you throw charge

PAYT schemes differ from traditional taxes by directly charging waste generators based on the quantity or frequency of their waste disposal. Although detailed revenue data are limited, case studies suggest that these systems can recover substantial portions of municipal solid waste (MSW) management costs.

In Belgium, PAYT fees are reported to cover approximately 50% of MSW service costs, with flat-rate municipal taxes filling the remainder (Alzamora et al., 2020). In Spain, PAYT systems reportedly recover as much as 82% of waste management costs, suggesting high potential for cost recovery when well implemented.

Mottershead et al. (2021) explore a PAYT scheme with rates between €0.16-0.22 per kg, tested in Latvia (lower end) and Cyprus, Greece, Estonia, Malta, and Slovakia (higher end). In this scenario, 80% of revenues are recycled into the economy — first to fund waste management infrastructure, and later to reduce employer social security contributions. This design exemplifies how PAYT revenues can be used both to improve service quality and offset broader fiscal burdens.

Key Insights

PAYT schemes offer strong behavioural incentives and high-cost recovery potential, but their success depends on robust billing systems, public buy-in, and equity safeguards. Clear communication and phased implementation are essential to prevent backlash and ensure effectiveness, particularly in low-income or high-density communities.

Taxes on plastic bags and plastic packaging

Plastic bag charges have become a common fiscal tool across EU Member States since the early 2000s. These charges, though less restrictive than outright bans, are designed to reduce single-use plastics by shifting consumer behaviour. They support the EU’s broader circular economy goals by internalising the environmental costs of plastic production, consumption, and disposal. Over time, several countries have moved from charges to more stringent restrictions, including introducing plastic bag bans. In Ireland, plastic bag usage dropped by 90% in the first year after the levy's introduction. Similar reductions — up to 74% — were reported in Portugal following an €0.10 charge.

In parallel, many Member States have expanded plastic-related taxation to include producer-facing measures, such as packaging and excise taxes. For instance, Belgium imposes a beverage packaging charge that distinguishes between reusable and single-use packaging, with significantly higher rates for the latter. Denmark's comprehensive weight-based system applies differentiated rates to plastic bags, containers, disposable tableware, and PVC film wrapping, reflecting environmental impact and product characteristics.

Despite the broad adoption and generally positive environmental results, some concerns persist. The literature highlights the potential for regressive impacts, as plastic bag charges may represent a higher relative cost burden on low-income households. Retailers also note potential revenue losses linked to declining sales of charged items. However, most studies find that political opposition to these taxes has been limited, with broad public acceptance once the environmental rationale is well communicated.

Table A2-1 in Annex 2 summarises the main characteristics of these taxes in EU Member States, including tax base, tax rate, scope and coverage, and years of entry into force where available.

3.2.1. Cost of implementation and effectiveness

Taxes on NO_x, SO_x and other pollutant emissions and taxes on noise emission

These taxes often face **high administrative complexity** — particularly due to the need for **direct measurement of emissions at source**, which increases transaction costs.

Empirical evidence on the administrative and implementation costs of taxes on pollutant emissions and noise remains limited. One exception is Juřík and Braathen (2021), who analysed air pollution taxes in Czechia. Their findings suggest that while the tax rates did not reflect the actual environmental and social damage costs — limiting their incentive effect and revenue potential — the policy's cost-effectiveness improved significantly when the tax base was narrowed to a limited set of pollutants and activities. This strategic narrowing reduced the ratio of administrative and compliance costs to revenues from 15% to just 5%, equating to approximately €576,000.

Taxes on agricultural activities

Evidence on the implementation costs of agricultural pollution taxes is scarce. However, in Sweden's NO_x tax scheme — where revenues are refunded to regulated plants based on energy output — administrative costs are reported to be less than 1% of total revenue (Isaksson, 2010).

> **Key Insights**
>
> Although comprehensive data are lacking, existing cases show that simplifying the tax base and recycling revenues can significantly reduce implementation costs. Designing taxes that align with existing monitoring systems and using proxy measures (e.g., energy output or land area) can ease administration and improve political acceptability.

Taxes on waste

Taxes on plastic bags and plastic packaging have been among the most widely adopted forms of product-specific environmental taxation in recent years. Evaluations of these measures suggest they can be highly effective in reducing plastic use, with relatively low administrative and compliance costs — particularly when they build on existing retail or tax infrastructure.

The Irish plastic bag levy, introduced in 2002, is one of the most frequently cited success stories. A study by Convery et al. (2007) estimated that the levy led to a 90% reduction in plastic bag usage almost immediately after its introduction, with strong public support and limited administrative burden. Retailers were responsible for collecting the levy at the point of sale and remitting it to the tax authority, which kept administrative costs low. The authors noted that "the costs of collection and enforcement were minimal relative to the environmental benefits," aided by a high level of public visibility and a simple structure (Convery et al., 2007).

More recent comparative evidence is provided by the OECD (2021), which reviewed policy outcomes from a range of case studies and found that taxes or mandatory charges on plastic bags can deliver significant reductions in usage when the price signal is strong enough to exceed average consumer willingness to pay. The report notes that such instruments are particularly effective where suitable alternatives (e.g. reusable bags) are available and visible, and where the charge is accompanied by regulatory constraints or bans (such as restrictions on bag thickness). In Wales, for example, a charge covering all single-use bags — regardless of material — reduced consumption by over 70% within three years (Cornago et al., 2021).

However, the effectiveness of such taxes is context-dependent. In Belgium, a tax introduced in 2007 on plastic foil and cutlery was found to have minimal behavioural impact, likely due to limited frequency of purchase and the relatively low level of the price signal. The OECD notes that demand inelasticity and lack of ready alternatives can severely limit behavioural responses in some cases, underscoring the importance of tax design and complementary measures (Cornago et al., 2021).

For plastic packaging, the evidence base is newer but expanding. The UK's Plastic Packaging Tax, introduced in April 2022, imposes a levy of £200 per tonne on plastic packaging with less than 30% recycled content. The accompanying impact assessment (UK HMRC, 2020) estimated that administrative costs would be modest and largely confined to the initial registration and reporting processes, while the behavioural impacts — such as shifts to recycled materials and reduced use of virgin plastic — were expected to be substantial. While detailed ex-post evaluations are not yet available, early industry responses suggest that the tax has already stimulated interest in supply chain adjustments and material substitution.

More broadly, the OECD (2021) report "Policies to Reduce Microplastics Pollution in Water" highlighted that plastic packaging taxes can provide long-term incentives for design-for-recycling and reduced material use. The report stressed the importance of careful policy design to avoid unintended trade-offs, such as shifts to heavier or more carbon-intensive alternatives, but concluded that plastic taxes are among the most promising instruments when supported by product standards and extended producer responsibility schemes.

In summary, both plastic bag levies and plastic packaging taxes demonstrate that environmental taxes can be both cost-effective and impactful, particularly when applied at the point of sale or production and coupled with strong public communication. While the administrative complexity increases with product diversity — as in the case of packaging — the experience to date suggests that the benefits can substantially outweigh the costs when well-designed.

Available literature provides limited evidence on the administrative and implementation costs of **waste disposal taxes** across EU Member States. Waste taxes are often embedded within broader municipal waste management systems, making it more difficult to isolate and assess their specific administrative burden.

This lack of transparency may stem from the decentralised nature of waste management in many countries, where local authorities manage collection, billing, and enforcement. Additionally, charges such as pay-as-you-throw are typically integrated into existing service fees, further complicating cost attribution. In the case of producer-facing taxes (e.g., packaging or plastic taxes), costs may be absorbed by extended producer responsibility systems, making them less visible in public budgets.

3.2.2. Generation of revenues

Taxes on NO_x, SO_x and other pollutant emissions and taxes on noise emission

Pollution taxes targeting air pollutants such as NO_X and SO_x have shown varying levels of revenue generation across Member States, depending on their scope, rates, and refund mechanisms. Sweden's long-standing NO_X tax, introduced in 1992, has been a significant source of revenue. Initially set at €3.6 per kg (€3,600 per ton), the rate was increased to €4.5 per kg (€4,500 per ton) in 2006. In that year, the tax generated approximately €60 million, rising to €70 million in 2007. This would have represented approximately 0.009% of total environmental tax revenue in 2009 (the first year for which we have identified data). Notably, this tax was revenue-neutral: proceeds were redistributed to regulated plants based on their energy output, benefiting those with lower emissions per unit of energy and incentivising cleaner technologies (Isaksson, 2010).

Model-based analysis from Spain (Labandeira et al., 2019) adds a forward-looking perspective on the revenue potential of pollution taxes. Their simulation of a suite of environmental taxes, including carbon and air pollution taxes, shows that a tax of €1,000–2,000 per ton of SO_x and NO_x would increase the prices of gas and diesel for residential and industrial users. Total revenues would rise by approximately 6% relative to existing energy tax levels. Revenue responsiveness to tax increases was higher in the industrial sector, suggesting that pollution taxes could be particularly effective fiscal instruments in sectors with concentrated emissions and measurable outputs.

In Czechia, Juřík and Braathen (2021) analysed real-world data on air pollution tax revenues. Significant increases in tax rates since 2013 — reaching €573/ton for TSP, €191 for SO_2, and €152 for NOX by 2021 — have positioned Czechia among the EU countries with the highest pollution tax rates. However, actual revenue collection remains relatively low, amounting to just €12 million, or 0.32% of total environmental taxes in 2017. This highlights the challenge of limited tax bases or exemptions reducing overall fiscal impact, despite relatively ambitious rates.

At the EU level, Hogg et al. (2016) assessed the revenue potential of pollution taxes under a harmonised application. Using rates such as €1,000/ton for SO_2 and NO_X, €2,000/ton for PM_{10}, and €3,000/ton for $PM_{2.5}$, the projected revenue for the EU-28 in 2030 was €3.26 billion — equivalent to 0.016% of GDP and 10% of all pollution and resource taxes. This modelling illustrates the potential scale of these instruments if adopted more widely and consistently across the EU.

Key Insights

Taxes on air pollutants can generate substantial revenue while encouraging cleaner technologies, particularly when implemented at relatively high levels and designed with refund mechanisms that reward low-emission operations. However, their effectiveness depends on a broad and consistent tax base, alignment with real environmental costs, and careful calibration of rates to avoid diminishing returns or low uptake due to exemptions or limited coverage.

In the transport sector, taxes on vehicle emissions can generate considerable revenues, but outcomes depend significantly on factors influencing consumer behaviour and policy framing. One example that highlights these dynamics is Italy's "Superbollo" — a registration tax introduced in 2011 targeting high-powered vehicles. Although its primary purpose was to raise fiscal revenue during the economic crisis, it was also expected to contribute to emissions reduction by discouraging high-emission vehicle purchases. Despite an initial revenue forecast of €168 million per year, the policy had unintended consequences. The tax triggered a contraction in the high-powered vehicle market, resulting in a net revenue loss of approximately €120 million annually (Bergantino et al., 2021). This case demonstrates the risk of implementing taxes primarily for revenue generation without accounting for their behavioural and economic impacts. It also underscores the need for complementary measures — such as incentives for low-emission vehicles or scrappage schemes — to support both environmental and fiscal goals.

Key Insights

Vehicle emission taxes must be designed with a clear understanding of market behaviour. High tax rates may discourage certain purchases but can also reduce revenue if they significantly distort the market. To maximize both fiscal and environmental returns, taxes should be part of a broader strategy that includes support for clean transport alternatives and equitable access to low-emission vehicles.

Taxes on agricultural activities

The reviewed literature does not discuss revenue generation or fiscal outcomes from **methane and nitrous oxide taxes in agriculture**. Most available studies focus instead on emission reduction potential and distributional effects.

Although still largely hypothetical, **taxes on food products** associated with high greenhouse gas emissions have been the subject of increasing academic and policy interest. A major proposal summarised by Pinto (2019) draws on a study by CE Delft, commissioned by the True Animal Protein Price Coalition (TAPPC).

The study suggests a gradual implementation of a meat tax by 2030, with target rates of €4.77/kg for beef, €3.61/kg for pork, and €1.73/kg for chicken. If implemented across the EU, such a measure could yield up to €32.2 billion annually — approximately half the budget of the Common Agricultural Policy.

While **the fiscal potential is significant, the political feasibility remains uncertain**. The proposal has been met with concerns over the regressive nature of such taxes and potential impacts on lower-income households. Alternative approaches, such as the bonus-malus scheme studied by Markandya et al. (2016), aim to shift diets toward healthier patterns using a mix of taxes and subsidies. This model limits price increases to 25–30% of the current value and reallocates revenues to reduce other taxes. Under this approach, government revenues could amount to €16 billion annually in Spain, without significantly increasing overall household food expenditure.

Key Insights

Taxes on high-emission food products offer large revenue potential and co-benefits for health and sustainability. However, phased implementation, paired subsidies, and revenue recycling are essential to address equity and political resistance.

Taxes on waste

Plastic bag and packaging taxes, while primarily designed to reduce consumption and promote sustainable alternatives, can also generate meaningful revenue. Ireland was one of the first countries to introduce a plastic bag levy in 2002, setting the rate at €0.15 per bag. The policy led to a dramatic reduction in plastic bag usage and generated approximately €11 million annually (Clinch and Dunne, 2006).

At the EU level, modelling by Hogg et al. (2016) projected that a harmonized tax of €0.10 per bag across all EU28 Member States could generate €1.1 billion in 2030 — equivalent to 0.006% of the EU's GDP in that year and 2.6% of all revenues from pollution and resource taxes. Although relatively small in macroeconomic terms, this revenue stream could provide consistent funding for waste management programs or be earmarked for environmental initiatives.

In the case of plastic packaging, broader product-based taxes show even greater revenue potential. Hogg et al. (2016)'s modelling of a packaging tax using differentiated rates by material type — €102/ton for plastics, €315 for aluminium, and lower rates for paper, glass, and wood — suggests revenues of €4.81 billion in 2030, or 0.024% of EU GDP and 11% of all revenues from pollution and resource taxes. These figures reflect the large scale and pervasiveness of packaging materials across the economy.

Spain's more recent implementation of a non-reusable plastic packaging tax, introduced at a rate of €0.45 per kilogram, provides a real-world example. Cañas Rivera (2023) estimates expected annual revenues from this measure at €724 million. However, this would have only represented 0.23% of total environmental taxes in the EU in 2023. This tax is implemented alongside Spain's landfill/incineration taxes and allows for regional rate variation, giving subnational governments additional flexibility in aligning with environmental goals.

Key Insights

Taxes on plastic bags and packaging can generate stable and visible revenue streams, particularly when linked to large consumption volumes. While the fiscal impact may be modest relative to total budgets, these revenues are well-suited for earmarking toward circular economy initiatives or offsetting other regressive charges. Differentiated rates by material can also strengthen environmental signals.

3.2.1. Impacts

Taxes on NO_x, SO_x and other pollutant emissions and taxes on noise emission

Sweden's **NO_x tax**, introduced in 1992, is one of the most frequently cited examples of an effective pollution tax. Between 1992 and 2007, NO_x emissions per unit of energy were reduced by approximately 50%. However, Coria et al. (2021) found that this reduction was not due solely to the tax: regulatory standards also played a role. Boilers subject to both the tax and emissions standards emitted 19% less NO_x than those subject only to the tax, highlighting the importance of combining market-based and regulatory approaches.

In Spain, a regional NO_x tax in Valencia, evaluated by Ebersteder et al. (2023), achieved more modest results. With rates between €9 and €50 per ton, NO_2 levels declined by only 1.2%. Reductions were greater in areas with larger and more innovative firms, suggesting that firm characteristics and local economic structure matter for impact.

Juřík and Braathen (2021) studied air pollution taxes in Czechia. Between 2013 and 2017, emissions from stationary industrial sources fell by 21% for TSP, 26% for SO_2, and 19% for NO_x. Elasticity estimates of reductions in emissions with respect to taxes based on these changes suggest relatively responsive reductions in emissions, particularly for SO_2 (−0.48) and TSP (−0.42).

Hahne (2022) assessed the eco-efficiency impacts of SO_2 and NO_x taxes across several EU countries from 2008 to 2019. The results generally confirm a positive effect, though the significance of refundable charges was more mixed, and outcomes varied across models. GDP per capita was positively associated with higher eco-efficiency, while reliance on fossil fuels in electricity production reduced scores.

Key Insights

Air pollution taxes can yield significant environmental benefits, particularly when combined with regulatory standards and implemented at meaningful rates. However, their effectiveness depends on rates that are relatively high compared to abatement costs. It also depends on the design of the tax and the characteristics of the regulated sectors. Differentiated approaches may be necessary to achieve stronger outcomes across contexts.

Several EU Member States have implemented **CO_2-based vehicle taxes**, often combining metrics such as emissions per kilometre, engine size, and fuel type. A review by Depren et al. (2022) finds that these taxes consistently reduce emissions per vehicle. In France, a feebate system achieved an 11% reduction in CO_2 emissions from new vehicles by 2013. Spain's car replacement scheme (2008–2018) helped phase out high-emission vehicles, though the cost-effectiveness of the measure has been debated.

In Italy, the "Superbollo" tax on high-powered vehicles contributed to a 5–7% decrease in average CO_2 emissions per kilometre as consumers shifted towards lower-emission models (Bergantino et al., 2021). Despite environmental benefits, the policy faced opposition from the automotive sector and consumer groups.

The adoption of electric vehicles in countries like Norway and Denmark shows the importance of total cost of ownership. Dijk et al. (2022) found that lower operating costs for electric and hybrid vehicles, supported by tax incentives, were critical in achieving high adoption rates — especially in Norway, where battery-electric vehicles achieved strong market penetration.

In the aviation sector, Bernardo et al. (2024) estimate that a €1 increase in passenger taxes could reduce flights by around 1%. Present tax levels already contribute to an estimated 14% reduction in emissions, disproportionately affecting low-cost carriers. However, these taxes face political resistance, particularly in tourism-dependent regions. Harmonizing rates across the EU could reduce competitive distortions and improve environmental outcomes.

Key Insights

Vehicle and transport taxes can reduce emissions when rates are significant, and incentives are aligned with cleaner alternatives. However, political resistance is strong, and distributional impacts require careful attention.

Harmonization across Member States and complementary subsidies can enhance environmental outcomes and reduce market distortions.

Pollution taxes on energy and industry

Although not the central focus of this report, pollution taxes in the energy and industrial sectors—particularly CO_2 taxes — offer relevant lessons for broader pollution pricing. While early CO_2 taxes generated substantial revenue, their relative share of GDP and overall tax revenue has declined as tax bases shrink and exemptions grow. Between 2002 and 2019, environmental tax revenue in the EU dropped from 6.6% to 5.9% of total revenue.

Modelling suggests that well-calibrated CO_2 taxes could still yield large revenues. Ekins et al. (2011) estimated that a tax rising to €142/tCO_2 could raise €176 billion annually, while a flat €80/tCO_2 tax could yield €208 billion (European Commission, 2024). However, average EU-wide emission elasticities with respect to tax rates remain modest (−0.1 to −0.2), indicating that price signals alone may not trigger deep reductions.

Sweden's experience shows more varied results. Although its CO_2 tax helped drive innovation and efficiency in some sectors (Lundgren & Marklund, 2016), exemptions meant that only 40% of emissions were covered (Skygebjerg et al., 2020). Emissions elasticities range widely across studies — from −0.3 to −2.0 — reflecting differences in sectoral responsiveness and methodology.

Distributional impacts are a key concern. Without targeted compensation, CO_2 taxes tend to be regressive although the magnitude is small and mechanisms such as lump-sum rebates, rate differentiation, and tax exemptions can reduce adverse impacts on low-income households. Modelling by Rodríguez et al. (2019) and Beltrán et al. (2024) shows that revenue recycling can help make these taxes more progressive. Complementary instruments like carbon border adjustments and differentiated sectoral pricing also help mitigate competitiveness concerns.

Taxes on agricultural activities

Pesticide taxes have been implemented in several EU Member States, particularly in the Nordic region. Sweden introduced a pesticide tax in 1984, followed by Denmark in 1996. These early adopters offer valuable insights into both revenue potential and behavioural impacts.

A modelling study by Möckel et al. (2021) explored the feasibility of applying Denmark's post-2013 pesticide tax in Germany. The results showed that revenues would depend heavily on the price elasticity of demand for pesticides. With an elasticity of -0.4, revenues could reach approximately €513 million; with -0.2, revenues would be even higher at €808 million. The elasticity of tax revenue with respect to the tax rate ranged from 0.7 to 1.2, indicating that pesticide use would decrease with increasing rates, though revenues might still rise in the short term.

Mottershead et al. (2021) also modelled the introduction of a similar pesticide tax in Austria, Belgium, Luxembourg, Slovenia, and Sweden. The study found significant short-term revenue potential, though revenues decline over time as farmers reduce pesticide application in response to the tax. Importantly, in all modelled scenarios, revenues were recycled back into the agricultural sector, helping to maintain political support and promote sustainable practices.

At the EU level, Hogg et al. (2016) estimated the impact of a €10/kg pesticide tax applied uniformly across the EU-28. Adjusted for relative prices and sector sizes, the projected revenue in 2030 was €4.01 billion, equivalent to 0.02% of GDP or 12% of revenues from all pollution and resource taxes. This highlights the substantial fiscal potential of this policy instrument when scaled beyond national implementation.

Key Insights

Well-designed pesticide taxes can raise significant revenues, particularly in the short term, while driving more sustainable input use. Long-term revenue streams may decline as usage falls, but this reflects the environmental success of the measure. Recycling revenues to support eco-friendly practices can help maintain sectoral buy-in.

Fertilizer taxes have been applied in several countries, though they are more politically sensitive due to their impact on production costs and competitiveness. Sweden implemented a set of fertilizer taxes from the 1980s through 2009, targeting nitrogen (N), phosphorus (P), and cadmium (Cd) in mineral fertilizers. The taxes aimed to reduce nitrogen runoff into drinking water and the Baltic Sea, curb cadmium accumulation in soil, and promote better nutrient management.

Rates ranged from €0.18 per kg of nitrogen (1994–2009), €0.12 per kg of phosphorus (1984–1994), to €3 per gram of cadmium (1994–2009). Total annual revenue was approximately €35 million. However, these taxes were eventually abolished in 2009 during the financial crisis due to pressure from the agricultural sector and concerns over competitiveness (Andersson, 2022).

At the EU-wide level, Hogg et al. (2016) examined a hypothetical fertilizer tax of €0.2 per kg of nitrogen applied across the EU-28. Adjusting for national agricultural price structures, the estimated revenue for 2030 was only €2 million, or 0.00001% of EU GDP or only 0.005% of all revenues from pollution and environmental taxes. This figure is significantly lower than what has been observed in practice in countries such as Sweden and the Baltic States, or what was estimated for Germany using Danish benchmarking. The disparity highlights that politically feasible rates — especially those set at low levels — may offer only modest fiscal returns unless paired with broader agricultural reform.

Key Insights

Fertilizer taxes can generate only moderate revenues while encouraging more efficient nutrient use and environmental protection. However, to be politically viable and impactful, they may require targeted exemptions, gradual introduction, and linkage to visible environmental benefits. Where fiscal yield is modest, these taxes may serve better as behavioural instruments rather than revenue-generating tools.

The agricultural sector remains one of the least taxed on the pollution it generates, including greenhouse gas emissions, despite its significant contribution to those emissions. Several modelling studies have explored the potential impact of taxes on methane and nitrous oxide emissions. Ollier et al. (2024) simulate an EU-wide emissions tax with rates of €30, €50, and €100 per ton of CO_2 equivalent. Their results suggest emission reductions of 6%, 9%, and 15% respectively, corresponding to an emissions elasticity of approximately −0.7.

However, these reductions come with notable economic trade-offs. A tax of €100/tCO_2 eq. for example could reduce overall sector income by around 20% but with significant increases in income inequality. The study finds that different rebate designs can dramatically influence distributional impacts. A flat rebate reduces inequality, while a rebate proportional to initial emissions maintains existing disparities. These findings point to the importance of careful redistribution strategies to ensure social acceptability and equity.

Mottershead et al. (2021) model NO_x taxation in Austria, Germany, and the Netherlands, with rates between €18.2 and €28.6/kg per year (€18,200 and €28,600 per ton per year). Although emission reductions are expected to be meaningful, the impacts on household income are generally small, and there is little evidence of regressive distributional effects. As the study focuses on a broader tax system, the results reflect the interaction of multiple fiscal measures rather than one standalone instrument.

Key Insights

Taxes on methane and nitrous oxide can deliver substantial climate mitigation benefits, but their equity and political feasibility hinge on smart rebate design. Policymakers must ensure that vulnerable farming communities are shielded from excessive losses while maintaining strong price signals to drive emissions reduction.

A growing body of literature supports the **taxation of high-emission food products** as a way to address climate and health objectives. Pinto (2019) reviews studies showing that carbon-based food taxes could reduce emissions significantly. For example, a UK study applying a €199/tCO_2 carbon price to all food products could reduce emissions by 18.7%, with almost the same reduction (18%) achieved by targeting only meat products.

A widely cited proposal by CE Delft suggests a phased-in tax on beef, pork, and chicken, reaching €4.77, €3.61, and €1.73 per kilogram respectively by 2030. This would lead to significant behavioural changes— beef consumption could fall by 67%, pork by 57%, and chicken by 30% — with an overall reduction of EU emissions by approximately 3% (equivalent to 120 MtCO_2e).

The design of such taxes is critical, especially given concerns over regressivity. Schapper et al. (2025) evaluate a “fee and dividend” system in Germany, combining food taxes with a per capita lump-sum rebate. Their results show that this system can not only reduce agricultural emissions by 15.3 MtCO_2e (22.5%) but also achieve slightly progressive distributional effects.

Markandya et al. (2016) explore a diet-shifting tax and subsidy scheme aligned with WHO health goals. Even with caps on price changes (25–30%), the model achieves a 13% reduction in food-related CO_2 emissions while improving nutritional outcomes, without increasing average household food costs.

Key Insights

Food-based CO_2 taxes can achieve strong environmental and health co-benefits. However, public acceptability depends on limiting regressivity through rebates or targeted subsidies. There are also strong cultural objections on taxes that make some foods more expensive. Clear communication of health and environmental gains is essential to build public support for these taxes.

Taxes on waste

Taxes on plastic bags have consistently demonstrated significant reductions in usage across Member States. In Ireland, a €0.15 tax introduced in 2002 led to an immediate 90% drop in consumption, accompanied by strong public support (Abate & Elofsson, 2024). Similarly, Portugal introduced a €0.10 levy in 2015, achieving a 90% reduction in single-use carrier bags within a year. In the UK, a charge of £0.05 in 2015 — raised to £0.10 in 2021 — reduced plastic bag sales by 95% in major supermarkets by 2022.

Sweden’s experience is especially illustrative of behavioural response and policy reversal. After a tax of SEK 3 (~€0.26) per bag was introduced in 2020, plastic bag consumption dropped from 74 bags per capita to 17 by 2023 (a 77% decrease). However, the tax was repealed in 2024, prompting concern over a potential resurgence in single-use plastic consumption and illustrating how policy rollback can undermine environmental gains.

In economic terms, the tax aligns closely with estimated marginal external damage costs. Abate & Elofsson estimate the combined marine and climate damage from a single plastic bag at approximately €0.125 — closely matching the €0.15 tax level in Ireland, suggesting that these measures are economically efficient as well as environmentally effective.

Some concerns remain around regressivity and retailer impacts. While the average annual cost per person in Sweden was estimated at €15–28, retailers reported reduced revenue from plastic bag sales. Studies also emphasize the importance of consumer education and consistent enforcement.

In terms of plastic packaging, Spain introduced a €0.45/kg tax on non-reusable plastic in 2023, alongside landfill and incineration taxes. The measure is expected to reduce packaging waste generation by 15% by 2030 (Cañas Rivera, 2023). At the EU level, a €0.80/kg levy on non-recycled plastic packaging introduced in 2021 is expected to help fund the EU budget while driving circular economy objectives. However, challenges persist in defining taxable items, monitoring compliance, and providing adequate incentives for biodegradable or reusable alternatives.

Key Insights

Taxes on plastic bags and packaging yield clear and rapid reductions in single-use plastic consumption. Alignment with marginal damage costs enhances their legitimacy, while revenues can support sustainability initiatives or mitigate regressive effects. Effective implementation requires clear product definitions, communication strategies, and long-term commitment to avoid policy backsliding.

Landfill taxes have been among the most consistently applied and effective waste policy tools in the European Union. Introduced progressively across Member States since the late 1980s — starting with Denmark in 1987 and followed by Austria (1989), France (1993), the UK (1996), and others — these taxes are designed to internalize the environmental costs of landfilling, reduce reliance on this disposal method, and incentivize waste prevention and recycling.

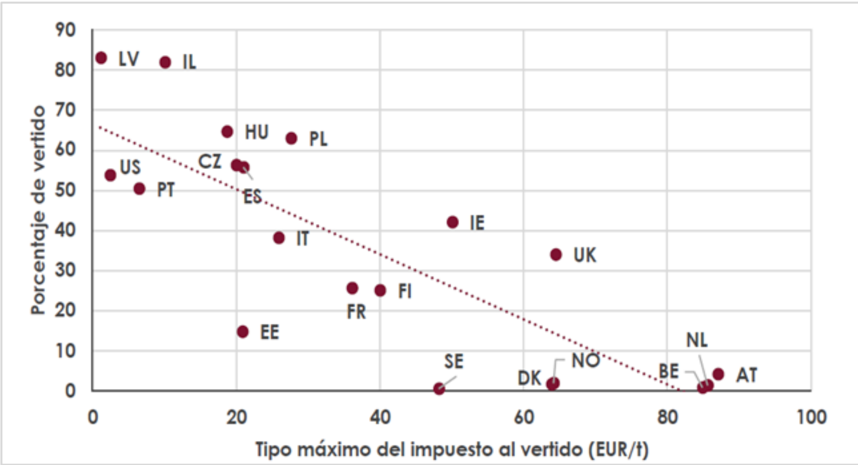
Across the EU, the effects of landfill taxation on waste reduction and diversion have been substantial. In the Netherlands, landfilled waste decreased from 8.2 million tonnes in 1995 to 2.75 million tonnes in 2003 — a 67% reduction. Household waste sent to landfill fell from 35% to just 6% over the same period.

Austria reduced the share of landfilled household waste from 75% in 1989 to 43% in 1999, while Denmark saw a 26% drop in landfill volumes between 1987 and 1996 and achieved a recycling rate of 61%. In the UK, by 2010, the landfill tax was generating over €1.2 billion annually, and the amount of waste sent to landfill had halved (Cambridge Econometrics, 2013).

These trends are supported by quantitative estimates of price elasticity. Studies covering multiple EU Member States show that for every 1% increase in landfill tax rates, landfilled waste decreases by roughly 0.3% to 0.4%. For example:

- Skygebjerg et al. (2020) report elasticities of −0.3 for Denmark and Norway and −0.35 for Finland.
- Țibulcă (2021) estimates an average elasticity of −0.4 across all EU Member States.
- Figure 5-2, based on AIReF (2023), supports a similar range, estimating −0.33 across the EU.

Figure 3-4: Waste to landfill rates and landfill tax rates (source: AIREF, 2023)



Source: AIREF, 2023

Further evidence from Catalonia, Spain, adds depth to this picture. There, the landfill tax increased from €18 per tonne in 2017 to €47 in 2020. The result was a 12% decrease in landfilled waste, a 4% reduction in total waste generation, and a 6% rise in recycling in municipalities without door-to-door (DtD) collection. In areas where DtD was introduced alongside the tax, impacts were even stronger—particularly for organic waste recycling, which increased by 12% (Jofre-Monseny & Sorribas-Navarro, 2024). Interestingly, the study also found diminishing marginal benefits at higher tax levels. An increase from €80 to €300 per tonne yielded only modest additional reductions, suggesting that the most significant gains occur at lower baseline tax levels.

Price responsiveness also varies by sector. The service sector, where disposal costs are more visible and often passed directly to clients, is more responsive to landfill taxes than households. In contrast, households in many Member States face flat-rate waste fees, meaning price signals from landfill taxes are often not transmitted to the end user. This limits behavioural change. For example, in Italy, the "TARI" municipal waste fee system does not vary by waste volume, reducing household incentives to cut landfill-bound waste (Ergun, 2022). A similar pattern is observed in Bulgaria, where flat waste charges and weak enforcement limit the effectiveness of landfill taxation (Georgieva & Blagoeva, 2023).

Several studies also highlight concerns about unintended effects, such as waste shifting and increased illegal dumping. Where landfill taxes rise but unit-based pricing systems are not introduced, firms or municipalities may divert waste to incineration or export it to lower-tax jurisdictions. Malek et al. (2023), in a 14-country panel study covering 1996–2018, found that a €1 increase in landfill tax reduced waste generation by 0.009 tonnes per capita, but that some of this waste was redirected to incineration, underscoring the need for a coordinated tax approach across waste treatment options.

Specific to construction and demolition waste (C&DW), landfill taxes have shown mixed results. In the Netherlands, high landfill tax rates combined with material recovery policies helped achieve a 97.5% recovery rate for C&DW. In Belgium, C&DW recycling rates vary widely — 87% in Flanders but just 50–70% in Wallonia. France, despite having a landfill tax, has been slower to scale up C&DW recycling, due in part to low tax rates and limited infrastructure. Devoie et al. (2020) report that the cost of basic recycling (around €4.6 per tonne) is lower than the landfill tax-inclusive cost in the Netherlands (€19/tonne), making the tax effective for encouraging low-cost recycling. However, more advanced recycling remains costlier than landfilling, limiting its uptake.

From a climate perspective, landfill taxes also contribute to methane emissions reduction. In Ireland, where the landfill levy rose from €15 in 2002 to €75 per tonne in 2013, Siedschlag et al. (2021) estimate a 7% reduction in total methane emissions and a 4.2% reduction in net methane emissions compared to a baseline with no tax increase.

Finally, modelling by Mottershead et al. (2021) suggests that applying a uniform EU-wide landfill tax of €30–35/tonne in 2020, increasing to €70/tonne by 2030, could achieve substantial environmental gains with minimal trade, competitiveness, or distributional effects. However, effective implementation would require Member States to address technical challenges, including how best to estimate the external costs of landfilling and how to integrate taxes into broader fiscal and regulatory systems.

Key Insights

Landfill taxes have proven to be one of the most effective instruments for reducing landfill use and driving waste treatment up the hierarchy. To maximise impact, these taxes should be accompanied by unit-based pricing, investments in sorting and recycling, and cross-border coordination to prevent evasion or waste exports. Targeted support may be needed for smaller municipalities and sectors vulnerable to rising disposal costs.

Taxes on waste incineration are increasingly used across the EU as a complement to landfill taxes. While incineration avoids methane emissions associated with landfill and can contribute to energy recovery, it still generates air pollutants and CO_2 emissions. Taxes on incineration aim to discourage excessive reliance on this disposal route and shift waste treatment further up the waste hierarchy — towards prevention, reuse, and recycling.

The interaction between landfill and incineration taxation is critical. As landfill taxes rise, there is a risk of substitution toward incineration. Jofre-Monseny and Sorribas-Navarro (2024) estimate the cross-price elasticity between landfill and incineration to be 0.4 for industries and 2.0 for municipalities, suggesting that municipal waste flows are far more responsive to landfill tax changes. In practical terms, the elasticities imply that a 1% increase in landfill tax could lead to a 0.4% rise in industrial incineration and a 2% increase in incineration from municipal sources, underscoring the importance of coordinated pricing across both waste pathways.

Several EU countries have explored or implemented incineration taxes, though their design and scope vary widely:

- Sweden considered a tax of €36 per tonne on incinerated waste, and an alternative proposal for a €180/tonne tax specifically on incinerated plastics to align with the national carbon tax (Björklund et al., 2003). While the expected result was reduced incineration and increased recycling, no quantified impacts were provided. The proposal sparked policy debate on whether taxation or regulation is more effective in managing waste streams.
- Norway and Germany introduced CO_2-based incineration taxes in 2024. Norway set its rate at €41 per tonne of CO_2 emitted, while Germany introduced a rate of €45 in 2024, scheduled to rise to €55 in 2025 and €65 in 2026. These taxes apply specifically to emissions from waste incineration plants. Meanwhile, Sweden and Denmark have chosen to integrate incineration emissions into the EU Emissions Trading System (ETS) rather than applying a specific tax. In France, incineration is included under the General Tax on Polluting Activities (TGAP). These initiatives are motivated by the desire to internalize the climate impacts of combustion-based waste treatment and create price parity between landfill and incineration.
- Belgium offers one of the longest-standing examples of an incineration tax. Introduced in 1990 and significantly revised in 2015, it applies specifically to plastic waste sent to incineration. In 2005–2006, average

rates stood at €7.7 per tonne. De Weerdt et al. (2020) found a significant negative correlation between incineration tax levels and plastic waste generation. While they reported that a 1% increase in the incineration tax reduced the growth rate of waste generation by 10-43 percentage points, this result is difficult to interpret and should not be confused with a true elasticity. Nevertheless, the study concluded that the tax encouraged firms to shift from incineration to recycling, contributing to the adoption of circular economy practices. Some of these costs were likely passed on to consumers, though this effect was not quantified.

A review of incineration taxation and emissions pricing mechanisms in nine EU countries, noted that price-based policies increase the competitiveness of recycling and stimulate investments in alternative waste treatment technologies. However, they caution that variations in tax design and scope across countries create market distortions, increase administrative complexity, and could lead to waste exports to lower-tax jurisdictions—an issue also raised in earlier landfill tax studies (Hansen & Yrke, 2024).

Despite these efforts, there is still limited empirical evidence on the overall effectiveness of incineration taxes. Malek et al. (2023), in a multi-country panel study, reported a counterintuitive increase in total waste volumes following incineration tax increases — specifically, a €1 rise in incineration tax was associated with a 0.01 million tonne increase in waste. The authors suggest this could be due to limited variability in tax rates during the study period, or potential data constraints, as the tax was only in place in Denmark, Sweden, and the Netherlands among the 14 countries analysed. This raises questions about the statistical robustness of observed effects and underscores the need for more comprehensive data across Member States.

Key Insights

Incineration taxes are a necessary complement to landfill taxation to prevent substitution effects and to ensure consistency with circular economy and climate goals. Their effectiveness increases when based on CO_2 emissions, aligned across jurisdictions, and supported by investments in recycling infrastructure. Without coordination, however, disparate tax regimes can cause market imbalances and incentivize waste shifting, undermining environmental objectives.

Pay-as-you-throw systems are increasingly used across the EU to strengthen the link between waste generation and the cost of disposal. Under these systems, households or producers are charged based on the quantity or volume of waste they discard — creating a direct financial incentive to reduce waste, improve sorting, and increase recycling rates.

The effectiveness of PAYT systems largely depends on how closely charges reflect actual waste generation. Evidence suggests that the stronger the volume-based or weight-based pricing element, the greater the behavioural response. Flat-rate schemes, in contrast, weaken these incentives and are often regressive.

Several EU Member States have implemented PAYT at different scales and through varying mechanisms:

- In the Netherlands, PAYT has been in place since 1992 and continues to be a core part of the country's high-performing municipal waste system.
- Ireland phased in PAYT nationally from 2003, starting with weight-based systems (Pay By Use – PBU). Alzamora et al. (2020) estimate that PAYT reduced landfill disposal by 20%, and lowered overall waste generation by 15–30%. The authors note that while demand for waste collection services is relatively price-insensitive, enforcement and system design are key to performance.
- Italy introduced PAYT in selected municipalities from 2013. Where adopted, waste production dropped by 9.7%, although there was no significant increase in sorted waste, and implementation faced strong public resistance (Compagnoni, 2020).
- In Malta, a proposed charge of €0.10–€0.30 per garbage bag was studied. While the higher rate was found to marginally increase composting behaviour, the overall impact was limited (Briguglio, 2021).

Ireland provides the most detailed example of PAYT impacts. Studies by Scott & Watson (2009) and Davies & O'Callaghan-Platt (2008) evaluated Ireland's weight-based and volume-based schemes.

- Household waste decreased by up to 45% in areas using weight-based PAYT.
- Recycling rates rose significantly — kerbside recycling in some regions jumped from 5,000 to over 20,000 tonnes.
- Landfilled waste dropped by 3% in PAYT regions but increased by 10% in non-PAYT areas.
- Annual savings were estimated at €33 per person for local waste authorities and €29 for households.

In the course of implementation several challenges emerged. Initial public resistance was strong — particularly among low-income households who perceived the charges as unfair. This led to inconsistent application of waiver systems, depending on the waste collector or local authority. The market's high level of privatization also created price variation and service fragmentation. Reports of increased illegal dumping, backyard burning, and misuse of commercial bins highlight enforcement challenges.

The experience indicates that system design matters. Evidence shows that weight-based schemes yield greater waste reductions than bag-based or volume-based systems. In Ireland, where local authorities could choose their own model, performance varied significantly. A flat standing charge (typically ~€120 per year) was often paired with a variable fee (e.g., €0.23 per kg), but some areas lacked strong price signals, diluting the effect of PAYT.

At the EU level, Mottershead et al. (2021) modelled a PAYT scheme with charges of €0.16–€0.22/kg, applying lower rates in Latvia and higher ones in Cyprus, Greece, Estonia, Malta, and Slovakia. While the model did not estimate waste volume changes, it projected only small negative impacts on real income, which could be neutralized through revenue recycling. Their design suggests directing initial PAYT revenue to fund waste management infrastructure, with longer-term use for offsetting social security contributions or other taxes.

Key Insights

PAYT schemes offer significant potential for waste prevention, particularly when charges are clearly linked to waste volume or weight, and when revenue is reinvested equitably. Strong enforcement, waivers for vulnerable groups, and transparent communication are essential for public acceptance. A consistent national regulatory framework can improve service equity and reduce market fragmentation in privatized systems.

3.2.2. Key takeaways on pollution taxes

The literature underscores pollution taxes' function as contributing economic instrument for internalizing environmental externalities and incentivizing emission reductions across multiple sectors. The literature highlights significant disparities in the effectiveness, revenue-generating potential, and political feasibility of different tax mechanisms, with pollution taxes on industry and transport exhibiting the most substantial fiscal and environmental impacts, while taxes on agricultural emissions face pronounced implementation challenges due to economic and social resistance.

Taxes on NO_X, SO_2, and other air pollutants have been effective in reducing localised pollution, with Sweden's NO_X tax leading to a ~50% reduction in emissions per unit of energy. However, the effectiveness of these taxes is highly dependent on tax rate levels as well as calibration and compliance mechanisms. For instance, studies on the Czechia's air pollution tax indicate that while rates were increased significantly post-2013, actual revenue and environmental benefits remain limited due to tax base restrictions and administrative challenges. Furthermore, the Swedish experience suggests that combining these taxes with regulatory standards yields greater emission reductions than taxation alone, underscoring the importance of policy integration and institutional coordination.

Transport-related CO_2 taxation, particularly vehicle registration and road-use charges based on emissions, altered consumer behaviour by shifting demand towards lower-emission vehicles. France's feebate system led to an 11% reduction in emissions from new cars, and Italy's Superbollo tax resulted in a shift in vehicle preferences. However, these policies have encountered strong industry and consumer opposition, particularly from automotive manufacturers and rural communities, where alternative transport options are limited. Political feasibility remains a persistent barrier, with studies indicating that such taxes are more successful when embedded within broader strategies that include subsidies for low-emission alternatives, clear communication, and transitional support to mitigate distributional effects.

Agricultural pollution taxes, targeting methane and nitrous oxide emissions, as well as pesticide and fertilizer use, have shown some emissions reduction but implementation has been hindered by sectoral lobbying, distributional concerns, and administrative complexity. While modelling studies suggest that taxing agricultural emissions at €50-100/tCO_2eq could reduce emissions by 9-15%, sector-wide income losses of up to 20% have fuelled opposition. Taxes on pesticides, such as Denmark's differentiated system based on pesticide toxicity, have successfully reduced pesticide loads by 16-40%, yet they also resulted in enforcement challenges, including illegal imports and stockpiling behaviours. Similarly, fertilizer taxes, previously applied in Sweden, were effective in reducing nitrogen runoff but were abolished due to competitiveness concerns and farmer opposition, illustrating the political fragility of such measures.

Revenue generation from pollution taxes varies widely across tax types and jurisdictions. Taxes on NO_X and SO_2, while effective in pollution reduction, generate relatively modest revenues, often necessitating revenue recycling mechanisms to maintain political viability. Agricultural pollution taxes, though capable of raising significant sums initially, face diminishing returns due to behavioural shifts and economic restructuring in response to taxation.

The literature on waste taxes highlights their role in efficiently shifting waste management practices, reducing environmental harm, and promoting circular economy objectives. However, their impact varies significantly depending on tax design, implementation mechanisms, and complementary regulatory measures. Across the reviewed cases, the most effective instruments are those that combine well-calibrated economic signals with strong institutional capacity, enforcement mechanisms, and behavioural incentives. For Member States considering the introduction or refinement of waste taxes, several design and implementation lessons emerge — ranging from setting tax rates that reflect environmental costs to investing revenues in recycling infrastructure and ensuring social acceptability through targeted exemptions or compensation schemes.

Taxes on plastic bags and plastic packaging have had a demonstrable impact in reducing single-use plastic consumption. The Irish plastic bag levy, which led to a 90% drop in plastic bag usage, serves as a benchmark for other EU states, while the Spanish tax on non-reusable plastic packaging (€0.45 per kilogram) is projected to reduce overall waste generation by 15% by 2030. However, these taxes have also faced criticism due to their regressive nature, particularly impacting lower-income households and smaller retailers. These impacts can be overcome through careful rate setting, revenue recycling schemes or through targeted exemption or compensation frameworks targeting lower income communities and actors. Additionally, policymakers must also clearly define taxable items and ensure effective oversight, particularly for biodegradable and alternative materials, to avoid loopholes and enforcement gaps.

Landfill taxes have significantly influenced waste disposal trends across EU member states, contributing to marked reductions in waste sent to landfill. The Catalonian landfill tax, which increased from €18 to €47 per ton between 2017 and 2020, led to a 12% reduction in landfill waste and a 6% rise in recycling rates in municipalities without door-to-door collection. Evidence suggests that landfill taxes alone may not fully incentivize behavioural changes among households, particularly when flat-fee waste collection systems remain in place. Furthermore, elasticity estimates suggest a -0.3 to -0.4% reduction in landfill waste per 1% increase in tax rate, indicating that while landfill taxes are effective, they require complementary waste separation and recycling policies to maximize their environmental benefits. Integrating landfill taxes with unit-based pricing, enhanced waste separation requirements, and recycling incentives is required to amplify their impact.

Incineration taxes, though less widely implemented, are becoming a more relevant policy tool in addressing emissions from waste combustion. Norway and Germany have recently introduced incineration taxes (€41 and €45 per ton of CO_2, respectively), signalling a shift towards integrating waste-to-energy emissions within broader climate policies. Despite their intended environmental benefits, these taxes face significant opposition from municipalities and industries concerned about increased waste management costs and the risk of waste exports to lower-tax jurisdictions. Evidence from Belgium suggests that incineration taxes have prompted some shifts towards recycling among firms, but their full impact remains difficult to quantify due to limited cross-country implementation and data inconsistencies. To be effective, these taxes must be harmonized across jurisdictions, paired with capacity-building in recycling sectors, and safeguarded against unintended effects such as cross-border waste exports.

Pay-As-You-Throw (PAYT) schemes have proven to be among the most effective tools for reducing household waste generation and promoting recycling. In Ireland, the phased introduction of PAYT in 2003 resulted in a 45% decline in household waste generation and significant increases in kerbside recycling. However, these schemes are not without challenges; illegal dumping and waste misreporting have been observed in several cases, particularly where enforcement mechanisms are weak or financial penalties are perceived as excessive. The PAYT model applied in some Italian municipalities led to a 9.7% reduction in total waste production, but no significant increase in sorted waste collection, underscoring the need for better waste sorting incentives within PAYT frameworks. Effective schemes provide graduated pricing, waivers for vulnerable groups, and public education campaigns to build acceptance.

Revenue generation from waste taxes varies widely. Plastic bag and packaging taxes have generated significant fiscal revenues, with projections indicating €1.1 billion annually across the EU under a standardized €0.1 per bag charge. Landfill taxes, in countries where they are applied extensively, contribute up to 38% of total environmental tax revenues, as seen in Italy. However, as landfill rates decline due to increased recycling and waste diversion, these revenues are expected to shrink, necessitating adjustments to maintain funding for waste management infrastructure. PAYT fees, while less substantial as direct revenue sources, have proven effective in covering a high proportion of municipal waste management costs, with Belgium’s model covering 50% of MSW expenses and Spain’s recovering 82% of municipal waste management expenditures. Crucially, revenue recycling into infrastructure, education, and subsidies for circular solutions enhances both policy effectiveness and political feasibility.

Ultimately, waste taxes serve as a mechanism to internalise the environmental costs of waste generation and disposal, but their long-term success depends on strategic policy integration. Effective waste taxation requires adaptive tax structures that consider elasticity responses, mitigate social equity concerns, and are complemented by investments in waste infrastructure, enforcement mechanisms, and consumer education. The design of these taxes must also navigate economic trade-offs, particularly in ensuring that taxes on waste disposal do not inadvertently lead to increased illegal dumping or cross-border waste displacement. The most successful waste tax policies are those embedded within comprehensive waste management strategies that include regulatory incentives, targeted subsidies for recycling initiatives, and clear price signals that encourage sustainable consumption and disposal behaviours.

Ultimately, pollution taxes represent a powerful but complex policy tool. Their success depends not only on careful tax design and calibration but also on the institutional and policy arrangements that support them. Key enabling factors include robust monitoring systems, clear legal frameworks, capacity for enforcement, and cross-ministerial coordination — particularly between environment, agriculture, and finance authorities.

3.3. Resource taxes

Resource taxes (Table 3-2) are implemented to ensure the sustainable use of natural assets — including land, water, minerals, and forestry resources — by internalising the environmental costs associated with the extraction of those assets. In line with the Eurostat definition ([22]), this category includes taxes levied on the depletion of natural resources, including charges related to water abstraction, mining, logging, and certain land uses. At the national level, these instruments often appear as other taxes on production (D.29), taxes on products (D.21), or other current taxes (D.59). This report discusses the following subgroups:

- Taxes on mining
- Taxes on tree felling
- Taxes on hunting and fishing
- Taxes on water abstraction / water use
- Taxes on land use
- Other resource taxes

With 93 identified resource taxes (

Table **A2-2** of 0), the total revenue collected in 2023 amounts to approximately €2.35 billion. The most substantial contribution comes from taxes on water abstraction and usage, which account for over three-quarters of total resource tax revenues. Mining-related taxes and levies on tree felling also play a notable role, reflecting efforts to manage extractive activities and protect natural ecosystems. A visual mapping of what Member States implement which resource taxes is presented in Table A2-4 of Annex 2.

Table 3-2: Resource taxes

Tax Name	Member States implementing these taxes	No. of taxes identified in the EU	Revenue (€ million) in 2023	As share of all resource tax revenues
Resource tax		93	**2,345.76**	-
Taxes on water abstraction / water use	BE, BG, HR, CY, DK, FR, NL, PL, PT, SI	33	1,792.38	76.40%
Taxes on mining	BG, CY, DK, PT, RO, ES, SE	18	247.36	10.50%
Other resource taxes	BG, HR, CY, CZ, ES	12	129.28	5.50%
Taxes on hunting and fishing	AT, BG, EE, FI, HU, IE, LV, MT, PT, ES	17	87.48	3.70%
Taxes on tree felling	AT, HR, HU, LT, PL	6	79.27	3.40%
Taxes on land use	HU	7	9.98	0.40%

Source: Eurostat – National Tax Lists

([22]) https://ec.europa.eu/eurostat/documents/3859598/5936129/KS-GQ-13-005-EN.PDF.pdf/706eda9f-93a8-44ab-900c-ba8c2557ddb0?t=1414782946000

Taxes on mining and water abstraction

Taxes on the extraction of minerals and taxes for abstraction of water are designed to address the overuse of common natural resources. These levies raise the marginal cost of extraction and are intended to reduce environmental damage such as habitat degradation, water scarcity, and land disruption.

In practice, most Member States apply some form of tax or charge on mining activities, generally targeting businesses extracting mineral resources. These taxes are often national in scope, though regional variations exist.

Taxes on forest felling

Forest felling taxes are implemented to curb deforestation and loss of ecosystem services, including biodiversity, carbon sequestration, and soil protection. Like extraction taxes, they aim to increase the cost of resource use and incentivize more sustainable forest management.

Several Member States apply felling charges, but the tax rates are typically low.

The Mottershead et al. (2021) review found that while the external environmental cost of forest depletion may run into the hundreds or even thousands of euros per hectare, the existing charges fall far short of internalizing these costs. For example, the report investigates a significantly higher benchmark — €2,850 per hectare — in a hypothetical Latvian forestry tax aimed at realigning incentives for the timber industry.

While such taxes promote forest conservation, they can face political resistance from the forestry sector, which argues that they reduce competitiveness and increase costs. There are also enforcement and compliance challenges, particularly in contexts where illegal logging is prevalent, or forestry monitoring systems are weak.

Taxes on agricultural land

Unlike other resource categories, agricultural land is lightly taxed in the EU. Where taxes exist, they typically reflect economic or social considerations—such as property value, inheritance, leasing income, or capital gains—rather than environmental impact. According to Sainteny and Dupuis (2021), such taxes do little to encourage biodiversity conservation or carbon storage, and in some cases may even incentivize land artificialization or abandonment, worsening environmental outcomes.

These current tax measures for agricultural land do not steer towards using the best practices for biodiversity conservation, carbon storage or for reconciling crop production with biodiversity conservation in open areas prone to biodiversity loss. This is largely because existing taxes are structured around ownership and transfer of land, rather than incentivizing environmentally sustainable land management. They typically do not reflect the ecological value of land or the environmental costs of intensive agricultural practices. Sainteny and Dupuis (2021) indicate that they can even sometimes incite land artificialization to the detriment of biodiversity, climate change mitigation, the landscape and agriculture itself.

To better align these taxes with environmental objectives, fiscal policy could incorporate ecological performance criteria — for example, through tax rebates for land managed under conservation agreements, regenerative agriculture, or low-input grazing systems. Alternatively, tax rates could be differentiated based on land use intensity or ecological vulnerability, with higher rates applied to activities that degrade ecosystems, and lower or zero rates for land managed in ways that enhance biodiversity, soil carbon, and water retention. This would transform agricultural land taxation from a neutral or even perverse incentive into a tool for promoting multifunctional landscapes and climate resilience.

A proposal for a tax that addresses environmental issues was made in Mottershead et al. (2021). The considerations and impacts of this proposal are discussed in the subsequent sections when referring to taxes on agricultural land. Notably, that study investigates a more targeted instrument: a tax on the conversion of agricultural land to non-agricultural uses, aimed at disincentivising land-use change detrimental to biodiversity and climate.

Other resource taxes

Several Member States levy charges on hunting and fishing activities. These taxes typically target individuals or businesses engaging in the extraction of wild fauna — both for recreation and commercial purposes. Though generally modest in size, these taxes can serve as a revenue stream while helping to regulate pressure on wildlife populations.

3.3.1. Cost of implementation and effectiveness

As with pollution and waste taxes, there is limited empirical literature on the administrative and implementation costs associated with resource taxes. Quantitative estimates of these costs are largely absent from the reviewed studies, making it difficult to compare efficiency across instruments or jurisdictions.

However, some general conclusions can be drawn from the available qualitative evidence. In the case of mineral and water extraction taxes, the literature suggests that administrative and compliance costs may be relatively high. These costs stem from the need to:

- Monitor extraction volumes and enforce accurate reporting.
- Establish sector-specific tax bases (e.g. differentiated rates by mineral type, water use purpose, or region).
- Address evasion risks in sectors with a history of underreporting or informal activity.

For forest felling and agricultural land taxes, the literature does not provide specific assessments — either quantitative or qualitative — of implementation costs.

3.3.2. Generation of revenues

Taxes on mineral and water extraction

Resource taxation on mineral and water extraction presents significant, though largely untapped, revenue potential across the EU. Despite their widespread application, current rates and designs vary considerably across Member States, leading to substantial differences in fiscal outcomes.

A comprehensive modelling exercise by Hogg et al. (2016) estimated the EU-wide revenue potential of resource taxation. It applied:

- A tax on aggregates at €2.4/ton, projected to generate €4.81 billion in 2030, or 0.024% of EU GDP or 11.5% of all revenues from pollution and resource taxes.
- A graduated water abstraction charge, with rates based on the Water Exploitation Index (WEI) and differentiated by sector (e.g. agriculture, public supply, manufacturing). This was projected to generate €17.37 billion in 2030, or 0.088% of GDP and 41% of all revenues from pollution and resource taxes — figures that underscores the considerable revenue potential of water abstraction charges, particularly in water-stressed Member States.

In practice, water abstraction charges are already applied in at least 19 EU countries, though with highly heterogeneous rates and exemptions:

- France applies abstraction charges ranging from €1–€40 per 1,000 m³, depending on origin (ground or surface water), usage (e.g. irrigation, industrial cooling), and resource stress (additional charges in overexploited zones). Revenues reached €354 million in 2011 and have averaged ~€300 million annually between 2000 and 2010. These funds support France’s Water Agencies and incentivize efficiency.

- Portugal applies a tiered water tax, with irrigation users paying just €0.003/m^3, compared to €0.0181/m^3 for urban supply. Small irrigation users (with pumping capacity <3.7 kW) are exempt.
- Denmark and the Netherlands apply water taxes of €0.01/m^3 and €0.359/m^3 respectively, with differentiated rates for industrial and agricultural use. In the Netherlands, the tax applies only to the first 300 m^3/year, with lower rates (€0.08/m^3) for agricultural abstractions above 40,000 m^3.

Taxation of mineral extraction is less common but gaining traction. As of 2024, at least ten Member States apply some form of mining tax, typically based on volume (m^3), weight (tonnes), or value of extracted materials:

- Estonia applies differentiated rates by material type, ranging from €0.6/m^3 to €3.34/m^3, and €2.03/ton to €3.03/ton.
- Finland recently introduced a tax on metal ores (0.6% of taxable value) and non-metallic minerals (€0.20/ton).
- Sweden, by contrast, operates under a concession-based regime. Mining companies pay a 0.02% royalty on annual production value, split between landowners and the state. This system has been widely criticised for failing to internalise environmental and social costs of extractive activities and for offering generous fiscal advantages to mining firms.

Recent analysis suggests that introducing a 4% royalty in Sweden would increase government revenue from environmental taxes by 12%, while combining a royalty with a resource rent tax could boost revenues by 45% (Tarras-Wahlberg, 2023). This points to significant untapped potential for fiscal reform in the European extractive sector.

Key Insights

Mineral and water extraction taxes are underused tools with high revenue potential, especially if rates are aligned with environmental costs and exemptions minimized. Tiered pricing, progressive royalty systems, and revenue earmarking for ecosystem protection can enhance both fiscal and environmental outcomes.

Taxes on forest felling

The existing literature does not provide comprehensive quantitative estimates of revenues from forest felling taxes currently in place. However, the potential revenue-raising capacity of these instruments is considered significant, especially under revised or strengthened tax designs.

For instance, Mottershead et al. (2021) estimate that raising forest felling charges to reflect the full external environmental cost of deforestation would result in substantially higher revenues than under existing regimes.

Importantly, both Mottershead et al. (2021) and Dinis et al. (2024) emphasize that revenues from forest felling taxes should be earmarked for environmental reinvestment. This earmarking approach serves not only to improve environmental outcomes but also to increase public and stakeholder acceptance of the tax, particularly among forest-dependent communities.

Key Insights

Forest felling taxes, if better aligned with external environmental costs, offer significant untapped revenue potential. Earmarking revenues for reforestation and enforcement can enhance both the environmental effectiveness and public acceptability of the tax.

Taxes on agricultural land (proposal for intensive agriculture)

While no environmental taxes on agricultural land are currently implemented in EU Member States, Mottershead et al. (2021) investigate an innovative tax targeting intensive livestock grazing. The tax would apply to farms exceeding specified stocking density thresholds, with the goal of reducing biodiversity loss caused by overgrazing and encouraging more sustainable agricultural practices.

Although revenue estimates are not quantified, the study outlines a revenue recycling model aimed at maintaining sectoral equity and supporting farmers with low-impact practices. Specifically:

- Farms with high livestock densities per hectare would be taxed (e.g. at €20/LSU in Ireland and €70/LSU in France and Portugal) ([23]).
- Revenue collected would be redistributed to farms with low stocking densities, which often operate under marginal economic conditions despite their positive environmental impact.

The scheme was developed for potential rollout in France, Ireland, and Portugal, with the structure flexible enough to be adapted to other Member States facing similar pressures from intensive grazing.

Key Insights

A tax on intensive grazing offers a dual benefit: disincentivizing overgrazing and generating revenue for supporting low-impact agriculture. Its success

([23]) Presumably the rates are applied where densities are above a threshold, but the details are not given in the report.

would depend on careful calibration of stocking thresholds, targeted recycling mechanisms, and robust data on livestock densities.

3.3.3. Impacts

Taxes on mineral and water extraction

Taxes on mineral and water extraction have the potential to reduce environmental pressures from resource use, while supporting fiscal and policy objectives. The effectiveness of these instruments depends heavily on their design — particularly tax rates, sectoral exemptions, and how revenues are recycled. Although empirical evaluations remain limited, a number of modelling studies and case-specific analyses provide important insights.

A major set of contributions on impacts comes from Ekins et al. (2011, 2012), who used a computable general equilibrium (CGE) framework to simulate the introduction of a materials tax across the EU. The tax applied a gradually increasing surcharge on the cost of material inputs (excluding water and energy) — starting at 5% in 2010 and reaching 15% by 2020 — alongside a high carbon price. Their findings show that material use declined by 3%, and CO_2 emissions fell by 16% relative to baseline levels by 2020. Crucially, revenues were recycled through reductions in employer social security contributions, helping offset potential economic drag. Distributional impacts were negligible, with most household effects driven by the carbon tax rather than the materials levy itself. While these results stem from a bundled package of reforms and cannot be put down solely to mineral taxes, they demonstrate that appropriately recycled resource taxes can contribute to achieving both environmental and economic benefits.

Evidence on water abstraction taxes is more fragmented but still informative. In France, for example, Oosterhuis (2022) found that the national abstraction charge — ranging from €1 to €40 per 1,000 m³ depending on use and location — had no measurable effect on consumption between 2000 and 2010. Annual revenues, on the other hand, were high and averaged around €300 million, used primarily to fund Water Agency operations and efficiency programs. The study concluded that the absence of behavioural change reflects insufficiently high tax rates, and estimates that for the charge to influence water use meaningfully, it would need to increase by a factor of 10 to 20.

By contrast, the Netherlands offers an example of a better-calibrated design. A groundwater abstraction tax of €0.1785/m³ (a rate more than four times the highest rate in France) resulted in a 2% to 12% reduction in industrial water consumption (ECOTEC, 2001). This outcome illustrates that when abstraction charges are set at a meaningful level and paired with clear incentives or regulatory frameworks, they can produce measurable efficiency gains.

Elasticity estimates support these observations. In the Nordic countries, Skygebjerg et al. (2020) report that Denmark's water tax (at €0.67/m³) has an elasticity of around –0.2, while Finland's peat tax (€3.4/MWh) shows an elasticity of –0.3, and its water tax has values ranging from –0.15 to –0.25. A broader EU-wide analysis by Țibulcă (2021) finds water resource tax elasticities in the range of –0.2 to –0.3, reinforcing the idea that even moderate rate increases can lead to substantial environmental benefits over time.

Despite these promising signs, rates and designs vary significantly across Member States. For instance, Portugal levies just €0.003/m³ for irrigation water, while urban water is charged at a higher €0.0181/m³. In France, rates differ by the origin of water (surface vs. groundwater), usage category (e.g. irrigation, refrigeration), and resource stress (with additional charges in overexploited zones). Denmark and the Netherlands apply significantly higher rates for urban water use, though large-volume agricultural users often face lower or no charges. These disparities reflect both differences in water availability and variability in policy ambition across the EU.

Mineral extraction taxes are similarly uneven. While some Member States like Estonia and Finland apply tiered rates by volume or value, others — such as Sweden — use a concessionary system. In Sweden, mining companies pay a 0.02% royalty on annual production value, with two-thirds going to landowners and one-third to the state. This framework has been widely criticised for failing to uphold the "polluter pays" principle and for not reflecting the environmental and social costs of extractive activities. Analysts such as Tarras-Wahlberg (2023) suggest that adopting a 4% royalty would increase government revenue by 12% and combining that with a resource rent tax could boost revenues by 45%. These proposals point to significant untapped fiscal potential, particularly if the goal is to align the extractive sector with environmental policy objectives.

While data on competitiveness effects remain limited, available evidence suggests that existing resource taxes — especially on water — have not negatively affected industrial performance. This is largely because current rates are low and many regimes include preferential treatment for heavy users, particularly in agriculture and industry. Where taxes are designed with progressive structures or are accompanied by revenue recycling, they can support equity and environmental outcomes simultaneously.

Key Insights

Evidence from across the EU suggests that resource taxes — when designed with sufficiently high rates and clear environmental objectives — can deliver measurable reductions in extraction and use of natural resources. Although implementation varies widely, successful cases underscore the importance of targeted pricing, minimal exemptions, and investment of revenues into sustainable resource management. Future reforms could benefit from greater policy coherence and the development of a shared EU framework for resource taxation.

Taxes on forest felling

Forest felling taxes are primarily designed to reduce deforestation and promote sustainable forestry, but their broader economic and distributional impacts have also been assessed in only a limited number of studies. While empirical evidence remains scarce, modelling and case studies suggest that such taxes, particularly when combined with targeted revenue recycling, can support green investment with modest macroeconomic effects.

In a modelling exercise by Mottershead et al. (2021), forest felling charges were assessed as part of a broader package of environmental tax reforms. Under a scenario where revenues were recycled into conservation and reforestation projects, the model projected a 0.5% increase in GDP and a 0.3% increase in employment by 2030 compared to a baseline. Distributional effects were mildly regressive — the lowest income group experienced the least favourable outcomes, though the magnitude of impact was small. Effects on trade and competitiveness were negligible. It should be noted, however, that the forest tax was analysed as part of a combined tax reform package, meaning that the impacts were not only attributable to forest charges.

In a country-specific review, Dinis et al. (2024) examined the experience of forest taxes in Portugal, where rates vary based on tree species and the expected environmental damage from deforestation. While precise impact figures are not provided, the study reports some success in reducing deforestation, alongside improved funding for local reforestation and sustainable forestry incentives. The tax includes exemptions for small landowners, supporting equity objectives, but enforcement and compliance challenges persist. The policy has faced political opposition from the timber sector, citing concerns over international competitiveness, though again, these impacts are not quantified.

Key Insights

Forest felling taxes can generate positive environmental and economic outcomes, particularly when revenues are reinvested into sustainable forestry. However, political feasibility depends on careful revenue recycling, targeted exemptions, and investment in compliance and monitoring capacity.

Taxes on agricultural land (proposal for intensive agriculture)

Although no such tax is currently implemented in the EU, some possibilities have been examined. Mottershead et al. (2021) investigate a levy on grazing livestock based on stocking density per hectare to reduce biodiversity damage from overgrazing. The scheme, modelled for France, Ireland, and Portugal, aims to incentivize lower-impact livestock farming by applying rates of €20 per LSU in Ireland and €70 per LSU in France and Portugal.

The study examines two policy scenarios — one with and one without revenue recycling. In the no-recycling scenario, costs are fully borne by the agriculture sector, resulting in:

- Higher domestic and export food prices
- Lower real disposable incomes for households
- Mild negative competitiveness effects for agri-food exports

Under the revenue recycling scenario, impacts are more balanced. Tax revenues are redirected to support low-density livestock farmers and environmental investments (e.g. organic agriculture, agroecological landscape features, or technological upgrades). Even so, employment effects are slightly negative, particularly in France and Portugal, due to labour-saving technology adoption. The reduction in real household incomes is modest — less than 0.1% for all income quintiles across all countries. Trade effects are minimal, and the tax is not expected to significantly impact macroeconomic stability.

There are significant implementation challenges, with the tax requiring:

- Reliable livestock density data
- A clearly defined threshold for low- and high-density grazing
- Targeted communications and support for affected farmers

Political resistance, particularly from intensive livestock producers, is likely and would need to be addressed through consultation, transitional support, or tiered implementation.

A separate study by Inkábová et al. (2020), using Slovak data from 2009-2018, investigated the broader impacts of different agricultural taxes (not specific to environmental purposes). It found that a one percent increase of energy tax on agriculture increase decreased production by 0.01458 with a probability of 95% and ROE indicator would decrease by 2.375 with a probability of 99%. If the effective tax rate (ETR) is 1% higher production indicator would increase by 0.009918 and ROE would be 1.287 higher, with a probability of 99%. Meaning that energy taxes have statistically significant negative effects on agricultural output and return on equity. However, these results were sensitive to national tax rules, exceptions, and sectoral financial structures. While not directly comparable, these findings highlight the potential for tax design to influence investment and income dynamics in agriculture.

Key Insights

A tax on intensive agriculture can encourage more biodiversity-friendly farming, with limited macroeconomic downsides if revenues are recycled effectively. However, implementation would require careful data systems, transitional support, and broad stakeholder engagement to ensure legitimacy and feasibility.

3.3.4. Key takeaways

The literature on resource taxes and charges highlights their potential as regulatory instruments to mitigate environmental degradation and promote sustainable resource management. However, their effectiveness is contingent on tax rate design, enforcement mechanisms, and the economic contexts in which they are applied. The distinct categories examined — taxes on mineral and water extraction, forest felling, and agricultural land — illustrate both their environmental benefits and the challenges associated with their implementation, particularly regarding compliance, sectoral competitiveness, and socio-economic impacts.

Taxes and charges on mineral and water extraction have been introduced with the objective of limiting overextraction and environmental degradation. Empirical evidence from the French water abstraction tax, which has remained ineffective due to low rates ranging from €1 to €40 per 1,000 m³, suggests that significantly higher rates would be necessary to influence water use behaviour. By contrast, the much higher Netherlands' €0.1785 per m³ tax on groundwater abstraction has been shown to reduce industrial water use by 2–12%, demonstrating that properly calibrated taxation can drive efficiency improvements without causing economic disruption. This example underscores the importance of setting rates high enough to influence behaviour, unlike in France, where lower rates have not produced measurable reductions in water use. that in France, the environmental and efficiency benefits are not the primary objectives of the water abstraction tax; rather, they are co-benefits of a tax whose main purpose is revenue generation.

Furthermore, the Dutch approach combines moderate rates with sectoral exemptions and a clear cap on household liability, which has helped ensure political acceptability and equity. However, critics argue that this fixed threshold may weaken the price signal for high-volume users, and that excluding agricultural users—who can abstract large volumes of water—from taxation limits the policy's overall environmental effectiveness. Experience from other Member States further illustrates this variability. For example, Portugal taxes irrigation water at only €0.003/m³, compared to €0.0181/m³ for urban water, while France differentiates its rates based on the origin of the water (surface or groundwater), end use (e.g. irrigation, cooling), and the level of resource stress in each river basin. For other Member States, this suggests the value of differentiated rate-setting by sector and region, backed by strong monitoring systems and carefully designed exemptions to balance fairness with environmental ambition. Moreover, modelling studies such as those by Ekins et al. (2012) show that when resource taxes are appropriately recycled—such as through reduced labour taxes—they can produce simultaneous environmental and economic gains. In that study, a materials tax (excluding water and energy) applied at gradually increasing rates resulted in a 3% reduction in material use and a 16% drop in CO_2 emissions by 2020, with minimal distributional impacts. These findings reinforce the potential of resource taxes to deliver balanced outcomes—provided they are embedded within broader fiscal reform strategies and institutional frameworks that support transparency, compliance, and reinvestment of revenues into environmental or efficiency-enhancing programmes.

At the EU level, the Hogg et al. (2016) study estimated that a harmonized tax on aggregates and water abstraction could generate €4.81 billion and €17.37 billion annually, respectively, highlighting their significant revenue potential. Despite concerns about competitiveness, evidence suggests that these taxes exert minimal economic pressure on industries due to their relatively low rates and the availability of technological adaptations that mitigate extraction costs.

Taxes on forest felling seek to internalize the environmental costs of deforestation and biodiversity loss. However, existing felling charges in some member states, such as Croatia and Hungary, remain negligible at under €30 per hectare, providing little incentive for sustainable forestry practices. The Latvian proposal for a substantially higher felling charge of €2,850 per hectare represents a significant recalibration aimed at aligning taxation with the estimated economic value of ecosystem services lost to deforestation. While this level of taxation could drive conservation efforts, it has also sparked opposition from logging companies concerned about profitability and sectoral employment. Modelling studies indicate that redirecting revenues from such a tax into reforestation and ecosystem restoration projects could offset negative economic impacts and even yield slight gains in GDP and employment. However, enforcement remains a key issue, as illegal logging and non-compliance with forestry regulations continue to undermine the intended effects of these taxes in various member states.

Agricultural land taxation within the EU remains largely detached from environmental objectives, with existing structures primarily focused on economic considerations, such as inheritance tax benefits and property transfer exemptions. A proposal to introduce an intensive agriculture tax, particularly on grazing livestock, aims to integrate these environmental objectives. The benchmark rates — €20 per LSU in Ireland and €70 per LSU in France and Portugal — seek to discourage overgrazing while promoting sustainable land use. However, modelling suggests that, without revenue recycling, such a tax could lead to increased domestic food prices, reduced competitiveness in agricultural exports, and minor declines in household real incomes. These potential downsides underscore the importance of reinvesting tax revenues into the agricultural sector to support sustainable practices.

One of the primary challenges across all categories of resource taxes is enforcement and administrative feasibility. Resource extraction taxes require detailed monitoring of material and water abstraction volumes, often leading to high compliance costs. Forest felling taxes must contend with illegal logging and the difficulty of valuing ecosystem services in monetary terms, while an agricultural land tax would require careful calibration to avoid unintended economic distortions. The literature indicates that while the administrative burden of these taxes can be substantial, their long-term benefits in terms of resource conservation, biodiversity protection, and climate mitigation justify their implementation, provided robust regulatory mechanisms are in place.

Overall, resource taxes have the potential to play a critical role in internalizing the environmental costs of resource use and guiding economies toward more sustainable practices. However, their success depends on setting appropriate tax rates that reflect true environmental costs, ensuring strong compliance frameworks, and integrating revenue recycling mechanisms that mitigate adverse economic effects. Mechanism must also overcome resistance from affected industries by implementing gradual tax adjustments, offering incentives for sustainable practices, and clearly communicating the long-term economic and ecological benefits. Without these considerations, resource taxes risk being either ineffective or politically unfeasible.

3.4. Cross-cutting insights from national practices

The national tax lists (NTL) have been primary source of gathering tax revenues numbers in this study. However, Eurostat’s statistical guide on environmental taxes states that NTLs do not always identify all environmental taxes. The accuracy of these lists depends on the level of disaggregation in the source data. A key issue is that several environmental taxes may often be regional or local taxes. Moreover, taxes with small revenues may end up being aggregated into broader tax categories (for example 'other regional taxes') (Eurostat, 2024).

Environmental tax design and implementation vary widely across the EU, reflecting diverse national circumstances, governance structures, and policy priorities. A number of cross-cutting insights can be drawn from Member States’ approaches.

Decentralisation and diversity of instruments

In many countries (e.g. Belgium, Germany, Spain), regional or municipal governments hold considerable authority over environmental taxes, especially those related to waste, water, or pollution. This leads to considerable heterogeneity in tax design and coverage, and can complicate data collection and harmonisation across levels of government.

In **Belgium**, the environmental tax system is highly decentralized, with substantial authority delegated to the three regions: Flanders, Wallonia, and Brussels-Capital. Each region independently administers pollution and resource taxes, allowing tailored responses to local environmental issues. Despite this, since 2022 comprehensive federal environmental tax reforms have also been explored.

In **Germany**, the taxation system is highly decentralized, generally regulated by the Laender as well as smaller municipalities. Hence, the taxes are highly variable, but a basic rate could be set by the federal government.

In **Spain**, autonomous communities retain the authority to establish environmental taxes tailored to local conditions on water usage, waste disposal, air pollution, and tourism-related activities, among others. Although efforts exist to harmonize taxation, diverse economic and environmental priorities sustain tax differences.

Use of fees vs taxes

Some Member States (e.g. Austria, Germany) make more frequent use of environmental fees — payments in exchange for a service — rather than unrequited taxes. This reflects not only legal definitions but also institutional preferences and affects what is reported in national tax lists and EU-wide tax statistics. Such variation should be taken into account when comparing national tax effort.

Austria is among the few countries who launched an explicitly eco-social tax reform agenda, although it mainly addresses CO_2 pricing**.** The Statistics Office distinguishes explicitly between environmental taxes and fees. In contrast to many other Member States, Austria often uses fees that are paid for a service in return (like waste management) rather than taxes to steer environmentally friendly behaviour.

Germany does not report taxes on pollution or resources in the National Tax List or the Federal Statistical Office (only energy and transport taxes are collected under environmental taxes).[24] They distinguish between environmental taxes and environmental fees levied on waste and wastewater, arguing that "while the tax payments made are not offset by any direct payment by the state, the public sector provides a service in return for fees" (The Federal Environmental Agency). This reflects a **narrower national interpretation** of what constitutes an environmental tax. German authorities draw a distinction between taxes and environmental fees, particularly for waste and wastewater, which are treated as payment for services provided by public bodies. As a

[24] https://www.destatis.de/EN/Themes/Society-Environment/Environment/Environmental-Economic-Accounting/taxes-other-duties/_node.html#475172

result, Germany's environmental tax statistics **understate the full range of environmentally motivated levies**, complicating cross-country comparisons and illustrating how national classification choices affect the visibility of environmental taxation in official statistics.

Good practices and stand-out taxes

A number of Member States have developed environmental taxes that could serve as good practice examples for others. These include:

- The **Austrian landfill tax** has been cited as a best practice to follow, although its revenues started falling in 2003 following its redesign. The raised revenue finances the containment and treatment of contaminated sites, thus, paying for externalities arising from landfill. Austria is the only EU Member State where such revenues are used exclusively for this purpose. The landfill tax was designed to incentivize better environmental practices at landfills and outlined a landfill ban for specific waste types. There are also differentiated rates for new and high-standard landfills and older ones, which was intended to balance the costs associated with developing and operating two types of landfills. However, there are concerns that the tax differential for the two types of landfills was not substantial enough to offset additional costs. The incineration tax is closely linked to the landfill tax, as the introduction of the latter increased incineration rates. Unlike the landfill tax, the revenue from the incineration tax is not earmarked exclusively for contaminated site remediation. Austria also considers **Land tax B** an environmental tax. It taxes most types of property other than land used for agricultural purposes. It is considered an environmental resource tax since building on the land seals the soil.[2]
- **Cyprus' plastic bag levy** stands out in its effectiveness: it managed to reduce the supermarket use of plastic carrier bags by 80%. The profits from plastic bag sales are used to support environmental awareness-raising campaigns.
- **Ireland's plastic bag and landfill taxes**, which have had measurable behavioural effects.
- **Latvia's comprehensive Natural Resources Tax**, which consolidates multiple environmental objectives into a single tax scheme. A key trend in Latvia's environmental taxation is the comprehensive structure of its Natural Resources Tax, which consolidates various environmental levies except those on energy and transport. This broad approach incentivises resource efficiency and pollution reduction by covering natural resource extraction, waste disposal (including hazardous and construction waste), and emissions (CO_2, PM_{10}, NO_2). This one tax covers most of Latvia's environmental taxes. Notably, some revenues are earmarked for

sustainability initiatives, such as improving water management, highlighting a targeted reinvestment strategy. In recent years, **Latvia** has progressively increased several tax rates, particularly for air pollutants such as PM_{10} and waste sent to landfills, to further discourage pollution and waste generation. However, taxation on certain other pollutants, like NO_2, has not been updated in recent years ([25]).

- **Sweden** and **Finland** have mainly recycled environmental tax revenues by lowering income taxes ([26]). Sweden implemented a "green tax shift" policy, reallocating tax burdens from labour to environmental factors ([27]). This was initiated as early as in 2001 and has continued ([28]). However, evidence is not clear on what the results and lessons learned have been. It should be noted that in Finland, this approach involves mainly using carbon tax revenues to lower income taxes ([29]). In Sweden, a **tax on hazardous chemicals in electronics** was imposed in 2017 and is paid on the weight of the final product ([30]). A 2020 evaluation of the tax has not been able to establish that the tax led to a decrease in chlorine, bromine, and phosphorus from flame retardants in home environments during the study period ([31]). Although it may have the desired effect in the future, as new products will enter the market. In some cases, it has already resulted in a substitution of chemicals. Overall, the tax was not found to be cost-effective. Furthermore, Sweden was one of the first countries to introduce a tax on pesticides. It was first imposed as a fee,

([25]) Idem.

([26]) https://cordis.europa.eu/docs/results/501/501993/124729471-6_en.pdf

([27]) https://www.regeringen.se/contentassets/18ed243e60ca4b7fa05b36804ec64beb/lessons-learned-from-25-years-of-carbon-taxation-in-sweden.pdf?

([28]) https://www.regeringen.se/globalassets/government/dokument/regeringskansliet/statement-of-government-policy-20192.pdf?

([29]) https://www.sciencedirect.com/science/article/pii/S2352484719302690#:~:text=There%20are%20different%20approaches%20among,taxes%20(Mao%2C%202018).

([30]) https://skatteverket.se/servicelankar/otherlanguages/inenglishengelska/businessesandemployers/startingandrunningaswedishbusiness/payingtaxesbusinesses/taxonchemicalsincertainelectronics.4.5c281c7015abecc2e2019351.html

([31]) https://skatteverket.se/download/18.569165a01749e7ae7891ef9/1603193061152/Evaluation%20of%20the%20Tax%20on%20Chemicals%20in%20Certain%20Electronics%20-%20English%20Summary.pdf and in 1995 it was changed to a tax ([32]). According to a 2017 revision of the Swedish **pesticide tax**, it had limited effects, as the amount of pesticides sold since the mid-1990s has been relatively stable ([33]). Since the tax is levied on the amount of active substance, those used in high dosage are at disadvantage. An alternative is a tax based on the environmental and health risks of a substance.

Policy interaction and reform challenges

In several cases, recent reforms have highlighted the need to coordinate environmental taxation with other policy tools, such as extended producer responsibility schemes or investment in infrastructure. In some cases, taxes have been reduced or repealed to avoid overlap or ease economic burdens, underscoring the importance of complementary measures for effective implementation.

In **Bulgaria**, recent tax policy reforms have focused on aligning Bulgaria's waste management policies with EU directives. However, without complementary measures such as stricter regulatory enforcement or investment in recycling infrastructure, the effectiveness of such fiscal measures remains uncertain.

Estonia has struggled to align its taxation system with broader EU resource efficiency goals. A notable development is the planned transition from the Pollution Charges Act to the Environmental Charges Act, which aims to streamline and modernize Estonia's environmental tax framework.

In **France**, recent reforms of environmental taxes reflect a shift towards targeted incentives rather than broad-based taxation. This is done in an effort to minimize distributional impacts.

In **Greece**, a major eco-tax reform is expected in 2025, as the Ministry of Finance is launching a reassessment of the effectiveness of existing green taxes. The **Greek landfill tax** has been increased annually by €5 since 2022, when the rate was set at €20/tonne. As of 2024, the standard rate stands at €30 per tonne. However, the actual rate applied can vary depending on the type of waste and the characteristics of the landfill site. Like in many other Member States, landfill taxation in Greece is complex, with possible exemptions or differentiated rates for certain categories of waste or treatment methods. It had been reintroduced several times, but it was difficult to implement due to the economic burden it posed, the lack of infrastructure and complementary

([32]) https://www.agrojournal.org/29/01-01.pdf

([33]) https://www.regeringen.se/contentassets/eb90ee4460e746c8a1fc8796cfcd9d18/skatt-pa-kadmium-i-vissa-produkter-och-kemiska-vaxtskyddsmedel-sou-2017102.pdf measures. ([34]) Over 80% of municipal waste is disposed in landfills in Greece, compared to the EU average below 40%.

In **Hungary**, environmental product charges have existed for decades for several different products and provided incentives for recycling. Nonetheless, in 2023, the law was significantly relaxed. The reason for this was the parallel implementation of an extended producer responsibility scheme, that was introduced following EU legislation. ([35]) As the EPR scheme and the product charges would have meant a double burden for producers, the latter was relinquished. Nonetheless, EPR charges fund the services of a concession company and just a fraction of them goes to the government, hence they no longer qualify as taxes. ([36])

Luxembourg collects a wide range of energy and transport taxes, however, it has not implemented any taxes on waste, pollution or resources except for a resource tax on water, The revenue for this water tax is a mere 0.8% of its total environmental tax revenues. The European Commission has been encouraging Member States to change national tax systems and to shift the tax burden from labour income to pollution through the Green Deal. ([37]) However, for tax data from 2002 to 2019, the opposite trend was observed in **Luxembourg** – the increase in labour tax revenues was higher than the increase in environmental tax revenues. ([38])

In **Romania**, recent adjustments to environmental taxation policies have primarily aimed to align national measures with European Union directives, particularly those promoting a circular economy.

In **Portugal**, despite notable increases in pollution and resource tax revenues, there is limited evidence that these have altered consumption and production patterns. Although the country has expanded its environmental taxes, these reforms have been met with push-back from lower-income households and resource-dependent industries.

While **Malta** has implemented a variety of environmental taxes ranging from an eco-contribution levy charged to tourists to excise duties on various polluting

([34]) https://environment.ec.europa.eu/document/download/dfff60be-3c31-4fcb-93a6-fa6e2ea5f219_en?filename=Taxes%2C%20charges%20and%20fees.pdf

([35]) https://www.rsm.hu/blog/epr-vagy-kvdt-termekdij

([36]) https://nav.gov.hu/ado/afa/20243.-Adozasi-kerdes---A-kiterjesztett-gyartoi-felelossegi-EPR-dij-es-az-onkormanyzatokat-az-EPR-dijbol-megilleto-osszeg-afa-megitelese

([37]) The role of (environmental) taxation in supporting sustainability transitions — European Environment Agency

([38]) Decrease in environmental tax share in Luxembourg | Delano News products, there is not much research available in the grey literature on the effectiveness of these taxes.

Waste and water taxation pathways

Countries have taken diverse approaches to taxing waste (e.g. general landfill taxes vs. targeted taxes by waste stream) and water (e.g. Cyprus' pricing focus vs. Greece's externality-based water pricing). These examples illustrate the range of regulatory and fiscal instruments available and the need to tailor measures to context.

In **Cyprus**, an extremely water scarce country, **water pricing** plays a central role in preserving drinking and irrigation water. A water tax of €0.01 per m³ of water consumed (plus VAT) is planned to be introduced in 2025, although the rate and application may vary depending on the type of use. ([39]) The Commission suggested increasing water prices, but this raises concerns for the agricultural industry and food security.

The **Greek externality pricing for water resources** is also a unique example, since it prices water services based on their estimated environmental cost, resource cost and financing cost. The resource cost is defined as the cost of alternative water uses if the water system is used beyond its natural replenishment. ([40]) A new pricing mechanism was introduced in 2024 ([41]), which makes it differentiated based on region, season, and social group.

Since the introduction of **the Finnish tax on landfill waste**, including municipal solid waste, the amount of waste that goes to landfills has been decreasing. In 2002, around 1,500 thousand tonnes of municipal waste were landfilled, while in 2022 this amount was close to zero ([42]). But at the same time, the amount of waste generated per capita has been growing in the period of 2018-2021 and as of 2022 is higher than the EU average ([43]). In the absence of tax on waste incineration in Finland, energy recovery rates have been increasing too. Around 56% of municipal waste generated in Finland is incinerated, being the most common method used to treat municipal solid waste in the country. In 2022 Finland was behind its 2025 recycling target of 55% – the recycling rate of all municipal waste reaching 43% in 2022, which is also below the EU average

([39]) https://www.gov.cy/media/sites/11/2024/07/finalkoetax_reformpresentation1mar24.pdf

([40]) Ibid.

([41]) https://www.ot.gr/2024/10/02/oikonomia/nero-erxontai-klimakotes-xreoseis-kai-pliri-anaktisi-tou-kostous-apo-tous-paroxous/

([42]) https://www.ymparisto.fi/en/state-environment/circular-economy/waste-and-recycling

([43]) https://www.ymparisto.fi/en/state-environment/circular-economy/waste-and-recycling

(48%). From 2016 to 2020, the recycling rate has remained stable – around 40-43% [44].

Ireland has implemented two waste taxes, namely the plastic bag levy and the landfill levy. Both taxes have been highly effective in achieving their policy goals. The declining revenues from the plastic bag levy (from €15 million in 2013 to €2.9 in 2023) and the landfill levy (from €43 million in 2013 to €5.4 million in 2023) indicate the effectiveness of these taxes in shifting consumer behaviour. [45] The following insights show how the volume of discarded plastic bags and waste disposal to landfills decreased over the years once the taxes had been implemented. In 2001, discarded plastic bags amounted to about 5% of litter pollution, and this decreased to 0.13% by 2015. [46] Similarly, the disposal of waste to landfills stood at over 80% in 2001 and had dropped considerably to 14% by 2018. [47]

Slovenia has implemented specific waste taxes for different kinds of waste streams, rather than having a generic landfill tax as observed in certain other EU member states. These waste streams include tyres, packaging materials, electronic waste, etc. The Slovenian Ministry of Finance provides revenues for these waste taxes by type of waste.

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[44] https://www.ymparisto.fi/en/state-environment/circular-economy/waste-and-recycling

[45] Key Findings Environment Taxes 2022 - Central Statistics Office

[46] IE-Plastic-Bag-Levy-final-1-1.pdf

[47] Information Note on Landfill Levy in Ireland

4. Assessment based on systems of environmental taxes

4.1. Combinations of environmental taxes and the individual effects

As noted in the preceding sections, several modelling exercises assess the effects of changes to multiple taxes simultaneously. While results are presented for individual tax instruments, these estimates also reflect the influence of concurrent tax changes, which cannot be fully disentangled. This should be borne in mind when interpreting the findings.

The studies from which evidence has been drawn include the following:

- Mottershead et al. 2021 (Several environmental taxes for the EU27)
- Țibulcă. 2021
- Skygebjerg et al. 2020 (Nordic states looking at CO_2 tax, NOx tax, energy tax, resource tax, landfill tax)
- Imran et al. 2024 (EU 27 looking at carbon taxes plus taxes on waste)
- Ekins (2011, 2012) (EU28 looking at carbon taxes and materials taxes)
- Hogg et al. (2016) (EU27 looking at several environmental taxes)
- EEA 2022 (All environmental taxes in EU27+Norway)

The results of these taxes are included in the assessments reported in Sections 3, 4 and 5. Hogg et al. (2016) has been referenced in a number of places giving the tax revenue and rates investigated for the EU28 as a programme for environmental tax reform. That report also draws some conclusions on the effects of the taxes on jobs, competitiveness and distributional impacts.

On jobs it notes that on balance, the impacts are likely to be positive where environmental taxes effectively replace taxes such as those on employment.

On competitiveness it further notes: “Where competitiveness is concerned, modelling studies tend to indicate that taxes will have a negative impact on some sectors, even where the tax revenue is used to offset other taxes (and clearly, the net effect might depend on which tax is reduced as a result of the environmental tax being introduced). This should be set against the possibility of there being a net positive impact on the economy as a whole in such revenue neutral reforms. In practice, ex post studies indicate that the resort to exemptions in the design of environmental taxes, typically, with a view to avoiding competitiveness impacts, has had the effect of limiting any such impacts (as well as reducing environmental effectiveness).” (Hogg et al., 2016, Page xii). In distributional impacts it finds there are mostly related to energy and transport taxes and not to the taxes considered in this review.

In addition to the above studies there are several that examine the effects of taxes taken together and their relationship to economic indicators such as economic growth and various environmental indicators of environmental quality, such as air and water. Their findings are summarized below.

4.2. Environmental taxes, pollutant emissions, environmental quality and economic growth

Savranlar et al. (2024) examine all environmental taxes in the EU member states. Such taxes improve the quality of the air in these nations. An increase in environmental taxes of 1% reduces CO_2 emissions by 0.14% in the European Union. An increase in renewable energy consumption increases environmental tax revenues by about 0.6%, while an increase in urbanization increases it by about 8%.

Alola and Nwulu (2022) review all environmental taxes from 1995-2020 and their effects on CO_2 and air quality. Only energy taxes significantly mitigate both emissions and energy intensity across the quantiles, while pollution and resource taxes exacerbate emissions and energy intensity. Specifically, a 1% increase in pollution and resource taxes respectively triggers GHG emission by ~7–9% (from 10th to 90th quantile) and ~7 to 5% (from 10th to 90th quantile). On the other hand, energy tax shows a desirable effect on GHG emission in the panel. These findings are at odds with others and would suggest that pollution and resource taxes can increase GHG emissions. Further evidence and analysis on this is required.

Hassan et al. (2020) analyse the relationship between environmental taxes and economic growth in the OECD. Data from 1994-2013. When they allow environmentally related tax revenues to interact with an initial level of real GDP per capita, the overall revenues of these taxes are negatively associated with the economic growth rate in the short and long term. However, the higher the initial level of GDP per capita, the more environmentally related tax revenues can promote the economic growth rate. The analysis also reveals that the relationship between environmentally related tax revenues and economic growth varies between countries that have a mechanism to redistribute environmentally related tax revenues and those that do not.

Rosiek (2015) examined the effects of taxes on industrial Emissions, Waste Disposal, Water Pollution, Chemical and Environmental Hazards on measures of environmental quality and on economic growth. Data were from 24 EU MS (Croatia, Cyprus, Luxembourg, and Malta excluded due to lack of data) for 2012. The paper reports that industrial emissions taxes reduce air pollution and greenhouse gas emissions. Waste disposal and water pollution taxes encourage better waste management and reduce water pollution. There are, however, important difference across countries – see below. Revenue-recycling plays a critical role — countries that reinvest pollution tax revenues into clean energy or labour tax reductions see better economic outcomes. There were significant reductions in greenhouse gas (GHG) emissions in high-efficiency countries and a higher level of renewable energy adoption in countries with strong pollution tax policies. Sweden, Austria, Spain, Lithuania, Portugal, and Latvia effectively reduce emissions while maintaining economic growth. They show a strong correlation between pollution taxation and renewable energy adoption. Belgium, Greece, Hungary, and Poland collect pollution taxes but do not effectively reduce emissions or improve economic sustainability. Reasons for inefficiency include low tax rates, exemptions, or poor tax design. The case of Poland having relatively low pollution reduction is put to weak enforcement (Doński, and Paczosa 2022).

Looking at the link between carbon taxes, pollution and natural resource taxes and energy and transport taxes taken together, Miceikiene et al. (2016) find that the experience of Denmark, Germany, the Netherlands, Finland, Sweden and the UK shows these countries, which have implemented significant environmental tax reforms, have largely achieved the environmental, economic, and social aims associated with the reforms. Environmental (energy intensity, GHG emissions productivity), economic-social (the share of environmental taxes in state revenue, labour productivity) indicators of the countries have improved during the analysed period. The environmental tax reforms have not put any significant burden of taxation on the society, while some of the countries (the United Kingdom, the Netherlands) have even achieved the neutrality of state revenue. Not all countries, however, have such positive results as other studies have shown.

In terms of competitiveness and how it is affected by environmental regulations and taxes, Fabrizi et al. (2024) look at this for OECD countries as a group. They find that stringency of green policies has both a direct and indirect positive impact on international competitiveness. But non-market-based instruments have a larger positive impact on exports than market-based instruments such as environmental taxes at all levels of pollution intensity. Competitiveness effects are stronger the greater a county's pollution intensity.

5. Impacts of the implementation of new environmental taxes in the EU

This section presents the estimated environmental, fiscal and economic impacts arising from the implementation of the investigated environmental taxes across all EU Member States. The analysis covers both **Scenario A**, representing a more ambitious set of tax rates aligned with the proposals by Hogg et al. (2016), and **Scenario B**, a less ambitious variant designed to reflect greater political and practical feasibility. For each tax type, the assessment quantifies projected changes in emissions, resource use and tax revenues for 2030 and 2035, and explores their broader implications for competitiveness, the single market and the long-term viability of tax reforms. The results provide an indicative overview of the potential scale and distribution of impacts across Member States, illustrating the relative effectiveness of different tax instruments in contributing to the EU's environmental and fiscal objectives.

5.1. Scenario A

5.1.1. Air pollution taxes

A tax was applied to emissions of **NOx**, **SO_2**, and **$PM_{2.5}$** for the following sectors, as defined in the Eurostat database:

- Mining and Quarrying
- Electricity, gas, steam and air conditioning supply
- Manufacturing
- Construction
- Water supply; sewerage, waste management and remediation activities

$PM_{2.5}$ was selected as the key indicator given its close association with health impacts, although PM_{10} could also be considered, as data for that pollutant are more widely available. The sectoral coverage was primarily determined by the availability and reliability of emissions data. The sectors included are those for which emissions can be tracked relatively easily across different emitters.

Member States were assumed to introduce a tax at a benchmark **rate of €1,300 per tonne** as of 2026. Where an existing sectoral tax rate was already higher, the higher national rate was retained. The original benchmark rate of €1,000 per tonne was explored by Hogg et al. (2016); adjusted for approximately 30% cumulative inflation in the Eurozone (based on ECB data), this corresponds to €1,300 in real terms in 2026.

The elasticity of emissions with respect to the tax was set at **–0.4**, based on Juřík & Braathen (2021).

The results are summarised in Table 5-4.

A Tax on NO_x

Table 5-1 presents the estimated emission reductions and tax revenues for NO_x by Member State and for the EU as a whole in 2030 and 2035. The sectors covered by the tax accounted for only about 13% of total NO_x emissions in the most recent year for which data were available. The main source of NO_x emissions remains the agriculture, forestry and fishing sector, which represented approximately 81% of total emissions in 2023. This sector was excluded from the tax proposal due to the methodological challenges of measuring NO_x emissions from agriculture ([48]).

As a result, the overall revenues generated are relatively modest. For the EU as a whole, additional tax revenues are estimated at €45 million in 2030 and €37 million in 2035. Emissions in the taxed sectors are projected to decline by around 29% as a result of the tax. When considered as a share of total NOx emissions, however, the reduction amounts to only 2.5–3% ([49]).

Countries where the tax affects a relatively large share of emissions include Portugal, Cyprus and Slovakia, while in Bulgaria, Denmark, Ireland, France and

([48]) Agricultural NOx emissions are diffuse rather than point-source. Unlike industrial facilities, farms do not emit NOx from a single measurable outlet such as a smokestack. Emissions arise over large and heterogeneous areas, such as fields, manure storage sites, grazing land, which makes continuous or direct measurement technically complex and costly. Emissions vary significantly over time. NOx emissions fluctuate with weather conditions, soil moisture, fertiliser type, application timing, and cultivation practices. This creates high temporal variability, meaning that any measurement taken at a single moment cannot easily be generalised over longer periods. Soil and biological processes are difficult to quantify. Much agricultural NOx stems from microbial processes in the soil (nitrification and denitrification). These processes are influenced by temperature, rainfall, soil texture and pH. Accurately measuring these interactions in situ requires sophisticated equipment and frequent sampling. Measurement requires specialised sensors that are rarely deployed at scale. Attribution of emissions is challenging. In many rural areas, background NOx levels are affected by transport, small combustion sources and long-range atmospheric transport. Distinguishing the agricultural share from other sources is difficult without detailed atmospheric modelling. Data gaps undermine the creation of consistent tax bases. Even where estimates exist, they are often based on emission factors or modelled data rather than direct measurements. These carry inherent uncertainty and may not provide the level of precision needed for taxation or compliance systems.

([49]) The changes in emissions as a percent of the total are the same for 2030 and 2035 for all Member States. This is because there is no additional impact of the tax between those years relative to the emissions from the taxed sectors. However, the impact by 2035 is smaller as a percent of all emissions as the taxed sector emissions decline as a percent of the total. The same applies to the effects of taxes on SO_2.

Lithuania, the taxed sectors represent only a small proportion of total NO_x emissions.

Table 5-1: Emissions and revenue changes with a tax on NO_x

NOx EMISSIONS	EMISSIONS CHANGES				ADDITIONAL TAX REVENUES €MN.	
Country	As % of Taxed Sectors		As % of all NOx Emissions			
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	-28.6%	-28.6%	-3.4%	-2.6%	1.31	0.87
Bulgaria	-28.6%	-28.6%	-1.0%	-0.7%	0.57	0.44
Czechia	-38.7%	-38.7%	-5.6%	-5.0%	1.12	0.94
Denmark	-23.3%	-23.3%	-1.5%	-1.5%	0.54	0.53
Germany	-28.6%	-28.6%	-3.6%	-2.7%	6.38	4.04
Estonia	-28.6%	-28.6%	-2.4%	-2.4%	0.24	0.25
Ireland	-28.6%	-28.6%	-1.4%	-1.4%	0.82	0.81
Greece	-28.6%	-28.6%	-2.7%	-2.3%	1.04	0.80
Spain	-28.6%	-28.6%	-4.3%	-3.6%	5.05	4.20
France	-28.6%	-28.6%	-1.4%	-1.1%	3.20	2.22
Croatia	-28.6%	-28.6%	-2.5%	-1.7%	0.31	0.19
Italy	-28.6%	-28.6%	-5.3%	-4.9%	8.30	7.27
Cyprus	-28.6%	-28.6%	-6.8%	-7.4%	0.12	0.13
Latvia	-28.6%	-28.6%	-2.7%	-2.9%	0.41	0.47
Lithuania	-28.6%	-28.6%	-1.5%	-1.0%	0.29	0.18
Luxembourg	-28.6%	-28.6%	-3.0%	-3.1%	0.08	0.08
Hungary	-28.6%	-28.6%	-1.7%	-1.6%	0.48	0.45
Malta	-28.6%	-28.6%	-2.5%	-1.9%	0.02	0.01
Netherlands	-28.6%	-28.6%	-2.6%	-1.9%	1.89	1.38
Austria	-28.6%	-28.6%	-4.3%	-4.1%	1.21	1.09
Poland	-28.6%	-28.6%	-2.6%	-2.4%	4.58	4.05
Portugal	-28.6%	-28.6%	-8.7%	-8.3%	2.91	2.64
Romania	-28.6%	-28.6%	-1.8%	-1.6%	1.73	1.40
Slovenia	-28.6%	-28.6%	-4.1%	-4.1%	0.23	0.22
Slovakia	-28.6%	-28.6%	-6.5%	-4.5%	0.78	0.51
Finland	-28.6%	-28.6%	-2.6%	-2.0%	0.98	0.70
Sweden	0.0%	0.0%	0.0%	0.0%	0.00	0.00
Sweden W/out Elec	-28.6%	-28.6%	-2.5%	-2.1%	1.12	0.94
All EU	**-28.5%**	**-28.5%**	**-3.0%**	**-2.5%**	**45.71**	**36.82**

Source: Own Elaboration

A Tax on SO_2

The same sectors as for NO_x were taxed at a **benchmark rate** of **€1,300 per tonne** on their **SO_2** emissions. These sectors account for approximately **two-thirds** of total SO_2 emissions across the EU. The main sector excluded from the tax is transportation, where maritime shipping represents a significant share of emissions, particularly in countries such as Denmark and Greece.

Overall, the tax is estimated to reduce total SO_2 emissions by **22%** in both 2030 and 2035. Within the taxed sectors, emissions are projected to decline by around **32%**.

For the EU as a whole, the additional tax revenues are estimated at **€494 million in 2030** and **€365 million in 2035**, roughly an order of magnitude higher than those generated by the NO_x tax.

Countries where the tax affects a relatively large share of SO_2 emissions include **Bulgaria, Germany, Cyprus, Lithuania, Slovenia and Slovakia**, while in **Malta, Greece and Italy**, the taxed sectors represent a comparatively small share of total emissions. In **Denmark and Sweden**, existing SO_2 tax rates are already higher than the explored benchmark for most sectors, and therefore no additional reductions are expected.

Table 5-2: Emissions and revenue changes with a tax on SO_2

SO_2 Emissions	Change in emissions, comparing the new scenario with tax against the baseline projections (for selected years)				Additional tax revenues €MN (for selected years)	
Country	Considering only Taxed Sectors		As % of all SO_2 emissions			
	In 2030	In 2035	In 2030	In 2035	In 2030	In 2035
Austria	-32%	-32%	-28%	-28%	7.23	6.64
Belgium	-32%	-32%	-31%	-31%	11.11	7.68
Bulgaria	-32%	-32%	-32%	-31%	16.78	7.54
Croatia	-32%	-32%	-18%	-15%	0.63	0.23
Cyprus	-32%	-32%	-32%	-32%	7.29	6.13
Czechia	-44%	-44%	-43%	-43%	10.13	6.28
Denmark	0%	0%	0%	0%	0.00	0.00
Estonia	-32%	-32%	-28%	-27%	5.59	3.37
Finland	-32%	-32%	-29%	-30%	9.59	6.61
France	-32%	-32%	-16%	-17%	35.93	23.15
Germany	-32%	-32%	-32%	-32%	171.10	149.63
Greece	-32%	-32%	-6%	-4%	7.95	3.34
Hungary	-32%	-32%	-29%	-28%	4.31	3.38
Ireland	-32%	-32%	-27%	-26%	1.04	0.51
Italy	-32%	-32%	-9%	-8%	32.64	22.23
Latvia	-32%	-32%	-24%	-23%	1.38	1.12
Lithuania	-32%	-32%	-30%	-30%	6.30	5.12
Luxembourg	-32%	-32%	-9%	-7%	0.19	0.13

SO_2 Emissions	Change in emissions, comparing the new scenario with tax against the baseline projections (for selected years)				Additional tax revenues €MN (for selected years)	
Country	Considering only Taxed Sectors		As % of all SO_2 emissions			
	In 2030	In 2035	In 2030	In 2035	In 2030	In 2035
Malta	-32%	-32%	0%	0%	0.00	0.00
Netherlands	-32%	-32%	-26%	-28%	10.84	8.44
Poland	-32%	-32%	-28%	-27%	76.10	51.35
Portugal	-32%	-32%	-27%	-26%	23.32	18.62
Romania	-32%	-32%	-25%	-17%	8.43	3.40
Slovakia	-32%	-32%	-31%	-30%	3.44	1.82
Slovenia	-32%	-32%	-32%	-32%	1.31	0.86
Spain	-32%	-32%	-23%	-21%	40.94	27.06
Sweden	0%	0%	0%	0%	0.00	0.00
All EU	**-32%**	**-32%**	**-22%**	**-22%**	**493.58**	**364.64**

Source: Own Elaboration

A Tax on $PM_{2.5}$

The same sectors as for NO_x and SO_2 were also taxed on their $PM_{2.5}$ emissions at a benchmark rate of **€1,300 per tonne**. These sectors account for approximately **35%** of total $PM_{2.5}$ emissions across the EU. The main sectors not included in the analysis are **transport ([50])** and **agriculture ([51])**, primarily

([50]) Real-world emissions differ markedly from test conditions. Standardised laboratory tests do not capture driving behaviour, cold starts, congestion, gradients or weather, all of which strongly influence $PM_{2.5}$ emissions. Real-world emission factors therefore carry uncertainty. Multiple sources contribute simultaneously. $PM_{2.5}$ from transport arises not only from exhausts but also from tyre wear, brake wear and road abrasion. These non-exhaust sources are growing in relative importance as engines become cleaner, yet they are much harder to quantify. Spatial and temporal variability is high. Traffic flows change by hour, day and season. Concentrations can differ significantly between open roads, urban canyons and roadside micro-environments, making it difficult to extrapolate local measurements to regional estimates. Measurement equipment is limited and unevenly distributed. Fixed monitoring stations provide only partial spatial coverage, often concentrated in urban centres. Mobile measurements exist but are not widely used for systematic monitoring.

([51]) $PM_{2.5}$ arises from highly diffuse activities. Emissions come from tilling, harvesting, animal housing, manure spreading, feed handling and ammonia-related secondary PM formation. These are spread across large areas and cannot be captured by point-source monitoring. Weather conditions play a major role. Wind speed, soil moisture, humidity and temperature strongly influence particulate generation and dispersion. This leads to high variability that is difficult to standardise for measurement. Secondary PM formation is complex to quantify. A substantial share of agricultural $PM_{2.5}$ is "secondary", formed when ammonia (NH_3) reacts in the atmosphere with NOx or SO_2. Estimating this requires atmospheric chemistry modelling rather than direct measurement, introducing further uncertainty. Equipment for direct measurement is rarely deployed on farms. PM sensors suitable for capturing agricultural dust plumes are expensive and not used routinely. Even when deployed, they provide only local snapshots rather than representative averages. Separating agricultural PM from background levels is difficult. Rural $PM_{2.5}$ often includes contributions from due to the difficulties associated with accurately measuring emissions from these sources.

Overall, the tax is estimated to reduce total $PM_{2.5}$ emissions by **10% in 2030** and **11% in 2035**. Within the taxed sectors, the reduction is projected at around **30%**.

For the EU as a whole, the additional tax revenues are estimated at **€154 million in 2030** and **€141 million in 2035 ([52])**. Countries where the tax affects a relatively large share of emissions include **Belgium, Croatia, Latvia, Cyprus and Slovenia**, while in **Denmark, Germany, Greece, Spain and Slovakia**, the taxed sectors represent only a small proportion of total $PM_{2.5}$ emissions.

Table 5-3: Emissions and revenue changes with a tax on $PM_{2.5}$

$PM_{2.5}$ Emissions	Change in emissions, comparing the new scenario with tax against the baseline projections (for selected years)				Additional tax revenues €MN (for selected years)	
Country	Considering only Taxed Sectors		As % of all $PM_{2.5}$ emissions			
	In 2030	In 2035	In 2030	In 2035	In 2030	In 2035
Austria	-30%	-30%	-15%	-15%	2.65	2.36
Belgium	-30%	-30%	-22%	-23%	4.15	3.75
Bulgaria	-30%	-30%	-16%	-16%	3.11	2.68
Croatia	-30%	-30%	-25%	-26%	3.08	2.95
Cyprus	-30%	-30%	-22%	-22%	0.31	0.24
Czechia	-40%	-40%	-22%	-21%	1.72	1.37
Denmark	-30%	-30%	-1%	-1%	0.96	0.82
Estonia	-30%	-30%	-16%	-16%	0.92	0.70
Finland	-30%	-30%	-13%	-13%	1.52	1.09
France	-30%	-30%	-14%	-15%	23.79	22.21
Germany	-30%	-30%	-6%	-6%	12.79	10.16
Greece	-30%	-30%	-9%	-7%	6.14	4.37
Hungary	-30%	-30%	-17%	-17%	2.44	1.97
Ireland	-30%	-30%	-20%	-21%	2.50	2.37
Italy	-30%	-30%	-10%	-10%	14.73	12.68
Latvia	-30%	-30%	-25%	-27%	7.64	10.55
Lithuania	-30%	-30%	-12%	-12%	1.31	1.24
Luxembourg	-30%	-30%	-20%	-22%	0.75	0.90
Malta	-30%	-30%	-14%	-14%	0.13	0.12
Netherlands	-30%	-30%	-13%	-14%	3.44	2.97
Poland	-30%	-30%	-12%	-12%	16.29	14.29
Portugal	-30%	-30%	-23%	-23%	17.86	17.86
Romania	-30%	-30%	-17%	-15%	6.19	4.95
Slovakia	-30%	-30%	-10%	-9%	0.65	0.48
Slovenia	-30%	-30%	-22%	-22%	1.71	1.72

transport, domestic heating, industry and long-range transport of dust or pollutants. Disentangling the agricultural component requires complex modelling and extensive data.

([52]) The reduction in PM2.5 emissions in 2035 as a percent of all emissions is slightly higher than in 2030 reflecting a greater decline in emissions from the taxed sector. This is different from the case of NOx and SO2, where the reduction is smaller for the taxed sector.

$PM_{2.5}$ Emissions	Change in emissions, comparing the new scenario with tax against the baseline projections (for selected years)				Additional tax revenues €MN (for selected years)	
Country	Considering only Taxed Sectors		As % of all $PM_{2.5}$ emissions			
	In 2030	In 2035	In 2030	In 2035	In 2030	In 2035
Spain	-30%	-30%	-5%	-5%	14.91	13.42
Sweden	-30%	-30%	-14%	-14%	3.12	2.33
All EU	**-30%**	**-30%**	**-10%**	**-11%**	**154.82**	**140.57**

Source: Own Elaboration

For the EU as a whole the **additional tax revenues** amount to €154 million in 2030 and €141 million in 2035. Countries where the tax affects a large share of emissions are Belgium, Croatia, Latvia, Cyprus and Slovenia. Countries where the taxed sector make up a small share of emissions of $PM_{2.5}$ emissions are Denmark, Germany. Greece, Spain and Slovakia.

A summary of changes for all three taxes on average emissions reductions and on additional revenues as a percent of those from **pollution taxes** is presented in Table 5-4. Total additional revenues in 2030 are estimated at €694 million, falling to €542 million in 2035. As a percent of all **pollution taxes** in 2023 the increase is modest – at 4.8% in 2030 and 3.75% in 2035. Some countries, however, would have a major increase, namely Bulgaria and Romania. Countries with relatively large increase include Czechia, Ireland, Greece, Portugal and Finland.

Table 5-4: Average reductions across all air pollutants and total revenues

All Emissions	Change in emissions, comparing the new scenario with tax against the baseline projections (for selected years)				Additional tax revenues €MN (for selected years)		As % of 2023 Pollution & Resource taxes	
Member State	Considering only Taxed Sectors		As % of all emissions					
	In 2030	In 2035	In 2030	In 2035	In 2030	In 2035	In 2030	In 2035
Austria	-31%	-31%	-51%	-16%	11.09	10.09	18.3%	16.6%
Belgium	-31%	-31%	-30%	-17%	16.58	12.30	3.2%	2.4%
Bulgaria	-32%	-32%	-29%	-11%	20.46	10.66	398.1%	207.3%
Croatia	-30%	-30%	-14%	-14%	4.01	3.38	2.5%	2.1%
Cyprus	-32%	-32%	-59%	-30%	7.72	6.50	12.2%	10.3%
Czechia	-43%	-43%	-76%	-23%	12.97	8.59	42.6%	28.2%
Denmark	-9%	-9%	-87%	-1%	1.51	1.35	0.5%	0.5%
Estonia	-32%	-32%	1%	-17%	6.75	4.32	18.9%	12.1%
Finland	-32%	-32%	-17%	-14%	12.09	8.40	67.15%	46.67%
France	-31%	-31%	-86%	-10%	62.92	47.59	1.2%	0.9%
Germany	-32%	-32%	11%	-22%	190.27	163.83	N.E.	N.E.
Greece	-31%	-31%	-55%	-5%	15.13	8.51	52.2%	29.4%
Hungary	-31%	-31%	-32%	-12%	7.23	5.80	3.2%	2.6%
Ireland	-30%	-30%	-72%	-5%	4.35	3.69	52.5%	44.6%
Italy	-31%	-31%	-23%	-8%	55.68	42.18	9.4%	7.1%

All Emissions	Change in emissions, comparing the new scenario with tax against the baseline projections (for selected years)				Additional tax revenues €MN (for selected years)		As % of 2023 Pollution & Resource taxes	
Member State	Considering only Taxed Sectors		As % of all emissions					
	In 2030	In 2035	In 2030	In 2035	In 2030	In 2035	In 2030	In 2035
Latvia	-30%	-30%	-5%	-20%	9.43	12.14	26.2%	33.7%
Lithuania	-32%	-32%	-76%	-15%	7.90	6.54	5.2%	4.3%
Luxembourg	-30%	-30%	-75%	-13%	1.02	1.11	N.E.	N.E.
Malta	-30%	-29%	-63%	-2%	0.15	0.14	0.5%	0.4%
Netherlands	-31%	-31%	-67%	-11%	16.18	12.79	0.4%	0.3%
Poland	-32%	-32%	-20%	-16%	96.97	69.70	14.5%	10.4%
Portugal	-31%	-31%	-35%	-22%	44.09	39.12	55.9%	49.6%
Romania	-31%	-30%	-84%	-7%	16.35	9.75	307.4%	183.3%
Slovakia	-31%	-31%	-13%	-13%	4.87	2.81	18.4%	10.6%
Slovenia	-31%	-30%	2%	-18%	3.25	2.79	13.5%	11.6%
Spain	-31%	-31%	-41%	-9%	60.90	44.69	3.2%	2.3%
Sweden	-8%	-8%	29%	-3%	4.25	3.27	1.32%	1.02%
All EU	**-32%**	**-32%**	**-18%**	**-13%**	**694.11**	**542.03**	**4.80%**	**3.75%**

Source: Own Elaboration - *Note*. N.E.— No revenues reported in 2023

5.1.2. Fertilizer tax

At present, no Member State applies a general fertiliser tax. The Netherlands previously had a tax on surplus fertiliser, but this was withdrawn, as was the case in Sweden. Belgium applies a manure tax; however, this is distinct from a fertiliser tax.

The benchmark tax rates follow those in Hogg et al. (2016), updated for inflation. In that study, a rate of **€0.20 per kilogram of nitrogen (N) applied** was investigated. As in the earlier analysis, the rates have been adjusted in line with differences in relative price levels across national agricultural sectors to mitigate potential distributional effects. The inflation-adjusted rates are presented in Table 5-5.

The tax applies to the **nitrogen content** of fertilisers, which varies by product type (European Commission, 2019). Urea, which constitutes approximately **56%** of fertiliser applications, contains **46% nitrogen**, while the remaining **44%** of applications consist primarily of nitrates (ammonium nitrate, calcium ammonium nitrate, calcium nitrate and urea ammonium nitrate), with an average nitrogen content of **26.5%**. This yields an overall weighted average nitrogen content of **37.3%**, which was used to calculate the tax per unit of fertiliser.

Based on an average EU price for inorganic nitrogen fertiliser of **€366 per tonne** in 2025 ([53]) the additional tax would raise prices by approximately **6%** in Estonia, Latvia and Malta, and by around **13%** in Bulgaria, Lithuania, Poland, Romania and Slovakia. The largest price increase, **53%**, would occur in Greece.

Table 5-5. Benchmark nitrogen taxes by Member State €/1000Kg

Member State	Rate	Member State	Rate
Belgium	455	Lithuania	130
Bulgaria	130	Luxembourg	325
Czechia	195	Hungary	260
Denmark	390	Malta	65
Germany	390	Netherlands	455
Estonia	65	Austria	260
Ireland	325	Poland	130
Greece	520	Portugal	195
Spain	195	Romania	130
France	325	Slovenia	260
Croatia	260	Slovakia	130
Italy	325	Finland	260
Cyprus	260	Sweden	260
Latvia	65		

Source: Own Elaboration

To estimate the impact of the fertiliser tax, an elasticity of **–0.3** was applied, based on evidence presented in the interim report (Ollier & De Cara, 2024) ([54]). Sensitivity analyses using alternative elasticity values are presented in the final section of this report. The resulting reductions in fertiliser consumption in 2030 and 2035, together with the corresponding changes in revenues, are shown in Table 5-6.

Total additional revenues are estimated at **€563 million in 2030** and **€547 million in 2035**, reflecting a slight downward trend in fertiliser use over time. As a share of total pollution and resource tax revenues in 2023, these figures represent approximately **4%.**

Substantial increases in revenue relative to existing pollution taxes are observed in **Bulgaria, Ireland, Greece, Germany and Romania**, while more moderate increases occur in **Estonia, Cyprus, Malta, the Netherlands, France, Spain and Croatia**. These variations partly reflect the differing magnitude of tax rate increases, as illustrated in Table 5-6.

([53]) https://agridata.ec.europa.eu/extensions/DashboardFertiliser/FertiliserPrices.html

([54]) Ollier & De Cara (2024) estimate a higher elasticity of around -0.7. However, Y. Pang et al. (2021) indicate that fertilizer demand is more price inelastic with values of between -0.12 and -0.29. As a result, we take a value of -0.3 as the base case.

Table 5-6: Average changes in fertilizer consumption and total revenues

Member State	Change in fertilizer consumption (%)		Change in revenue €MN		% of 2023 pollution/resource tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Austria	-24%	-24%	8	8	9.3%	9.7%
Belgium	-42%	-42%	9	9	1.5%	1.4%
Bulgaria	-12%	-12%	20	25	64.9%	81.9%
Croatia	-24%	-24%	6	6	1.2%	1.2%
Cyprus	-24%	-24%	1	1	0.8%	0.8%
Czechia	-18%	-18%	14	13	44.7%	43.7%
Denmark	-36%	-36%	18	18	3.5%	3.4%
Estonia	-6%	-6%	1	1	2.0%	2.2%
Finland	-24%	-24%	11	11	24.0%	24.3%
France	-30%	-30%	129	117	3.6%	3.3%
Germany	-36%	-36%	72	61	n.e.	n.e.
Greece	-48%	-48%	17	17	59.1%	57.9%
Hungary	-24%	-24%	19	19	8.8%	8.6%
Ireland	-30%	-30%	23	22	238.8%	231.3%
Italy	-30%	-30%	48	47	7.8%	7.8%
Latvia	-6%	-6%	2	3	3.6%	4.2%
Lithuania	-12%	-12%	5	5	2.6%	2.6%
Luxembourg	-30%	-30%	1	1	8.7%	7.8%
Malta	-6%	-6%	0	0	0.1%	0.1%
Netherlands	-42%	-42%	18	17	0.4%	0.4%
Poland	-12%	-12%	43	42	6.4%	6.2%
Portugal	-18%	-18%	5	5	5.0%	4.8%
Romania	-12%	-12%	25	29	212.6%	249.5%
Slovakia	-12%	-12%	5	5	18.4%	19.1%
Slovenia	-24%	-24%	2	2	3.2%	3.0%
Spain	-18%	-18%	46	46	2.1%	2.1%
Sweden	-24%	-24%	15	17	5.3%	5.8%
All EU	**-24%**	**-23%**	**563**	**547**	**3.9%**	**3.8%**

Source: Own Elaboration - *Note*: n.e. — No pollution tax revenue reported in 2023.

5.1.3. Pesticide tax

Three main results are presented in this section:

- The change in the share of pesticide categories when taxes are introduced, relative to a baseline with no taxes, for 2030;
- The change in the **Harmonised Risk Indicator 1 (HRI 1)** as a result of the taxes in 2030 and 2035; and
- The additional revenues generated from the pesticide tax.

Changes in the share of pesticide categories

The changes in the shares of the different pesticide categories are shown in Table 5-7. The comparison is made between the shares in 2030 under the tax and those in the baseline scenario for that same year. The results indicate an

increase in the share of Group 1 (low-risk active substances) and a corresponding **decline in Groups 2 and 3** (approved active substances and candidates for substitution, respectively). On average, the share of Group 1 increases by **8%**, while Group 2 declines by **7%** and Group 3 by **1%**. Total pesticide use decreases by approximately **6%** overall.

The largest shifts towards Group 1 substances occur in **Malta, Ireland, Italy, Cyprus, Austria and Finland**, whereas the smallest changes are observed in **Latvia, Lithuania, Poland and Romania**.

Change in the Harmonised Risk Indicator (HRI 1)

Error! Reference source not found. presents the changes in the HRI 1 Indicator. The **Harmonised Risk Indicator 1 (HRI 1)** was established under *Commission Directive (EU) 2019/782* to monitor progress towards the objectives of *Directive 2009/128/EC* on the sustainable use of pesticides. The indicator is calculated using statistics on the quantities of active substances in plant protection products placed on the market, categorised into four risk groups, and multiplied by hazard weightings defined in *Commission Directive (EU) 2019/782*. The results are aggregated and expressed as an index relative to a baseline value of 100, corresponding to the average result for the period 2011–2013.

The evolution of the index between 2025 and 2035 under both the baseline and tax scenarios is shown in Figure 5-1. A reduction of approximately **13%** in the HRI 1 index is projected by 2035 under the tax scenario compared with the baseline.

Figure 5-1: Estimated change in HRI-1 Index

Scenario A

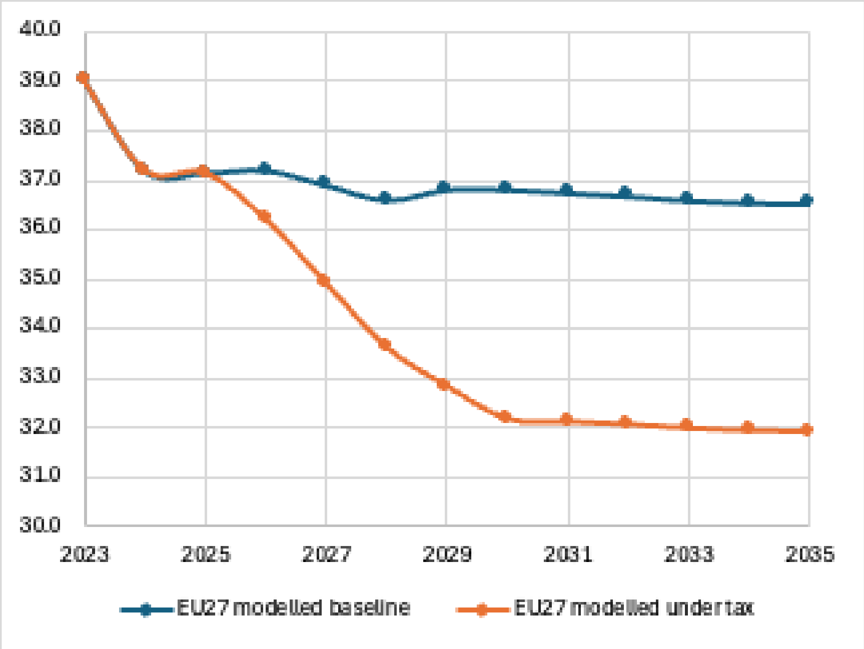

Table 5-7: Change in share of pesticides as a result of the taxes in 2030

	2030 tax versus 2030 baseline				
	1	**2**	**3**	**4**	**Reduction**
Belgium	9%	-8%	-1%	0%	-7%
Bulgaria	4%	-3%	0%	0%	-3%
Czechia	5%	-4%	-1%	0%	-3%
Denmark	6%	-6%	0%	0%	-4%
Germany	10%	-9%	-1%	0%	-7%
Estonia	2%	-2%	0%	0%	-1%
Ireland	14%	-13%	-1%	0%	-9%
Greece	9%	-7%	-2%	0%	-7%
Spain	10%	-9%	-1%	0%	-7%
France	6%	-5%	-1%	0%	-4%
Croatia	5%	-5%	-1%	0%	-4%
Italy	14%	-13%	-2%	0%	-11%
Cyprus	15%	-14%	-1%	0%	-10%
Latvia	2%	-2%	0%	0%	-1%
Lithuania	3%	-3%	0%	0%	-2%
Luxembourg	7%	-7%	-1%	0%	-5%
Hungary	6%	-5%	-1%	0%	-5%
Malta	33%	-25%	-8%	0%	-30%
Netherlands	5%	-5%	0%	0%	-3%
Austria	10%	-9%	-1%	0%	-6%
Poland	2%	-2%	0%	0%	-2%
Portugal	10%	-9%	-1%	0%	-8%
Romania	3%	-3%	0%	0%	-3%
Slovenia	9%	-8%	-1%	0%	-6%

	2030 tax versus 2030 baseline				
Slovakia	2%	-2%	0%	0%	-2%
Finland	14%	-14%	0%	0%	-9%
Sweden	7%	-6%	0%	0%	-4%
EU	8%	-7%	-1%	0%	-6%

Source: Own elaboration

Table 5-8: Change in HRI – 1 Indicator

	2030 tax	2035 tax
Member State	versus 2030 baseline as a percentage	versus 2035 baseline as a percentage
Belgium	-14.2%	-14.2%
Bulgaria	-5.7%	-5.7%
Czechia	-7.5%	-7.5%
Denmark	-9.3%	-9.3%
Germany	-14.7%	-14.7%
Estonia	-3.4%	-3.4%
Ireland	-20.5%	-20.5%
Greece	-14.2%	-14.3%
Spain	-14.8%	-14.8%
France	-8.8%	-8.8%
Croatia	-8.5%	-8.5%
Italy	-21.8%	-21.8%
Cyprus	-21.5%	-21.5%
Latvia	-3.0%	-3.0%
Lithuania	-4.4%	-4.4%
Luxembourg	-11.3%	-11.3%
Hungary	-9.5%	-9.5%
Malta	-49.9%	-50.0%
Netherlands	-7.5%	-7.5%
Austria	-14.9%	-14.9%
Poland	-3.9%	-3.9%
Portugal	-16.0%	-16.1%
Romania	-5.4%	-5.4%
Slovenia	-13.3%	-13.3%
Slovakia	-3.9%	-4.0%
Finland	-19.8%	-19.8%
Sweden	-9.7%	-9.7%
EU	-12.6%	-12.6%

Source: Own elaboration

Revenues generated

The revenues generated from the pesticide tax are summarised in Table 5-9 for 2030 and 2035, together with the corresponding increase as a percentage of total pollution tax revenues in 2023 (the most recent year for which data are available).

Table 5-9: Revenues from taxation of pesticides

	Revenues (€ Mn)		As % of 2023 pollution taxes	
Member State	2030	2035	2030	2035
Belgium	48.4	48.3	9%	9%
Bulgaria	16.8	16.7	327%	325%
Czechia	24.3	24.2	80%	79%
Denmark	35.3	35.2	12%	12%
Germany	319.8	318.3	N.E.	N.E.
Estonia	1.6	1.6	4%	4%
Ireland	22.9	22.8	276%	275%
Greece	51.4	51.0	177%	176%
Spain	274.5	271.5	14%	14%
France	364.4	362.8	7%	7%
Croatia	10.1	10.1	6%	6%
Italy	269.1	266.9	45%	45%
Cyprus	4.7	4.7	7%	7%
Latvia	3.8	3.7	10%	10%
Lithuania	11.0	11.0	7%	7%
Luxembourg	1.1	1.1	NE	NE
Hungary	55.8	55.6	25%	25%
Malta	0.3	0.3	1%	1%
Netherlands	69.0	68.6	2%	2%
Austria	23.5	23.0	39%	38%
Poland	85.9	85.7	13%	13%
Portugal	37.5	37.5	48%	47%
Romania	27.1	27.1	510%	509%
Slovenia	4.2	4.1	17%	17%
Slovakia	8.1	8.1	31%	31%
Finland	21.8	21.8	121%	121%
Sweden	4.6	4.5	1%	1%
EU	**1,797**	**1,786**	12.44%	12.36%

Source: Own elaboration and Eurostat – *Note*: n.e. Not calculated as 2023 levels were reported zero.

5.1.4. Water abstraction

Data on water abstraction were primarily obtained from Eurostat, which provides figures for **abstraction from surface and groundwater** for each Member State covering the period 2013 to 2020, although the series is shorter for some countries. For Ireland, Italy, Austria, Portugal and Finland, where

Eurostat data were missing, supplementary information was sourced from the European Environment Agency ([55]).

Average charge rates were calculated for most Member States by dividing total revenues from water abstraction by the corresponding abstraction volumes. For Latvia, Lithuania, Poland, Romania and Slovakia, revenue data were unavailable, so current charge rates reported by the countries themselves were used instead. Under a baseline scenario assuming no tax reform, abstraction was projected to evolve in line with historical trends.

In the modelled scenario, the average abstraction tax applied in each Member State was benchmarked against Denmark's 2022 rate of €0.215 per cubic metre. This benchmark was then adjusted using two correction factors. The first accounts for water scarcity through the Water Exploitation Index (WEI), which measures annual water consumption as a percentage of renewable freshwater resources. The WEI correction factors, following Hogg et al. (2016), were: 0.25 for Member States with WEI below 10%, 0.50 for those between 10% and 20%, 0.75 for those between 20% and 30%, and 1.00 for those above 30%. The second correction adjusts for differences in purchasing power parity (PPP) between Denmark and the other Member States, ensuring that the fiscal burden reflects relative income levels and price structures. The resulting PPP- and WEI-adjusted rates for each Member State are presented in Table 5-10 of the study. Within this framework, national authorities retain flexibility to differentiate rates between surface and groundwater, or by region and aquifer, according to their domestic circumstances.

Behavioural responses to higher abstraction charges were modelled using an **elasticity of -0.2** ([56]), drawn from the literature review and representing the lower bound of estimates to ensure conservative projections of demand reduction. As with the modelling of air pollution taxes, the full adjustment to the new tax level is assumed to materialise over five years, with effects increasing linearly from the year of introduction in 2026. Sensitivity analysis later in the report explores alternative elasticity assumptions to test the robustness of these results.

Overall, the modelling suggests that, once fully implemented, abstraction reductions would range from around one-quarter to one-third in Member States where tax increases are most substantial, such as Spain, Italy, France,

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([55])See: https://www.eea.europa.eu/en/analysis/indicators/water-abstraction-by-source-and/water-abstraction-by-source.

([56]) See Bruno & Jessoe (2021). The paper reports elasticities from -0.1 to -0.8 but most are in the lower part of that range. Note that the elasticity of fertilizer with respect a tax increase of 1% is less than the price elasticity of demand as a one percent tax increase raises the price by less than 1%. The Danish rate remains unchanged, as it already serves as the benchmark. All other Member States apply lower rates, with the sole exception of Croatia, whose higher rate is maintained without adjustment.

Belgium, Greece and Portugal. Countries with no change in the average tariff, such as Denmark and Croatia, would experience no adjustment. Revenue gains are particularly pronounced in Member States where abstraction had not previously been taxed or where rates were very low, including Ireland, Greece, Italy, Portugal and Romania.

Table 5-10: Modelled Abstraction Charges by Member State €/000M[3]

Member State	Rate	Member State	Rate
Belgium	175	Lithuania	61
Bulgaria	45	Luxembourg	100
Czechia	66	Malta	55
Denmark	215	Italy	275
Germany	81	Netherlands	87
Estonia	75	Austria	85
Ireland	104	Poland	54
Greece	258	Portugal	261
Spain	297	Romania	191
France	167	Slovenia	68
Croatia	573	Slovakia	64
Italy	292	Finland	93
Cyprus	278	Sweden	86
Latvia	61		

Source: Own Elaboration

The revenue gains and changes in abstraction volumes are presented in Table 5-11. The introduction of the revised charges leads to reductions in water abstraction of up to 33 per cent in Estonia and Finland, 32 per cent in Spain and Italy, 29 per cent in France, and 28 per cent in Belgium, Greece and Portugal. No change is observed in countries where the average tariff remains unaltered, namely Denmark and Croatia. Revenue increases are substantial across most Member States and particularly pronounced in those where abstraction levels remain stable, including Ireland, Greece, Italy, Portugal and Romania.

Table 5-11: Changes in revenue and amounts of water abstracted with revised charges

Member State	% change in abstraction		Gain in revenue €MN		As % of 2023 resource tax	
	By 2030	By 2035	By 2030	By 2035	In 2030	In 2035
Austria	-9%	-9%	319	326	395%	404%
Belgium	-28%	-28%	333	305	342%	313%
Bulgaria	-5%	-5%	197	193	758%	743%
Croatia	0%	0%	0	0	0%	0%
Cyprus	-30%	-30%	34	32	284%	263%
Czechia	-7%	-7%	65	61	N.E	N.E
Denmark	0%	0%	0	0	0%	0%
Estonia	-33%	-33%	35	28	216%	175%
Finland	-33%	-33%	105	101	239%	229%
France	-29%	-29%	1,864	1,718	441%	407%
Germany	-22%	-22%	630	563	N.E	N.E
Greece	-28%	-28%	1,882	1,887	N.E	N.E

Member State	% change in abstraction		Gain in revenue €MN		As % of 2023 resource tax	
	By 2030	By 2035	By 2030	By 2035	In 2030	In 2035
Hungary	-6%	-6%	277	294	2100%	2226%
Ireland	-11%	-11%	142	135	11152%	10591%
Italy	-32%	-32%	8,008	8,883	4795%	5319%
Latvia	-7%	-7%	8	8	31%	30%
Lithuania	-7%	-7%	13	11	26%	21%
Luxembourg	-11%	-11%	-1	-1	-6%	-7%
Malta	-30%	-30%	6	5	N.E	N.E
Netherlands	-13%	-13%	188	157	4%	4%
Poland	-6%	-6%	370	344	54%	50%
Portugal	-28%	-28%	1,117	1,141	1090%	1114%
Romania	-21%	-21%	1,410	1,609	12089%	13797%
Slovakia	-23%	-23%	17	17	65%	63%
Slovenia	-15%	-15%	23	22	43%	41%
Spain	32%	32%	5,191	4,854	5191%	4854%
Sweden	-9%	-9%	187	184	65%	64%
All EU	**-18%**	**-18%**	**22,422**	**22,874**	**155%**	**159%**

Source: Own Elaboration

Note: Tax revenues as a percent of resources taxes are relative to 2023 resource taxes
N.E.— No revenues reported in 2023

When expressed as a share of existing resource tax revenues, the projected abstraction charges represent a substantial increase. At EU level, total revenues would rise by approximately 155 per cent in 2030 and 159 per cent in 2035. For several Member States, notably Czechia, Germany, Greece and Malta, Eurostat data for 2023 do not report any resource tax revenues, making percentage comparisons impossible. Among the remaining countries, the largest relative increases are expected in Romania, Portugal, Hungary, Italy, Ireland and Bulgaria.

5.1.5. Waste incineration

Data on waste incineration for each Member State between 2004 and 2022 were obtained from Eurostat, covering both hazardous and non-hazardous waste. Projections for baseline incineration volumes, assuming no change in taxation, were derived by extrapolating historical trends over the observed period. Existing tax rates on waste incineration were taken from the European Environment Agency ([57]). In Member States where rates vary by region, waste type or facility, average values were used in the analysis to ensure comparability across countries, as summarised in Table 5-12.

Table 5-12: Existing Tax Rates on Incineration of Waste in the EU (€/MT)

([57]) https://www.eea.europa.eu/en/analysis/maps-and-charts/overview-of-taxes-on-the

Member State	Tax €/kg	Member State	Tax €/kg
Belgium	14-68	Lithuania	0
Bulgaria	0	Luxembourg	0
Czechia	0	Hungary	0
Denmark	75	Malta	0
Germany	0	Netherlands	36
Estonia	0	Austria	8
Ireland	0	Poland	0
Greece	0	Portugal	5-22
Spain	15	Romania	0
France	11-14	Slovenia	0
Croatia	0	Slovakia	0
Italy	0-5	Finland	0
Cyprus	0	Sweden	0
Latvia	15	Average EU (*)	19-29

Source: EEA (2024) - *Note*: (*) Only for Member States with a positive tax -

The relationship between incineration volumes and tax rates is complex, reflecting the interaction between different waste treatment options. Existing literature points to significant substitution effects between landfill and incineration. Jofre-Monseny & Sorribas-Navarro (2024) estimate cross-price elasticities of 0.4 for industrial waste and 2.0 for municipal waste, indicating that municipal waste flows are considerably more responsive to changes in landfill taxation. In practical terms, a 1 per cent increase in landfill tax could lead to a 0.4 per cent rise in industrial incineration and a 2 per cent increase in municipal incineration, demonstrating the need for coordinated pricing across waste management routes.

Given that landfill taxes are expected to rise sharply in most Member States, upward pressure on incineration demand could emerge. However, as the investigated reforms also envisage substantial increases in incineration taxes, overall substitution effects are likely to remain limited. On this basis, the elasticity of incineration with respect to tax rates is assumed to be -0.2, representing a modest behavioural response while allowing for some degree of substitution. Sensitivity analyses using elasticity values of 0 and -0.4 are included in the final section.

Under these assumptions, the results presented in Table 5-13 indicate an average EU-wide reduction in incinerated waste of around 12 per cent, with additional revenues estimated at approximately €50 million in 2030 and €77 million in 2035.

In most Member States, waste incineration volumes are projected to decline by around 20 per cent following the introduction of higher taxes. However, in countries where existing tax rates are already comparatively high, namely

Belgium, Denmark and the Netherlands, no further change in incineration levels is expected. The largest relative increases in revenue, measured against 2023 pollution tax receipts, are observed in Romania and Finland, while in most other Member States the fiscal impacts remain modest.

Table 5-13: Changes in waste to incineration and revenues collected with revised taxes

Member State	% reduction in waste		Revenue change in €MN		As % of 2023 Pollution Tax Rev.	
	2030	2035	2030	2035	2030	2035
Austria	0%	0%	0.00	0.00	0.00%	0.00%
Belgium	0%	0%	0	0	0.00%	0.00%
Bulgaria	-20%	-20%	0.01	0.00	0.17%	0.06%
Croatia	0%	0%	0.00	0.00	0.00%	0.00%
Cyprus	0%	0%	0.00	0.00	0.00%	0.00%
Czechia	-20%	-20%	1.50	1.76	4.92%	5.80%
Denmark	0%	0%	0	0	0.00%	0.00%
Estonia	-20%	-20%	0.00	0.00	0.00%	0.00%
Finland	-20%	-20%	3.24	3.13	18.02%	17.39%
France	-11%	-11%	34.85	54.98	0.69%	1.09%
Germany	-20%	-20%	12.28	6.84	0.00%	0.00%
Greece	-20%	-20%	0.15	0.18	0.53%	0.62%
Hungary	-20%	-20%	1.51	1.67	0.67%	0.74%
Ireland	-20%	-20%	0.07	0.04	0.81%	0.54%
Italy	-20%	-20%	3.48	1.95	0.59%	0.33%
Latvia	-6%	-6%	0.00	0.00	0.00%	0.00%
Lithuania	-20%	-20%	0.02	0.01	0.01%	0.01%
Luxembourg	-20%	-20%	0.00	0.00	0.00%	0.00%
Malta	-20%	-20%	0.08	0.09	0.28%	0.28%
Netherlands	0%	0%	0.00	0.00	0.00%	0.00%
Poland	-20%	-20%	5.16	5.32	0.77%	0.80%
Portugal	-9%	0%	0.08	0.09	0.11%	0.12%
Romania	-20%	-20%	5.59	10.70	105.15%	201.05%
Slovakia	-20%	-20%	0.06	0.03	0.22%	0.13%
Slovenia	-20%	-20%	0.36	0.26	1.48%	1.10%
Spain	-6%	-6%	0.28	0.24	0.01%	0.01%
Sweden	-20%	-20%	0.81	0.81	0.25%	0.25%
All EU	**-12%**	**-12%**	**69.54**	**88.12**	**0.48%**	**0.61%**

Source: Own Elaboration

5.1.6. Landfills

Landfill taxation is well established across the European Union, with 23 of the 27 Member States applying some form of levy (see Table 5-14) ([58]). Tax rates differ according to the type of waste, with hazardous waste typically subject to higher charges than non-hazardous waste. They may also vary by landfill

([58]) https://www.cewep.eu/landfill-taxes-and-restrictions/

category, as in France where unauthorised sites face higher rates, and by the degree of waste separation, as observed in Slovakia. Furthermore, several Member States, including Belgium, Italy and Spain, apply regionally differentiated rates. For the purposes of this analysis, which is conducted at national level, population-weighted averages of regional rates have been used to ensure consistency and comparability across countries.

Table 5-14: Existing tax rates on landfill of waste in the EU (€/MT)

Member State	Tax €/kg	Member State	Tax €/kg
Belgium	102.1	Lithuania	10
Bulgaria	48.45	Luxembourg	8
Czechia	20	Hungary	19
Denmark	79	Malta	0
Germany	0	Netherlands	33
Estonia	30	Austria	87
Ireland	75	Poland	46
Greece	30	Portugal	22
Spain	18	Romania	17
France	94.5	Slovenia	11
Croatia	0	Slovakia	22
Italy	17.8	Finland	70
Cyprus	0	Sweden	51
Latvia	65	Average EU(*)	42.4

Source: Own Elaboration - *Note*: (*) Only for Member States with a positive tax

The 2016 report investigated a landfill tax of €50 per tonne for non-hazardous waste, excluding inert waste for which a lower rate of €2.5 per tonne was recommended. To reflect inflation, these figures have been updated to €65 per tonne from 2025, with the full effect expected by 2030 ([59]). Six Member States — Belgium, Ireland, France, Latvia, Austria and Finland — already apply rates above this level, meaning that the modelled benchmark tax would have no additional impact in these countries.

According to the literature review, landfill tax elasticities cluster around a mean value of –0.33, which has been adopted in this analysis. The outcomes of applying the revised rates are shown in Table 5-15, with a sensitivity analysis provided in the final section.

Across the EU, the introduction of the harmonised landfill tax is projected to increase revenues by approximately 39 per cent relative to 2023 pollution tax

([59]) Some Member States have a different rate for inert waste to landfills. It has not been possible to obtain data on the amount of non-hazardous waste to landfills that is inert waste (or mineral waste) and then to apply different rates for the two. Hence, we have assumed the same rate will apply to all waste to land.

levels, while reducing the volume of waste sent to landfill by around 18 per cent. Total additional revenues are estimated to exceed €5 billion, indicating that landfill taxation has considerably greater fiscal and environmental effects than incineration taxes, for which expected revenues range between €50 million and €77 million.

The greatest impacts are observed in Romania, where waste landfilled is currently more than twice the volume of that in Germany, despite Romania's population being less than one quarter as large. Substantial reductions, exceeding 30 per cent by 2030, are projected in Czechia, Italy, Spain, Lithuania, Luxembourg, Portugal, Romania, Slovenia and Slovakia. In Italy and Spain, these results are largely driven by the planned extension of landfill taxation to additional regions and by significant rate increases in areas where charges have so far remained low.

Table 5-15: Changes in waste to landfill and revenues collected at modelled tax levels

Member State	% reduction in waste		Revenue change in €MN		As % of 2023 Pollution Tax Rev.	
	2030	2035	2030	2035	2030	2035
Austria	0%	0%	0	0	0%	0%
Belgium	0%	0%	0	0	0%	0%
Bulgaria	-9%	-9%	236	158	4596%	3077%
Croatia	-25%	-25%	60	50	37%	31%
Cyprus	-25%	-25%	19	16	30%	26%
Czechia	-32%	-32%	92	85	301%	278%
Denmark	0%	0%	0	0	0%	0%
Estonia	-23%	-23%	147	159	413%	445%
Finland	0%	0%	0	0	0%	0%
France	0%	0%	0	0	0%	0%
Germany	-25%	-25%	0	0	N.E.	N.E.
Greece	-23%	-23%	181	153	623%	527%
Hungary	-33%	-33%	186	188	82%	83%
Ireland	0%	0%	0	0	0%	0%
Italy	-35%	-35%	201	150	34%	25%
Latvia	0%	0%	0	0	0%	0%
Lithuania	-46%	-46%	11	7	7%	7%
Luxembourg	-50%	-50%	68	61	N.E.	N.E.
Malta	-25%	-25%	5	3	16%	9%
Netherlands	-20%	-20%	33	28	1%	1%
Poland	-11%	-11%	484	528	72%	79%
Portugal	-30%	-30%	56	43	71%	54%
Romania	-36%	-36%	2,925	2,639	54975%	49609%
Slovakia	-30%	-30%	50	43	188%	161%
Slovenia	-44%	-44%	4	3	18%	12%
Spain	-35%	-35%	443	320	23%	17%
Sweden	-8%	-8%	501	491	156%	153%
All EU	**-18%**	**-16%**	**5,701**	**5,126**	**39%**	**35%**

Source: Own elaboration - *Note*: N.E.: No revenues reported in 2023

5.1.7. Water effluent taxes

Member States currently operate a diverse and often complex set of taxes on water effluents, which are distinct from the charges levied for wastewater collection and treatment services. As highlighted in the 2016 review of water charges, the absence of a consistent and comprehensive dataset on wastewater emissions hampers cross-country comparison and complicates revenue modelling for effluent-related taxes. In that earlier study, a tax was modelled exclusively on biochemical oxygen demand (BOD), applying the Dutch rate of €2.47 per kilogram of BOD in 2013, with adjustments made for differences in purchasing power across Member States.

The present analysis follows the same general approach, updating the 2013 rates by 30 per cent to account for inflation. These revised rates are applied to wastewater discharge data for 2020 obtained from the European Environment Agency ([60]), which reports total discharges in millions of cubic metres per year. To convert these data into equivalent BOD_5 emissions, it is assumed that the average BOD_5 concentration in wastewater is 375 mg per litre, corresponding to the mid-point of the typical range of 250–500 mg/L.

Current wastewater tax rates have been expressed in terms of euros per kilogram of BOD_5, using the following conversion methods:

- For Member States where wastewater is taxed per cubic metre (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, France, Latvia, Hungary and Spain), rates were converted using the assumed BOD_5 content described above. Where multiple rates exist for different categories of waste producers, a simple average was used.
- For Germany, an average effective rate was derived by dividing total wastewater tax revenues by total discharges.
- Estonia, Lithuania, Poland, Portugal and Slovakia report rates explicitly based on BOD_5 or BOD_7, sometimes in combination with other pollutants.
- Luxembourg, the Netherlands and Slovenia apply taxes based on “pollution units.” In Luxembourg, one pollution equivalent corresponds to 0.2 cubic metres of wastewater; in the Netherlands, one pollution unit is defined as 54.8 kilograms of oxygen demand, which is taken here as equivalent to BOD_5; and in Slovenia, the same assumption has been applied for comparability.
- No wastewater pollution taxes are currently in place in Ireland, Greece, Italy, Malta, Finland or Sweden.

([60]) https://water.europa.eu/freshwater/countries/uwwt

The resulting estimates of current and modelled wastewater tax rates are presented in Table 5-16.

Table 5-16: Current and simulated taxes on wastewater in the EU

Member State	Tax €/kg BOD_5		Member State	Tax €/kg BOD_5	
	Current	Benchmark		Current	Benchmark
Belgium	4.17	4.17	Lithuania	0.82	1.78
Bulgaria	4.03	4.03	Luxembourg	5.00	5.00
Czechia	4.11	4.11	Hungary	1.29	1.68
Denmark	2.13	4.02	Malta	0.00	2.20
Germany	0.07	3.04	Netherlands	1.81	3.21
Estonia	0.66	2.16	Austria	6.64	6.64
Ireland	0.00	3.20	Poland	0.85	1.69
Greece	0.00	2.50	Portugal	0.01	2.38
Spain	0.75	2.65	Romania	0.03	1.50
France	0.80	3.28	Slovenia	0.49	2.35
Croatia	0.32	1.89	Slovakia	1.27	1.98
Italy	0.00	2.95	Finland	0.00	3.60
Cyprus	1.71	2.51	Sweden	0.00	3.91
Latvia	4.20	4.20			

Source: Own elaboration

The responsiveness of wastewater discharges to higher taxation is determined by the elasticity of generation with respect to the tax rate. Empirical evidence on this relationship remains limited, with few studies providing reliable estimates. One such study from Denmark reports an elasticity of –0.2. This value has been adopted as the baseline assumption for the present calculations to provide a conservative estimate of behavioural response.

The results, summarised in Table 5-17, show that Member States with existing wastewater tax rates exceeding those investigated by Hogg et al. (2016), adjusted for inflation, include Austria, Belgium, Bulgaria, Czechia and Latvia. Consequently, no additional reduction in wastewater discharges is expected in these countries. Across the EU as a whole, however, the introduction of wastewater taxes at the benchmark level is projected to reduce biochemical oxygen demand (BOD_5) emissions by around 16 per cent and generate an additional €24 billion in annual revenue. The largest absolute increases in revenue are observed in Germany, Italy, France and Spain. When expressed as a share of 2023 pollution tax revenues, these reforms would represent a rise of approximately 172 per cent. The most significant relative increases occur in Romania, Finland, Greece and Ireland, reflecting their currently low levels of pollution-related taxation.

Table 5-17: Changes in wastewater discharges and revenues collected with revised taxes

Member State	% change in discharge		Change in revenue €MN		As % of 2023 pollution taxes	
	2030	2035	2030	2035	2030	2035
Austria	0%	0%	0	0	0%	0%
Belgium	0%	0%	0	0	0%	0%
Bulgaria	0%	0%	0	0	0%	0%
Croatia	-16%	-16%	147	143	91%	89%
Cyprus	-7%	-7%	16	17	26%	26%
Czechia	0%	0%	0	0	0%	0%
Denmark	-6%	-6%	560	565	192%	194%
Estonia	-11%	-11%	53	52	148%	146%
Finland	-9%	-9%	502	500	2791%	2776%
France	-13%	-13%	4,238	4,277	84%	85%
Germany	-9%	-9%	8,327	8,320	N.E.	N.E.
Greece	-9%	-9%	692	674	2388%	2323%
Hungary	-3%	-3%	115	113	51%	50%
Ireland	-9%	-9%	452	465	5454%	5618%
Italy	-9%	-9%	5,588	5,577	944%	942%
Latvia	0%	0%	0	0	0%	0%
Lithuania	-7%	-7%	58	55	38%	37%
Luxembourg	0%	0%	0	0	0%	0%
Malta	-9%	-9%	39	41	126%	135%
Netherlands	-6%	-6%	696	705	17%	17%
Poland	-7%	-7%	728	710	109%	106%
Portugal	-9%	-9%	763	753	966%	954%
Romania	-9%	-9%	681	661	12807%	12431%
Slovakia	-4%	-4%	70	69	265%	261%
Slovenia	-15%	-15%	67	67	281%	280%
Spain	-12%	-12%	2,901	2,930	151%	152%
Sweden	-9%	-9%	1,330	1,364	413%	424%
All EU	**-9%**	**-9%**	**28,026**	**28,062**	**194%**	**194%**

Source: Own elaboration - *Note*: N.E.— No revenues reported in 2023

5.1.8. Mineral taxes

Hogg et al. (2016) explored the introduction of a tax on aggregates extracted from the ground, intended in part to promote the reuse of construction materials and discourage the disposal of construction and demolition waste in landfills. The suggested rate was €2.40 per tonne, reflecting the rate applied in the United Kingdom at that time. In the present analysis, this figure has been adjusted for inflation to €3.12 per tonne, which serves as the minimum harmonised rate applied to four material categories: (a) marble, granite, sandstone, porphyry, basalt and other ornamental or building stone; (b) slate; (c) limestone and gypsum; and (d) sand and gravel.

Data on the extraction of these materials were obtained from Eurostat for the period 2009-2022, with some gaps for particular countries. Specifically, data on limestone and gypsum for Belgium are classified as confidential; data for limestone, dolomite and gypsum are unavailable for Romania; information for

Greece extends only to 2016, for Bulgaria to 2018, and for Finland to 2020. Based on the available Eurostat series, extraction levels for 2025, 2030 and 2035 have been projected assuming that historical trends since 2009 continue.

Current taxes were estimated using several approaches depending on data availability:

- In Member States where rates are reported directly in euros per tonne, a weighted average was calculated using extraction quantities as weights. This method was applied for Denmark, Estonia, Croatia, Italy, Latvia, Lithuania, Poland, Austria, Romania and Sweden.
- In cases where the tax is reported as a percentage of market value, average unit rates were derived by combining available EU price data with extraction volumes to estimate total revenues, which were then divided by total quantities extracted. This applies to Czechia, Germany, Hungary, Portugal and Slovakia.
- No extraction taxes are reported for Belgium, Bulgaria, Ireland, Greece, Spain, France, Cyprus, Luxembourg, Malta, the Netherlands, Slovenia or Finland.

The elasticity of extraction with respect to the tax rate is assumed to be -0.2, consistent with reviewed evidence. The results of applying the benchmark tax rate are summarised in **Error! Reference source not found.**. Across the EU, aggregate extraction is projected to decline by approximately 13 per cent, while annual revenues rise by about €6.7 billion in 2030 and €7.2 billion in 2035. In Member States where existing rates already exceed the benchmark — namely Czechia, Germany and Hungary — no change in extraction is expected. For most other countries, reductions in extraction are around 17 per cent, with smaller decreases in Portugal and Sweden, where current tax levels are relatively high. When expressed as a share of 2023 resource tax revenues, these reforms would generate a substantial fiscal increase of roughly 340-370 per cent at EU level, and several times that figure in individual Member States with low existing rates ([61]).

Table 5-18: Changes in mineral extraction and revenues collected with revised taxes

Member State	Reduction in extraction		Revenues €MN		As % of 2023 resource taxes	
	2030	2035	2030	2035	2030	2035
Austria	-17%	-17%	179	177	891%	882%
Belgium	-17%	-17%	113	109	115%	112%

([61]) A number of Member States show no revenue from resource taxes in the Eurostat Database, although other sources indicate that such revenues are present. This is the case for Germany, Greece, Malta and Slovakia.

Member State	Reduction in extraction		Revenues €MN		As % of 2023 resource taxes	
	2030	2035	2030	2035	2030	2035
Bulgaria	-17%	-17%	190	205	733%	790%
Croatia	-17%	-17%	48	46	14%	13%
Cyprus	-17%	-17%	35	35	296%	293%
Czechia	0%	0%	0	0	N.E.	N.E.
Denmark	-27%	-27%	157	172	69%	75%
Estonia	-34%	-34%	34	36	213%	222%
Finland	-17%	-17%	738	930	2,732%	3,446%
France	-17%	-17%	1,009	1,014	239%	240%
Germany	0%	0%	0	0	N.E.	N.E.
Greece	-17%	-17%	56	46	N.E.	N.E.
Hungary	0%	0%	0	0	0%	0%
Ireland	-17%	-17%	125	122	9,869%	9,634%
Italy	-20%	-20%	267	237	160%	142%
Latvia	-17%	-17%	75	88	274%	321%
Lithuania	-17%	-17%	126	151	253%	304%
Luxembourg	-17%	-17%	1	1	9%	8%
Malta	-17%	-17%	4	4	N.E.	N.E.
Netherlands	-17%	-17%	65	67	21%	21%
Poland	-16%	-16%	539	571	4,147%	4,398%
Portugal	-6%	-6%	63	57	269%	244%
Romania	-17%	-17%	1,297	1,543	20,432%	24,297%
Slovakia	-17%	-17%	81	80	N.E.	N.E.
Slovenia	-17%	-17%	42	40	136%	132%
Spain	-17%	-17%	323	275	323%	275%
Sweden	-9%	-9%	126	133	1,417%	1,494%
All EU	**-13%**	**-13%**	**5,570**	**5,985**	**285%**	**306%**

Source: Own elaboration - *Note*: N.E.— No revenues reported in 2023

5.1.9. Summary of results – Scenario A

The aggregated results for all eight simulated taxes across Member States are summarised in Table 5-19. The table presents the combined environmental and fiscal effects of introducing the modelled tax rates. By 2030, the simulation suggests that an additional €62 billion in environmental tax revenues could be generated if all Member States applied the benchmark tax rates outlined in this report. For comparison, total revenues from pollution and resource taxes amounted to just €13.1 billion in 2023, meaning that the hypothesised reforms would increase this figure nearly fivefold. As a result, pollution and resource taxes would account for almost 20 per cent of all environmental tax revenues recorded in 2023.

Table 5-19: Summary of results from modelled taxes ([62])

Scenario A

Scenario with benchmark tax — all MS	Emission/Use of inputs/Waste discharge or extraction of minerals		Additional revenue collected €MN		As % of 2023 pollution & resource taxes	
	2030	2035	2030	2035	2030	2035
Air pollution NO_x, SO_2, $PM_{2.5}$	-18%	-13%	694	542	4.8%	3.8%
Fertilizer	-24%	-23%	563	547	3.9%	3.8%
Pesticides	-6%	-6%	1,797	1,786	12.4%	12.4%
Water abstraction	-24%	-24%	22,422	22,874	137.5%	140.3%
Waste to incineration	-12%	-12%	70	83	0.5%	0.6%
Waste to landfill	-18%	-16%	5.701	5,126	39.5%	35.5%
Water effluent	-9%	-9%	28,026	28,062	194%	194%
Mineral aggregates extracted	-13%	-13%	5,570	5,985	284.8%	305.9%
Total	**-**	**-**	**64,842**	**65,004**	**494%**	**496%**

Source: Own elaboration

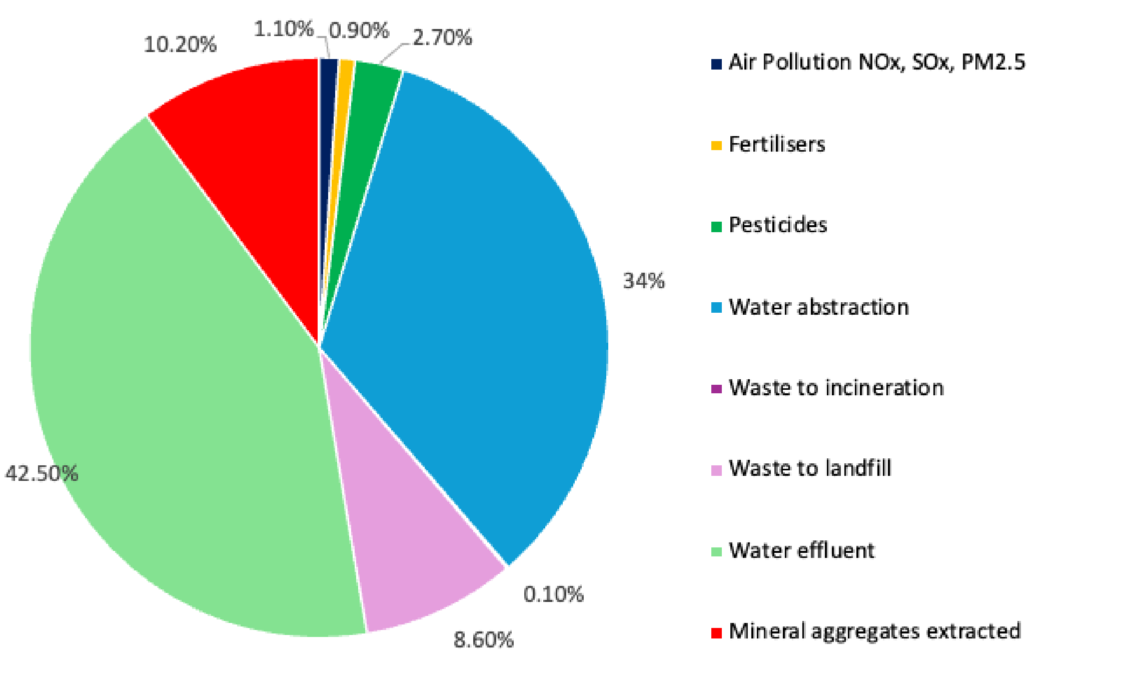
The largest contributions to the overall revenue increase stem from water effluent and water abstraction taxes, which together account for around three quarters of the total, representing approximately 40 per cent and 36 per cent respectively.

([62]) The % of change in emissions linked to air pollutant are those comparing the taxable sectors.

Figure **5-2** illustrates the distribution of projected revenues by tax type, while detailed country-level results are presented in Annex 6.

By 2030, the simulated reforms are expected to achieve substantial environmental gains, with reductions in emissions, input use, waste discharges and resource extraction reaching significant double-digit levels across most categories. The effects are particularly marked in areas where both the environmental burden and the taxable base are large, such as mineral extraction and industrial wastewater discharges. Overall, the results indicate that well-designed environmental taxation targeted at high-impact sectors can deliver measurable reductions in environmental pressures while reinforcing public revenues, thereby advancing both sustainability and fiscal resilience. Nonetheless, further assessment is required to evaluate the potential distributional and competitiveness implications of these measures. In addition, questions of governance and implementation feasibility need to be considered. While many Member States indicated a willingness to phase in taxes at the benchmarked levels, others expressed reservations. It is also possible that Member State positions have evolved since the surveys conducted in 2016. Continued dialogue is therefore essential to ensure political commitment and practical feasibility in advancing these reforms.

Figure 5-2: Share of additional revenue by tax type



5.1.10. Sensitivity analysis – Scenario A

The results presented are naturally sensitive to the assumptions underpinning both the tax rates applied and the elasticities used. Sensitivity to tax rates is assessed through two alternative scenarios, one applying substantially lower rates on pollutants and resources than the other (see Table 2-3 and Table 2-4: Scenario B tax rates

). The distinction between these scenarios, and their implications, is discussed in Section **Error! Reference source not found.**, where Scenario B is described in detail.

To evaluate the sensitivity of results to elasticity assumptions, two additional cases are examined alongside the Base Case. In the first, a zero elasticity is assumed, implying no behavioural response to changes in tax rates. In the second, elasticities are set 50 per cent higher than in the Base Case, reflecting a stronger behavioural adjustment. The elasticity values applied in each case are reported in Table 5-20.

Table 5-20: Elasticities used in Base Case and Low and High Cases

Tax type	Base Case	Low Case	High Case
NOx	-0.40	0	-0.60
SO2	-0.48	0	-0.72
PM10	-0.42	0	-0.63
Fertilizers	-0.30	0	-0.45

Tax type	Base Case	Low Case	High Case
Pesticides (1)	-0.3 and +0.5	0 and 0	-0.45 and +0.75
Water Abstraction	-0.20	0	-0.30
Waste Incineration	-0.25	0	-0.375
Waste to Landfill	-0.33	0	-0.5
Water Effluent	-0.10	0	-0.15
Minerals Extraction	-0.2	0	-0.3

For pesticides there is also a cross-price elasticity of 0.5 in the Base Case, 0 in the Low Case and +0.75 in the High Case – *Source*: Own elaboration

A summary of the results for the three elasticity assumptions under Scenario A is presented in Table 5-21. The table illustrates how variations in behavioural responsiveness influence both environmental and fiscal outcomes, highlighting the extent to which projected reductions in emissions, discharges, or resource use, as well as corresponding revenue changes, depend on the assumed elasticity values.

Table 5-21: Key results under different elasticities

Tax type	Base Case	Low Case	High Case
NOx	-0.40	0	-0.60
SO2	-0.48	0	-0.72
PM10	-0.42	0	-0.63
Fertilizers	-0.30	0	-0.45
Pesticides (1)	-0.3 and +0.5	0 and 0	-0.45 and +0.75
Water Abstraction	-0.20	0	-0.30
Waste Incineration	-0.25	0	-0.375
Waste to Landfill	-0.33	0	-0.5
Water Effluent	-0.10	0	-0.15
Minerals Extraction	-0.2	0	-0.3

For pesticides there is also a cross-price elasticity of 0.5 in the Base Case, 0 in the Low Case and +0.75 in the High Case – *Source*: Own elaboration

The effects of varying elasticity assumptions are summarised as follows.

- When a zero elasticity is applied, there is no behavioural response to the simulated taxes, meaning that emissions and resource use remain unchanged. As quantities do not decline, overall tax revenues are consequently higher: around 29 per cent above those in the base case across all pollutants and resources.
- When higher elasticities are used, implying stronger behavioural reactions, the reductions in emissions and resource use are considerably greater. The scale of change varies across pollutants and resources: air pollution falls by more than double relative to the base case (from 18 per cent to 39 per cent); fertilizer use declines by 33 per cent more; pesticide use by 50 per cent; water abstraction and waste incineration by 42 per cent; waste to landfill by 33 per cent; water effluents by 44 per cent; and

mineral extraction by 38 per cent. These sharper declines in activity levels result in lower overall revenues: approximately €57 billion compared with €66 billion in the base case, representing a 14 per cent decrease.

The implications of applying lower tax rates are explored under Scenario B, the results of which are presented in the following section.

5.2. Scenario B

This section presents the results of introducing the benchmark tax rates specified in Table 2 and compares these outcomes with those obtained under Scenario A. The comparison highlights how applying lower benchmark rates affects both environmental and fiscal results, providing insight into the sensitivity of projected impacts to the overall level of taxation.

5.2.1. Tax on air pollution

The same sectors as in Scenario A are subject to taxation on emissions of NOx, SO_2 and $PM_{2.5}$, but at rates set at one quarter of those applied in Scenario A.

Tax on NOx

Table 5-22 presents the reductions in emissions and the corresponding changes in revenues. Under the lower benchmark rates, emissions from the taxed sectors decline by 7.4 per cent across all Member States, equivalent to a reduction of around 0.7-0.8 per cent in total NOx emissions. This compares with reductions of 28.6 per cent in the taxed sectors and 2.5-3 per cent in total emissions under Scenario A. Revenues are correspondingly lower, amounting to €12.8 million in 2030 and €10.3 million in 2035, compared with €45.7 million and €46.8 million respectively under the higher-rate scenario.

Table 5-22: Emissions and revenue changes with a tax on NO_x

Scenario B

NOx EMISSIONS	EMISSIONS CHANGES				ADDITIONAL TAX REVENUES €MN.	
Country	As % of Taxed Sectors		As % of all NOx Emissions			
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	-7.4%	-7.4%	-0.9%	-0.6%	0.43	0.28
Bulgaria	-7.4%	-7.4%	-0.3%	-0.2%	0.18	0.14
Czechia	-7.4%	-7.4%	-1.2%	-1.1%	0.00	0.00

NOx EMISSIONS	EMISSIONS CHANGES				ADDITIONAL TAX REVENUES €MN.	
Country	As % of Taxed Sectors		As % of all NOx Emissions			
	By 2030	By 2035	By 2030	By 2035	2030	2035
Denmark	-7.4%	-7.4%	0.0%	0.0%	0.00	0.00
Germany	-7.4%	-7.4%	-0.9%	-0.7%	2.07	1.31
Estonia	-7.4%	-7.4%	-0.6%	-0.6%	0.07	0.08
Ireland	-7.4%	-7.4%	-0.4%	-0.4%	0.27	0.26
Greece	-7.4%	-7.4%	-0.7%	-0.6%	0.34	0.26
Spain	-7.4%	-7.4%	-1.1%	-0.9%	1.64	1.37
France	-7.4%	-7.4%	-0.4%	-0.3%	0.58	0.40
Croatia	-7.4%	-7.4%	-0.6%	-0.4%	0.10	0.06
Italy	-7.4%	-7.4%	-1.3%	-1.2%	2.45	2.15
Cyprus	-7.4%	-7.4%	-1.7%	-1.8%	0.04	0.04
Latvia	-7.4%	-7.4%	-0.7%	-0.7%	0.13	0.14
Lithuania	-7.4%	-7.4%	-0.4%	-0.3%	0.06	0.04
Luxembourg	-7.4%	-7.4%	-0.7%	-0.8%	0.03	0.03
Hungary	-7.4%	-7.4%	-0.4%	-0.4%	0.02	0.01
Malta	-7.4%	-7.4%	-0.6%	-0.5%	0.01	0.00
Netherlands	-7.4%	-7.4%	-0.6%	-0.5%	0.61	0.45
Austria	-7.4%	-7.4%	-1.1%	-1.0%	0.39	0.35
Poland	-7.4%	-7.4%	-0.7%	-0.6%	0.94	0.83
Portugal	-7.4%	-7.4%	-2.2%	-2.1%	0.95	0.86
Romania	-7.4%	-7.4%	-0.5%	-0.4%	0.56	0.45
Slovenia	-7.4%	-7.4%	-1.0%	-1.0%	0.08	0.07
Slovakia	-7.4%	-7.4%	-1.6%	-1.1%	0.22	0.15
Finland	-7.4%	-7.4%	-0.7%	-0.5%	0.32	0.23
Sweden Elec	-7.4%	-7.4%	0.0%	0.0%	0.00	0.00
Sweden W/out Elec	-7.4%	-7.4%	-2.5%	-2.1%	0.37	0.30
All EU	**-7.4%**	**-7.4%**	**-0.8%**	**-0.7%**	**12.84**	**10.27**

Source: Own elaboration

Tax on SO_2

The results for SO_2 are shown in Table 5-23. Emissions from the taxed sectors fall by 8.0 per cent for all Member States, except those where existing taxes already exceed the new benchmark rate of €325 per tonne. This reduction corresponds to about 5 per cent of total SO_2 emissions. Under Scenario A, the higher tax rates produced reductions of 32 per cent in the taxed sectors and 22 per cent in total emissions. Revenues in this case amount to €150.7 million in 2030 and €112.6 million in 2035, compared with €493.6 million and €364.6 million respectively under Scenario A.

Table 5-23: Emissions and revenue changes with a tax on SO_2

Scenario B

SO_2 EMISSIONS	EMISSIONS CHANGES				ADDITIONAL TAX REVENUES €MN.	
Country	As % of Taxed Sectors		As % of all SO_2 emissions			
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	-8%	-8%	-8%	-8%	3.78	2.61
Bulgaria	-8%	-8%	-8%	-8%	5.71	2.56
Czechia	0%	0%	0%	0%	0.00	0.00
Denmark	0%	0%	0%	0%	0.00	0.00
Germany	-8%	-8%	-8%	-8%	58.17	50.87
Estonia	-8%	-8%	-7%	-7%	1.84	1.11
Ireland	-8%	-8%	-7%	-6%	0.35	0.17
Greece	-8%	-8%	-1%	-1%	2.70	1.14
Spain	-8%	-8%	-6%	-5%	13.92	9.20
France	-8%	-8%	-4%	-4%	10.75	6.93
Croatia	-8%	-8%	-4%	-4%	0.21	0.08
Italy	-8%	-8%	-2%	-2%	10.10	6.88
Cyprus	-8%	-8%	-8%	-8%	2.48	2.08
Latvia	-8%	-8%	-6%	-6%	0.45	0.36
Lithuania	-8%	-8%	-8%	-8%	2.14	1.74
Luxembourg	-8%	-8%	-2%	-2%	0.07	0.04
Hungary	-8%	-8%	-7%	-7%	0.15	0.11
Malta	-8%	-8%	0%	0%	0.00	0.00
Netherlands	-8%	-8%	-6%	-7%	3.69	2.87
Austria	-8%	-8%	-7%	-7%	2.46	2.26
Poland	-8%	-8%	-7%	-7%	16.28	10.99
Portugal	-8%	-8%	-7%	-7%	7.93	6.33
Romania	-8%	-8%	-6%	-4%	2.83	1.14
Slovenia	-8%	-8%	-8%	-8%	0.44	0.29
Slovakia	-8%	-8%	-8%	-8%	1.03	0.54
Finland	-8%	-8%	-7%	-7%	3.26	2.25
Sweden	0%	0%	0%	0%	0.00	0.00
All EU	**-8%**	**-8%**	**-5%**	**-5%**	**150.73**	**112.56**

Source: Own elaboration

Tax on $PM_{2.5}$

Table 5-24 reports the effects of the $PM_{2.5}$ tax. With the lower rates, emissions in the taxed sectors decline by 7.0 per cent across Member States, equivalent to a reduction of about 3 per cent in total $PM_{2.5}$ emissions. This compares with decreases of 30 per cent in the taxed sectors and 10–11 per cent overall under the higher-rate scenario. The revenues generated amount to €48.6 million in 2030 and €44.2 million in 2035, relative to €154.8 million and €140.6 million respectively under Scenario A.

Table 5-24: Emissions and revenue changes with a tax on $PM_{2.5}$

Scenario B

$PM_{2.5}$ EMISSIONS	EMISSIONS CHANGES				ADDITIONAL TAX REVENUES €MN.	
Country	As % of Taxed Sectors		As % of all $PM_{2.5}$ emissions			
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	-7%	-7%	-6%	-6%	1.36	1.23
Bulgaria	-7%	-7%	-4%	-4%	1.02	0.88
Czechia	-7%	-7%	-4%	-4%	-0.17	-0.13
Denmark	-7%	-7%	0%	0%	0.32	0.27
Germany	-7%	-7%	-1%	-1%	4.20	3.34
Estonia	-7%	-7%	-4%	-4%	0.29	0.22
Ireland	-7%	-7%	-5%	-5%	0.82	0.78
Greece	-7%	-7%	-2%	-2%	2.02	1.44
Spain	-7%	-7%	-1%	-1%	4.90	4.41
France	-7%	-7%	-3%	-4%	6.88	6.43
Croatia	-7%	-7%	-6%	-6%	1.01	0.97
Italy	-7%	-7%	-3%	-3%	4.41	3.79
Cyprus	-7%	-7%	-5%	-6%	0.10	0.08
Latvia	-7%	-7%	-6%	-7%	2.40	3.31
Lithuania	-7%	-7%	-3%	-3%	0.38	0.36
Luxembourg	-7%	-7%	-5%	-5%	0.25	0.30
Hungary	-7%	-7%	-4%	-4%	0.80	0.65
Malta	-7%	-7%	-4%	-3%	0.04	0.04
Netherlands	-7%	-7%	-3%	-3%	1.13	0.98
Austria	-7%	-7%	-4%	-4%	0.87	0.78
Poland	-7%	-7%	-3%	-3%	5.36	4.70
Portugal	-7%	-7%	-6%	-6%	5.87	5.87
Romania	-7%	-7%	-4%	-4%	2.04	1.63
Slovenia	-7%	-7%	-5%	-6%	0.56	0.56
Slovakia	-7%	-7%	-3%	-2%	0.21	0.16

PM2.5 EMISSIONS	EMISSIONS CHANGES				ADDITIONAL TAX REVENUES €MN.	
Country	As % of Taxed Sectors		As % of all PM2.5 emissions			
	By 2030	By 2035	By 2030	By 2035	2030	2035
Finland	-7%	-7%	-3%	-3%	0.50	0.36
Sweden	-7%	-7%	-3%	-3%	1.03	0.77
All EU	**-7%**	**-7%**	**-3%**	**-3%**	**48.61**	**44.16**

Source: Own elaboration

As in Scenario A, Table 5-25 summarises the combined results for the three air pollution taxes under Scenario B, showing average emission reductions and additional revenues as a share of existing pollution tax receipts. Under the lower benchmark rates, total additional revenues are estimated at €212.2 million in 2030, declining to €167.0 million in 2035. This compares with €694 million and €542 million, respectively, under Scenario A. Expressed as a share of total pollution tax revenues in 2023, the increases are modest — around 1.5 per cent in 2030 and 1.2 per cent in 2035 — compared with 4.8 per cent and 3.8 per cent in Scenario A.

Nevertheless, significant revenue gains remain for certain countries. Bulgaria and Romania continue to record the largest proportional increases, while Ireland, Greece, Portugal and Finland also experience relatively strong growth in revenues despite the lower overall rates.

Table 5-25: Average reductions across all air pollutants and total revenues

Scenario B

ALL EMISSIONS	EMISSIONS CHANGES				ADDITIONAL TAX REVENUES €MN.		As % of 2023 Pollution Taxes	
Country	As % of Taxed Sectors		As % of all emissions					
	By 2030	By 2035	By 2030	By 2035	2030	2035	2030	2035
Belgium	-8%	-8%	-18%	-4%	5.57	4.13	1.1%	0.8%
Bulgaria	-8%	-8%	-15%	-3%	6.91	3.59	134.5 %	69.8 %
Czechia	-2%	-2%	-68%	-1%	-0.17	-0.13	-0.5%	-0.4%
Denmark	-1%	-1%	-87%	0%	0.32	0.27	0.1%	0.1%
Germany	-8%	-8%	28%	-5%	64.45	55.53	N.E	N.E
Estonia	-8%	-8%	19%	-4%	2.21	1.41	6.2%	4.0%
Ireland	-8%	-7%	-68%	-1%	1.44	1.22	17.4 %	14.7 %
Greece	-8%	-8%	-46%	-1%	5.06	2.83	17.4 %	9.8%
Spain	-8%	-8%	-31%	-2%	20.46	14.98	1.1%	0.8%

ALL EMISSIONS	EMISSIONS CHANGES				ADDITIONAL TAX REVENUES €MN.		As % of 2023 Pollution Taxes	
Country	As % of Taxed Sectors		As % of all emissions					
	By 2030	By 2035	By 2030	By 2035	2030	2035	2030	2035
France	-8%	-8%	-84%	-2%	18.21	13.76	0.4%	0.3%
Croatia	-7%	-7%	-1%	-4%	1.33	1.11	0.8%	0.7%
Italy	-8%	-8%	-11%	-2%	16.96	12.82	2.9%	2.2%
Cyprus	-8%	-8%	85%	-7%	2.62	2.20	4.1%	3.5%
Latvia	-7%	-7%	17%	-5%	2.97	3.82	8.3%	10.6%
Lithuania	-8%	-8%	-72%	-4%	2.58	2.13	1.7%	1.4%
Luxembourg	-8%	-7%	-72%	-3%	0.34	0.37	N.E	N.E
Hungary	-8%	-8%	-22%	-3%	0.96	0.78	0.4%	0.3%
Malta	-7%	-7%	-58%	0%	0.05	0.05	0.2%	0.1%
Netherlands	-8%	-8%	-61%	-3%	5.43	4.29	0.1%	0.1%
Austria	-8%	-8%	-44%	-4%	3.72	3.39	6.1%	5.6%
Poland	-8%	-8%	-6%	-4%	22.57	16.51	3.4%	2.5%
Portugal	-8%	-8%	55%	-6%	14.75	13.06	18.7%	16.5%
Romania	-8%	-8%	-81%	-2%	5.42	3.22	102.0%	60.5%
Slovenia	-8%	-8%	17%	-5%	1.08	0.93	4.5%	3.9%
Slovakia	-8%	-8%	3%	-3%	1.47	0.85	5.5%	3.2%
Finland	-8%	-8%	-2%	-3%	4.08	2.83	22.65%	15.74%
Sweden	-4%	-3%	31%	-2%	1.40	1.07	0.43%	0.33%
All EU	**-8%**	**-8%**	**-4%**	**-3%**	**212.19**	**167.00**	**1.47%**	**1.16%**

Source: Own elaboration – *Note*: N.E.: No revenues reported in 2023

5.2.2. Fertilizer tax

At present, no EU Member State applies a general fertiliser tax. The Netherlands previously operated a levy on surplus fertiliser, but this has been withdrawn, as has Sweden’s former fertiliser tax. Belgium continues to apply a manure tax, although this is distinct in scope and design from a fertiliser tax.

The benchmark rates used in this analysis follow those explored by Hogg et al. (2016), updated to reflect inflation. In that study, the rate was set at €0.20 per kilogram of nitrogen (N) applied. As in the earlier assessment, the rates have been adjusted in line with relative agricultural price levels across Member

States to limit adverse distributional impacts between national farming sectors. The inflation-adjusted rates are shown in Table 5-26.

These taxes apply specifically to the nitrogen content of fertilisers, which varies depending on the type of product (Annis, 2004). Urea, which accounts for 56 per cent of applications, contains 46 per cent nitrogen. The remaining 44 per cent of fertiliser use consists primarily of nitrates — such as ammonium nitrate, calcium ammonium nitrate, calcium nitrate and urea ammonium nitrate — with an average nitrogen content of 26.5 per cent. On this basis, the weighted average nitrogen content across all fertilisers is estimated at 37.3 per cent, and this figure has been used to calculate the effective tax per tonne of fertiliser.

Given an average EU price of €366 per tonne of inorganic nitrogen fertiliser in 2025 ([63]), the additional tax would raise prices by approximately 6 per cent in Estonia, Latvia and Malta, and by around 13 per cent in Bulgaria, Lithuania, Poland, Romania and Slovakia. The most pronounced increase would occur in Greece, where prices would rise by about 53 per cent.

Table 5-26: Simulated nitrogen taxes by Member State €/1000Kg

Member State	Rate	Member State	Rate
Belgium	455	Lithuania	130
Bulgaria	130	Luxembourg	325
Czechia	195	Hungary	260
Denmark	390	Malta	65
Germany	390	Netherlands	455
Estonia	65	Austria	260
Ireland	325	Poland	130
Greece	520	Portugal	195
Spain	195	Romania	130
France	325	Slovenia	260
Croatia	260	Slovakia	130
Italy	325	Finland	260
Cyprus	260	Sweden	260
Latvia	65		

Source: Own elaboration

To estimate the effects of the fertiliser tax, an elasticity of -0.3 has been applied, based on reviewed evidence ([64]). Sensitivity analyses using alternative elasticity values are presented in the final section. The projected reductions in fertiliser

([63]) See: https://agridata.ec.europa.eu/extensions/DashboardFertiliser/FertiliserPrices.html

([64]) Ollier & De Cara (2024) estimate a higher elasticity of around -0.7. However, other studies indicate that fertilizer demand is more price inelastic with values of between -0.12 and -0.29 (Y. Pang et al., 2021). As a result, we take a value of -0.3 as the base case.

consumption for 2030 and 2035, together with the corresponding changes in revenue, are shown in Table 5-27.

Across the EU, total additional revenues are estimated at €563 million in 2030 and €547 million in 2035, with the slight decline reflecting the gradual downward trend in fertiliser application over time. When expressed as a share of 2023 pollution tax revenues, this represents an increase of about 4 per cent. Several Member States — particularly Bulgaria, Ireland, Greece, Finland and Romania — experience significant relative increases in revenue, while only marginal changes are observed in Estonia, Cyprus, Malta, the Netherlands, France, Spain and Croatia. These differences are largely explained by the variation in effective tax increases across countries, as reported in Table 5-27.

Table 5-27: Changes in fertilizer use and revenues collected with revised taxes

Scenario B

Country	Change in fertiliser consumption (%)		Change in revenue € million		% of 2023 pollution tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	-10%	-10%	3.62	3.33	0.7%	0.7%
Bulgaria	-3%	-3%	5.56	7.01	108.1 %	136.5 %
Czechia	-4%	-4%	4.00	3.90	13.1%	12.8%
Denmark	-9%	-9%	6.39	6.33	2.2%	2.2%
Germany	-9%	-9%	25.73	21.83	n.e.	n.e.
Estonia	-1%	-1%	0.27	0.31	0.8%	0.9%
Ireland	-7%	-7%	7.53	7.29	90.9%	88.1%
Greece	-12%	-12%	7.24	7.09	25.0%	24.5%
Spain	-4%	-4%	13.37	13.32	0.7%	0.7%
France	-7%	-7%	42.56	38.70	0.8%	0.8%
Croatia	-6%	-6%	1.94	1.91	1.2%	1.2%
Italy	-7%	-7%	15.73	15.56	2.7%	2.6%
Cyprus	-6%	-6%	0.18	0.18	0.3%	0.3%
Latvia	-1%	-1%	0.60	0.70	1.7%	1.9%
Lithuania	-3%	-3%	1.46	1.43	1.0%	0.9%
Luxembourg	-7%	-7%	0.24	0.22	n.e.	n.e.
Hungary	-6%	-6%	5.95	5.88	2.6%	2.6%
Malta	-1%	-1%	0.00	0.01	0.0%	0.0%
Netherlands	-10%	-10%	6.81	6.55	0.2%	0.2%
Austria	-6%	-6%	2.33	2.41	3.8%	4.0%
Poland	-3%	-3%	11.92	11.70	1.8%	1.8%

Country	Change in fertiliser consumption (%)		Change in revenue € million		% of 2023 pollution tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Portugal	-4%	-4%	1.48	1.44	1.9%	1.8%
Romania	-3%	-3%	6.83	8.02	128.4 %	150.7 %
Slovenia	-6%	-6%	0.53	0.51	2.2%	2.1%
Slovakia	-3%	-3%	1.34	1.39	5.1%	5.3%
Finland	-6%	-6%	3.27	3.31	18.1%	18.4%
Sweden	-6%	-6%	4.77	5.23	1.5%	1.6%
All EU	**-6%**	**-6%**	**181.66**	**175.55**	**1.3%**	**1.2%**

Source: Own elaboration

5.2.3. Pesticide tax

Under Scenario B, the simulated pesticide tax results in a 3 per cent reduction in pesticide use, compared with a 6 per cent reduction under Scenario A. The corresponding decline in the HRI 1 Index of overall pesticide toxicity is 6.4 per cent, roughly half the reduction achieved in the higher-rate scenario (12.6 per cent). Revenues generated under Scenario B amount to €972 million in 2030 and €966 million in 2035, representing around 6 per cent of total pollution tax revenues recorded in 2023. By contrast, Scenario A yields €1.7 billion, or approximately 11 per cent of the same baseline. Detailed results by Member State are presented in Table 5-28.

Table 5-28: Change in revenues (in 2030 and 2035) and change in pesticide use distribution across toxicity groups (in 2035) as result of tax application

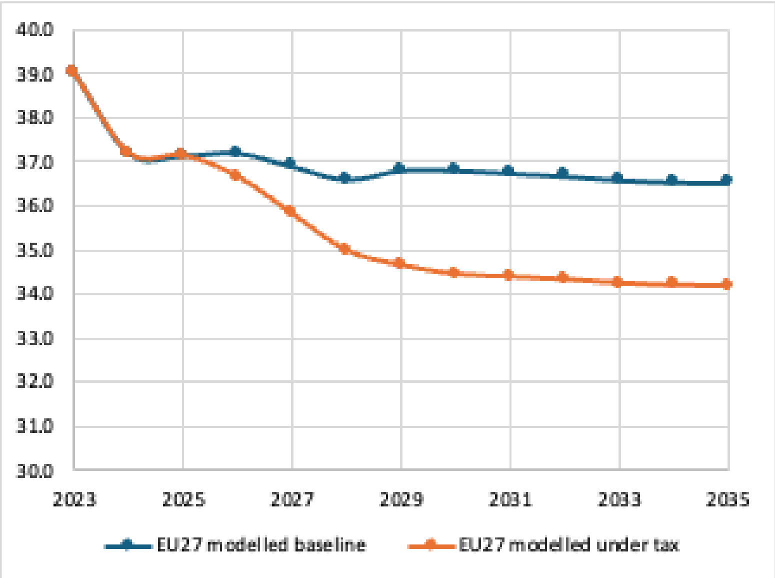
Scenario B

Member State	Revenues (€Mn).		Change (%) in use distribution 2035 tax versus 2035 baseline				
	2030	2035	1	2	3	4	Reduction in kg ai
Belgium	26.4	26.3	5%	-4%	0%	0%	-3%
Bulgaria	8.7	8.6	2%	-2%	0%	0%	-1%
Czechia	12.7	12.6	2%	-2%	0%	0%	-2%
Denmark	18.6	18.6	3%	-3%	0%	0%	-2%
Germany	174.7	173.9	5%	-4%	0%	0%	-3%
Estonia	0.8	0.8	1%	-1%	0%	0%	-1%
Ireland	13.0	13.0	7%	-7%	0%	0%	-5%
Greece	28.0	27.8	4%	-3%	-1%	0%	-4%

Member State	Revenues (€Mn).		Change (%) in use distribution 2035 tax versus 2035 baseline				
	2030	2035	1	2	3	4	Reduction in kg ai
Spain	150.1	148.4	5%	-5%	0%	0%	-3%
France	191.6	190.8	3%	-2%	0%	0%	-2%
Croatia	5.3	5.3	3%	-2%	0%	0%	-2%
Italy	154.6	153.4	7%	-6%	-1%	0%	-5%
Cyprus	2.7	2.7	7%	-7%	0%	0%	-5%
Latvia	1.9	1.9	1%	-1%	0%	0%	-1%
Lithuania	5.6	5.6	1%	-1%	0%	0%	-1%
Luxembourg	0.6	0.6	4%	-3%	0%	0%	-2%
Hungary	29.5	29.4	3%	-3%	0%	0%	-2%
Malta	0.2	0.2	16%	-12%	-4%	0%	-15%
Netherlands	35.1	34.9	2%	-2%	0%	0%	-2%
Austria	12.9	12.6	5%	-5%	0%	0%	-3%
Poland	43.9	43.8	1%	-1%	0%	0%	-1%
Portugal	20.7	20.6	5%	-5%	-1%	0%	-4%
Romania	14.0	13.9	2%	-1%	0%	0%	-1%
Slovenia	2.3	2.2	4%	-4%	0%	0%	-3%
Slovakia	4.2	4.1	1%	-1%	0%	0%	-1%
Finland	11.4	11.4	7%	-7%	0%	0%	-4%
Sweden	2.4	2.3	3%	-3%	0%	0%	-2%
EU	972	966	4%	-4%	0%	0%	-3%

Figure 5-3: Estimated change in HRI 1 index

Scenario B



5.2.4. Tax on water abstraction

Table 5-29 presents the results for water abstraction taxes under Scenario B. Revenues are projected at €4.9 billion in 2030 and €5.1 billion in 2035, equivalent to around 30-31 per cent of 2023 resource tax revenues. These figures are considerably lower than under Scenario A, where revenues reached €22 billion, or roughly 138-140 per cent of 2023 levels. The pattern of impact across Member States remains broadly consistent between the two scenarios, with the same countries experiencing the greatest and least effects.

Table 5-29: Changes in revenue and water abstracted with revised charges

Scenario B

Country	Change in water abstraction (%)		Change in revenue € million		% of 2023 resource tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	0%	0%	0.00	0.00	0%	0%
Bulgaria	-1%	-1%	23.47	23.00	90%	89%
Czechia	-1%	-1%	2.73	2.54	N.E.	N.E.
Denmark	0%	0%	0.00	0.00	0%	0%
Germany	0%	0%	0.00	0.00	N.E.	N.E.
Estonia	-7%	-7%	3.35	2.72	21%	17%
Ireland	-2%	-2%	30.52	28.99	2403%	2282%
Greece	-5%	-5%	482.80	484.04	N.E.	N.E.
Spain	-6%	-6%	1,401.04	1,310.11	1401%	1310%
France	-6%	-6%	17.37	16.01	4%	4%
Croatia	0%	0%	0.00	0.00	0%	0%
Italy	-6%	-6%	2,149.22	2,383.88	1287%	1427%
Cyprus	-6%	-6%	5.47	5.07	46%	42%
Latvia	-1%	-1%	0.33	0.32	1%	1%
Lithuania	-1%	-1%	1.25	1.01	3%	2%
Luxembourg	-2%	-2%	-0.02	-0.02	0%	0%
Hungary	-1%	-1%	57.00	60.41	432%	458%
Malta	-6%	-6%	1.55	1.35	N.E.	N.E.
Netherlands	0%	0%	48.30	40.19	1%	1%
Austria	-2%	-2%	67.43	68.87	84%	85%
Poland	-1%	-1%	23.64	21.95	3%	3%
Portugal	-6%	-6%	287.56	293.69	281%	287%
Romania	-4%	-4%	255.80	291.95	2194%	2504%
Slovenia	0%	0%	0.00	0.00	0%	0%
Slovakia	0%	0%	0.00	0.00	0%	0%
Finland	-7%	-7%	10.13	9.72	23%	22%

Country	Change in water abstraction (%)		Change in revenue € million		% of 2023 resource tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Sweden	-2%	-2%	39.69	38.96	14%	13%
All EU	**-3%**	**-4%**	**4,908.64**	**5,084.75**	**30%**	**31%**

Source: Own elaboration

5.2.5. Waste incineration tax

Table 5-30 presents the results for waste incineration under Scenario B. The reduction in waste sent to incineration is modest: around 1.6 per cent in 2030 and 1.1 per cent in 2035. The associated revenue raised is approximately €16 million, equivalent to just 0.1 per cent of total EU pollution tax revenues in 2023. This contrasts with Scenario A, where incinerated waste declined by about 12 per cent and revenues ranged between €69 million and €88 million, corresponding to 0.5-0.6 per cent of 2023 pollution tax revenues. The markedly lower results in Scenario B reflect the fact that the benchmark rates fall below the current national rates in 14 Member States, meaning that no change in waste incineration occurs in those cases.

Table 5-30: Changes in waste incineration and revenues collected with revised taxes

Scenario B

Country	Reduction in waste (%)		Change in revenue € million		% of 2023 pollution tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Bulgaria	-8.3%	-8.3%	0.00	0.00	0.08%	0.03%
Czechia	-8.3%	-8.3%	0.71	0.84	2.34%	2.76%
Denmark	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Germany	-8.3%	-8.3%	5.85	3.26	0.00%	0.00%
Estonia	-8.3%	-8.3%	0.00	0.00	0.00%	0.00%
Ireland	-8.3%	-8.3%	0.03	0.02	0.38%	0.26%
Greece	-8.3%	-8.3%	0.07	0.09	0.25%	0.30%
Spain	0.0%	0.0%	0.00	0.00	0.00%	0.00%
France	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Croatia	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Italy	-8.3%	-8.3%	1.31	0.73	0.22%	0.12%
Cyprus	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Latvia	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Lithuania	-8.3%	-8.3%	0.01	0.00	0.01%	0.00%

Country	Reduction in waste (%)		Change in revenue € million		% of 2023 pollution tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Luxembourg	-8.3%	-8.3%	0.00	0.00	0.00%	0.00%
Hungary	-8.3%	-8.3%	0.72	0.80	0.32%	0.35%
Malta	-8.3%	-8.3%	0.04	0.04	0.13%	0.13%
Netherlands	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Austria	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Poland	0.0%	0.0%	2.68	2.76	0.40%	0.41%
Portugal	0.0%	0.0%	0.00	0.00	0.00%	0.00%
Romania	-8.3%	-8.3%	2.66	5.09	50.06%	95.72%
Slovenia	-8.3%	-8.3%	0.17	0.13	0.71%	0.52%
Slovakia	-8.3%	-8.3%	0.03	0.02	0.10%	0.06%
Finland	-8.3%	-8.3%	1.54	1.49	8.58%	8.28%
Sweden	-8.3%	-8.3%	0.39	0.38	0.12%	0.12%
All EU	**-1.6%**	**-1.1%**	**16.21**	**15.65**	**0.11%**	**0.11%**

Source: Own elaboration

5.2.6. Landfill tax

Table 5-31 summarises the results for landfill taxes under Scenario B. Waste sent to landfill is projected to fall by 8.9 per cent in 2030 and 8.2 per cent in 2035, while the revenues generated amount to €1.9 billion and €1.7 billion, respectively. These figures correspond to 13.5 per cent and 11.8 per cent of 2023 pollution tax revenues. By comparison, under Scenario A, landfill waste declined by 18 per cent in 2030 and 16 per cent in 2035, with revenues of €5.7 billion and €5.1 billion, equivalent to 39 per cent and 35 per cent of 2023 pollution tax revenues.

Table 5-31: Changes in waste to landfill and revenues collected with revised taxes

Scenario B

Country	Reduction in waste (%)		Change in revenue € million		% of 2023 pollution tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Bulgaria	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Czechia	-17.8%	-17.8%	37.1	34.4	122.1%	113.0%
Denmark	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Germany	-13.8%	-13.8%	0.0	0.0	N.E.	N.E.
Estonia	-6.2%	-6.2%	29.7	32.0	83.3%	89.8%

Country	Reduction in waste (%)		Change in revenue € million		% of 2023 pollution tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Ireland	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Greece	-6.0%	-6.0%	35.7	30.2	123.2%	104.2%
Spain	-20.6%	-20.6%	193.8	140.0	10.1%	7.3%
France	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Croatia	-13.8%	-13.8%	38.6	32.0	23.9%	19.8%
Italy	-20.9%	-20.9%	88.5	66.2	15.0%	11.2%
Cyprus	-13.8%	-13.8%	11.9	10.5	18.8%	16.6%
Latvia	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Lithuania	-25.7%	-25.7%	7.3	5.0	4.8%	3.3%
Luxembourg	-27.8%	-27.8%	50.0	45.2	N.E.	N.E.
Hungary	-18.4%	-18.4%	78.2	79.1	34.6%	35.0%
Malta	-13.8%	-13.8%	3.2	1.7	10.5%	5.6%
Netherlands	-2.9%	-2.9%	3.5	3.0	0.1%	0.1%
Austria	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Poland	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Portugal	-15.2%	-15.2%	20.8	15.9	26.4%	20.2%
Romania	-22.1%	-22.1%	1324.3	1195.0	24892.6%	22462.9%
Slovenia	-32.5%	-32.5%	2.3	1.5	9.6%	6.3%
Slovakia	-15.2%	-15.2%	18.4	15.9	69.7%	59.9%
Finland	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Sweden	0.0%	0.0%	0.0	0.0	0.0%	0.0%
All EU	**-8.9%**	**-8.2%**	**1,943.5**	**1,707.6**	**13.5%**	**11.8%**

Source: Own elaboration

5.2.7. Taxes on water effluent

Table 5-32 presents the results for water effluent taxes under Scenario B. The introduction of the benchmark rates leads to a reduction in effluent discharges, measured as BOD_5, of around 5 per cent, generating nearly €16 billion in additional revenue. Although substantial, these outcomes are notably lower than those observed under Scenario A, where discharges declined by 9 per cent and revenues reached €28 billion. Expressed as a share of 2023 pollution tax revenues, Scenario B represents an increase of 110 per cent, compared with 194 per cent under Scenario A. The largest proportional reductions in discharges occur in Croatia, Slovenia and Germany, while the highest absolute revenues are recorded in Germany, Italy and France under both scenarios.

Table 5-32: Changes in wastewater discharges and revenues collected with revised taxes

Scenario B

Country	Reduction in waste (%)		Change in revenue € million		% of 2023 pollution tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Bulgaria	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Czechia	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Denmark	-1.6%	-1.6%	113.3	114.3	38.9%	39.3%
Germany	-5.7%	-5.7%	5,314.6	5,310.3	N.E.	N.E.
Estonia	-6.8%	-6.8%	24.8	24.5	69.4%	68.7%
Ireland	-5.7%	-5.7%	292.2	300.9	3528.8%	3634.6%
Greece	-5.7%	-5.7%	448.0	435.8	1544.8%	1502.6%
Spain	-7.6%	-7.6%	1,424.1	1,438.4	74.1%	74.8%
France	-8.9%	-8.9%	2,196.0	2,216.3	43.4%	43.8%
Croatia	-12.2%	-12.2%	83.4	81.1	51.6%	50.2%
Italy	-5.7%	-5.7%	3,615.5	3,608.2	610.7%	609.5%
Cyprus	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Latvia	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Lithuania	-3.0%	-3.0%	18.1	17.3	11.9%	11.4%
Luxembourg	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Hungary	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Malta	-5.7%	-5.7%	24.9	26.8	81.4%	87.3%
Netherlands	-1.0%	-1.0%	96.3	97.5	2.4%	2.4%
Austria	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Poland	-2.1%	-2.1%	179.1	174.7	26.8%	26.2%
Portugal	-5.7%	-5.7%	492.2	486.0	623.7%	615.8%
Romania	-5.7%	-5.7%	436.1	423.2	8196.4%	7955.8%
Slovenia	-10.4%	-10.4%	36.6	36.5	152.5%	152.1%
Slovakia	0.3%	0.3%	-3.4	-3.3	-12.7%	-12.5%
Finland	-5.7%	-5.7%	325.0	323.3	1805.6%	1796.0%
Sweden	-5.7%	-5.7%	860.5	882.5	267.3%	274.1%
All EU	**-5.2%**	**-5.2%**	**15,977.1**	**15,994.4**	**110.6%**	**110.7%**

Source: Own elaboration – *Note*: N.E. No revenues reported in 2023

5.2.8. Tax on mining

The final category concerns mineral taxes, with results presented in Table 5-33. Under Scenario B, mineral extraction declines by around 3 per cent, compared with a 13 per cent reduction under Scenario A. Revenues generated amount to €1.43 billion in 2030 and €1.4 billion in 2035, corresponding to 68 per cent and

73 per cent of 2023 EU resource tax revenues, respectively. These figures are considerably lower than those in Scenario A, where revenues equalled 285 per cent and 306 per cent of 2023 resource tax receipts. The largest percentage reductions in extraction are observed in Estonia and Denmark, while the highest revenues are recorded in France, Romania, Finland and Spain. These countries also featured among the top revenue generators in Scenario A, although Poland, included in that group previously, no longer appears, as the new benchmark rate falls below its current national tax level.

Table 5-33: Changes in mineral extraction and revenues collected with revised taxes

Scenario B

Country	Reduction in mineral extraction (%)		Change in revenue € million		% of 2023 resource tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Belgium	-5.0%	-5.0%	38.7	37.4	39.6%	38.3%
Bulgaria	-5.0%	-5.0%	65.3	70.4	251.6%	271.3%
Czechia	0.0%	0.0%	0.0	0.0	N.E.	N.E.
Denmark	-8.2%	-8.2%	23.9	26.1	10.4%	11.4%
Germany	0.0%	0.0%	0.0	0.0	N.E.	N.E.
Estonia	-10.1%	-10.1%	9.1	9.5	56.8%	59.4%
Ireland	-5.0%	-5.0%	43.0	42.0	3388.7%	3308.3%
Greece	-5.0%	-5.0%	19.3	15.9	N.E.	N.E.
Spain	-5.0%	-5.0%	111.0	94.6	111.0%	94.6%
France	-5.0%	-5.0%	346.3	348.1	82.0%	82.4%
Croatia	-5.0%	-5.0%	10.6	10.0	3.1%	2.9%
Italy	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Cyprus	-5.0%	-5.0%	12.2	12.0	101.5%	100.6%
Latvia	-5.0%	-5.0%	23.2	27.2	85.1%	99.8%
Lithuania	-5.0%	-5.0%	37.9	45.6	76.2%	91.8%
Luxembourg	-5.0%	-5.0%	0.3	0.2	3.2%	2.6%
Hungary	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Malta	-5.0%	-5.0%	1.4	1.4	N.E.	N.E.
Netherlands	-5.0%	-5.0%	22.3	23.1	7.1%	7.4%
Austria	-5.0%	-5.0%	47.0	46.5	233.6%	231.3%
Poland	0.0%	0.0%	0.0	0.0	0.0%	0.0%
Portugal	-4.6%	-4.6%	0.0	0.0	0.0%	0.0%
Romania	-5.0%	-5.0%	264.1	314.0	4158.4%	4945.1%

Country	Reduction in mineral extraction (%)		Change in revenue € million		% of 2023 resource tax	
	By 2030	By 2035	By 2030	By 2035	2030	2035
Slovenia	-5.0%	-5.0%	14.3	13.9	46.8%	45.4%
Slovakia	-5.0%	-5.0%	26.9	26.4	N.E.	N.E.
Finland	-5.0%	-5.0%	211.1	266.3	781.7%	986.1%
Sweden	-5.6%	-5.6%	0.0	0.0	0.0%	0.0%
All EU	**-3.3%**	**-3.4%**	**1,327.7**	**1,430.6**	**67.9%**	**73.1%**

Source: Own elaboration – *Note*: N.E. No revenues reported in 2023

5.2.9. Summary of results – Scenario B

The aggregated results for all eight modelled taxes across Member States are summarised in Table 5-34. The table presents the combined environmental and fiscal outcomes of applying the benchmark rates described in this report. By 2030, total environmental tax revenues would increase by approximately €26 billion if these rates were implemented, compared with €65 billion under Scenario A. For reference, total revenues from pollution and resource taxes amounted to just €14.4 billion in 2023. This implies that the simulated reforms would raise current revenues by nearly 1.8 times, bringing pollution and resource taxes to around 12 per cent of all environmental tax revenues recorded in 2023, compared with nearly 20 per cent under Scenario A.

The largest contributions to the overall increase come from water effluent taxes, which account for about 62 per cent of the total, and water abstraction taxes, which represent a further 19 per cent. Figure 5-4 illustrates the distribution of projected revenues by tax type.

In environmental terms, the projected reductions in emissions, input use, waste discharges and resource extraction by 2030 range from 2 per cent for waste incineration to 8 per cent for waste sent to landfill. These improvements are notably smaller than those achieved under Scenario A, where reductions reached double-digit levels across most categories. Accordingly, the environmental benefits under the benchmark rate scenario are significantly more limited.

Table 5-34: Summary of results from modelled taxes ([65])

Scenario B

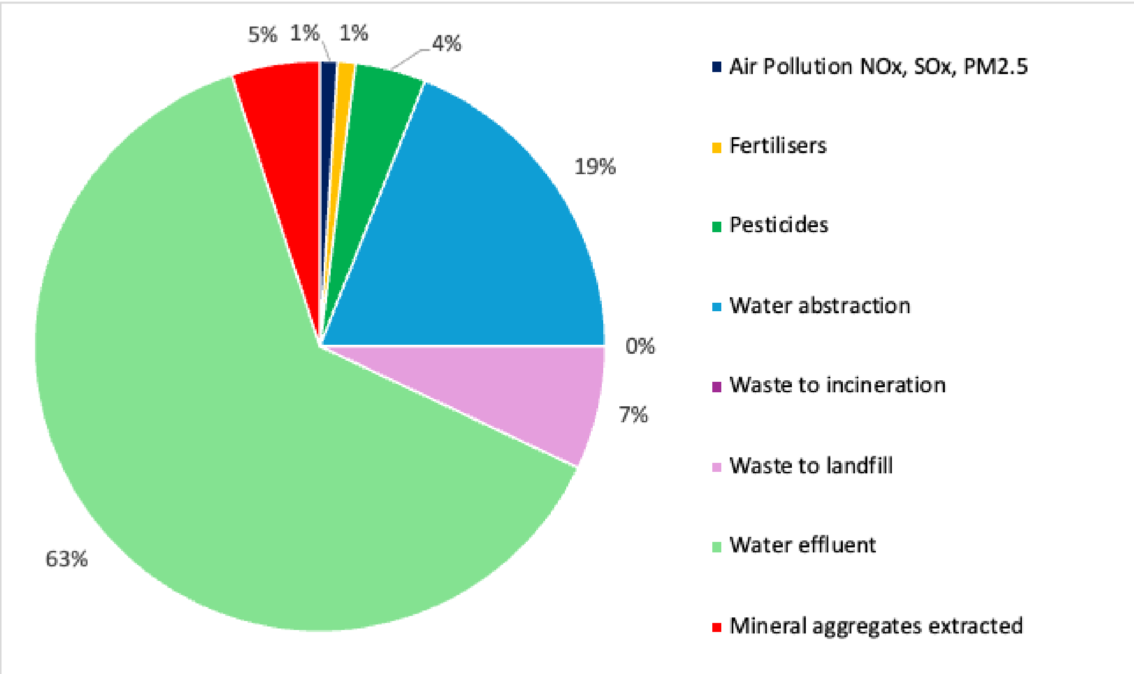
([65]) The % of change in emissions linked to air pollutant are those comparing the taxed sectors.

Scenario with benchmark tax — all MS	Emission/Use of inputs/Waste discharge or extraction of minerals		Additional revenue collected €MN		As % of 2023 pollution & resource taxes	
	2030	2035	2030	2035	2030	2035
Air pollution NO_x, SO_2, $PM_{2.5}$	-4%	-3%	212	167	1.5%	1.2%
Fertilizer	-6%	-6%	182	176	1.3%	1.2%
Pesticides	-3%	-3%	972	966	6.7%	6.7%
Water abstraction	-3%	-4%	4,909	5,085	30.1%	31.2%
Waste to incineration	-2%	-1%	16	16	0.1%	0.1%
Waste to landfill	-8%	-7%	1,944	1,708	11.5%	9.7%
Water effluent	-5%	-5%	15,977	15,994	111%	111%
Mineral aggregates extracted	-3%	-3%	1,328	1,431	67.9%	73.1%
Total	**-**	**-**	**25,539**	**25,541**	**196%**	**195%**

Source: Own elaboration

Figure 5-4: Share of additional revenue by tax type

Scenario B



5.3. Distributional impact analysis

Any increase in environmental taxation will inevitably influence the incomes of businesses and households, and may also affect employment levels. To assess these broader economic implications, it is necessary to examine how such taxes alter relative prices across sectors and how labour demand shifts in response. This type of analysis requires an economy-wide framework capable of capturing interactions between industries, households, and international trade flows. For the purposes of this review, evidence is drawn from previous studies that have modelled the macroeconomic and distributional impacts of pollution and resource tax reforms in selected EU Member States.

Two comprehensive ex ante assessments of environmental tax reforms have been carried out using the E3ME macroeconomic model, which allows for detailed analysis of the economic and employment impacts of environmental taxation across the EU. The first is Mottershead et al. (2021), conducted for the European Commission (DG Environment), and the second is *The Ex'tax Project* (Groothuis, 2022). Of these, Mottershead et al. (2021) provides the most relevant insights for this study, as it examines a range of tax instruments, some closely aligned with those considered here albeit at different rates, and analyses their employment and distributional effects across income quintiles in the Member States. The results from that study for taxes on NOx, landfill disposal, pesticides, fertilisers, wastewater and water consumption are used here to inform the likely distributional consequences of similar instruments in the present assessment.

A key finding from these studies is that the overall economic and social effects depend critically on **how the revenues from environmental taxes are used**. Three main revenue recycling options were examined:

A. **MBI + debt reduction:** Net revenues are not recycled into the economy but used to reduce government debt, leading to higher budget surpluses.

B. **MBI + income tax reduction:** Revenues are used to lower income tax rates, helping to offset potential reductions in real household incomes arising from higher consumer prices.

C. **MBI + bespoke revenue recycling:** Revenues are channelled into specific policy areas, such as subsidies for renewable energy technologies, reductions in social security contributions, or investments in sustainable agriculture.

For the purposes of this review, the focus is primarily on Option A, as it represents the scenario with the fewest additional fiscal policy assumptions. Where the alternative recycling options lead to significantly different outcomes, these are highlighted in the discussion that follows.

5.3.1. Tax on NO_X

The tax on NO_X emissions was analysed for Austria, Germany and the Netherlands, with tax rates set at €2,870 per tonne in Austria, €2,520 per tonne in Germany and €1,820 per tonne in the Netherlands. The modelling results indicate only minor effects on both employment and household income. For

2030, the simulated changes show that employment impacts are slightly negative in Austria and Germany (less than -0.01 per cent of baseline levels) and marginally positive in the Netherlands (around +0.02 per cent). Household income effects are similarly small, with a reduction of about -0.02 per cent in Austria and Germany and almost no change in the Netherlands. Moreover, there is no evidence of either progressivity or regressivity across income quintiles, as the distributional effects are effectively neutral.

To put these figures in perspective, the lowest income decile in Germany had an average annual income of approximately €9,151 in 2020. The estimated income loss from a NO_x tax of €2,520 per tonne would therefore amount to roughly €1.80 per year for this group, an amount that is economically negligible.

5.3.2. Landfill tax

Mottershead et al. (2021) modelled the introduction of a landfill tax of €70 per tonne in 2030 for Cyprus, Greece and Lithuania. Their results indicate only minor effects on both income and employment. Employment declines slightly in Greece (-0.05 per cent) and Cyprus (-0.1 per cent), while no significant change is observed in Lithuania. Real household incomes also fall marginally across all income quintiles, with reductions of 0.15 per cent in Greece, 0.08 per cent in Cyprus, and between 0.03 and 0.04 per cent in Lithuania. The income impacts show no meaningful progressivity or regressivity, indicating that the tax is broadly distributionally neutral.

The rate applied in that study is closely aligned with the €65 per tonne used in Scenario A of the present review, suggesting that the outcomes are likely to be comparable. While the findings cannot be transferred directly to all Member States, there is no clear reason to expect significantly different effects elsewhere in the EU.

5.3.3. Pesticide tax

Mottershead et al. (2021) examined the effects of pesticide taxation in Austria, Belgium, Luxembourg, Slovenia and Sweden. While their study does not specify the tax rates applied, it reports the revenues projected for 2030, which can be compared with those estimated in this review under Scenarios A and B (see Table 5-35).

Table 5-35: Revenues from pesticide taxes for 2030 (€Mn.)

Member State	Mottershead et al	Scenario A	Scenario B
Austria	320	24	13
Belgium	144	48	26
Luxembourg	13	1	0.6
Slovenia	28	4	2

Member State	Mottershead et al	Scenario A	Scenario B
Sweden	39	5	2

Source: Motterhead et al. (2021) and own elaboration

The revenue figures in this review are considerably lower than those reported in Mottershead et al. (2021), implying proportionally smaller economic and distributional effects. Moreover, the present analysis applies tax rates that vary according to pesticide toxicity, providing users with greater flexibility in substitution and leading to a dampened overall impact.

In Mottershead et al. (2021), the simulated effects were modest even at higher revenue levels: (a) overall employment remained virtually unchanged in all Member States; (b) employment effects in the agricultural sector ranged from -3.35 per cent in Slovenia to +0.73 per cent in Austria; and (c) changes in real household income across income quintiles were negligible, amounting to zero in Belgium, Luxembourg, Slovenia and Sweden, and -0.03 per cent across all quintiles in Austria.

Given that the pesticide tax rates modelled in this review are lower and more differentiated, the corresponding distributional and employment impacts are expected to be very small, confirming that such measures are unlikely to generate significant adverse socioeconomic effects.

5.3.4. Fertilizer tax

Mottershead et al. (2021) examined the introduction of a fertiliser levy in the Czech Republic, Denmark, Estonia and France. As with the pesticide tax, the study does not specify the tax rates applied but reports the revenues projected for 2030. These figures are presented in Table 5-36 below, together with the corresponding revenue estimates from this review under Scenarios A and B.

Table 5-36: Revenues from fertilizer taxes for 2030 (€Mn.)

Member State	Mottershead et al	Scenario A	Scenario B
Czech Republic	283	14	4
Denmark	155	18	6
Estonia	21	23	7
France	1,832	129	43

Source: Motterhead et al. (2021) and own elaboration

As with the pesticide taxes, the fertiliser tax rates simulated in this review are considerably lower than those examined in Mottershead et al. (2021), with the sole exception of Estonia, where revenues under Scenario A are broadly comparable to those in the earlier modelling exercise.

The results reported by Mottershead et al. (2021)show that the overall macroeconomic impacts of a fertiliser levy are minimal. Specifically: (a) employment effects in the base case scenario, which assumes no revenue recycling, are virtually zero; (b) agricultural employment declines slightly in Denmark (-0.03 per cent) and more notably in the Czech Republic (-0.82 per cent) and Estonia (-1.26 per cent), while it increases in France (+0.2 per cent); and (c) the effects on household incomes are very small. In Denmark, average household income rises by 0.01 per cent, while in France it falls by 0.04 per cent. In the Czech Republic, income decreases by 0.02 per cent for the lowest quintile and 0.03 per cent for the highest, whereas in Estonia it rises by 0.12 per cent for the bottom quintile and 0.09 per cent for the top. The resulting distributional effects are therefore slightly progressive in both the Czech Republic and Estonia.

Given that the fertiliser taxes simulated in this review are lower and applied at more moderate rates, the resulting changes in employment and household income can be expected to be considerably smaller than those reported in Mottershead et al. (2021), confirming that such measures would have only minor socioeconomic effects.

5.3.5. Wastewater tax

Mottershead et al. (2021) analysed the effects of a wastewater tax in Ireland and Romania. Although the study does not specify the tax rates applied, it provides projected revenue figures for 2030. These are presented in Table 5-37 below, alongside the corresponding revenue estimates from this review under Scenarios A and B.

Table 5-37: Revenues from Water Effluent Tax for 2030 (€Mn.)

Member State	Mottershead et al	Scenario A	Scenario B
Ireland	132	452	292
Romania	100	681	436

Source: Motterhead et al. (2021) and own elaboration

In this instance, the revenues projected from wastewater taxes in this review exceed those reported in Mottershead et al. (2021). In Ireland, the amounts raised are between 2.2 and 3.4 times higher, while in Romania they are between 4.4 and 6.8 times greater. Accordingly, the associated economic impacts would be expected to scale proportionally, leading to somewhat stronger effects than those observed in the earlier modelling.

In Mottershead et al., the estimated impacts were small: (a) a slight decline in overall employment in 2030, amounting to -0.01 per cent in Ireland and virtually zero in Romania; and (b) a modest reduction in real household income across all quintiles of -0.04 per cent in Ireland and -0.03 per cent in Romania. Applying these findings to the present analysis suggests that, given the higher revenue levels simulated here, the corresponding impacts would likely be larger, though still limited in absolute terms.

One way to mitigate these effects would be through an appropriate revenue recycling mechanism. The *Mottershead et al.* study demonstrates that when revenues are recycled through targeted measures, such as reductions in income tax or investments in water management, the negative effects on employment and income can be effectively neutralised. While further analysis would be needed to confirm this outcome under the rates applied in this review, it is reasonable to expect that similar recycling approaches could substantially offset any adverse impacts.

5.3.6. Water consumption

The economy-wide modelling conducted by *Mottershead et al.* examined a tax on water consumption. Although this differs from the water abstraction tax considered in the present review, the two measures are expected to produce broadly similar effects. The rate applied in the modelling exercise was set at 4 per cent of the existing water price in ten Member States: Bulgaria, Cyprus, Czechia, Germany, Greece, Italy, Malta, Poland, Portugal and Spain. Since water prices vary substantially across countries, the effective tax levels also differ. Table 5-38 provides estimated tax rates for these Member States as applied in *Mottershead et al.* and compares them with those used in Scenarios A and B of this review.

Table 5-38: Tax rates for water consumption and water abstraction (€/M^3)

Member State	Mottershead et al	Scenario A	Scenario B
Bulgaria	0.044	0.045	0.009
Cyprus	0.074	0.278	0.054
Czech R.	0.14	0.066	0.013
Germany	n.a.	0.081	0.016
Greece	0.056	0.258	0.05
Italy	0.08	0.292	0.057
Malta	0.136	0.275	0.054
Poland	0.112	0.054	0.011
Portugal	0.072	0.292	0.051
Spain	0.076	0.297	0.058

Source: Motterhead et al. (2021) and Own Elaborations – *Note*: n.a. German data were not available

The rates modelled by Mottershead et al. are generally comparable to those in Scenario B, while Scenario A applies notably higher rates in several water-scarce Member States, namely Cyprus, Greece, Italy, Portugal and Spain.

These higher rates are consistent with the recommendations of Hogg et al. (2016), which linked tax levels to the Water Exploitation Index (WEI) and suggested stronger price signals in countries facing greater water stress.

The results from Mottershead et al. show relatively minor macroeconomic and distributional effects. Specifically: (a) all ten Member States experience a small reduction in employment, ranging from 0.01 per cent in Cyprus, Malta and Poland to 0.05 per cent in Spain, with the impacts markedly reduced under scenarios involving bespoke revenue recycling; and (b) real household incomes decline slightly across all quintiles, by about 0.04 per cent in Germany, Greece and Italy, and by 0.07-0.08 per cent in Spain. The remaining countries exhibit smaller declines, with no clear pattern of progressivity or regressivity in the income effects.

These findings suggest that water-related tax increases of the magnitude simulated in Scenario B would not have noticeable distributional or employment effects. However, the higher rates applied in Scenario A, particularly in countries with severe water scarcity, could lead to more perceptible reductions in real incomes and may therefore warrant accompanying compensatory measures.

In summary, the distributional analysis points to very modest impacts on household incomes and employment, with no consistent bias towards higher- or lower-income groups. Most of the results from Mottershead et al. can be reasonably transferred to this review, with the exception of cases where higher tax rates apply, notably for water effluent and water abstraction taxes in some Member States under Scenario A. In such instances, the adoption of targeted revenue recycling mechanisms could play a valuable role in mitigating any adverse socioeconomic effects.

5.4. Implementation of new environmental taxes in the EU – impacts on competitiveness and single market, administrative costs and long-term viability of taxes

This section assesses the potential impacts of the hypothetical tax benchmarks modelled under Scenarios A and B, using the relevant checklists provided in the *Better Regulation Toolbox*. It should be noted that this analysis does not constitute a formal impact assessment, as no legislative proposal is being advanced. Rather, it draws on the modelling results to identify and interpret key quantitative and qualitative effects at Member State level, highlighting the scale and significance of the changes both nationally and across the EU as a whole.

The assessment is qualitative in nature, focusing on the direction (positive or negative) and relative magnitude of the expected impacts. Particular attention is given to those Member States and sectors most likely to be significantly affected. The analysis examines the following dimensions:

- **Cost and price competitiveness** – assessing potential impacts on production costs, consumer prices and overall competitiveness of firms.
- **Capacity to innovate** – considering whether the taxes create incentives for innovation and the adoption of cleaner technologies.
- **International competition** – evaluating implications for the external competitiveness of EU industries in global markets.
- **Market and sector competitiveness** – analysing potential effects on the structure, dynamics and performance of key sectors.
- **Single market effects** – identifying whether differing tax responses across Member States could affect the functioning of the EU internal market.
- **Long-term viability and implementation costs** – assessing the sustainability of the investigated measures and the likely administrative and compliance costs associated with their introduction.

5.4.1. Assumed implementation scenarios

To assess the potential effects of the tax benchmarks, certain assumptions regarding their implementation must be established. As outlined above, two scenarios are considered:

- **Scenario A** represents a relatively ambitious approach, applying similar benchmark taxation rates for each of the instruments across all Member States, with minor adjustments to account for differences in purchasing power parity (PPP).
- **Scenario B** is less ambitious, applying somewhat lower tax rates while maintaining the same overall structure and scope.

In both scenarios, it is assumed that all Member States introduce the full set of benchmark taxes. Where an existing national tax already exceeds the benchmark rate, that higher rate is maintained, and no downward adjustment is made. This ensures that the benchmarking exercise does not imply reducing existing levels of environmental taxation, but rather provides a common reference point for comparing potential reforms across the EU.

5.4.2. Baseline taxation instrument and rates

The following assessment draws on the modelling results presented in Section 5 to analyse the magnitude and distribution of changes across Member States. Table 5-39 to **Error! Reference source not found.** summarise the outcomes for each of the new environmental taxes under Scenarios A and B, providing information for every Member State and for the EU average on:

- the **current tax rate** in place (marked as "0" where no relevant tax exists);
- the **benchmark tax rate**;
- the **difference** between the current and benchmark rates;
- the **estimated revenues** generated in 2030 and 2035; and
- the **estimated revenues as a share** of total 2023 pollution or resource tax receipts, based on Eurostat data ([66]).

For clarity, the 'All EU' value in the baseline tables (Table 5-39 to Table 5-46) represents the average across all Member States for each variable.

To facilitate interpretation, the tables employ a colour-coded system highlighting the relative magnitude of changes. Member States where projected revenues exceed the EU average are marked in **red**, those showing an increase in revenues are marked in **amber**, and those with no change are shown in **green**. These colour thresholds are defined relative to the Member State averages for three indicators: additional tax revenue in 2030, additional tax revenue in 2035, and additional tax revenue in either year as a percentage of 2023 pollution or resource tax revenues. Examples of the averages applied for each scenario are discussed in the commentary accompanying the tables.

It is important to note that a change in revenue does not necessarily imply that a Member State will be materially affected by the benchmark tax. The degree of impact also depends on the relative size and economic importance of the affected sectors, and on the extent of their exposure to international competition. These aspects are further examined in Sections **Error! Reference source not found.** and **Error! Reference source not found.**.

Moreover, the revenue projections are based on several modelling assumptions described in Section 4, meaning that they may overestimate the actual fiscal effects. In particular, very large increases in revenue relative to 2023 levels could reflect either an overestimation of revenues or missing data in the Eurostat baseline, especially for certain resource or pollution tax categories. For this reason, the results should be interpreted with caution and viewed primarily as indicative of relative, rather than absolute, changes.

Table 5-39 presents the results for the air pollution tax on NOx emissions. Compared with the average gains in tax revenues across all Member States — €1.6 million and €1.3 million in 2030 and 2035 under Scenario A, and €0.5 million and €0.4 million under Scenario B — the largest increases in both

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([66]) [env_ac_taxind2] Environmental taxes by economic activity (NACE Rev. 2) scenarios occur in Germany, Spain, France, Italy, Portugal, Poland and Romania. Most countries experience some increase in revenues under both scenarios, with the only exceptions being Sweden (in both scenarios) and Denmark and Czechia (under Scenario B).

Table 5-39: Comparing tax regimes for each Member State

Air pollution tax NOx (€/MT)([67])

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Belgium	A	0	1300	1300	1.3	0.9	0.3%	0.2%
Belgium	B	0	325	325	0.4	0.3	0.1%	0.1%
Bulgaria	A	0	1300	1300	0.6	0.4	11.1%	8.5%
Bulgaria	B	0	325	325	0.2	0.1	3.6%	2.8%
Czechia	A	382	1300	918	1.1	0.9	3.7%	3.1%
Czechia	B	382	382	0	0.0	0.0	0.0%	0.0%
Denmark	A	670	1300	630	0.5	0.5	0.2%	0.2%
Denmark	B	670	670	0	0.0	0.0	0.0%	0.0%
Germany	A	0	1300	1300	6.4	4.0	NA	NA
Germany	B	0	325	325	2.1	1.3	NA	NA
Estonia	A	14	1300	1286.1	0.2	0.3	0.7%	0.7%
Estonia	B	14	325	311.1	0.1	0.1	0.2%	0.2%
Ireland	A	0	1300	1300	0.8	0.8	9.9%	9.8%
Ireland	B	0	325	325	0.3	0.3	3.2%	3.2%

([67]) NA means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Greece	A	0	1300	1300	1.0	0.8	3.6%	2.7%
Greece	B	0	325	325	0.3	0.3	1.2%	0.9%
Spain	A	0	1300	1300	5.1	4.2	0.3%	0.2%
Spain	B	0	325	325	1.6	1.4	0.1%	0.1%
France	A	167	1300	1133	3.2	2.2	0.1%	0.0%
France	B	167	325	158	0.6	0.4	0.0%	0.0%
Croatia	A	0	1300	1300	0.3	0.2	0.2%	0.1%
Croatia	B	0	325	325	0.1	0.1	0.1%	0.0%
Italy	A	38	1300	1262	8.3	7.3	1.4%	1.2%
Italy	B	38	325	287	2.5	2.1	0.4%	0.4%
Cyprus	A	0	1300	1300	0.1	0.1	0.2%	0.2%
Cyprus	B	0	325	325	0.0	0.0	0.1%	0.1%
Latvia	A	19	1300	1280.6	0.4	0.5	1.1%	1.3%
Latvia	B	19	325	305.6	0.1	0.1	0.3%	0.4%
Lithuania	A	139	1300	1161.3	0.3	0.2	0.2%	0.1%
Lithuania	B	139	325	186.3	0.1	0.0	0.0%	0.0%
Luxembourg	A	0	1300	1300	0.1	0.1	N.A	N.A
Luxembourg	B	0	325	325	0.0	0.0	NA	NA

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Hungary	A	300	1300	1000	0.5	0.5	0.2%	0.2%
Hungary	B	300	325	25	0.0	0.0	0.0%	0.0%
Malta	A	0	1300	1300	0.0	0.0	0.1%	0.0%
Malta	B	0	325	325	0.0	0.0	0.0%	0.0%
Netherlands	A	0	1300	1300	1.9	1.4	0.0%	0.0%
Netherlands	B	0	325	325	0.6	0.4	0.0%	0.0%
Austria	A	0	1300	1300	1.2	1.1	2.0%	1.8%
Austria	B	0	325	325	0.4	0.4	0.6%	0.6%
Poland	A	143	1300	1157	4.6	4.1	0.7%	0.6%
Poland	B	143	325	182	0.9	0.8	0.1%	0.1%
Portugal	A	0	1300	1300	2.9	2.6	3.7%	3.3%
Portugal	B	0	325	325	0.9	0.9	1.2%	1.1%
Romania	A	5	1300	1295	1.7	1.4	32.5%	26.3%
Romania	B	5	325	320	0.6	0.4	10.5%	8.4%
Slovenia	A	0	1300	1300	0.2	0.2	1.0%	0.9%
Slovenia	B	0	325	325	0.1	0.1	0.3%	0.3%
Slovakia	A	50	1300	1250	0.8	0.5	3.0%	1.9%
Slovakia	B	50	325	275	0.2	0.1	0.8%	0.6%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Finland	A	0	1300	1300	1.0	0.7	5.4%	3.9%
Finland	B	0	325	325	0.3	0.2	1.8%	1.3%
Sweden Elec	A	4500	4500	0	0.0	0.0	0.0%	0.0%
Sweden Elec	B	4500	4500	0	0.0	0.0	0.0%	0.0%
Sweden W/out Elec	A	0	1300	1300	1.12	0.94	0.3%	0.3%
Sweden W/out Elec	B	0	325	325	0.4	0.3	0.1%	0.1%
All EU ([68])	**A**	**230**	**1414**	**1184.75**	**45.7**	**36.8**	**0.3%**	**0.3%**
All EU	**B**	**230**	**325**	**95.46429**	**12.84**	**10.27**	**0.1%**	**0.1%**

Table **5-40** shows the tax information for the **air pollution tax on $PM_{2.5}$.** All Member States across both scenarios A and B observed a change in revenue. The greatest revenue gain (compared to the averages €5.7m and €5.21m for scenario A, €1.8m and €1.6m for scenario B) is observed in Germany, Spain, France, Italy, Poland and Portugal across both scenarios.

([68]) In the ‘All EU’ row, the ‘Tax rate currently implemented (€/MT)’, ‘Benchmark tax rate (€/MT)’, and ‘Difference between current and new tax rate (€/MT)’ figures represent the EU average across Member States. The additional tax revenues for 2030 and 2035 are the sum of additional tax revenues for all Member States. The additional tax revenues in 2030 and 2035 as percentage of the relevant 2023 environmental tax revenues represent the EU average.

Table 5-40: Comparing tax regimes for each Member State

Air pollution tax $PM_{2.5}$ (€/MT) ([69])

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Belgium	A	0	1300	1300	4.2	3.7	0.8%	0.7%
Belgium	B	0	325	325	1.4	1.2	0.3%	0.2%
Bulgaria	A	0	1300	1300	3.1	2.7	60.5%	52.2%
Bulgaria	B	0	325	325	1.0	0.9	19.9%	17.1%
Czechia	A	382	1300	918	1.7	1.4	5.7%	4.5%
Czechia	B	382	382	0	0.0	0.0	0.0%	0.0%
Denmark	A	0	1300	1300	1.0	0.8	0.3%	0.3%
Denmark	B	0	325	325	0.3	0.3	0.1%	0.1%
Germany	A	0	1300	1300	12.8	10.2	N.A	N.A
Germany	B	0	325	325	4.2	3.3	NA	NA
Estonia	A	14	1300	1286.1	0.9	0.7	2.6%	2.0%
Estonia	B	14	325	311.1	0.3	0.2	0.8%	0.6%

([69]) NA means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Ireland	A	0	1300	1300	2.5	2.4	30.2%	28.6%
Ireland	B	0	325	325	0.8	0.8	9.9%	9.4%
Greece	A	0	1300	1300	6.1	4.4	21.2%	15.1%
Greece	B	0	325	325	2.0	1.4	7.0%	5.0%
Spain	A	0	1300	1300	14.9	13.4	0.8%	0.7%
Spain	B	0	325	325	4.9	4.4	0.3%	0.2%
France	A	50	1300	1250	23.8	22.2	0.5%	0.4%
France	B	50	325	275	6.9	6.4	0.1%	0.1%
Croatia	A	0	1300	1300	3.1	3.0	1.9%	1.8%
Croatia	B	0	325	325	1.0	1.0	0.6%	0.6%
Italy	A	38	1300	1262	14.7	12.7	2.5%	2.1%
Italy	B	38	325	287	4.4	3.8	0.7%	0.6%
Cyprus	A	0	1300	1300	0.3	0.2	0.5%	0.4%
Cyprus	B	0	325	325	0.1	0.1	0.2%	0.1%
Latvia	A	19	1300	1280.6	7.6	10.6	21.2%	29.3%
Latvia	B	19	325	305.6	2.4	3.3	6.7%	9.2%
Lithuania	A	52	1300	1247.7	1.3	1.2	0.9%	0.8%
Lithuania	B	52	325	272.7	0.4	0.4	0.2%	0.2%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Luxembourg	A	0	1300	1300	0.7	0.9	N.A	N.A
Luxembourg	B	0	325	325	0.2	0.3	NA	NA
Hungary	A	0	1300	1300	2.4	2.0	1.1%	0.9%
Hungary	B	0	325	325	0.8	0.6	0.4%	0.3%
Malta	A	0	1300	1300	0.1	0.1	0.4%	0.4%
Malta	B	0	325	325	0.0	0.0	0.1%	0.1%
Netherlands	A	0	1300	1300	3.4	3.0	0.1%	0.1%
Netherlands	B	0	325	325	1.1	1.0	0.0%	0.0%
Austria	A	0	1300	1300	2.7	2.4	4.4%	3.9%
Austria	B	0	325	325	0.9	0.8	1.4%	1.3%
Poland	A	0	1300	1300	16.3	14.3	2.4%	2.1%
Poland	B	0	325	325	5.4	4.7	0.8%	0.7%
Portugal	A	0	1300	1300	17.9	17.9	22.6%	22.6%
Portugal	B	0	325	325	5.9	5.9	7.4%	7.4%
Romania	A	0	1300	1300	6.2	5.0	116.4%	93.1%
Romania	B	0	325	325	2.0	1.6	38.3%	30.6%
Slovenia	A	0	1300	1300	1.7	1.7	7.1%	7.2%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Slovenia	B	0	325	325	0.6	0.6	2.3%	2.4%
Slovakia	A	0	1300	1300	0.7	0.5	2.5%	1.8%
Slovakia	B	0	325	325	0.2	0.2	0.8%	0.6%
Finland	A	0	1300	1300	1.5	1.1	8.4%	6.1%
Finland	B	0	325	325	0.5	0.4	2.8%	2.0%
Sweden	A	0	1300	1300	3.1	2.3	1.0%	0.7%
Sweden	B	0	325	325	1.0	0.8	0.3%	0.2%
All EU[68]	**A**	**21**	**1300**	**1279**	**155**	**141**	**1.1%**	**1.0%**
All EU	**B**	**21**	**325**	**304**	**49**	**44**	**0.3%**	**0.3%**

Table 5-41 shows the tax information for the **air pollution tax on SO_2**. Similar to NOx, the majority of the Member States observed a change in the tax revenue from the implementation of the new tax rate with the exception of Czechia (for scenario B), Denmark (for scenario A and B), Malta (scenario A and B), Luxembourg (scenario B) and Sweden (scenario A and B). In terms of the countries that observed the greatest change across both scenarios in revenue (compared to the averages, €18.3m and €13.5m for scenario A, €5.6m and €4.2m for scenario B), these included Germany, Spain and Poland.

Table 5-41: Comparing tax regimes for each Member State

Air pollution tax SO_2 (€/MT) ([70])

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Belgium	A	0	1300	1300	11.1	7.7	2.2%	1.5%

([70]) N.A means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Belgium	B	0	325	325	3.8	2.6	0.7%	0.5%
Bulgaria	A	0	1300	1300	16.8	7.5	326.5%	146.7%
Bulgaria	B	0	325	325	5.7	2.6	111.0%	49.9%
Czechia	A	382	1300	918	10.1	6.3	33.3%	20.6%
Czechia	B	382	382	0	0.0	0.0	0.0%	0.0%
Denmark	A	1340	1340	0	0.0	0.0	0.0%	0.0%
Denmark	B	1340	1340	0	0.0	0.0	0.0%	0.0%
Germany	A	0	1300	1300	171.1	149.6	N.A	N.A
Germany	B	0	325	325	58.2	50.9	NA	NA
Estonia	A	14	1300	1286.1	5.6	3.4	15.7%	9.5%
Estonia	B	14	325	311.1	1.8	1.1	5.2%	3.1%
Ireland	A	0	1300	1300	1.0	0.5	12.5%	6.2%
Ireland	B	0	325	325	0.4	0.2	4.3%	2.1%
Greece	A	0	1300	1300	7.9	3.3	27.4%	11.5%
Greece	B	0	325	325	2.7	1.1	9.3%	3.9%
Spain	A	0	1300	1300	40.9	27.1	2.1%	1.4%
Spain	B	0	325	325	13.9	9.2	0.7%	0.5%
France	A	50	1300	1250	35.9	23.2	0.7%	0.5%
France	B	50	325	275	10.8	6.9	0.2%	0.1%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Croatia	A	0	1300	1300	0.6	0.2	0.4%	0.1%
Croatia	B	0	325	325	0.2	0.1	0.1%	0.0%
Italy	A	38	1300	1262	32.6	22.2	5.5%	3.8%
Italy	B	38	325	287	10.1	6.9	1.7%	1.2%
Cyprus	A	0	1300	1300	7.3	6.1	11.5%	9.7%
Cyprus	B	0	325	325	2.5	2.1	3.9%	3.3%
Latvia	A	19	1300	1280.6	1.4	1.1	3.8%	3.1%
Latvia	B	19	325	305.6	0.4	0.4	1.2%	1.0%
Lithuania	A	0	1300	1300	6.3	5.1	4.2%	3.4%
Lithuania	B	0	325	325	2.1	1.7	1.4%	1.1%
Luxembourg	A	0	1300	1300	0.2	0.1	N.A	N.A
Luxembourg	B	0	325	325	0.1	0.0	NA	NA
Hungary	A	300	1300	1000	4.3	3.4	1.9%	1.5%
Hungary	B	300	325	25	0.1	0.1	0.1%	0.1%
Malta	A	0	1300	1300	0.0	0.0	0.0%	0.0%
Malta	B	0	325	325	0.0	0.0	0.0%	0.0%
Netherlands	A	0	1300	1300	10.8	8.4	0.3%	0.2%
Netherlands	B	0	325	325	3.7	2.9	0.1%	0.1%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Austria	A	0	1300	1300	7.2	6.6	11.9%	11.0%
Austria	B	0	325	325	2.5	2.3	4.1%	3.7%
Poland	A	143	1300	1157	76.1	51.4	11.4%	7.7%
Poland	B	143	325	182	16.3	11.0	2.4%	1.6%
Portugal	A	0	1300	1300	23.3	18.6	29.5%	23.6%
Portugal	B	0	325	325	7.9	6.3	10.0%	8.0%
Romania	A	5	1300	1295	8.4	3.4	158.5%	63.9%
Romania	B	5	325	320	2.8	1.1	53.3%	21.5%
Slovenia	A	0	1300	1300	1.3	0.9	5.4%	3.6%
Slovenia	B	0	325	325	0.4	0.3	1.9%	1.2%
Slovakia	A	50	1300	1250	3.4	1.8	13.0%	6.9%
Slovakia	B	50	325	275	1.0	0.5	3.9%	2.1%
Finland	A	0	1300	1300	9.6	6.6	53.3%	36.7%
Finland	B	0	325	325	3.3	2.2	18.1%	12.5%
Sweden	A	2670	2670	0	0.0	0.0	0.0%	0.0%
Sweden	B	2670	2670	0	0.0	0.0	0.0%	0.0%
All EU[68]	**A**	**186**	**1352**	**1167**	**494**	**365**	**3.4%**	**2.5%**
All EU	**B**	**186**	**325**	**139**	**151**	**113**	**1.0%**	**0.8%**

Table **5-42** shows the tax information for the water abstraction tax. Compared to the averages (€830m and €847m for Scenario A and €182m and €188m for Scenario B), the gain in revenue is highest for Greece, Spain, Italy, Portugal and Romania across both scenarios. There were only several member states that didn't observe any change in revenue across both scenarios. This included Denmark, Ireland and Croatia due to their current tax rate being higher than the benchmark rate.

Table 5-42: Comparing tax regimes for each Member State

Water abstraction (M^3) ([71])

Member State	Scenario	Tax rate currently implemented (M^3)	Benchmark harmonized tax rate (M^3)	Difference between current and new tax rate (M^3)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Tax	Additional tax revenues in 2035 as % of 2023 Resource Tax
Belgium	A	0.03	0.17	0.1	333	305	342%	313%
Belgium	B	0.03	0.03	0.0	0	0	0%	0%
Bulgaria	A	0.00	0.04	0.0	197	193	758%	743%
Bulgaria	B	0.00	0.01	0.0	23	23	90%	89%
Czechia	A	0.01	0.07	0.1	65	61	NA	NA
Czechia	B	0.01	0.01	0.0	3	3	NA	NA
Denmark	A	0.21	0.21	0.0	0	0	0%	0%
Denmark	B	0.21	0.21	0.0	0	0	0%	0%
Germany	A	0.02	0.08	0.1	630	563	NA	NA.
Germany	B	0.02	0.02	0.0	0	0	NA	NA
Estonia	A	0.01	0.07	0.1	35	28	216%	175%
Estonia	B	0.01	0.01	0.0	3	3	21%	17%
Ireland	A	0.00	0.10	0.1	142	135	11,152%	10,591%
Ireland	B	0.00	0.02	0.0	31	29	2,403%	2,282%

([71]) N.A. means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented (M³)	Benchmark harmonized tax rate (M³)	Difference between current and new tax rate (M³)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Tax	Additional tax revenues in 2035 as % of 2023 Resource Tax
Greece	A	0.00	0.26	0.3	1,882	1,887	NA	NA
Greece	B	0.00	0.05	0.1	483	484	NA	NA
Spain	A	0.00	0.30	0.3	5,191	4,854	5,191%	4,854%
Spain	B	0.00	0.06	0.1	1,401	1,310	1,401%	1,310%
France	A	0.03	0.17	0.1	1,864	1,718	441%	407%
France	B	0.03	0.03	0.0	17	16	4%	4%
Croatia	A	0.57	0.57	0.0	0	0	0%	0%
Croatia	B	0.57	0.57	0.0	0	0	0%	0%
Italy	A	0.00	0.29	0.3	8,008	8,883	4,795%	5,319%
Italy	B	0.00	0.06	0.1	2,149	2,384	1,287%	1,427%
Cyprus	A	0.02	0.28	0.3	34	32	284%	263%
Cyprus	B	0.02	0.05	0.0	5	5	46%	42%
Latvia	A	0.01	0.06	0.1	8	8	31%	30%
Latvia	B	0.01	0.01	0.0	0	0	1%	1%
Lithuania	A	0.01	0.06	0.1	13	11	26%	21%
Lithuania	B	0.01	0.01	0.0	1	1	3%	2%
Luxembourg	A	0.10	0.10	0.0	-1	-1	-6%	-7%
Luxembourg	B	0.10	0.02	-0.1	0	0	0%	0%
Hungary	A	0.00	0.06	0.1	277	294	2,100%	2,226%

Member State	Scenario	Tax rate currently implemented (M^3)	Benchmark harmonized tax rate (M^3)	Difference between current and new tax rate (M^3)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Tax	Additional tax revenues in 2035 as % of 2023 Resource Tax
Hungary	B	0.00	0.01	0.0	57	60	432%	458%
Malta	A	0.00	0.27	0.3	6	5	NA	NA
Malta	B	0.00	0.05	0.1	2	1	NA	NA
Netherlands	A	0.04	0.09	0.0	188	157	4%	4%
Netherlands	B	0.04	0.02	0.0	48	40	1%	1%
Austria	A	0.00	0.08	0.1	319	326	395%	404%
Austria	B	0.00	0.02	0.0	67	69	84%	85%
Poland	A	0.01	0.05	0.0	370	344	54%	50%
Poland	B	0.01	0.01	0.0	24	22	3%	3%
Portugal	A	0.00	0.26	0.3	1,117	1,141	1,090%	1,114%
Portugal	B	0.00	0.05	0.1	288	294	281%	287%
Romania	A	0.01	0.19	0.2	1,410	1,609	12,089%	13,797%
Romania	B	0.01	0.04	0.0	256	292	2,194%	2,504%
Slovenia	A	0.03	0.07	0.0	23	22	43%	41%
Slovenia	B	0.03	0.03	0.0	0	0	0%	0%
Slovakia	A	0.02	0.06	0.0	17	17	65%	63%
Slovakia	B	0.02	0.01	0.0	0	0	0%	0%
Finland	A	0.01	0.09	0.1	105	101	239%	229%
Finland	B	0.01	0.02	0.0	10	10	23%	22%

Member State	Scenario	Tax rate currently implemented (M^3)	Benchmark harmonized tax rate (M^3)	Difference between current and new tax rate (M^3)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Tax	Additional tax revenues in 2035 as % of 2023 Resource Tax
Sweden	A	0.00	0.09	0.1	187	184	65%	64%
Sweden	B	0.00	0.02	0.0	40	39	14%	13%
All EU[68]	**A**	**0.04**	**0.15**	**0.1**	**22,422**	**22,874**	**138%**	**140%**
All EU	**B**	**0.04**	**0.05**	**0.0**	**4,909**	**5,085**	**30%**	**31%**

Table **5-43** shows information for the wastewater effluent tax. Germany, Spain, France, Italy and Sweden all observed the greatest increase in revenue (average for additional tax revenues in 2030 and 2035 for scenario A are €1,038 and €1,039 million respectively, whilst they are €592 million and €593 million in Scenario B). Meanwhile, Belgium, Bulgaria, Cyprus, Luxembourg and Austria all observed no change due to their current tax being higher than the benchmark rate.

Table 5-43: Comparing tax regimes for each Member State

Wastewater (BOD5 €/Kg) ([72])

Member State	Scenario	Tax rate currently implemented (BOD5 €/Kg)	Benchmark harmonized tax rate (BOD5 €/Kg)	Difference between current and new tax rate (BOD5 €/Kg)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Tax	Additional tax revenues in 2035 as % of 2023 Resource Tax
Belgium	A	4.17	4.17	0.0	0	0	0%	0%
Belgium	B	4.17	4.17	0.0	0	0	0%	0%
Bulgaria	A	4.03	4.03	0.0	0	0	0%	0%
Bulgaria	B	4.03	4.03	0.0	0	0	0%	0%
Czechia	A	4.11	4.11	0.0	0	0	0%	0%
Czechia	B	4.11	4.11	0.0	0	0	0%	0%
Denmark	A	2.13	4.02	1.9	560	565	192%	194%
Denmark	B	2.13	2.50	0.4	113	114	39%	39%
Germany	A	0.07	3.04	3.0	8,327	8,320	N.E.	N.E.
Germany	B	0.07	1.90	1.8	5,315	5,310	N.E.	N.E.
Estonia	A	0.66	2.16	1.5	53	52	148%	146%
Estonia	B	0.66	1.35	0.7	25	24	69%	69%
Ireland	A	0.00	3.20	3.2	452	465	5,454%	5,618%
Ireland	B	0.00	1.99	2.0	292	301	3,529%	3,635%

([72]) N.A means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented (BOD5 €/Kg)	Benchmark harmonized tax rate (BOD5 €/Kg)	Difference between current and new tax rate (BOD5 €/Kg)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Tax	Additional tax revenues in 2035 as % of 2023 Resource Tax
Greece	A	0.00	2.50	2.5	692	674	2,388%	2,323%
Greece	B	0.00	1.56	1.6	448	436	1,545%	1,503%
Spain	A	0.75	2.65	1.9	2,901	2,930	151%	152%
Spain	B	0.75	1.65	0.9	1,424	1,438	74%	75%
France	A	0.80	3.28	2.5	4,238	4,277	84%	85%
France	B	0.80	2.04	1.2	2,196	2,216	43%	44%
Croatia	A	0.32	1.89	1.6	147	143	91%	89%
Croatia	B	0.32	1.18	0.9	83	81	52%	50%
Italy	A	0.00	2.95	3.0	5,588	5,577	944%	942%
Italy	B	0.00	1.84	1.8	3,615	3,608	611%	609%
Cyprus	A	1.71	2.51	0.8	19	19	30%	30%
Cyprus	B	1.71	1.71	0.0	0	0	0%	0%
Latvia	A	4.20	4.20	0.0	0	0	0%	0%
Latvia	B	4.20	4.20	0.0	0	0	0%	0%
Lithuania	A	0.82	1.78	1.0	58	55	38%	37%
Lithuania	B	0.82	1.11	0.3	18	17	12%	11%
Luxembourg	A	5.00	5.00	0.0	0	0	0%	0%
Luxembourg	B	5.00	5.00	0.0	0	0	0%	0%
Hungary	A	1.29	1.68	0.4	115	113	51%	50%
Hungary	B	1.29	1.29	0.0	0	0	0%	0%

Member State	Scenario	Tax rate currently implemented (BOD5 €/Kg)	Benchmark harmonized tax rate (BOD5 €/Kg)	Difference between current and new tax rate (BOD5 €/Kg)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Tax	Additional tax revenues in 2035 as % of 2023 Resource Tax
Malta	A	0.00	2.20	2.2	39	41	126%	135%
Malta	B	0.00	1.37	1.4	25	27	81%	87%
Netherlands	A	1.81	3.21	1.4	696	705	17%	17%
Netherlands	B	1.81	2.00	0.2	96	98	2%	2%
Austria	A	6.64	6.64	0.0	0	0	0%	0%
Austria	B	6.64	6.64	0.0	0	0	0%	0%
Poland	A	0.85	1.69	0.8	728	710	109%	106%
Poland	B	0.85	1.05	0.2	179	175	27%	26%
Portugal	A	0.01	2.38	2.4	763	753	966%	954%
Portugal	B	0.01	1.48	1.5	492	486	624%	616%
Romania	A	0.03	1.50	1.5	681	661	12,807%	12,431%
Romania	B	0.03	0.93	0.9	436	423	8,196%	7,956%
Slovenia	A	0.49	2.35	1.9	67	67	281%	280%
Slovenia	B	0.49	1.47	1.0	37	36	152%	152%
Slovakia	A	1.27	1.98	0.7	70	69	265%	261%
Slovakia	B	1.27	1.27	0.0	0	0	0%	0%
Finland	A	0.00	3.60	3.6	502	500	2,791%	2,776%
Finland	B	0.00	2.25	2.2	325	323	1,806%	1,796%
Sweden	A	0.00	3.91	3.9	1,330	1,364	413%	424%

Member State	Scenario	Tax rate currently implemented (BOD5 €/Kg)	Benchmark harmonized tax rate (BOD5 €/Kg)	Difference between current and new tax rate (BOD5 €/Kg)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Tax	Additional tax revenues in 2035 as % of 2023 Resource Tax
Sweden	B	0.00	2.44	2.4	861	883	267%	274%
All EU[68]	**A**	**1.52**	**3.06**	**1.5**	**28,026**	**28,062**	**194%**	**194%**
All EU	**B**	**1.52**	**2.32**	**0.8**	**15,981**	**15,998**	**111%**	**111%**

Table **5-44** shows the information for the **landfill tax.** Eight Member States observed no change in tax revenue (Belgium, Denmark, Germany, Ireland, France, Latvia, Austria, Finland) due to the current tax rate being higher than the benchmark tax rate. Meanwhile, Romania observed the greatest gain in tax revenue. The average for additional revenue in 2030 and 2035 equated to €211 million and €190 million for scenario A. Whilst, the average for additional revenue in 2030 and 2035 in scenario B equated to €72 and €63 million respectively.

Table 5-44: Comparing tax regimes for each Member State

Landfill (€/MT) ([73])

Member State	Scenario	Tax rate currently implemen ted (€/MT)	Benchmark harmonised tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Taxes	Additional tax revenues in 2035 as % of 2023 Pollution Taxes
Belgium	A	102.10	102.10	0.0	0	0	0%	0%
Belgium	B	102.10	102.10	0.0	0	0	0%	0%
Bulgaria	A	48.45	65.00	16.6	236	158	4,596%	3,077%
Bulgaria	B	48.45	48.45	0.0	0	0	0%	0%
Czechia	A	20.00	65.00	45.0	92	85	301%	278%
Czechia	B	20.00	36.20	16.2	37	34	122%	113%
Denmark	A	79.00	79.00	0.0	0	0	0%	0%
Denmark	B	79.00	79.00	0.0	0	0	0%	0%
Germany	A	0.00	65.00	65.0	0	0	NA	NA
Germany	B	0.00	36.20	36.2	0	0	NA	NA
Estonia	A	29.84	65.00	35.2	147	159	413%	445%
Estonia	B	29.84	36.20	6.4	30	32	83%	90%
Ireland	A	75.00	75.00	0.0	0	0	0%	0%
Ireland	B	75.00	75.00	0.0	0	0	0%	0%

([73]) N.A means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark harmonised tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Taxes	Additional tax revenues in 2035 as % of 2023 Pollution Taxes
Greece	A	30.00	65.00	35.0	181	153	623%	527%
Greece	B	30.00	36.20	6.2	36	30	123%	104%
Spain	A	18.03	65.00	47.0	443	320	23%	17%
Spain	B	18.03	36.20	18.2	194	140	10%	7%
France	A	94.50	94.50	0.0	0	0	0%	0%
France	B	94.50	94.50	0.0	0	0	0%	0%
Croatia	A	0.00	65.00	65.0	60	50	37%	31%
Croatia	B	0.00	36.20	36.2	39	32	24%	20%
Italy	A	17.80	65.00	47.2	201	150	34%	25%
Italy	B	17.80	36.20	18.4	89	66	15%	11%
Cyprus	A	0.00	65.00	65.0	19	16	30%	26%
Cyprus	B	0.00	36.20	36.2	12	11	19%	17%
Latvia	A	65.00	65.00	0.0	0	0	0%	0%
Latvia	B	65.00	65.00	0.0	0	0	0%	0%
Lithuania	A	10.00	65.00	55.0	11	7	7%	5%
Lithuania	B	10.00	36.20	26.2	7	5	5%	3%
Luxembourg	A	8.00	65.00	57.0	68	61	NA	NA
Luxembourg	B	8.00	36.20	28.2	50	45	NA	NA

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark harmonised tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Taxes	Additional tax revenues in 2035 as % of 2023 Pollution Taxes
Hungary	A	19.35	65.00	45.7	186	188	82%	83%
Hungary	B	19.35	36.20	16.9	78	79	35%	35%
Malta	A	0.00	65.00	65.0	5	3	16%	9%
Malta	B	0.00	36.20	36.2	3	2	11%	6%
Netherlands	A	33.15	65.00	31.9	33	28	1%	1%
Netherlands	B	33.15	36.20	3.1	4	3	0%	0%
Austria	A	87.00	87.00	0.0	0	0	0%	0%
Austria	B	87.00	87.00	0.0	0	0	0%	0%
Poland	A	46.00	65.00	19.0	484	528	72%	79%
Poland	B	46.00	46.00	0.0	0	0	0%	0%
Portugal	A	22.00	65.00	43.0	56	43	71%	54%
Portugal	B	22.00	36.20	14.2	21	16	26%	20%
Romania	A	17.00	65.00	48.0	2,925	2,639	54,975%	49,609%
Romania	B	17.00	36.20	19.2	1324	1195	24,893%	22,463%
Slovenia	A	11.00	65.00	54.0	4	3	18%	12%
Slovenia	B	11.00	36.20	25.2	2	2	10%	6%
Slovakia	A	22.00	65.00	43.0	50	43	188%	161%
Slovakia	B	22.00	36.20	14.2	18	16	70%	60%
Finland	A	70.00	70.00	0.0	0	0	0%	0%
Finland	B	70.00	70.00	0.0	0	0	0%	0%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark harmonised tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Taxes	Additional tax revenues in 2035 as % of 2023 Pollution Taxes
Sweden	A	51.00	65.00	14.0	501	491	156%	153%
Sweden	B	51.00	51.00	0.0	0	0	0%	0%
All EU[68]	**A**	**36.20**	**69.40**	**33.2**	**5,701**	**5,126**	**39%**	**35%**
All EU	**B**	**36.16**	**49.39**	**13.2**	**1,944**	**1,708**	**13%**	**12%**

Table **5-45** shows the information for the **waste incineration tax**. Bulgaria, Estonia, Ireland, Greece, Spain, Croatia, Cyprus, Latvia, Lithuania, Luxembourg, Malta, Austria, Portugal, Slovenia and Slovakia all showed no change in revenue despite the tax increasing. This is due to the amount that waste taken to incineration was predicted to fall (see section **Error! Reference source not found.** for more information). The average for additional tax revenues in 2030 and 2035 for scenario A are €2.6 million and €3.1 million, whilst for scenario B it is €0.6 million for both. Poland, Romania and Finland all observed higher changes in revenue than the averages and both scenario A and B.

Table 5-45: Comparing tax regimes for each Member State

Incineration (€/MT) ([74])

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark harmonised tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Taxes	Additional tax revenues in 2035 as % of 2023 Pollution Taxes
Belgium	A	41.00	41.00	0.0	0	0	0%	0%
Belgium	B	41.00	41.00	0.0	0	0	0%	0%
Bulgaria	A	0.00	19.50	19.5	0	0	0%	0%
Bulgaria	B	0.00	8.10	8.1	0	0	0%	0%
Czechia	A	0.00	19.50	19.5	1	2	5%	6%
Czechia	B	0.00	8.10	8.1	1	1	2%	3%
Denmark	A	75.00	75.00	0.0	0	0	0%	0%
Denmark	B	75.00	75.00	0.0	0	0	0%	0%
Germany	A	0.00	19.50	19.5	12	2	0%	0%
Germany	B	0.00	8.10	8.1	6	3	0%	0%
Estonia	A	0.00	19.50	19.5	0	0	0%	0%
Estonia	B	0.00	8.10	8.1	0	0	0%	0%
Ireland	A	0.00	19.50	19.5	0	0	1%	1%
Ireland	B	0.00	8.10	8.1	0	0	0%	0%

([74]) N.A means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark harmonised tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Taxes	Additional tax revenues in 2035 as % of 2023 Pollution Taxes
Greece	A	0.00	19.50	19.5	0	0	1%	1%
Greece	B	0.00	8.10	8.1	0	0	0%	0%
Spain	A	15.00	19.50	4.5	0	0	0%	0%
Spain	B	15.00	15.00	0.0	0	0	0%	0%
France	A	12.50	19.50	7.0	35	55	1%	1%
France	B	12.50	12.50	0.0	0	0	0%	0%
Croatia	A	0.00	19.50	19.5	0	0	0%	0%
Croatia	B	0.00	8.10	8.1	0	0	0%	0%
Italy	A	2.50	19.50	17.0	3	2	1%	0%
Italy	B	2.50	8.10	5.6	1	1	0%	0%
Cyprus	A	0.00	19.50	19.5	0	0	0%	0%
Cyprus	B	0.00	8.10	8.1	0	0	0%	0%
Latvia	A	15.00	19.50	4.5	0	0	0%	0%
Latvia	B	15.00	15.00	0.0	0	0	0%	0%
Lithuania	A	0.00	19.50	19.5	0	0	0%	0%
Lithuania	B	0.00	8.10	8.1	0	0	0%	0%
Luxembourg	A	0.00	19.50	19.5	0	0	0%	0%
Luxembourg	B	0.00	8.10	8.1	0	0	0%	0%
Hungary	A	0.00	19.50	19.5	2	2	1%	1%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark harmonised tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Taxes	Additional tax revenues in 2035 as % of 2023 Pollution Taxes
Hungary	B	0.00	8.10	8.1	1	1	0%	0%
Malta	A	0.00	19.50	19.5	0	0	0%	0%
Malta	B	0.00	8.10	8.1	0	0	0%	0%
Netherlands	A	36.00	36.00	0.0	0	0	0%	0%
Netherlands	B	36.00	36.00	0.0	0	0	0%	0%
Austria	A	8.00	19.50	11.5	0	0	0%	0%
Austria	B	8.00	19.50	11.5	0	0	0%	0%
Poland	A	0.00	19.50	19.5	5	5	1%	1%
Poland	B	0.00	8.10	8.1	3	3	0%	0%
Portugal	A	13.50	19.50	6.0	0	0	0%	0%
Portugal	B	13.50	13.50	0.0	0	0	0%	0%
Romania	A	0.00	19.50	19.5	6	11	105%	201%
Romania	B	0.00	8.10	8.1	3	5	50%	96%
Slovenia	A	0.00	19.50	19.5	0	0	1%	1%
Slovenia	B	0.00	8.10	8.1	0	0	1%	1%
Slovakia	A	0.00	19.50	19.5	0	0	0%	0%
Slovakia	B	0.00	8.10	8.1	0	0	0%	0%
Finland	A	0.00	19.50	19.5	3	3	18%	17%
Finland	B	0.00	8.10	8.1	2	1	9%	8%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark harmonised tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Taxes	Additional tax revenues in 2035 as % of 2023 Pollution Taxes
Sweden	A	0.00	19.50	19.5	1	1	0%	0%
Sweden	B	0.00	8.10	8.1	0	0	0%	0%
All EU[68]	**A**	**0.00**	**0.00**	**0.0**	**70**	**83**	**0%**	**1%**
All EU	**B**	**8.09**	**14.13**	**6.0**	**16**	**16**	**0%**	**0%**

Table 5-46 shows the tax information for the **fertiliser tax**. The majority of the Member States observed an increase in revenue. This is due to them all not currently having a fertiliser tax in place. The largest gains in revenues (compared to the average, €21m and €20m for scenario A, €7m and €7m for scenario B) are in Germany, Ireland, Spain, Italy, Poland and Romania.

Table 5-46: Comparing tax regimes for each Member State

Fertiliser (€/Kg) ([75])

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution taxes	Additional tax revenues in 2035 as % of 2023 Pollution taxes
Belgium	A	0.00	0.17	0.2	9	9	2%	2%
Belgium	B	0.00	0.04	0.0	4	3	1%	1%

([75]) N.A means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution taxes	Additional tax revenues in 2035 as % of 2023 Pollution taxes
Bulgaria	A	0.00	0.05	0.0	20	25	392%	495%
Bulgaria	B	0.00	0.01	0.0	6	7	108%	136%
Czechia	A	0.00	0.07	0.1	14	13	45%	44%
Czechia	B	0.00	0.02	0.0	4	4	13%	13%
Denmark	A	0.00	0.15	0.1	18	18	6%	6%
Denmark	B	0.00	0.04	0.0	6	6	2%	2%
Germany	A	0.00	0.15	0.1	72	61	NA	NA
Germany	B	0.00	0.04	0.0	26	22	NA	NA
Estonia	A	0.00	0.02	0.0	1	1	3%	3%
Estonia	B	0.00	0.01	0.0	0	0	1%	1%
Ireland	A	0.00	0.12	0.1	23	22	275%	267%
Ireland	B	0.00	0.03	0.0	8	7	91%	88%
Greece	A	0.00	0.19	0.2	17	17	59%	58%
Greece	B	0.00	0.05	0.0	7	7	25%	24%
Spain	A	0.00	0.07	0.1	46	46	2%	2%
Spain	B	0.00	0.02	0.0	13	13	1%	1%
France	A	0.00	0.12	0.1	129	117	3%	2%
France	B	0.00	0.03	0.0	43	39	1%	1%
Croatia	A	0.00	0.10	0.1	6	6	4%	4%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution taxes	Additional tax revenues in 2035 as % of 2023 Pollution taxes
Croatia	B	0.00	0.02	0.0	2	2	1%	1%
Italy	A	0.00	0.12	0.1	48	47	8%	8%
Italy	B	0.00	0.03	0.0	16	16	3%	3%
Cyprus	A	0.00	0.10	0.1	1	1	1%	1%
Cyprus	B	0.00	0.02	0.0	0	0	0%	0%
Latvia	A	0.00	0.02	0.0	2	3	6%	7%
Latvia	B	0.00	0.01	0.0	1	1	2%	2%
Lithuania	A	0.00	0.05	0.0	5	5	3%	3%
Lithuania	B	0.00	0.01	0.0	1	1	1%	1%
Luxembourg	A	0.00	0.12	0.1	1	1	NA	NA
Luxembourg	B	0.00	0.03	0.0	0	0	NA	NA
Hungary	A	0.00	0.10	0.1	19	19	9%	8%
Hungary	B	0.00	0.02	0.0	6	6	3%	3%
Malta	A	0.00	0.02	0.0	0	0	0%	0%
Malta	B	0.00	0.01	0.0	0	0	0%	0%
Netherlands	A	0.00	0.17	0.2	18	17	0%	0%
Netherlands	B	0.00	0.04	0.0	7	7	0%	0%
Austria	A	0.00	0.10	0.1	8	8	12%	13%
Austria	B	0.00	0.02	0.0	2	2	4%	4%

Member State	Scenario	Tax rate currently implemented (€/MT)	Benchmark tax rate (€/MT)	Difference between current and new tax rate (€/MT)	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution taxes	Additional tax revenues in 2035 as % of 2023 Pollution taxes
Poland	A	0.00	0.05	0.0	43	42	6%	6%
Poland	B	0.00	0.01	0.0	12	12	2%	2%
Portugal	A	0.00	0.07	0.1	5	5	6%	6%
Portugal	B	0.00	0.02	0.0	1	1	2%	2%
Romania	A	0.00	0.05	0.0	25	29	466%	547%
Romania	B	0.00	0.01	0.0	7	8	128%	151%
Slovenia	A	0.00	0.10	0.1	2	2	7%	7%
Slovenia	B	0.00	0.02	0.0	1	1	2%	2%
Slovakia	A	0.00	0.05	0.0	5	5	18%	19%
Slovakia	B	0.00	0.01	0.0	1	1	5%	5%
Finland	A	0.00	0.10	0.1	11	11	59%	59%
Finland	B	0.00	0.02	0.0	3	3	18%	18%
Sweden	A	0.00	0.10	0.1	15	17	5%	5%
Sweden	B	0.00	0.02	0.0	5	5	1%	2%
All EU[68]	**A**	**0.00**	**0.09**	**0.1**	**563**	**547**	**4%**	**4%**
All EU	**B**	**0.00**	**0.02**	**0.0**	**182**	**176**	**1%**	**1%**

Table 5-47 shows the information for the **minerals tax**. Similar to fertilisers, the majority of Member States observed an increase in revenue as again due to many of Member States not having a tax currently implemented. Across both scenarios, Spain, France, Finland and Romania observed an increase higher than the averages for additional tax revenue in 2030 and 2035. The average additional tax revenues were €206 million in 2030 and €222 million in 2035 for scenario A, and €49 million in 2030 and €53 million in 2035 for scenario B.

Table 5-47: Comparing tax regimes for each Member State

Minerals (€/Kg) ([76])

Member State	Scenario	Tax rate currently implemented €/Kg	Benchmark tax rate €/Kg	Difference between current and new tax rate €/Kg	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Taxes	Additional tax revenues in 2035 as % of 2023 Resource Taxes
Belgium	A	0.00	3.12	3.1	113	109	115%	112%
Belgium	B	0.00	0.94	0.9	39	37	40%	38%
Bulgaria	A	0.00	3.12	3.1	190	205	733%	790%
Bulgaria	B	0.00	0.94	0.9	65	70	252%	271%
Czechia	A	4.87	4.87	0.0	0	0	NA	NA
Czechia	B	4.87	4.87	0.0	0	0	NA	NA
Denmark	A	0.64	3.12	2.5	157	172	69%	75%
Denmark	B	0.64	0.94	0.3	24	26	10%	11%
Germany	A	7.36	7.36	0.0	0	0	NA	NA
Germany	B	7.36	7.36	0.0	0	0	NA	NA
Estonia	A	0.40	3.12	2.7	34	36	213%	222%

([76]) N.A means there was no data to do the calculation. Where the row includes "0" this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Scenario	Tax rate currently implemented €/Kg	Benchmark tax rate €/Kg	Difference between current and new tax rate €/Kg	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Taxes	Additional tax revenues in 2035 as % of 2023 Resource Taxes
Estonia	B	0.40	0.94	0.5	9	10	57%	59%
Ireland	A	0.00	3.12	3.1	125	122	9869%	9634%
Ireland	B	0.00	0.94	0.9	43	42	3389%	3308%
Greece	A	0.00	3.12	3.1	56	46	NA	NA
Greece	B	0.00	0.94	0.9	19	16	NA	NA
Spain	A	0.00	3.12	3.1	323	275	323%	275%
Spain	B	0.00	0.94	0.9	111	95	111%	95%
France	A	0.00	3.12	3.1	1009	1014	239%	240%
France	B	0.00	0.94	0.9	346	348	82%	82%
Croatia	A	0.42	3.12	2.7	48	46	14%	13%
Croatia	B	0.42	0.94	0.5	11	10	3%	3%
Italy	A	1.05	3.12	2.1	267	237	160%	142%
Italy	B	1.05	1.05	0.0	0	0	0%	0%
Cyprus	A	0.00	3.12	3.1	35	35	296%	293%
Cyprus	B	0.00	0.94	0.9	12	12	102%	101%
Latvia	A	0.12	3.12	3.0	75	88	274%	321%
Latvia	B	0.12	0.94	0.8	23	27	85%	100%
Lithuania	A	0.16	3.12	3.0	126	151	253%	304%
Lithuania	B	0.16	0.94	0.8	38	46	76%	92%
Luxembourg	A	0.00	3.12	3.1	1	1	9%	8%

Member State	Scenario	Tax rate currently implemented €/Kg	Benchmark tax rate €/Kg	Difference between current and new tax rate €/Kg	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Taxes	Additional tax revenues in 2035 as % of 2023 Resource Taxes
Luxembourg	B	0.00	0.94	0.9	0	0	3%	3%
Hungary	A	4.10	4.10	0.0	0	0	0%	0%
Hungary	B	4.10	4.10	0.0	0	0	0%	0%
Malta	A	0.00	3.12	3.1	4	4	NA	NA
Malta	B	0.00	0.94	0.9	1	1	NA	NA
Netherlands	A	0.00	3.12	3.1	65	67	21%	21%
Netherlands	B	0.00	0.94	0.9	22	23	7%	7%
Austria	A	0.29	3.12	2.8	179	177	891%	882%
Austria	B	0.29	0.94	0.7	47	46	234%	231%
Poland	A	1.34	3.12	1.8	539	571	4,147%	4,398%
Poland	B	1.34	1.34	0.0	0	0	0%	0%
Portugal	A	2.24	3.12	0.9	63	57	269%	244%
Portugal	B	2.24	2.24	0.0	0	0	0%	0%
Romania	A	0.47	3.12	2.7	1,297	1,543	20,432%	24,297%
Romania	B	0.47	0.94	0.5	264	314	4,158%	4,945%
Slovenia	A	0.00	3.12	3.1	42	40	136%	132%
Slovenia	B	0.00	0.94	0.9	14	14	47%	45%
Slovakia	A	0.05	3.12	3.1	81	80	NA	NA
Slovakia	B	0.05	0.94	0.9	27	26	NA	NA

Member State	Scenario	Tax rate currently implemented €/Kg	Benchmark tax rate €/Kg	Difference between current and new tax rate €/Kg	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Resource Taxes	Additional tax revenues in 2035 as % of 2023 Resource Taxes
Finland	A	0.00	3.12	3.1	615	775	2,276%	2,872%
Finland	B	0.00	0.94	0.9	211	266	782%	986%
Sweden	A	1.97	3.12	1.2	126	133	1,417%	1,494%
Sweden	B	1.97	1.97	0.0	0	0	0%	0%
All EU[68]	**A**	**0.94**	**3.38**	**2.4**	**5,570**	**5,985**	**285%**	**306%**
All EU	**B**	**0.94**	**1.55**	**0.6**	**1,328**	**1,431**	**68%**	**73%**

Table **5-48** and **Error! Reference source not found.** show information for the **pesticide tax**. For group 2 and group 3, the majority of the Member States observed an increase in revenue. With the largest increases for scenario A observed in Germany, France, Italy and Spain (the average additional tax revenue in 2030 for group 2, 3 and 4 is €55.8 million, €12.3 million, €0 million). Similar, for scenario B, the largest increases in revenue are seen in Germany, Italy and Spain (the average additional tax revenue in 2035 for group 2, 3 and 4 is €30.2 million, €6.6 million, €0.0 million).

Table 5-48: Comparing tax regimes for each Member State

Pesticide tax Scenario A (€/Kg) ([77])

Member State	Tax	Tax rate currently impleme nted	Benchmark tax rate	Difference between current and new tax rate	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Austria	Group 2	0.00	14.30	14.30	20.7	20.3	34%	34%
Austria	Group 3	0.00	19.50	19.50	2.8	2.7	5%	4%
Austria	Group 4	0.00	26.00	26.00	0	0	N/A	N/A
Belgium	Group 2	0.00	25.03	25.03	40.4	40.5	8%	8%
Belgium	Group 3	0.00	34.13	34.13	8.0	7.8	2%	2%
Belgium	Group 4	0.00	45.50	45.50	0	0	N/A	N/A
Bulgaria	Group 2	0.00	7.15	7.15	13.6	13.6	264%	264%
Bulgaria	Group 3	0.00	9.75	9.75	3.2	3.1	63%	61%
Bulgaria	Group 4	0.00	13.00	13.00	0	0	N/A	N/A
Croatia	Group 2	0.00	14.30	14.30	8.3	8.4	5%	5%
Croatia	Group 3	0.00	19.50	19.50	1.8	1.7	1%	1%
Croatia	Group 4	0.00	26.00	26.00	0	0	N/A	N/A
Cyprus	Group 2	0.00	14.30	14.30	4.2	4.2	7%	7%
Cyprus	Group 3	0.00	19.50	19.50	0.5	0.5	1%	1%
Cyprus	Group 4	0.00	26.00	26.00	0	0	N/A	N/A

([77]) N.A means there was no data to do the calculation. Where the row includes “0” this means no current tax in that Member State is applied. When the current rates are higher rates than the benchmark rate, we assume no new revenue.

Member State	Tax	Tax rate currently impleme nted	Benchmark tax rate	Difference between current and new tax rate	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Czechia	Group 2	0.00	10.73	10.73	19.7	19.7	65%	65%
Czechia	Group 3	0.00	14.63	14.63	4.6	4.5	15%	15%
Czechia	Group 4	0.00	19.50	19.50	0	0	N/A	N/A
Denmark	Group 2	0.00*	21.45	21.45	0	0	N/A	N/A
Denmark	Group 3	0.00*	29.25	29.25	0	0	N/A	N/A
Denmark	Group 4	0.00*	39.00	39.00	0	0	N/A	N/A
Estonia	Group 2	0.00	3.58	3.58	1.4	1.4	4%	4%
Estonia	Group 3	0.00	4.88	4.88	0.2	0.2	0%	0%
Estonia	Group 4	0.00	6.50	6.50	0	0	N/A	N/A
Finland	Group 2	0.00	14.30	14.30	21.4	21.4	119%	119%
Finland	Group 3	0.00	19.50	19.50	0.4	0.4	2%	2%
Finland	Group 4	0.00	26.00	26.00	0	0	N/A	N/A
France	Group 2	0.00	17.88	17.88	292.0	292.6	6%	6%
France	Group 3	0.00	24.38	24.38	72.4	70.2	1%	1%
France	Group 4	0.00	32.50	32.50	0	0	N/A	N/A
Germany	Group 2	0.00	21.45	21.45	269.1	269.0	N/A	N/A
Germany	Group 3	0.00	29.25	29.25	50.8	49.3	N/A	N/A
Germany	Group 4	0.00	39.00	39.00	0	0	N/A	N/A
Greece	Group 2	0.00	28.60	28.60	35.3	35.5	122%	122%
Greece	Group 3	0.00	39.00	39.00	16.1	15.6	56%	54%

Member State	Tax	Tax rate currently impleme nted	Benchmark tax rate	Difference between current and new tax rate	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Greece	Group 4	0.00	52.00	52.00	0	0	N/A	N/A
Hungary	Group 2	0.00	14.30	14.30	43.5	43.7	19%	19%
Hungary	Group 3	0.00	19.50	19.50	12.3	11.9	5%	5%
Hungary	Group 4	0.00	26.00	26.00	0	0	N/A	N/A
Ireland	Group 2	0.00	17.88	17.88	20.5	20.5	247%	247%
Ireland	Group 3	0.00	24.38	24.38	2.4	2.3	29%	28%
Ireland	Group 4	0.00	32.50	32.50	0	0	N/A	N/A
Italy	Group 2	0.00	17.88	17.88	215.3	215.0	36%	36%
Italy	Group 3	0.00	24.38	24.38	53.8	51.9	9%	9%
Italy	Group 4	0.00	32.50	32.50	0	0	N/A	N/A
Latvia	Group 2	0.00	3.58	3.58	3.2	3.2	9%	9%
Latvia	Group 3	0.00	4.88	4.88	0.6	0.5	2%	2%
Latvia	Group 4	0.00	6.50	6.50	0	0	N/A	N/A
Lithuania	Group 2	0.00	7.15	7.15	9.4	9.5	6%	6%
Lithuania	Group 3	0.00	9.75	9.75	1.5	1.5	1%	1%
Lithuania	Group 4	0.00	13.00	13.00	0	0	N/A	N/A
Luxembourg	Group 2	0.00	17.88	17.88	0.9	0.9	N/A	N/A
Luxembourg	Group 3	0.00	24.38	24.38	0.2	0.2	N/A	N/A
Luxembourg	Group 4	0.00	32.50	32.50	0	0	N/A	N/A
Malta	Group 2	0.00	21.45	21.45	0.2	0.2	1%	1%

Member State	Tax	Tax rate currently impleme nted	Benchmark tax rate	Difference between current and new tax rate	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Malta	Group 3	0.00	29.25	29.25	0.1	0.1	0%	0%
Malta	Group 4	0.00	39.00	39.00	0	0	N/A	N/A
Netherlands	Group 2	0.00	25.03	25.03	62.5	62.3	2%	2%
Netherlands	Group 3	0.00	34.13	34.13	6.5	6.3	0%	0%
Netherlands	Group 4	0.00	45.50	45.50	0	0	N/A	N/A
Poland	Group 2	0.00	7.15	7.15	61.7	62.3	9%	9%
Poland	Group 3	0.00	9.75	9.75	24.1	23.4	4%	4%
Poland	Group 4	0.00	13.00	13.00	0	0	N/A	N/A
Portugal	Group 2	0.00	10.73	10.73	29.8	30.0	38%	38%
Portugal	Group 3	0.00	14.63	14.63	7.7	7.5	10%	9%
Portugal	Group 4	0.00	19.50	19.50	0	0	N/A	N/A
Romania	Group 2	0.00	7.15	7.15	21.0	21.2	395%	398%
Romania	Group 3	0.00	9.75	9.75	6.1	5.9	115%	111%
Romania	Group 4	0.00	13.00	13.00	0	0	N/A	N/A
Slovakia	Group 2	0.00	7.15	7.15	6.2	6.2	23%	24%
Slovakia	Group 3	0.00	9.75	9.75	1.9	1.9	7%	7%
Slovakia	Group 4	0.00	13.00	13.00	0	0	N/A	N/A
Slovenia	Group 2	0.00	14.30	14.30	3.7	3.7	15%	15%
Slovenia	Group 3	0.00	19.50	19.50	0.5	0.4	2%	2%
Slovenia	Group 4	0.00	26.00	26.00	0	0	N/A	N/A

Member State	Tax	Tax rate currently impleme nted	Benchmark tax rate	Difference between current and new tax rate	ADDITIONAL TAX REVENUES €MN.2030	ADDITIONAL TAX REVENUES €MN.2035	Additional tax revenues in 2030 as % of 2023 Pollution Tax	Additional tax revenues in 2035 as % of 2023 Pollution Tax
Spain	Group 2	0.00	10.73	10.73	234.7	233.3	12%	12%
Spain	Group 3	0.00	14.63	14.63	39.7	38.2	2%	2%
Spain	Group 4	0.00	19.50	19.50	0	0	N/A	N/A
Sweden	Group 2	3.00	14.30	11.30	10.8	10.8	3%	3%
Sweden	Group 3	3.00	19.50	16.50	0.8	0.8	0.3%	0.2%
Sweden	Group 4	3.00	26.00	23.00	0	0	N/A	N/A
All EU[68]	**Group 2**	**0.00**	**17.16**	**17.16**	**1,473.4**	**1,473.2**	**12%**	**10%**
All EU	**Group 3**	**0.00**	**17.80**	**17.80**	**323.6**	**313.0**	**2%**	**2%**
All EU	**Group 4**	**0.00**	**18.46**	**18.46**	**0**	**0**	**N/A**	**N/A**

Key: Group 2 - active substances; Group 3 - active substances candidates for substitution; Group 4 - non-approved active substances

*Denmark has a pesticide tax, but rates are not comparable.

5.5. Sectors potentially affected and their economic significance in each Member State

For each taxation instrument, we identify the tax base — that is, who pays the charge — and, insofar as possible, the economic sector or sectors in which these payers operate. This mapping is necessarily approximate, since many instruments are designed to cover a broad spectrum of activities. Drawing on the evidence in Section 4, we then consider how costs may be absorbed within the affected sectors or passed through to downstream users and, ultimately, to consumers of the relevant goods and services. The aim at this stage is not to quantify impacts, but to trace the parts of the economy and supply chains that could be exposed, and to note where instruments overlap in their coverage. In the next step, we place these potentially affected sectors in national context by gauging their economic weight — both as a share of Gross Value Added and of total employment — so that the significance of any prospective effects can be better understood.

Table 5-49: Instruments and sectors

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
Tax on SO_2, NOx and $PM_{2.5}$ emissions into the environment	*The three instruments are discussed jointly in this table given they are each targeted on the same five sectors (the definitions are the same as in the Eurostat database):* ***Mining and Quarrying*** ***Electricity, gas, steam and air conditioning supply*** ***Manufacturing*** ***Construction*** ***Water supply; sewerage, waste management and remediation activities*** ***SO2:*** *The sectors above comprise two-thirds of all SO_2, emissions (see section **Error! Reference source not found.**). The EEA provide time series data on sources and emission of air pollutants in Europe; the latest publication relates to 2025. At the level of the EU as a whole, this shows a sharply decreasing trend in SOx emissions (between 2005-2020). The rates differ in Member States (from -56% in Latvia to -93.5% in Greece) ([78]). Other data show similar decreases in SO2 from Large Combustion Plants ([79]). The latest data on emission sources from the EEA relate to 2022. These indicate that emissions of all key pollutants – including SO2 - continued to decline, whilst GDP increased.* *In 2022 the major emitting sectors of SO2 were energy supply (41%); manufacturing and extractive industries (37%) ([80]).*	*Any increase would initially be borne by the four-sectors left. These may in turn be reflected in increases for energy, aggregates, and or manufacturing or construction inputs. The extent of any such risk will reflect the scale of any increase in specific Member States, alongside a rage of other factors influencing costs.*

([78]) https://www.eea.europa.eu/en/analysis/indicators/emissions-of-the-main-air

([79]) https://www.eea.europa.eu/en/analysis/indicators/emissions-and-energy-use-in

([80]) https://www.eea.europa.eu/en/analysis/publications/air-quality-in-europe-2022/sources-and-emissions-of-air-pollutants-in-europe

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	NO_X *The emissions from the five targeted sectors above comprised about 13% of all NOx emissions in the latest year for which data are available (see section* ***Error! Reference source not found.****). The 2025 time series data from the EEA indicate that NOx emissions declined, but not at the same rate as SOx; they stood at about 47% of 2005 emissions levels by 2023 ([81]). As with SOx the decrease has been witnessed across the EU, but differ between Member States (from -29.6% in Lithuania to -62.9% in Belgium. EEA data indicate the road transport sector was the main source of emissions of NOx emissions, responsible for 37% (this sector is excluded from the tax), followed by agriculture at 19%, and manufacturing and extractive industries also at 19% ([82]).* ***PM2.5:*** *The 2025 time series data from the EEA indicate that PM2.5 emissions declined, but as a much slower rate than the other targeted pollutants; they stood at about 62% of 2005 emissions levels by 2023 across the EU as a whole. Member State decreases differed (from -17% in Romania to -63.3% in Slovakia). The primary source of PM2.5, was energy consumption in the residential, commercial and institutional sector (58% of PM2.5 emissions). The manufacturing and extractive industry (14%), the road transport sector (9% - not included in the tax) and Agriculture (7%), were also significant sources.* *The three taxes are targeted at the same sectors in each case, whilst each encompass a wide range of specific activities, there is overlap in the major emitting sources and hence the sectors who would incur the majority of the costs. The majority of costs, appear likely to be borne by energy generating companies and various manufacturing and extractive industries. The costs may in turn be passed on to a diverse range of industries and potentially thereafter to individual households as consumers of energy.*	

([81]) https://www.eea.europa.eu/en/analysis/indicators/emissions-of-the-main-air

([82]) https://www.eea.europa.eu/en/analysis/publications/air-quality-in-europe-2022/sources-and-emissions-of-air-pollutants-in-europe

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
Tax on SO_2 emissions into the environment		
Tax on $PM_{2.5}$ emissions into the environment		
Water Abstraction	*The tax is applied to abstraction of ground and surface water; the specific rates in Member States may differ based on region and aquifer as well as the extent of water scarcity. Data from the European Environment Agency (EEA) (2000, 2010 and 2022) ([83]) note that the majority of water abstraction (between 80% (2000) and 74% (2022) is via surface water, with groundwater comprising between (20% (2000) and 26% (2022). Total freshwater abstraction per year in the EU-27 over that period has decreased by 19%. These trends reflect changes in demand by different users. Increases in water abstraction from groundwater can largely be attributed to increasing demand from public water supply (18%) across Europe and in the agriculture sector (17%), particularly in southern Europe. Groundwater accounted for 62% of the total public water supply and 33% of agricultural water demands during 2022 in the EU-27.* *Data on water abstraction by economic sector indicate the mains users are: In 2022 the largest water abstraction demands came from:* ***Electricity cooling*** *c. 78,000 million m3;* ***Agriculture*** *c. 58, 000 million m3;* ***Public Water Supply*** *c. 41, 000 million m3 and* ***Manufacturing*** *29,000 million m3.* ***Mining and quarrying*** *and* ***Construction*** *both comprise less than 5,000 million m3 ([84]).* *As such a wide range of industries would incur the costs of the taxes, primarily electricity generating companies, agricultural businesses and public water utilities. The costs may in turn be passed on to a diverse range*	*Any increase would initially be borne by energy generating companies, agricultural businesses, public utilities and reflected in increases in operating costs. These may in turn be reflected in increases for energy, water and or food products. The extent of any such risk will reflect the scale of any increase in specific Member States, alongside a rage of other factors influencing costs.*

([83]) https://www.eea.europa.eu/en/analysis/indicators/water-abstraction-by-source-and

([84]) https://www.eea.europa.eu/en/analysis/indicators/water-abstraction-by-source-and/water-abstraction-by-economic

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	of industries including individual households as consumers of electricity, water supply and of food stuffs.	
Water Effluent – tax on biochemical oxygen demand (BOD) ([85]) in wastewater	*The tax will be applied based on discharges of effluent to wastewater, based on BOD content. The analysis in* ***Error! Reference source not found.*** *noted that the existing system of taxation instruments in Member States is complex. Existing taxes apply different rates for different waste producers. For example, in Denmark, the existing system of taxation focusses on content of nitrogen, phosphorus and organic substances in public water discharges, in Portugal nitrogen and phosphorus content, in Germany on "direct discharges" and in Malta, based on a system of discharge permits targeted at specific sectors.* *2024 data from the EEA note that in European rivers, oxygen consuming substances decreased over the period 1992 to 2022. 2022 BOD fell to half of the 1992 level, but has fluctuated at around 2.7mgO$_2$/l since 2010. It notes that the decrease in BOD (and ammonium) concentrations reflect improvements in wastewater treatment, alongside structural economic changes - particularly in central and eastern European countries during the 1990s – and the corresponding effects on the size of – and hence pollution from – their manufacturing industries ([86]).* *Key sources of organic pollution are municipal wastewater and industrial wastewater, especially from paper or food processing industries. Large contributions also stem from agricultural emissions, specifically surface run-off, manure and slurry from intensive livestock farms.* As such high BOD *levels are mainly observed in lowlands with high agricultural and industrial*	*The tax will be applied to all sectors that release wastewater. This will have an impact on operating costs of the sector implicated and incentivise companies to improve their wastewater treatment. In terms of the agricultural sector, this will incentivise land managers to apply techniques which reduce runoff into rivers etc. The additional costs of improving treatment costs or using more sustainable farming techniques may be passed on to the consumer for example, through higher food prices or higher water bills.*

([85]) BOD is the amount of dissolved oxygen needed by aerobic biological organisms to break down organic matter present in a given water sample at a certain temperature over a specific time period. BOD and ammonium increase with higher loads of biologically degradable organic matter. BOD (and ammonium) are key indicators of organic pollution in water.

([86]) https://www.eea.europa.eu/en/analysis/indicators/oxygen-consuming-substances-in-european-rivers?activeAccordion=

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	activity (for example the Po Valley in Italy). Lower BOD levels are usually seen in highlands such as the Alps ([87]). *It is assumed that the taxation instrument would be targeted in the first instance on point source water discharge at source i.e. from various industries – including those with discharge permits and/or who have on site wastewater treatment and discharge facilities on site. It is assumed the tax would not be imposed directly on waste water treatment plants.* *As such the costs in turn, could be incurred by a large range of sites and economic sectors. For example, industries that require wastewater treatment include: agriculture, automotive, construction, food processing, industrial manufacturing, marine industries, mining and quarrying, oil and gas, pharmaceutical manufacturing, pulp and paper, textile manufacturing, water treatment and treatment of industrial wastewater ([88]). In the EU, households and certain industries in 21,626 urban areas generate 538.4 million p.e. of wastewater every day ([89]). Currently, 81% of Europe's urban waste waters are collected and treated in line with EU standards ([90]).* *In 2016, the European Pollutant Release and Transfer Register (E-PRTR) ([91]) reported emissions to water above set thresholds from around 3 600 facilities. Based on national assessments, in most countries industrial point*	

([87]) https://www.eea.europa.eu/en/analysis/indicators/oxygen-consuming-substances-in-european-rivers?activeAccordion=

([88]) https://www.vlses.com/stay-in-the-know/newsroom/what-industries-require-wastewater-treatment/

([89]) https://water.europa.eu/freshwater/countries/uwwt/european-union

([90]) https://water.europa.eu/freshwater/countries/uwwt/european-union

([91]) https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/other-assessments/waste-water/#pressures-impacts-and-measures-industrial-waste-water

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	sources of pollution are identified as a relatively small source of pressure ([92]). The data suggest that smaller industrial point sources not regulated by the Industrial Emissions Directive (IED) may exert greater pressure on the quality of water than the larger installations covered by the IED. Industrial sectors that include large-scale activities such as pulp and paper, iron and steel, energy supply, non-ferrous metals and chemicals sectors tend to have a higher proportion of direct releases to water and these generally require onsite capacity to treat the wastewater before their release. Those industrial sectors with generally smaller scale installations, e.g. other manufacturing, and food and drink production, tend to report higher proportions of releases to the sewer system (i.e. indirect releases) than direct releases to water.	
Waste to landfill	*The tax is applied to waste sent to Landfill. Depending on Member State different rates apply to hazardous and non-hazardous waste and on the extent of pre-sorting.* *Data form the EEA indicate that whilst the overall EU landfill rate has decreased from 23% in 2020 to 17% in 2022, absolute volumes of waste generated has continued to increase. Moreover, the trends within waste stream are very different. For example, (mixed) household and similar waste to landfill has decreased from over 70 million tonnes to under 30 million; volumes of combustion waste have been fluctuating (standing at just under 50 million tonnes in 2022) and volumes of sorting residues sent to landfill has increased significantly, from under 20 million in 2010, to over 35 million tonnes. "Other sources", comprise around 24 million tonnes ([93]).* *The tax is levied on **landfill operators (waste management companies)** but the cost is typically passed on to waste producers across sectors (via higher gate fees or waste collection charges), thereby incentivising waste reduction and pre-treatment.*	*Any increase in cost would initially be borne by waste management companies and potentially municipal authorities themselves. The subsequent potential supply chain effects would therefore differ. Costs arising from increases in tax rates (or introduction of a new instrument) may be passed on to a range of different industrial companies by the waste management companies, be absorbed by those companies or a combination of the two. Costs to municipal waste collection may be reflected in increased costs, ultimately*

([92]) https://www.eea.europa.eu/en/analysis/publications/industrial-waste-water-treatment-pressures

([93]) https://www.eea.europa.eu/en/analysis/indicators/diversion-of-waste-from-landfill

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	As such, the industry primarily affected in the first instance by taxes are ***waste management companies.*** *These may be private contractors or – as below – be local/city/regional government operations undertaking municipal waste collection/disposal. The costs are then assumed to be passed on to a diverse range of sources generating the waste (households, commercial establishments, and industrial sectors).* *Data on Waste generation, differs significantly both by sector and by Member State ([94]). For example,* *Mining and quarrying on average, generates 22.7% of total EU waste (but varies from zero/negligible proportions to 72.4% of total waste in Bulgaria)* *Manufacturing: 10.3% EU average (from 0.9% Malta, to 27%, Slovakia)* *Energy: 3% EU average (from 0.1% in Cyprus to 30.2% in Estonia)* *Waste/Water: 10.5% EU average (from 1.0% in Finland to 36.3% in Latvia)* *Construction and demolition; 38.4% EU average (from 77.1% Malta to 1.6% Bulgaria)* *Other economic activities: 6.1% EU average (from 67.0% in Slovenia to 1.2% in Finland)* *Households: 9.0% EU average (from 1.5% in Finland to 28.0% in Latvia)* *The analysis in section 5.1.5 suggests substantial revenues may be raised in several Member States and hence the costs to waste management companies (and those generating the waste) may be significant.*	*to rate payers in those authorities. Again, the net effects would depend on the specific Member State, and volumes of waste directed between Landfill and incineration.* *The available data indicates that quantitatively greater demand for waste management – on average across the EU - could be incurred by construction and demolition activities, mining and quarrying and manufacturing activities.*
Waste Incineration	*The tax is applied to waste incineration from industry as well as that from municipal waste collection, which itself is often contracted to private companies. As such, the sectors incurring the initial charges will initially be* ***waste management companies but may include local/city/regional government****. The costs may in turn be passed on to a diverse range of industries generating such waste as well as individual households. As noted in section* ***Error! Reference source not found.*** *the precise effects are*	

([94]) https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	complex given the cross elasticises between taxes for landfill and for incineration. *Data from Eurostat indicates for the EU as a whole, on average 6.4% of waste treatment is via energy recovery. Within the EU these rates differ from 19.6% in Lithuania, to 0.0% in Bulgaria. For the EU as a whole, a further 0.4% of total waste disposed of via incineration without energy recovery (between 0.0% in several Member States, to 0.7% in Belgium) ([95]).*	
Fertilizers	*The tax is applied to the nitrogen content of a fertiliser, primarily urea and nitrates.* *Data from fertilizers Europe ([96]) indicates that total EU consumption of fertilizer in 2022 was 16 million tonnes (of nutrient) and the EU has an 8% share of the global market in nitrogen fertilizers, importing 5.1 million tonnes and exporting 2.3% million tonnes. The same source indicates that fertilizer consumption by crop (2021/2022) was:* *26% wheat;* *26% coarse grains;* *12% fertilised grassland;* *11% oilseeds;* *7% fodder crops;* *6% permanent corps;* *6% other crops;* *3% potatoes;* *2% Sugar beat.* *Eurostat "Agri data" also supplies more extensive information on crop usage across Europe. These data show annual mineral fertilizer consumption for field crops in the EU27 stood at 97.4 Kilogrammes of Nitrogen fertilizer per Hectare in 2018; increasing to 98.7 kg/Ha in 2019; declining slowly*	*Any increase would initially be borne by agricultural businesses, reflected in increases in operating costs, likely in turn reflected in per tonne crop price increases and potentially thereafter in food prices. It is possible, particularly in downstream sectors (i.e. supply of finished foodstuffs) that a degree of non-EU competition could occur. The extent of any such risk will reflect the scale of any increase in specific Member States, alongside a range of other factors influencing costs.*

([95]) https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics#Waste_treatment Specifically Figure 5.

([96]) https://www.fertilizerseurope.com/wp-content/uploads/2023/07/Industry-Facts-and-figures-2023.pdf

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	thereafter (97.7 kg/Ha in 2020; 95.4 Kg/Ha in 2021 and 87.7 KG/Ha in 2021). However national and regional differences in that consumption are extensive, reflecting climatic and other factors. For example, 2022 data suggests that nitrogen fertilizer consumption in Ireland, several regions in Northern, Central, South West and Eastern France, Central Germany; Czechia, Poland, Lithuania and parts of northern Italy had above average consumption, whilst Portugal, Southern Spain, Italy and Austria had below average consumption ([97]). *Those incurring the costs are therefore **agricultural businesses, particularly those involved in crop production**. The main subsequent users of affected products are manufacturers of food products, wholesalers and food service activities who supply food products to retailers and consumers. The ultimate cost increase will reflect the extent to which users are able to substitute affected fertilizers substances with alternatives with lower nitrogen content.*	
Pesticides	The tax is applied on the sale of Pesticides based on the active ingredient content. Those in scope include i) fungicides and bactericides ii) herbicides iii) insecticides iv) molluscicides v) plant growth regulators and vi) “others” (see section **Error! Reference source not found.**). In 2023 EU sales of pesticides stood at around 292,000 tonnes; this number had remained relatively stable from 2011-2021 but has steadily decreased since 2021. This decline has been attributed to rising costs of pesticides, itself driven by the war in Ukraine as well as a wider slowdown in rates of economic growth, impacting wider demand. The largest category by volume was fungicides and bactericides (with 39% of sales) according to Eurostat data ([98]). As Member States with 52% of EU utilised agricultural land and 49% of total EU arable land – France, Spain and Germany account for the majority of sales. Other notable consumers include Italy,	*Any increase would initially be borne by agricultural businesses, reflected in increases in operating costs, likely in turn reflected in per tonne crop price increases and potentially thereafter in food prices. It is possible, particularly in downstream sectors (i.e. supply of finished foodstuffs) that a degree of non-EU competition could occur. The extent of any such risk will reflect the scale of any increase in specific Member States, alongside a range of other factors influencing costs.*

([97]) https://agridata.ec.europa.eu/extensions/FertiliserReport/FertiliserReport.html

([98]) https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_consumption_of_pesticides

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	Poland , the Netherlands, Portugal, Romania, Czechia, Austria and Denmark ([99]). Although trend data are not available for all Member States, there were different trends across the EU in terms of changes in pesticides sales between 2011 and 2023. Sales has increased in five MS (Latvia, Austria (by over 50% in both cases) and in Lithuania, Finland and France. In 16 MS volumes decreased, particularly in Portugal, Italy (over -40%), Ireland, Slovenia and Czechia (just under -40%) ([100]). By reducing crop pests and reducing competition from weeds, Pesticides can improve yields and hence availability and price of associated products with associated benefits to farmers and consumers. Demand for products is influenced by a range of economic, climactic and geographical factors. For example, it is more viable to incur the costs of treatment to most profitable crops and use is influenced by site specific/seasonal vulnerabilities the pest infestation, the type of farming operation (conventional or organic). The data indicate substantial differences in the range of products used in different countries and include both agricultural use and use in other sectors such as forestry or on public/private areas ([101]). *As with fertilisers, those incurring the costs are therefore primarily **agricultural businesses, particularly those involved in crop production but also some forestry/logging operations**. The main subsequent users of affected products are manufacturers of food products, wholesalers and food service activities who supply food products to retailers and consumers. The ultimate cost increase will reflect the extent to which users are able to lower the active ingredient of pesticides, substitute them entirely or diversity into organic operations, for example.*	

([99]) Note in Germany and Austria, large volumes of inert gases, such as carbon dioxide or nitrogen, used in the storage of agricultural products. This inflates the total volume of pesticides sold in those MS.

([100]) https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_consumption_of_pesticides

([101]) https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_consumption_of_pesticides

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
Minerals	*The tax is applied on ground extracted aggregates (Marble, granite, sandstone, porphyry, basalt, other ornamental or building stone; Slate; Limestone and gypsum; and Sand and gravel). As such the primary economic agents subject to the tax are businesses extracting the mineral resources (based on the NACE 2 categories these fall under "other* ***mining and quarrying activities****"). This includes quarries and operation of gravel and sand pits.* *In terms of downstream users, the construction generates the largest demand for sand, gravel, and crushed natural stone, various brick clays, gypsum, and natural ornamental or dimension stone. Demand typically reflects level of new house building, maintenance, renovation, and civil engineering projects. The sector is characterised with a higher number of small and medium sized enterprises (SMEs) ([102]).* *In terms of market characteristics, Europe is self-sufficient in its aggregates production, only Belgium and the Netherlands import sizable volumes. The EU is the largest global producer of mined gypsum, accounting for about 25% of the global total. Spain, France, and Germany are the biggest producers in the EU. Similarly, around 35% of global natural stone production is in Europe, of which over 80% is in Italy, Greece, Spain, and Portugal. The sector has been facing increasing competition from countries such as China, India, and Brazil, however ([103]).* *As such, the main subsequent users of affected materials are construction firms, contractors and building suppliers who purchase those materials in bulk for sale and or supply either directly to customers, to wholesalers or to retailers. The rationale for the tax is partly to encourage reuse of such aggregates and reduce disposal of construction and demolition waste that*	*Any increase in costs will either be absorbed by extraction firms or passed down supply chains, in part or in full. The bulk and weight of the materials alongside the earlier analysis in elasticities and revenue potential suggests imports from outside of the EU appears unlikely at any scale in response. The cost of materials will form one input of various construction projects of differing scales of across the EU. On this basis, supply chain affects may include an increase in input costs for come construction, refurbishment and civil engineering projects.*

([102]) https://single-market-economy.ec.europa.eu/sectors/raw-materials/related-industries/minerals-and-non-energy-extractive-industries/construction-minerals_en

([103]) https://single-market-economy.ec.europa.eu/sectors/raw-materials/related-industries/minerals-and-non-energy-extractive-industries/construction-minerals_en

Benchmarked/simulated tax	Who incurs the direct cost of the tax (who pays) for the current equivalent tax? In which economic sector(s) are the taxpayers?	Possible impacts on the supply chain
	may contain it, to landfill. The precise costs incurred will therefore reflect the behavioural response to the taxation instrument as well as any exemptions and revenue recycling incorporated into the design of the instrument.	

Next, the analysis considers the economic importance of the sectors likely to be affected by the benchmark taxes, drawing on Eurostat data on gross value added (GVA) and income by detailed industry ([104]) (**Error! Reference source not found.**). This exercise is intended to provide context for assessing potential impacts on competitiveness. The correspondence between the sectors covered by the available data and those directly affected by the benchmark taxes is not exact, so several approximations are required. For each taxation instrument, the most relevant sectors have been identified, and their GVA calculated as a proportion of total national and EU GVA. In the tables, sectors where the GVA share is significantly above the EU average are highlighted in red, those moderately above average in orange, and those below average in green.

Across the EU, manufacturing accounts for more than 10 per cent of total GVA in 25 of the 27 Member States, although this category encompasses a diverse range of industrial activities. Construction also plays an important role in the European economy, contributing just over 5 per cent of total GVA on average. Its contribution is fairly consistent across countries, ranging from 1.9 per cent in Greece to 8.6 per cent in Slovakia.

By contrast, the remaining sectors most directly affected by environmental taxes — namely mining and quarrying; water supply; sewerage, waste management and remediation activities; and crop and animal production, hunting and related services — represent a smaller share of total GVA in most Member States. However, their relative economic weight varies: for example, construction has particular significance in Slovakia and Romania, while agriculture remains a key contributor to GVA in Bulgaria and Greece. These sectoral differences are important when considering how the benchmark taxes may influence competitiveness and structural adjustment within national economies.

Table 5-50: Sector analysis – GVA as a percentage of total GVA by NACE category (2022)

Member state	Mining and Quarrying	Manufacturing	Construction	Water collection, treatment and supply	Crop and animal production, hunting and related service	Sewerage, waste management, remediation activities	Electricity, gas, steam and air conditioning supply	Manufacture of food products; beverages and tobacco products
Belgium	0.06%	13.49%	5.35%	0.22%	0.74%	0.64%	1.89%	1.92%
Bulgaria	0.91%	14.82%	3.79%	0.15%	3.67%	0.40%	8.39%	2.79%

([104])https://ec.europa.eu/eurostat/databrowser/view/nama_10_a64__custom_18259902/default/table?page=time:2022

Member state	Mining and Quarrying	Manufacturing	Construction	Water collection, treatment and supply	Crop and animal production, hunting and related service	Sewerage, waste management, remediation activities	Electricity, gas, steam and air conditioning supply	Manufacture of food products; beverages and tobacco products
Czechia	0.56%	21.30%	5.47%	0.34%	1.78%	0.62%	3.80%	1.77%
Denmark	0.90%	14.56%	5.04%	0.13%	0.98%	0.61%	2.22%	1.31%
Germany	0.17%	20.28%	4.88%	0.17%	1.00%	0.90%	2.09%	1.38%
Estonia	0.57%	13.59%	6.44%	0.27%	1.51%	0.35%	4.94%	1.63%
Ireland	0.12%	38.89%	2.46%	0.11%	1.09%	0.28%	0.73%	1.99%
Greece	0.29%	10.37%	1.92%	0.39%	3.77%	0.56%	5.38%	3.08%
Spain	0.53%	12.04%	5.84%	0.36%	2.34%	0.75%	3.44%	2.34%
France	0.10%	10.69%	5.46%	0.13%	1.77%	0.52%	1.25%	1.83%
Croatia	0.22%	14.74%	5.95%	0.36%	3.46%	1.17%	1.66%	2.73%
Italy	0.17%	17.07%	5.69%	0.31%	1.93%	0.78%	1.86%	1.70%
Cyprus	0.16%	4.85%	4.93%	0.14%	1.06%	0.55%	1.00%	1.37%
Latvia	0.53%	13.52%	5.75%	0.20%	2.86%	0.73%	2.99%	2.12%
Lithuania	0.24%	18.06%	6.88%	0.20%	3.38%	0.65%	2.27%	2.98%
Luxembourg	0.05%	4.32%	4.56%	0.10%	0.26%	0.34%	0.70%	-
Hungary	0.51%	19.80%	6.40%	0.10%	3.44%	0.53%	1.23%	1.98%
Malta	-	6.74%	3.93%	-	0.34%	-	-	0.92%
Netherlands	1.91%	11.58%	4.95%	0.12%	1.78%	0.46%	1.85%	1.86%
Austria	0.35%	18.03%	6.76%	0.15%	1.12%	0.81%	2.04%	1.95%
Poland	1.96%	19.79%	6.55%	0.24%	2.78%	0.99%	3.18%	2.69%
Portugal	0.32%	14.41%	4.76%	0.41%	1.46%	0.54%	0.84%	2.20%
Romania	1.94%	14.93%	7.40%	0.24%	3.37%	0.67%	4.59%	3.06%
Slovenia	0.33%	22.71%	6.76%	0.35%	1.11%	0.56%	1.17%	1.45%
Slovakia	0.15%	19.43%	8.57%	0.39%	1.31%	0.57%	0.62%	1.38%
Finland	0.48%	18.14%	6.58%	0.21%	0.83%	0.67%	2.91%	1.21%
Sweden	0.82%	15.81%	6.66%	0.11%	0.75%	0.56%	3.11%	0.91%

Member state	Mining and Quarrying	Manufacturing	Construction	Water collection, treatment and supply	Crop and animal production, hunting and related service	Sewerage, waste management, remediation activities	Electricity, gas, steam and air conditioning supply	Manufacture of food products; beverages and tobacco products
Total EU ([105])	**0.47%**	**16.57%**	**5.38%**	**0.21%**	**1.62%**	**0.70%**	**2.18%**	**1.82%**

In Table 5-51 and Table 5-52 we compare the estimated taxation revenues expected for each tax under Scenario A and scenario B, respectively with the GVA of the sectors affected in each Member State. The same limitations as above apply to the exercise; hence the analysis here should only be interpreted as indicative and as a first step prior to more detail national impact assessment, but it serves as an additional benchmark to identify where the expected costs incurred likely to be more or less significant to the sectors affected. Moreover, the percentages are likely to be smaller because the additional revenue is divided by total GVA across several sectors in each case sectors. Ideally, the additional revenue would be divided by the GVA of only those sub-sectors that will be impacted by the tax to provide a more accurate assessment. But overall, all things being equal, a higher percentage equates to more significant cost burden and hence greater risk of competitiveness effects. This exercise suggests:

- The tax burdens resulting from the benchmarked taxes are the most significant in the cases of water effluent, minerals and water abstraction for scenario A. For scenario B, this changes somewhat, with the most significant being water effluent, Pesticides, Mineral and water abstraction.
- Within Member States, potentially significant differences are observed for some of the taxes. For example, in scenario A:
    - For the water effluent tax, the costs appear more significant for Malta, but also Portugal and Greece.
    - For the minerals tax, the costs appear more significant for Bulgaria and Romania as well as Finland and Latvia, Lithuania and Cyprus.

([105]) The European Union total is taken from Eurostat although there are gaps in sector data for some Member States.

- For the water abstraction tax, the costs appear more significant for Greece, in particular but also Portugal.
- Whilst not one of the most significant overall, the waste to landfill tax has different effects across Member States, and the costs appears more significant for Romania and Estonia.

Table 5-51: Additional Tax Revenue under Scenario A (2030) as a percentage of the total GVA of affected sectors by NACE category (2022)

Member state	SO_2 emissions into the environment (106)	$PM_{2.5}$ emissions into the environment (106)	NOx emissions into the environment (106)	Water Abstraction (107)	Water Effluent (108)	Waste to landfill (109)	Waste Incineration (110)	Fertilizers (111)	Pesticides (Groups 2 and 3) (112)	Minerals (113)
Belgium	0.010%	0.004%	0.001%	0.30%	0.00%	0.00%	0.000%	0.07%	0.36%	0.41%

(106) The affected sectors are ‘mining and quarrying’, ‘manufacturing’, ‘construction’, ‘sewerage, waste management, remediation activities’ and ‘electricity, gas, steam and air conditioning supply’.

(107) The affected sectors are ‘mining and quarrying’, ‘manufacturing’, ‘construction’, ‘water collection, treatment and supply’, ‘crop and animal production, hunting and related service activities’ and ‘electricity, gas, steam and air conditioning supply’.

(108) The affected sectors are ‘mining and quarrying’, ‘manufacturing’, ‘construction’, ‘crop and animal production, hunting and related service activities’, ‘sewerage, waste management, remediation activities’ and ‘electricity, gas, steam and air conditioning supply’.

(109) The affected sectors are ‘mining and quarrying’, ‘manufacturing’, ‘construction’, ‘sewerage, waste management, remediation activities’ and ‘electricity, gas, steam and air conditioning supply’.

(110) The affected sectors are ‘manufacturing’ and ‘sewerage, waste management, remediation activities’.

(111) The affected sectors are ‘crop and animal production, hunting and related service activities’ and ‘manufacture of food products; beverages and tobacco products’.

(112) The affected sectors are ‘crop and animal production, hunting and related service activities’ and ‘manufacture of food products; beverages and tobacco products’.

(113) The affected sectors are ‘mining and quarrying’ and ‘construction’.

Member state	SO_2 emissions into the environment (106)	$PM_{2.5}$ emissions into the environment (106)	NOx emissions into the environment (106)	Water Abstraction (107)	Water Effluent (108)	Waste to landfill (109)	Waste Incineration (110)	Fertilizers (111)	Pesticides (Groups 2 and 3) (112)	Minerals (113)
Bulgaria	0.077%	0.014%	0.003%	0.81%	0.00%	1.09%	0.000%	0.41%	0.34%	5.28%
Czechia	0.012%	0.002%	0.001%	0.08%	0.00%	0.11%	0.003%	0.15%	0.26%	0.00%
Denmark	0.000%	0.001%	0.001%	0.00%	0.69%	0.00%	0.000%	0.23%	0.46%	0.79%
Germany	0.017%	0.001%	0.001%	0.06%	0.80%	0.00%	0.002%	0.09%	0.38%	0.00%
Estonia	0.067%	0.011%	0.003%	0.39%	0.60%	1.78%	0.000%	0.10%	0.16%	1.52%
Ireland	0.000%	0.001%	0.000%	0.07%	0.21%	0.00%	0.000%	0.15%	0.15%	0.98%
Greece	0.023%	0.018%	0.003%	4.64%	1.69%	0.53%	0.001%	0.14%	0.41%	1.39%
Spain	0.014%	0.005%	0.002%	1.69%	0.93%	0.16%	0.000%	0.08%	0.47%	0.41%
France	0.008%	0.006%	0.001%	0.41%	0.90%	0.00%	0.013%	0.15%	0.43%	0.77%
Croatia	0.005%	0.023%	0.002%	0.00%	0.96%	0.45%	0.000%	0.18%	0.29%	1.39%
Italy	0.007%	0.003%	0.002%	1.65%	1.13%	0.04%	0.001%	0.07%	0.41%	0.25%
Cyprus	0.244%	0.010%	0.004%	1.08%	0.58%	0.62%	0.000%	0.09%	0.75%	2.67%
Latvia	0.019%	0.103%	0.005%	0.10%	0.00%	0.00%	0.000%	0.15%	0.24%	3.77%
Lithuania	0.037%	0.008%	0.002%	0.07%	0.30%	0.06%	0.000%	0.14%	0.28%	2.88%
Luxembourg	0.003%	0.011%	0.001%	-0.01%	0.00%	0.98%	0.000%	0.39%	0.60%	0.03%
Hungary	0.011%	0.006%	0.001%	0.61%	0.25%	0.45%	0.005%	0.25%	0.72%	0.00%
Malta	0.000%	0.007%	0.001%	0.32%	2.10%	0.29%	0.009%	0.00%	0.15%	0.63%
Netherlands	0.006%	0.002%	0.001%	0.10%	0.35%	0.02%	0.000%	0.05%	0.21%	0.11%
Austria	0.006%	0.002%	0.001%	0.28%	0.00%	0.00%	0.000%	0.06%	0.19%	0.63%

Member state	SO_2 emissions into the environment (106)	$PM_{2.5}$ emissions into the environment (106)	NOx emissions into the environment (106)	Water Abstraction (107)	Water Effluent (108)	Waste to landfill (109)	Waste Incineration (110)	Fertilizers (111)	Pesticides (Groups 2 and 3) (112)	Minerals (113)
Poland	0.040%	0.008%	0.002%	0.18%	0.35%	0.25%	0.004%	0.13%	0.27%	1.07%
Portugal	0.053%	0.041%	0.007%	2.38%	1.62%	0.13%	0.000%	0.07%	0.49%	0.59%
Romania	0.011%	0.008%	0.002%	1.68%	0.80%	3.83%	0.014%	0.15%	0.16%	5.37%
Slovenia	0.008%	0.011%	0.001%	0.14%	0.41%	0.03%	0.003%	0.13%	0.33%	1.18%
Slovakia	0.012%	0.002%	0.003%	0.06%	0.23%	0.17%	0.001%	0.19%	0.31%	0.95%
Finland	0.014%	0.002%	0.001%	0.16%	0.73%	0.00%	0.007%	0.22%	0.46%	3.77%
Sweden	0.000%	0.002%	0.001%	0.14%	0.98%	0.38%	0.001%	0.19%	0.06%	0.34%
Total EU (114)	**0.013%**	**0.004%**	**0.001%**	**0.59%**	**0.72%**	**0.16%**	**0.003%**	**0.11%**	**0.36%**	**0.66%**

Table 5-52: Additional Tax Revenue under Scenario B (2030) as a percentage of the total GVA of affected sectors by NACE category (2022)

Member state	SO_2 emissions into the environment	$PM_{2.5}$ emissions into the environment	NOx emissions into the environment	Water Abstraction	Water Effluent	Waste to landfill	Waste Incineration	Fertilizers	Pesticides (Groups 2 and 3)	Minerals
Belgium	0.003%	0.001%	0.000%	0.00%	0.00%	0.00%	0.000%	0.03%	0.19%	0.14%

(114) The European Union total is based on data from Eurostat although there are gaps in sector data for some Member States.

Member state	SO_2 emissions into the environment	$PM_{2.5}$ emissions into the environment	NOx emissions into the environment	Water Abstraction	Water Effluent	Waste to landfill	Waste Incineration	Fertilizers	Pesticides (Groups 2 and 3)	Minerals
Bulgaria	0.026%	0.005%	0.001%	0.10%	0.00%	0.00%	0.000%	0.11%	0.18%	1.81%
Czechia	0.000%	0.000%	0.000%	0.00%	0.00%	0.04%	0.001%	0.04%	0.14%	0.00%
Denmark	0.000%	0.000%	0.000%	0.00%	0.14%	0.00%	0.000%	0.08%	0.24%	0.12%
Germany	0.006%	0.000%	0.000%	0.00%	0.51%	0.00%	0.001%	0.03%	0.21%	0.00%
Estonia	0.022%	0.004%	0.001%	0.04%	0.28%	0.36%	0.000%	0.03%	0.08%	0.41%
Ireland	0.000%	0.000%	0.000%	0.01%	0.13%	0.00%	0.000%	0.05%	0.08%	0.34%
Greece	0.008%	0.006%	0.001%	1.19%	1.10%	0.11%	0.000%	0.06%	0.22%	0.48%
Spain	0.005%	0.002%	0.001%	0.46%	0.46%	0.07%	0.000%	0.02%	0.26%	0.14%
France	0.003%	0.002%	0.000%	0.00%	0.47%	0.00%	0.000%	0.05%	0.22%	0.26%
Croatia	0.002%	0.008%	0.001%	0.00%	0.54%	0.29%	0.000%	0.06%	0.15%	0.30%
Italy	0.002%	0.001%	0.001%	0.44%	0.73%	0.02%	0.000%	0.02%	0.24%	0.00%
Cyprus	0.083%	0.003%	0.001%	0.17%	0.00%	0.40%	0.000%	0.03%	0.43%	0.92%
Latvia	0.006%	0.032%	0.002%	0.00%	0.00%	0.00%	0.000%	0.04%	0.12%	1.17%
Lithuania	0.012%	0.002%	0.000%	0.01%	0.09%	0.04%	0.000%	0.04%	0.14%	0.87%
Luxembourg	0.001%	0.004%	0.000%	0.00%	0.00%	0.72%	0.000%	0.13%	0.32%	0.01%
Hungary	0.000%	0.002%	0.000%	0.13%	0.00%	0.19%	0.002%	0.08%	0.38%	0.00%
Malta	0.000%	0.002%	0.000%	0.08%	1.36%	0.18%	0.004%	0.00%	0.11%	0.21%
Netherlands	0.002%	0.001%	0.000%	0.02%	0.05%	0.00%	0.000%	0.02%	0.11%	0.04%
Austria	0.002%	0.001%	0.000%	0.06%	0.00%	0.00%	0.000%	0.02%	0.10%	0.16%

Member state	SO_2 emissions into the environment	$PM_{2.5}$ emissions into the environment	NOx emissions into the environment	Water Abstraction	Water Effluent	Waste to landfill	Waste Incineration	Fertilizers	Pesticides (Groups 2 and 3)	Minerals
Poland	0.008%	0.003%	0.000%	0.01%	0.09%	0.00%	0.002%	0.04%	0.14%	0.00%
Portugal	0.018%	0.013%	0.002%	0.61%	1.04%	0.05%	0.000%	0.02%	0.27%	0.00%
Romania	0.004%	0.003%	0.001%	0.30%	0.51%	1.73%	0.007%	0.04%	0.08%	1.09%
Slovenia	0.003%	0.004%	0.000%	0.00%	0.22%	0.01%	0.001%	0.04%	0.18%	0.40%
Slovakia	0.004%	0.001%	0.001%	0.00%	-0.01%	0.06%	0.000%	0.05%	0.16%	0.31%
Finland	0.005%	0.001%	0.000%	0.02%	0.47%	0.00%	0.004%	0.07%	0.24%	1.29%
Sweden	0.000%	0.001%	0.000%	0.03%	0.63%	0.00%	0.000%	0.06%	0.03%	0.00%
Total EU ([115])	**0.004%**	**0.001%**	**0.000%**	**0.13%**	**0.41%**	**0.05%**	**0.001%**	**0.04%**	**0.20%**	**0.16%**

([115]) The European Union total is based on data from Eurostat although there are gaps in sector data for some Member States.

5.6. Assessment of potential competitiveness impacts

This section examines the potential impacts on economic competitiveness resulting from the introduction of the benchmarked environmental taxes under Scenarios A and B. The assessment follows the approach outlined in the European Commission's *Better Regulation Toolbox* (2023) ([116]), drawing in particular on Tool #21 ("Sectoral Competitiveness") and Tool #24 ("Competition"). These tools provide structured checklists for evaluating how new measures may influence competitiveness at sectoral and market levels. Given the diversity of the investigated tax instruments, the wide range of affected markets, and the differing national circumstances among Member States, the analysis is necessarily conducted at a high level and on a qualitative basis. Consequently, the discussion should be interpreted with due regard for the inherent uncertainties.

To inform the analysis, several key sources of information have been used. First, we consider the projected additional revenues from each tax instrument in every Member State, expressed as a percentage of the relevant 2023 environmental tax category (pollution or resource). This provides an indication of where the largest shifts in cost burden may arise. Second, we reference the approximate tax bases identified in Section **Error! Reference source not found.** to indicate which economic sectors are most likely to be affected. Third, we compare the additional tax revenues to sectoral Gross Value Added (GVA) in each affected sector and Member State, to gauge the relative scale of the potential impact. Profit margins are not assessed, as comparable data at the necessary level of disaggregation are unavailable. Fourth, we contextualise these results by examining the contribution of each affected sector to national GVA.

The extent of the impact in practice will depend on a range of factors specific to each Member State, including the design of the instrument, the mechanisms for levying and collecting the tax, the treatment of exemptions, the use of revenue recycling, and the broader macroeconomic context. These elements fall within the discretion of national governments and cannot be anticipated at this stage, representing an important limitation of the analysis. The present assessment focuses on the initial, direct effects of the harmonised taxes and does not attempt to model secondary or longer-term dynamics. For example, firms subject to a new tax may choose either to pay the charge or to take measures to reduce or avoid it, which may entail additional investment or operating costs — such as installing SO_2 scrubbers or reducing fertiliser use, with potential side

([116]) https://commission.europa.eu/document/download/de79fb8e-4cc1-45a0-ac34-72f73a5147ca_en?filename=BRT-2023-Chapter%203-Identifying%20impacts%20in%20evaluations%20fitness%20checks%20and%20impact%20assessments.pdf effects on productivity. Similarly, the analysis does not consider the possibility of offsetting fiscal adjustments, such as reductions in other taxes, which Member States might introduce to compensate for new revenues.

It is also important to recall that environmental taxation can have positive implications for competitiveness in the medium and long term. Two main channels can be identified. First, improvements in environmental quality and public health may deliver broader economic benefits, supporting productivity and competitiveness over time. Second, by strengthening the price signals that reward efficiency and pollution reduction, environmental taxes can stimulate innovation, investment in research and development, and the uptake of cleaner technologies. These shifts can enhance productivity, resilience, and competitiveness across EU industries in the longer run.

Table 5-53: Cost and price competitiveness checklist

Component	Instrument	Notes
Cost of inputs (++)	*Tax on NOx, SO_2 and $PM_{2.5}$ emissions into the environment*	The taxes are likely to affect costs of production (see below) but depending on how the tax is levied could influence input prices. The precise input, and sector(s) affected will depend on the tax instrument ([117]). Input costs could be directly affected or indirectly, via actions in response (for example, the costs of deploying abatement techniques). These depend on business' behavioural response and (where applicable) the abatement techniques deployed, which at this stage are uncertain. As such, the figures below reflect only revenues (and costs) placed on those who 'choose to pay the tax'. Costs falling on those who change behaviour, so they are no longer liable for the tax are not reflected (i.e. any costs associated with their behavioural change, such as deployment of emissions abatement techniques) ([118]). In terms of scale, total estimated additional tax revenue across the EU27 is estimated to be (all Scenario A): • **NOx:** €46m in 2030 and €37m in 2035, equivalent to 0.32 of 2023 total pollution taxes or 0.0012% of the GVA of affected sectors. • **SO_2:** €494m in 2030 and €365m in 2035, equivalent to 3.4% and 2.5% respectively of 2023 total pollution taxes or 0.135% of GVA of affected sectors. • **$PM_{2.5}$:** €155m in 2030 and €141m in 2035, equivalent to 1.1% and 1.0% respectively of 2023 total pollution taxes or 0.0042% of GVA in affected sectors. The three tax instruments are targeted at the same five sectors, which will therefore face cumulative cost impacts (Mining and Quarrying; Electricity, gas, steam and air conditioning supply; Manufacturing; Construction; and Water supply, sewerage, waste management and remediation activities). The precise distribution of costs between them is uncertain, but if taxes are levied in line with emissions, this provides an indicator of potential size of the costs facing each, however it is not a perfect proxy. For illustration, drawing on the latest emissions inventory data, the proportion of total economy-wide emissions from affected sectors in 2023 are ([119]): • **NOx:** extractive industry 0.3%, energy supply 13%, manufacturing 13%, waste management 1%. • **SO_2:** extractive industry 2%, energy supply 41%, manufacturing 36%.

([117]) For example, Denmark's duty on sulphur is based on the sulphur content in energy products, including oil-based fuels in addition to wood, straw, waste etc. used for energy purposes in plants with a capacity of 1,000 kW and more and only payable on fuels and propellants with a sulphur content exceeding 0.05%. Also, Denmark's duty on CFCs, HFCs, PFCs, and SF6s (halons) is levied on producers and importers of these substances.

([118]) Abatement techniques vary in cost and carry a range of different costs (e.g. upfront capex, ongoing operation, maintenance, labour, energy, raw materials, etc). Where abatement techniques are adopted, that will provide an increase in revenue for technique manufacturers, installers, and linked supply chains.

([119]) https://www.eea.europa.eu/en/topics/in-depth/air-pollution/national-air-pollutant-emissions-data-viewer-2005-2023

Component	Instrument	Notes
		• **$PM_{2.5}$:** extractive industry 2%, energy supply 2%, manufacturing 12%, waste management 7%. In terms of effects by Member State, those estimated to incur the largest absolute cost (in terms of revenues estimated in 2030 from Scenario A) are: • **NOx:** Italy €8.3m, Germany €6.4m and Spain €5.1m • **SO_2:** Germany €171m, Poland €76m and Spain €41m • **$PM_{2.5}$:** France €24m, Portugal €18m and Poland €16m In terms of anticipated changes from the baseline, the majority of Member States will face small increase in taxes, relative to existing levels (for NOx, SO_2 and $PM_{2.5}$,). 16, 13 and 11 Members States respectively are anticipated to see an increase of <2% versus current pollution tax revenues). But some Member States are estimated to face more significant increases than others. Whilst the data are subject to uncertainties by 2030 the simulated taxes are estimated to affect revenues to the greatest extent for Scenario A in: • **NOx:** Romania 33%, Bulgaria 11% and Ireland 10% • **SO_2:** Bulgaria 327%, Romania 159% and Finland 53% • **$PM_{2.5}$:** Romania 116%, Bulgaria 61% and Ireland 30% Comparing the tax revenue to the GVA of the affected sectors provides a further benchmark. On this basis, the most affected Member States are (all figures represent the additional tax revenue under Scenario A (2030) as a percentage of the total GVA in 2022 of the affected sectors by NACE category – see **Table 5-51**): • **NOx:** Portugal 0.0066%, Latvia 0.0055% and Cyprus 0.0039% • **SO_2:** Cyprus 0.24%, Bulgaria 0.077% and Estonia 0.067% • **$PM_{2.5}$:** Latvia 0.10%, Portugal 0.041% and Croatia 0.023% ***On this basis whilst input prices would likely increase, the scale and costs will differ significantly by Member State, in terms of their absolute size and the rate of increase from current tax levels. But their significance in terms of the GVA of affected sectors appears low, comprising well under 1% in each case and in all Member States.***
	Water Abstraction	A water abstraction tax will by definition affect input prices for sectors using water in their production processes. An elasticity of -0.2 implies that a tax would not substantially reduce the amount of water consumed. **Error! Reference source not found.** indicates that the greatest impact on input costs will likely be felt by the electricity cooling and agriculture sectors, reflecting their use volumes. Moreover, impacts will likely be greater in countries with a higher score on the Water Exploitation Index (WEI) (i.e. countries facing high water stress). Cyprus, Malta, Portugal, Greece, Spain, Romania and Italy score more than 30% on

Component	Instrument	Notes
		the WIE ([120]) given that the simulated benchmark tax rates are adjusted for WEI (see section **Error! Reference source not found.**). In terms of scale, a water abstraction tax implies substantial additional revenues across the EU amongst the largest of the instruments considered. The estimated additional tax revenue across the EU27 (all Scenario A) in: • €22.4b in 2030 and €22.8b in 2035, equivalent to 138% and 140% of 2023 total resource taxes or 0.59% of the GVA of affected sectors. Member States estimated to assume the largest absolute tax burden (all figures relate to 2030 and for Scenario A) are: • Italy €8b, Spain €5.2b and Greece €1.9b. Relative to existing tax levels, some Member States face more significant increases, those with the highest increases (all figures relate to 2030 Scenario A) are: • Romania 12,089%, Ireland 11,152%, Spain 5,191% ([121]) Comparing the tax revenue to GVA of the affected sectors provides an indication of their significance. On this basis, the most affected Member States are (all figures represent the additional tax revenue under Scenario A (2030) as a percentage of the total GVA in 2022 of the affected sectors by NACE category – see **Table 5-51**): • Greece 4.64%, Portugal 2.38% and Spain 1.69% ***Overall, a more substantive impact on input prices is likely, by virtue of the scale of the tax and the sectors on which it focusses. The costs (i.e. expected revenues) will differ significantly by Member State, in terms of their absolute size, rate of increase from current tax levels and their significance in terms GVA of affected sectors. At least two of these criteria are above average in Spain and Greece suggesting potential for more significant input price increases in these countries.***
	Water Effluent – tax on BOD in wastewater	A tax on water effluents would not be expected to impact the costs of inputs in affected sectors directly affected. This tax targets the pollutants generated by the sectors. This is discussed further below (see cost of production).
	Waste to landfill	As above the costs of inputs would not be directly affected. These taxes target waste generated by the sectors, and not their input use directly. This is discussed further below (see cost of production).
	Waste incineration	

([120]) https://www.eea.europa.eu/en/analysis/indicators/use-of-freshwater-resources-in-europe-1

([121]) These values are high as the existing level of resource taxes collected in 2023 from these Member States much lower compared to how much the benchmark tax would raise.

<table>
<tr><th>Component</th><th>Instrument</th><th>Notes</th></tr>
<tr><td rowspan="3"></td><td>Fertilizers</td><td rowspan="2">A fertiliser tax would increase the cost of inputs, focused on the agriculture sector. The same applies to a pesticide tax, however, effects will be mitigated in this case given the focus on pesticides in Groups 2 and 3 (approved active substances and candidates for substation respectively). Group 1 (low-risk active substances) will not be subject to the tax. As such, it is assumed farmers will shift some of their consumption of pesticides from Groups 2 and 3 to Group 1, reducing the impact of this tax (see section Error! Reference source not found.).

The total estimated additional tax revenue across the EU27 is estimated to be (all Scenario A):
Fertilisers: €563m in 2030 and €547m in 2035, equivalent to 3.89% and 3.78% of 2023 total pollution taxes or 0.11% of the GVA of affected sectors.
Pesticides: €2.1b in 2030 and €1.79b in 2035, equivalent to 14% and 12% of 2023 total pollution taxes or 0.36% of the GVA of affected sectors.
The Member States estimated to assume the largest absolute tax burden are (all figures 2030 Scenario A):
Fertilisers: France €129m, Germany €72m and Italy €48m
Pesticides: France €364.4m, Germany €319.8m and Spain €274.4m
Relative to existing tax levels, Member States estimated to result in the largest percentage increases are (all figures relate to 2030 Scenario A):
Fertilisers: Romania 466%, Bulgaria 392%, Ireland 275%
Pesticides: Romania 510%, Bulgaria 327%, Ireland 276%
Comparing the tax revenue to GVA of the affected sectors indicates the most affected Member States are likely to be (all figures represent the additional tax revenue under Scenario A (2030) as a percentage of the total GVA in 2022 of the affected sectors by NACE category – see Table 5-51):
Fertilisers: Bulgaria 0.41%, Luxembourg 0.39%, Hungary 0.25%
Pesticides: Cyprus 0.75%, Hungary 0.72%, Luxembourg 0.6%
Overall, the costs of inputs will be affected, and the direct costs are likely concentrated on the agricultural sector. The costs will differ significantly by Member State, in terms of their absolute size, rate of increase they represent and their significance. The significance in terms of the GVA of affected sectors generally appears low (comprising well under 1% in each case and in all Member States). But at least two criteria are comparatively high in Bulgaria for the Fertilizers tax. The GVA of the crop production sector as a share of the national GVA of Bulgaria (3.67%) is also well above the EU figure (1.62%). The effects on Member States from pesticides tax are more evenly spread across the three criteria, although are generally of a greater magnitude, given the higher revenues expected.</td></tr>
<tr><td>Pesticides</td></tr>
<tr><td>Minerals</td><td>The cost of inputs is likely to increase, with the direct costs focussed on the mineral extraction and construction sectors.</td></tr>
</table>

Component	Instrument	Notes
		The total estimated additional tax revenue across the EU27 is estimated to be (all Scenario A): • €5.6b in 2030 and €6b in 2035, equivalent to 285% and 306% of 2023 total resource taxes or 0.66% of the GVA of affected sectors. The Member States estimated to assume the largest tax burden are (all figures 2030 Scenario A): • Romania €1.3b, France €1b, Finland €615m Relative to existing tax levels, the Member States estimated to result in the most significant increases (all figures relate to 2030 Scenario A): • Romania 20,432%, Ireland 9,869%, Poland 4,147% ([122]) Comparing tax revenues to GVA of the affected sectors, indicates the most affected Member States are (all figures represent the additional tax revenue under Scenario A (2030) as a percentage of the total GVA in 2022 of the affected sectors by NACE category – see **Table 5-51**): • Romania 5.37%, Bulgaria 5.28%, Latvia and Finland both 3.77% ***Overall, a more significant effect on the costs of inputs within targeted sectors appears likely. The precise effects are uncertain and depend on a range of factors. Whilst overall at EU level, the costs as a share of GVA are relatively modest (<1% of sectoral GVA), the costs will likely differ significantly by Member State, in terms of their absolute size, rate of increase and significance in terms of GVA. At least two of the criteria are comparatively high in Romania. Moreover, the GVA of the construction sector as a share of the national GVA of Romania (7.40%), is higher than EU figure (5.38%).***
Cost of capital (+/O)	*All instruments*	Tool #21 'Sectoral Competitiveness' of the Better Regulation Toolkit defines the cost of capital as the price and availability of financing. Accordingly, it is anticipated that there will be no direct effect..
Cost of labour (+/O)	*All instruments*	It is unlikely that the tax will place a direct cost on labour or directly impact the unit cost of labour (i.e. wages). This is because the environmental issue targeted by the taxes are associated with other inputs or the production process itself, rather than labour as an input. Where businesses take action in response to the tax to reduce their liability this will carry a cost (and/or cost saving) for the business. For example, in response to the 'Tax on PM2.5 emissions into the environment', depending on the abatement technique selected, this may increase or reduce total labour costs, depending on if the technique requires additional labour time or displaces an element of the workforce.

([122]) These values are quite high as the existing level of resource taxes collected in 2023 from these Member States is relatively much lower compared to how much the benchmark tax would raise.

Component	Instrument	Notes
Other compliance costs (e.g. reporting obligations) (+/O)	*All instruments*	There may be additional costs (administrative burden) for businesses associated with complying with the taxes (e.g. reporting). For example, for *Minerals*, additional costs would be incurred via tracking and reporting extraction volumes as well as enforcement. However, these costs, when compared to costs of inputs/production/outputs, appear likely to be marginal. Existing data and reporting could be utilised – e.g. in the case of the *Tax on $PM_{2.5}$ emissions into the environment* – many of the businesses affected are likely to already report emissions under the Industrial Emissions Portal Regulation (IEPR). Compliance costs are also likely to be smaller where existing taxes are in place (depending on the sector coverage of existing and new taxes). For example, of the *Tax on $PM_{2.5}$ emissions into the environment*, additional administrative burdens may be smaller/negligible in Czechia, Estonia, France, Italy, Latvia, Lithuania. In contrast, for *Minerals,* impacts on firms in nine Member States are anticipated to be higher given existing reported revenue from a minerals tax is zero (Belgium, Bulgaria, Ireland, Greece, Spain, France, Cyprus, Luxembourg, Malta, Netherlands, Slovenia and Finland).
Cost of production, distribution, after-sales services (++)	*Tax on NOx, SO_2 and $PM_{2.5}$ emissions into the environment*	The taxes considered will impact costs of production, but the balance between inputs / production depends on how the tax is levied. For example, Sweden's NOx charge is paid by the producer of the electrical power or heat, and the operator is subject to charge when the production unit emits nitrogen oxides. Likewise, Hungary's Environmental Pollution Fee, or Environmental Impact Fee, applies to point-source emitters of nitrogen oxide, sulphur oxides and non-toxic dust, which are mainly in the industry and power sector, levied as a charge per kg of emission. Denmark's duty on nitrogen oxides is levied on power plants and industry as a cost per kg of emission The assessment of overall significance of the costs, sectors and Member States affected is as per 'Costs of inputs' above. And as above, the taxes will place a cost on those affected, either through the tax levied (direct), or associated with actions taken in response to reduce emissions (indirect), for example, deploying abatement techniques
	Water Abstraction	There is a low-risk of impact on costs of production, distribution and after-sales services. The tax would be levied per unit volume of water (see cost of inputs).
	Water Effluent – tax on biochemical oxygen demand (BOD) in wastewater	A tax on water effluents would increase the cost of production in affected sectors. Firms will either implement monitoring and treatment techniques (which will likely involve higher energy use, chemical reagents and water recycling) to reduce the effluent levels in their wastewater discharges and/or pay the simulated benchmark tax rate. The effect would be strongest in water-intensive sectors such as agriculture, food processing, pulp and paper, textiles, etc. Of all the investigated taxes, the tax on water effluents will result in highest amount of additional revenue collected (see **Table 5-19**). The total estimated additional tax revenue across the EU27 is estimated to be (all Scenario A): 8b in 2030 and €28.1b in 2035, equivalent to 194% and 194% of 2023 total pollution taxes or 0.72% of the GVA of affected sectors. The Member States estimated to assume the largest tax burden are (all figures 2030 Scenario A): Germany €8.3b, Italy €5.6b, France €4.2b Relative to existing tax levels, some Member States are likely to face a more significant increases, in particular (all figures relate to 2030 Scenario A):

Component	Instrument	Notes
		Romania 12,807%, Ireland 5,454%, Finland 2,791% ([123]) Comparing the tax revenue to sectoral GVA suggests the most affected Member States (all figures represent the additional tax revenue under Scenario A (2030) as a percentage of the total GVA in 2022 of the affected sectors by NACE category – see **Table 5-51**) are likely to be: Malta 2.1%, Greece 1.69%, Portugal 1.62%. ***Overall, a more substantive impact on production prices is likely, by virtue of the scale of the tax and the sectors on which it focusses. The costs (i.e. expected revenues) will differ significantly by Member State, in terms of their absolute size, rate of increase from current tax levels and their significance in terms GVA of affected sectors.***
	Waste to landfill *Waste incineration*	These taxes are assumed to be levied on those upstream sectors driving waste volumes (or potentially waste management companies/utilities, who are assumed to pass on the costs to the sources generating the waste). As such costs of production would increase for sectors upstream of waste management companies. The sectors most impacted are construction and demolition, mining and quarrying, and manufacturing. Total estimated additional tax revenue across the EU27 is estimated to be (all Scenario A): **Waste to landfill:** €5.7b in 2030 and €5.1b in 2035, equivalent to 39% and 35% of 2023 total pollution taxes or 0.16% of the GVA of affected sectors. **Waste to incineration:** €69.5m in 2030 and €83m in 2035, equivalent to 0.5% and 0.6% of 2023 total pollution taxes or 0.003% of the GVA of affected sectors. The Member States estimated to assume the largest tax burden are (all figures 2030 Scenario A): **Waste to landfill:** Romania €2.9b, Sweden €501.4m and Poland €483.7m **Waste to incineration:** France €34.9m, Germany €12m, Romania €5.6m Relative to existing tax levels, some Member States are estimated to assume a more significant increase, in particular (all figures relate to 2030 Scenario A): **Waste to landfill:** Romania 54,975%, Bulgaria 4,596%, Greece 623% ([124]) **Waste to incineration:** Romania 105.1%, Finland 18%, Czechia 4.9%

([123]) These values are high as the existing level of resource taxes collected in 2023 from these Member States is comparatively lower.

([124]) These values are high as the existing level of resource taxes collected in 2023 from these Member States is comparatively lower.

Component	Instrument	Notes
		Comparing the tax revenue to GVA of the affected sectors suggested the most affected Member States are (all figures represent the additional tax revenue under Scenario A (2030) as a percentage of the total GVA in 2022 of the affected sectors by NACE category – see **Table 5-51**): **Waste to landfill:** Romania 3.83%, Estonia 1.78%, Bulgaria 1.09% **Waste to incineration:** Romania 0.014%, France, 0.013%, Malta 0.009% ***Overall, costs of production are expected to increase, driven by changes associated with waste to landfill tax. The costs (i.e. expected revenues) will differ significantly by Member State, in terms of their absolute size, rate of increase they would represent and their significance in terms GVA. But at least two criteria are comparatively high in terms of the Waste to landfill tax are Romania and Bulgaria. The effects associated with waste incineration tax are likely less significant. The additional revenues comprise 0.003% of the GVA of affected sectors overall.***
	Fertilizers *Pesticides*	There is a low-risk of direct impacts on costs of production, distribution and after-sales services. The tax would be levied per unit mass of nitrogen share in fertilisers and based on active ingredient in pesticides (see costs of inputs).
	Minerals	There is a low-risk of direct impact on costs of production, distribution and after-sales services. The tax would be levied per unit of mass of the respective mineral (see costs of inputs).
Price of outputs (++)	*Tax on NOx, SO_2 and $PM_{2.5}$ emissions into the environment*	The tax will place a cost on those affected, either through the tax levied (direct), or associated with actions taken in response to reduce emissions (indirect), for example, deploying abatement techniques. This may induce changed incentives to invest (e.g., in new abatement technology) and the extent to which those new costs are absorbed and/or passed on to customers in the form of higher prices. Depending on how the tax is levied and/or how businesses respond to the tax, this may have a consequent impact on the price of outputs from different sectors. The extent of such effects is more uncertain and will also depend on a number of other parameters which determine whether and to what extent businesses can pass costs through to consumers (e.g. range and availability of substitutes, technical aspects of substitutes, etc). One key aspect is how traded the product is (which depends in part on the product characteristics), both intra-EU and in terms of imports – for each affected sector this is considered further in the International Competitiveness checklist below. If passed on these would be reflected in increases for a wide range of energy, aggregates, and or manufacturing or construction inputs. Given the diversity of these outputs and the comparatively modest scale of the costs suggests a limited effect on prices.
	Water Abstraction	An elasticity of -0.2 alongside the scale of increases to input costs suggests a greater likelihood of costs being passed on by affected industries, reflected in increases for energy, water and or food products. Whilst a diverse range of goods may then be affected – potentially diluting the impact across product groups - subsequent impacts are uncertain and would depend on elasticities of demand for each product category and the ability of each sector to introduce water efficiency techniques.
	Water Effluent – tax on biochemical oxygen demand (BOD) in wastewater	There appears some risk that prices of outputs from affected sectors will increase. Firms in the mining and quarrying, manufacturing, construction, crop and animal production, sewerage, waste management, remediation activities, and electricity, gas, steam and air conditioning supply sectors may pass on part of the higher effluent management and treatment costs to consumers through higher prices of their products. The ability to pass on these costs depends on market competition

Component	Instrument	Notes
		and demand elasticity facing each affected sector. The range and diversity of products affected may dilute the effect somewhat, but activities in pulp and paper, food production and agriculture appear more likely to be affected.
	Waste to landfill *Waste incineration*	Based on the scale of costs there is a higher risk of the prices of outputs rising as a result of the waste to landfill tax. The sectors upstream from waste management companies/utilities, including mining and quarrying, manufacturing, construction, and energy production, may pass on part of higher waste processing costs to their consumers. However, price rises may be mitigated by an increase in recycling in affected sectors. The available data indicates that quantitatively greater demand for waste management – on average across the EU - could be incurred by construction and demolition activities, mining and quarrying and manufacturing activities.
	Fertilizers *Pesticides*	The above data suggest material risk of risk of prices of outputs increasing in the agricultural value chain, reflecting the cumulative costs from both fertilisers and pesticides taxes. Any such costs would be passed on food processors, manufacturers or distributors who may then absorb the costs and/or pass them on. The proportion of any price rise passed on to the consumer will depend on how inelastic the demand for the product is, for example, it is relatively inelastic for staple foods as well las the degree of exposure to non EU imports.
	Minerals	A minerals tax may increase the prices of outputs in both the mining/quarrying industry (raw minerals, ores, aggregates, construction material) and the construction industry, given the elasticity of -0.2. **Error! Reference source not found.** notes that Europe is self-sufficient in its aggregates production and importing from outside the EU at scale to substitute EU products appears less likely given their bulk and weight. However, specific segments are noted face competition globally, including from China, India and Brazil.

Key: ++: Likely to be relevant and potentially significant

+: Likely to be relevant but impact appears marginal

O: Not expected to be relevant or significant

Table **5-54** considers implications for the capacity of and incentives for product and process innovations in the sectors affected by the investigated taxes.

Table 5-54: Capacity to innovate checklist

Component	Instrument	Notes
Capacity for product innovation (++)	*All instruments*	Effects will relate to each sector's capacity for and incentives to bring to the market new products and/or improve current ones, and how these change after application of the taxes. As per Tool #21 'Sectoral Competitiveness' of the Better Regulation Toolkit, this capacity for product innovation depends both on access to technical skills and the incentives to develop, invest and or adopt new technologies. Taking each in turn: • The taxes are unlikely to directly affect availability of technical skills. Where businesses take action in response to the taxes, this may indirectly increase demand for skills related to design, implementation and operation of associated activities (e.g. emissions abatement techniques). Size of demand will be driven by total cost and behavioural response. Demand for skills will be greatest in the sectors and Member States with largest behavioural response to avoid the taxes (see 'Costs of inputs' above for an indication of those most affected). • The taxes will disincentivise bringing products to market that are more environmentally harmful (where costs cannot be reflected in product price and passed to consumer) and will incentivise less-environmentally harmful substitutes and alternatives. The size of the incentive will depend on the size of the tax relative to the product cost and price, and the ability to pass costs through to end consumers. Sectors with a greater level of trade or available substitutes will face greatest incentive to innovate. • The scope for product innovation will depend on the market, application, use and other characteristics of the product concerned, and may be more feasible for some products than others. For example, a tax on pesticides and/or fertilizers incentivizes product innovation to reducing the toxicity of their active ingredients. The same logic would also apply to fertilisers abased on nitrogen content. For others, the tax may encourage innovation in products further down the value chain. For example, a tax on minerals would encourage downstream sectors, such as construction, to innovate their products in a manner that they need to use a lower proportion of minerals in each product. There are some investigated taxes, such as water abstraction, landfill and waste incineration where *product* innovation appears less likely/feasible given lack of substitutes for the product and where firms may partially mitigate the tax burden through process innovation.

Component	Instrument	Notes
Capacity for process innovation (++)	*All instruments*	Effects will relate to capacity and incentives to innovate processes and product related services, including distribution, marketing, and after-sales services. As per Tool #21 'Sectoral Competitiveness' of the Better Regulation Toolkit, this process depends on the supply of management and organisational skills and talent. The taxes are expected to affect the incentives to develop, invest and or adopt new production processes, as well as incentivise innovation in associated activities (e.g. such as abatement techniques), and potentially in monitoring and reporting regimes. As above, the size of incentive will depend on the size of the tax relative to the product cost and price, and the ability to pass costs through to end consumers. Sectors with a greater level of trade or available substitutes will face greatest incentive to innovate. In particular, taxes impacting the manufacturing, agriculture and food production sectors appear more likely to incentivise process innovations due to international competitiveness risk. The nature of process innovation will depend on the type of tax applied, for example: • Water abstraction would incentivize sectors with high water use to innovate in water efficiency measures and reuse techniques. • Water effluent would promote the development of water treatment techniques that reduce effluent levels (and or pollutant levels in effluent) more effectively at a lower cost. • Taxes on waste to landfill and waste incineration will encourage process innovations that lead to waste reduction and higher rates of recycling and material recovery (and potentially the interrelationship between the two taxes). • A tax on fertilisers would incentivise innovation in alternative techniques such as nutrient management, precision agriculture and other process improvements and on pesticides the development of alternative techniques such as integrated pest management that reduce pesticide usage. • A tax on minerals would encourage downstream sectors to introduce recycling and material recovery processes that reduce their reliance on extracted minerals (and increase other material usage).

Key:

++: Likely to be relevant and potentially significant

+: Likely to be relevant but impact appears marginal

O: Not expected to be relevant or significant

Table 5-55 examines potential effects on the EU's international economic competitiveness. The analysis relies on literature on competitiveness and Eurostat trade data for trade between Member States and trade outside the EU ([125]), alongside other indicators of risk and vulnerability. Where a sector is observed to have a higher level of trade, this may indicate that the sector is more vulnerable to any additional costs placed on production (in this case through additional taxes), which would make the affected businesses less competitive relative to those (e.g. outside the EU) who do not face such taxes.

Table 5-55: International competitiveness checklist

Component	Notes
Market shares (single market) (++)	Some Member States already levy environmental taxes, others do not. Implementing a consistent environmental tax and tax rate across all Member States will create a more level playing field for businesses located in different Member States, where trading across Member State borders (see Single Market impacts in next section). Given Member States have different starting points with respect to existing taxes levied and levels of new revenue under each tax, businesses in different Member State will face different additional costs relative to competitors in other Member States. This could lead to shifts in imports and exports within the Single Market, potentially leading to a redistribution of production and sourcing decisions across the EU. It is informative to consider the relative importance of different sectors for intra-EU trade. Using data from Eurostat ([126]), which provides information on imports and exports by NACE Rev.2 activity between EU Member States, it is evident • the manufacturing sector plays a central role in intra-EU trade. For the majority of Member States, manufacturing in terms of value accounted for over 60% of total intra-EU exports, underlining its importance as a key driver of economic activity and cross-border trade within the EU. • In contrast, the other sectors identified as being potentially affected by the investigated environmental taxes — such as agriculture and electricity, gas, steam, and air conditioning supply — contribute only marginally to total exports between Member States. At the EU level, agriculture represents approximately 1% of total intra-EU exports, while the electricity, gas, steam and air conditioning supply sector accounts for around 2%. These comparatively low export shares suggest that any direct trade-related impacts for the manufacturing sector would have the greatest knock-on effects for the value and patterns of intra-EU trade.

([125]) For some affected sectors identified in section **Error! Reference source not found.**, the Eurostat trade did not map across fully. The categories used instead are 'Water supply; sewerage, waste management and remediation activates' for 'Water collection, treatment and supply', 'Agriculture, forestry and fishing' for 'Crop and animal production, hunting and related service activities', 'Manufacture of food products' for 'Manufacture of food products; beverages and tobacco products', and 'Water supply; sewerage, waste management and remediation activities' for 'Sewerage, waste management, remediation activities'.

([126]) https://ec.europa.eu/eurostat/databrowser/view/ext_tec01__custom_18404397/default/table

Component	Notes

	• When examining imports the data show a similar story, namely that Member States also rely heavily on the manufacturing sector for goods and services sourced from other EU countries. For most Member States, around one-third of all imported goods and services originate from the manufacturing sector, underscoring the high degree of interdependence within the EU's internal market. Given this interconnectedness, the introduction of environmental taxes could have indirect implications for imports as well as exports.
	• The analysis above captures the value of exports of goods and services of different sectors and their relative importance to all export trade inside the EU. Alternatively, another metric can be used which shows the relative importance of trade to each sector - i.e. the value of exports as a percentage of the sector's GVA. This is a proxy of the 'tradability' within a sector - where a product is more traded, additional costs present a greater risk to businesses as there is greater competition within a given market. The level of trade in a given sector will depend, in part, part on the characteristics of the products themselves (e.g. their size and weight, which will determine feasibility and cost of transportation, their perishability, etc) but also on a range of other factors (e.g. value, demand, location of upstream/downstream supply chains, etc). E.g. manufactured goods, although covering a wide range of sectors and products, general have low perishability, high value, and are feasible to transport, and hence have high levels of trade. By comparison, aggregate products from mining are typically heavier and more difficult and costly to transport long distances, and hence observe a relatively lower level of trade.
	• From this analysis, the manufacturing sector has the highest level of trade within the EU, with the share of exports to GVA equating to 88% inside the EU. Other sectors in the EU with significant levels of trade include: manufacturing of food production (exports as a share of GVA is 77%), mining and quarrying (exports as a share of GVA is 21%), and electricity, gas, steam and air conditioning supply (exports as a share of GVA is 19%). These sectors are subject to several environmental taxes:
	    o Manufacturing – Water effluent, water abstraction, water to landfill, air pollution and waste incineration taxes
	    o Manufacturing of food production – fertiliser and pesticide taxes
	    o Mining and quarrying - Water effluent, water abstraction, water to landfill, air pollution and minerals taxes
	    o Electricity, gas, steam and air conditioning supply - Water effluent, water abstraction, water to landfill, and air pollution taxes.
	
	That said, the additional revenue from these taxes as a percentage of GVA across all affected taxes was relatively low for all taxes, suggesting that the overall impact on the sectors will be marginal and that the additional costs to the sector will be relatively modest. In Scenario A, these percentages were (total impacts across all sectors): 0.72% for water effluent, 0.66% for minerals, 0.59% for water abstraction, 0.36% for pesticides, 0.16% for waste to landfill, 0.11% for fertiliser taxes, 0.013% for air pollution (maximum value), and 0.0033% waste incineration. However, these percentages appear small because the addition in tax revenue is compared to the total GVA across a number of sectors within quite broad NACE categories. In reality, for example, not all manufacturing sub-sectors will be affected, nor all businesses within affected sub-sectors; therefore, if the additional tax revenue were divided by the GVA of only those sub-sectors that are impacted, the resulting percentages would be higher.
	
	At the Member State level, countries may experience adjustments in trade dynamics if manufacturing production costs rise due to the new taxes with the degree of impact is likely to vary depending on the existence and level of current environmental taxes. Countries that do not currently impose a tax — or where the investigated tax rates are significantly higher than existing levels — are expected to experience more pronounced effects on their manufacturing exports. For example, Greece, Portugal, Spain, and Malta all registered substantial changes in the projected revenue and tax levels under the Scenario A simulations for water effluent and water abstraction taxes. These countries also export a lot from their manufacturing sectors, with all of them exporting over 60% of total exports from the manufacturing sector. This suggests that in the short term, domestic manufacturers in these countries may face a

Component	Notes
	greater increase in production costs relative to those in other Member States. In such cases, domestic producers facing higher input costs could become less competitive, prompting importers in the domestic market to increase inflows from other, less affected Member States. Over time, these shifts in imports and exports could influence trade patterns within the Single Market, potentially leading to a redistribution of production and sourcing decisions across the EU. In addition, where trade patterns shift, this could also impact on the supporting supply chains for those sectors which directly face the tax – for example, in the case of food manufacturing, manufacturers will rely on outputs from the agricultural sector, and where domestic food manufacturing faces a competitiveness risk, this risk will somewhat also face the upward agricultural supply chain and producers. While some short-term disruptions are possible as firms adapt to new price signals, the longer-term effects may encourage greater resource efficiency, cleaner production methods, and technological innovation within manufacturing supply chains. These technological innovations and efficiency improvements could potentially offsetting initial competitiveness losses and contributing to the EU's broader environmental and sustainability objectives. ***Overall, some of the sectors affected by the taxes assessed appear vulnerable to risks of international competition, in particular manufacturing and manufacturing of food products, but also mining and quarrying and electricity, gas, steam and air conditioning supply. Different taxes will place different costs on different sectors, with the most significant costs associated with taxes on: water effluent (0.72% of GVA) and water abstraction (0.59% GVA) affecting manufacturing and mining and quarrying, taxes on minerals (0.66%) affecting mining and quarrying, and pesticides (0.36%) of which some of the cost may be passed through to manufacturers of food and beverages. The overall level of risk appears low (comparing tax revenues to GVA), however risk levels will vary and may be higher for specific Member States or sub-sectors, leading to the potential for changes in intra-EU trade patterns.***
Market shares (external markets) (++)	With respect to external markets, non-EU producers would not be subject to the costs stemming from taxes on EU producers. Hence the additional costs associated with the taxes could negatively impact the EU's international competitiveness footing in the short term, as EU producers face an additional cost which is not faced by their international competitors. Where businesses in the EU become less competitive due to products from these sectors becoming more expensive, the consumers of these products may choose to import more from outside the EU. Moreover, due to changing global trade patterns and the introduction of restrictions on trade, there is a risk that goods intended for non-EU markets may be redirected towards the EU's internal market at lower prices, relative to the production costs of such goods in the EU. Which sectors will be most affected will vary depending on: the size of costs placed on it by each tax, and the level of trade in a given sector (which is a proxy of the 'tradability' of the underlying products in that sector). As for intra-EU trade, the level of trade in a given sector will depend, in part, on the characteristics of the products themselves (e.g. their size and weight, which will determine feasibility and cost of transportation, their perishability, etc) but also on a range of other factors (e.g. value, demand, location of upstream/downstream supply chains, etc). For extra-EU trade, some of these factors may be heightened, leading to lower levels of trade, and there will be additional influences (e.g. based on trade agreements between the EU and other countries).

Component	Notes
	As above, Eurostat data ([127]) on extra-EU trade levels provides information on EU Member States' trade with countries outside the EU, categorised by NACE Rev.2 activity. • Among the sectors affected by the investigated taxes, manufacturing exports play a particularly significant role. Manufacturing accounts for 74% of the EU's exports, with 16 Member States having over 70% of their exports originating from this sector. • When it comes to imports, Eurostat data shows that once again manufacturing comprises a significant share of Member States' trade, representing 47% of the EU's imports and more than 50% for 17 Member States. • The analysis captures the value of exports of goods and services across different sectors and their relative importance to total export trade outside the EU. Alternatively, another useful measure is the value of exports as a percentage of each sector's GVA, which shows the relative importance of trade outside the EU to each sector. Based on this analysis, the manufacturing sector in the EU is the most export-dependent, with exports accounting for 69% of its GVA. This is followed by the manufacturing of food products (47%), mining and quarrying (10.5%), agriculture (4.3%), and electricity, gas, steam and air conditioning supply (3.4%). • These sectors are subject to several environmental taxes: o Manufacturing – Water effluent, water abstraction, water to landfill, air pollution and waste incineration taxes o Manufacturing of food production – fertiliser and pesticide taxes o Mining and quarrying - Water effluent, water abstraction, water to landfill, air pollution and minerals taxes o Electricity, gas, steam and air conditioning supply - Water effluent, water abstraction, water to landfill, and air pollution taxes. That said, the additional revenue from these taxes as a percentage of GVA across all affected taxes was relatively low for all taxes, suggesting that the overall impact on the sectors will be marginal and that the additional costs to the sector will be relatively modest. In Scenario A, these percentages were (total impacts across all sectors): 0.72% for water effluent, 0.66% for minerals, 0.59% for water abstraction, 0.36% for pesticides, 0.16% for waste to landfill, 0.11% for fertiliser taxes, 0.013% for air pollution (maximum value), and 0.0033% waste incineration. However, these percentages appear small because the addition in tax revenue is compared to the total GVA across a number of affected sectors. In reality, for example, not all manufacturing sub-sectors will be affected, nor all businesses within affected sub-sectors; therefore, if the additional tax revenue were divided by the GVA of only those sub-sectors that are impacted, the resulting percentages would be higher. At the Member State level, countries may experience different adjustments in trade dynamics if manufacturing production costs rise. Greece, Portugal, Spain, and Malta registered the most substantial tax levels relative to GVA under the Scenario A simulations for water effluent and water abstraction taxes. The manufacturing of food products is also a key export category for several Member States, with 8 Member States (Denmark, Spain, Bulgaria, Poland, Ireland, Croatia, Greece, Malta) having more than 7% of their exports from this category. The introduction of fertiliser and pesticide taxes will impact the competitiveness of the food sector in these Member States. This impact on competitiveness has been a cause for concern in the past, with Sweden abolishing its fertiliser tax in 2009 (Andersson, 2022). Further indication of risks from increased competition from outside the EU can also be observed from other sources. For example:

([127]) [ext_tec01] Trade by NACE Rev. 2 activity and enterprise size class

Component	Notes

	• Mottershead et al (2021) ([128]) provide some further model-based analysis of the potential trade impacts of selected instruments on selected Member States. Note, effects were modelled on a smaller number of Member State examples in each case and there were differences in implementation assumptions, however the general conclusions are useful:
	  ○ **NOx tax:** was estimated to have "small net effects on the competitiveness (i.e. trade balance) of the selected countries". The review indicated there may be a small decrease in exports differences only observable at the third decimal place), as well as a small net effect on imports. The review concluded that the overall effect on the balance of trade varies as, in general, exports and imports either both increase or decrease.
	  ○ **Landfill Tax:** was estimated to have a "a very small net effects on the competitiveness (i.e. trade balance) of the selected countries", with only small changes in exports and imports, but the degree to which revenues are recycled did have some effect on imports.
	  ○ **Pesticide Tax:** was projected to have "very small net effects on the competitiveness (i.e. trade balance)" although it did note different effects on the balance of trade in different countries and with different approaches to revenue recycling. Moreover, the review identifies the case of Denmark pesticide task as "a good example of careful policy design to address competitiveness concerns". Noting that farmers raised concerns over the impact of the tax on specialty and high value crops. The Danish Ministry of Environment conducted an evaluation of the effects of the tax and concluded that "Pesticide costs measured as a share of gross dividend remained constant and decreases in certain crops were found to be due to other factors". However, justified concerns were identified in the case of potatoes. As a result, the government reduced another tax in compensation and redirected part of the revenue from the pesticide tax into a dedicated fund".
	  ○ **Fertilizer levy:** Notes the levy reduced both imports and exports somewhat, but the "overall effect on the balance of trade is positive throughout. This implies that the reduction in imports brought about by a fertiliser levy supersedes the reduction in exports". We note (see section 3) the case of Sweden; whose instrument – whilst effective in terms of reducing nitrogen consumption - was abolished due to competitiveness concerns and farmer opposition.
	  ○ **Waste Water Pollution Tax:** The review notes "overall, the impact on trade is very small and the effect of the changes on the balance of trade is minor".
	• DG TRADE produce a "heat map" that provides an overview of products for which a potentially harmful increase of imports has been detected. The largest impacts are expected to be on ***food products, textiles, chemicals, metals, electrical equipment and machinery*** ([129]). The taxation instruments may then exacerbate the risks these manufacturing sub-sectors face to their international competitiveness.
	• The Carbon Border Adjustment Mechanism (or CBAM) will cover 6 sectors when it comes into effect: cement, aluminium, fertilisers, iron and steel, hydrogen and electricity. Given this is a mechanism to avoid competitiveness effects of an environmental tax (in this case the ETS), this is an indicator that these sectors are seen as particularly at risk of international competition.
	
	The remaining sectors affected by these taxes, 'construction', 'agriculture, forestry and fishing', and 'water supply; sewerage, waste management and remediation activities', do not represent a major share of the EU's exports or imports, therefore, the introduction of the investigated taxes is less likely to pose a direct risk to their international competitiveness. However, where trade patterns shift, this could also impact on the supporting supply chains for

([128]) See modelled results on trade in Annex 6.

([129]) European Commission: [Monitoring trade diversion - Trade and Economic Security]

Component	Notes
	those sectors which directly face the tax – for example, in the case of food manufacturing, manufacturers will rely on outputs from the agricultural sector, and where domestic food manufacturing faces a competitiveness risk, this risk will somewhat also face the upward agricultural supply chain and producers. ***Overall, some of the sectors affected by the taxes assessed appear vulnerable to risks of international competition, in particular manufacturing and manufacturing of food products, but also mining and quarrying and electricity, gas, steam and air conditioning supply. Different taxes will place different costs on different sectors, with the most significant costs associated with taxes on: water effluent (0.72% of GVA) and water abstraction (0.59% GVA) affecting manufacturing and mining and quarrying, taxes on minerals (0.66%) affecting mining and quarrying, and pesticides (0.36%) of which some of the cost may be passed through to manufacturers of food and beverages. The overall level of risk appears low (comparing tax revenues to GVA), however risk levels will vary and may be higher for specific Member States or sub-sectors, presenting a potential for changes in trade patterns and possible in imports to certain Member States in specific sub-sectors under individual taxes.*** An additional consideration is that where environmental taxes on affected sectors exist outside EU (or do so in future), the disadvantage is mitigated. Furthermore, these tax increases should be set against the possibility of there being a net positive impact on the economy as a whole where reforms are revenue neutral, however the Hogg et al. (2016) suggests that environmental taxes will have a negative impact on the competitiveness of some sectors, even where the tax revenue is used to offset other taxes. Moreover, it is likely that international competitiveness in the medium/long-term will benefit from the consequent improvements in human and environmental health resulting from the introduction of these taxes. For example, taxes on use of fertilisers may encourage more sustainable farming practices, which in turn improve the long-term sustainability of EU soils, whereas geographic locations without such taxes will likely continue to be exposed to risks driving degradation of soil health (and thus, subsequent decreased productivity of processes intrinsically dependent upon good soil health).

Key:

++: Likely to be relevant and potentially significant

+: Likely to be relevant but impact appears marginal

O: Not expected to be relevant or significant

Another aspect of economic competitiveness is the nature and extent of competition within the affected markets. Below we assess potential impacts for different types of market actors using the checklist in Tool #24 “Competition”. Based on the preceding analysis, we will draw together the nature and extent and likelihood of effects (-/+) on existing firms, impacts on entry of new firms into relevant markets; Impacts on consumer prices (and/or quality of products); and impact on up and downstream markets.

Table 5-56: Competition checklist

Component	Notes
Limiting the number or range of suppliers and producers	The taxes have the potential to raise the cost of entry for, where these are, for example, levied on manufacturing/production processes and/or where product prices are materially affected within specific supply chains. This is a particular concern for SMEs. These increases may lead some suppliers or producers being not able to enter the market or finding it increasingly difficult to remain competitive thereby causing them to leave the market. Greater harmonisation would likely offset this by removing an indirect barrier to supply goods or services and/or to invest capital across the EU (see single market effects in **Error! Reference source not found.**).
Limiting the ability of suppliers and producers to compete	The taxes will deliberately increase the costs of production for some suppliers/producers in targeted sectors given the associated pollution/resource implications, based on the polluter pays principle. They may also limit the ability of smaller suppliers and producers to enter or remain competitive in the market, as the increase in production and input costs from the investigated taxes may reduce profit margins, raise barriers to entry, and make it more difficult for them to scale their operations or invest in innovation. This is offset by advantages to other suppliers that would simultaneously be conferred, such as those providing abatement equipment and their supply chains.
Reducing the incentive of suppliers or producers to compete	In the short term due to the raise in input costs and costs of production it may lead to reduced competition due to potentially limiting the number of suppliers and producers competing. This may then potentially reduce the incentive of suppliers or producers to compete. However, in the long run taxes would seek to incentivise innovation and support commercialisation of new technologies. The introduction of environmental taxes would aim not only to reduce pollution but also to incentivise innovation and support the commercialisation of cleaner technologies. By placing a financial cost on environmentally harmful activities, such taxes can encourage businesses to invest in research and development (R&D), adopt cleaner production methods, and improve resource efficiency. Over time, this can help stimulate technological advancement and the growth of green industries, contributing to broader objectives such as the EU’s transition toward a low-carbon and circular economy.
Limiting the choices and information available to customers	No significant effects are likely regarding information. Taxes likely to disincentivise production of environmental harmful products, and incentivise production of cleaner, more sustainable alternatives – this may impact on consumer choice, in particular in the short term as businesses adjust production processes in response to taxes. Impacts on consumer choice will also depend on how traded particular products are (e.g. where products have a greater level of trade, risk of impact on consumer choice is more limited).

5.7. Assessment of contribution to the single market

The potential contribution from scenarios A and B to the functioning of the single market has been undertaken based on the guidance in the BRT Tool #

25 “Internal Market” ([130]). The complexity of factors and diversity of circumstances in each MS does not permit a detailed, quantitative assessment. The starting point for the analysis is the information presented in section **Error! Reference source not found.**. namely, what environmental taxes are currently being implemented across Member States, what are the associated rates and to what extent are those rates likely to be harmonised as a result of assumed benchmark rates in scenarios A and B? This is supported by a targeted review of literature.

For each of the hypothetical benchmark tax, an assessment was completed on the potential benefits and costs to the single market, focussing on consumers, companies (including SMEs) and employees. Where possible we identify if these are likely to be direct effects or indirect. Note this is distinct to an assessment of the costs and benefits of the instruments more generally, which does not form part of the assessment. It is important to note that the details of such effects depend on the specific implementation of any such tax (i.e. how any increase in rate is phased in, relevant exemptions and revenue recycling measures etc). Where possible, we refer to available data on sectors, their significance in terms of GVA and employment as well as Member States where the greatest changes are anticipated. However, any such analysis has to be undertaken at a high level, address general principles and only and any assessment of likely impact is subject to uncertainty.

Article 114 of the TFEU ([131]) establishes the legal basis for actions in the area of the single market. It outlines an objective to create a common market with respect to the free movement of goods, services, capital and workers ([132]). In turn, the principles of Subsidiarity and of Proportionality are set out in TFEU Articles 5(3) and 5(4) ([133]). This governs the limits of Union Competences. Competencies not conferred remain the sole jurisdiction of Member States, including taxation. As such application of environmental taxation instruments often vary across Member States due to differing polluting industries in operation, environmental conditions, pressures and socio-economic circumstances as well as national policy aims. Member States are often best placed to enact, manage and enforce such measures due to their specific

([130]) https://commission.europa.eu/document/download/9c8d2189-8abd-4f29-84e9-abc843cc68e0_en?filename=BR%20toolbox%20-%20Jul%202023%20-%20FINAL.pdf

([131]) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12012E/TXT

([132]) https://commission.europa.eu/document/download/9c8d2189-8abd-4f29-84e9-abc843cc68e0_en?filename=BR%20toolbox%20-%20Jul%202023%20-%20FINAL.pdf (See Box 1 on Article 114 of the TFEU on the Better Regulation Toolbox).

([133]) https://eur-lex.europa.eu/resource.html?uri=cellar:2bf140bf-a3f8-4ab2-b506-fd71826e6da6.0023.02/DOC_1&format=PDF

understanding of the situation at national and local level as pertains to both polluting industries and the socio-economic climate.

The European Semester is the EU's annual framework for coordinating economic and budgetary policies among its Member States. Via stronger economic and social coordination, the Semester aims to ensure sustainable economic growth, job creation, macroeconomic stability and sound public finances across the EU. It is based on the concept that enhanced policy coordination can help boost economic development. In turn, the 'Greening the European Semester' initiative, led by an expert group, seeks to ensure coherence and alignment in economic policies which support environmental objectives, such as tax shifts from labour to environmental pollution ([134]).

The 2020 Commission Staff Working Document (SWD) "Business Journeys in the Single Market" ([135]) is a detailed analysis of key obstacles that keeps the single market from further integration and providing a level playing field to businesses attempting to benefit from it. The document summarises economic evidence on the overall benefits of the single market, listed below, alongside more detailed examination of thematic obstacles:

- The economic benefits of the single market (compared to trading on the basis of World Trade Organisation (WTO) rules) is between 8% and 9% higher GDP on average for the EU. The benefits derived via increased competition within the EU alone is estimated at around 2% of GDP.
- The single market positively affects trade. Intra-EU cross border trade in goods stood at around €3.5 trillion in 2018, compared to €2 trillion extra-EU global trade. A similar picture is evident for services.
- In terms of investment, without the single market EU capital stock could fall by 10% and that EU membership increased Foreign Direct Investment (FDI) flows from other EU countries by an average of 44%.
- Economic welfare gains to Member States attributed to the single market amounted to €427 billion per year, largely from reduced mark-ups and increased productivity. The corresponding effects on employment, arising as a result of these GDP and productivity increases is also estimated to be significant, estimated in the tens of millions.
- Evidence suggests the single market enhances efficient value chain integration, including integration in international value chains. For example, between 2000 and 2013 the share of European exports in global value chains increased by 10%; this compares to 2% in the Americas and 6% in Asia over the same period.

([134]) https://environment.ec.europa.eu/economy-and-finance_en

([135]) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020SC0054

- The standards ensconced in the single market have also been an important foundation in wider multinational and bilateral trade negotiations with the rest of the world ([136]).

In the report, one of the thematic obstacles identified to greater cross border (intra EU) selling is taxes. Specifically, “burdensome procedures due to differences in tax systems and administration” and [an] “uneven playing field with respect to taxation differences” ([137]). As noted in Section ●, the central objective of environmental taxation is improved human health and environmental outcomes, whilst ensuring that the polluter pays. This is achieved via ensuring that that the polluter(s) takes account of (internalizes) societal welfare costs when deciding how much to pollute. Moreover, they can support greater market stability for industry by providing a clear price signal for how the costs of pollution/resource use are addressed, spurring innovation toward more sustainable processes and /or production technologies. They may also enable Member States to reduce other distortionary taxes supporting a more coordinated approach to national action, where national action remains more appropriate to address the cost of pollution/resource use.

Ensuring that such decisions and investments are taken on a more consistent basis across Member States with highly integrated economies is then associated with further benefits. These include: reducing barriers to the free movement of people, goods, services, and capital in the Single Market; minimising risks of market distortions for companies, workers and consumers and reducing distributional effects between Member States in addressing the costs of pollution/non-renewable resources use. These issues are discussed further in section **Error! Reference source not found.**.

Despite this, introducing such instruments and increasing – in many cases – the rates at which pollution is subject to tax imposes costs on affected companies. These may in turn be passed down value chains and to consumers, but these effects are complex and nuanced. For example, the direct costs (and revenues) tend to be immediate, but may well reduce over time as the extent of behaviour change increases and switching costs decrease. The Indirect costs – for example associated with purchasing abatement equipment – may be incurred in the short term, associated with behaviour change and of course benefits from emission reductions. But, over the mid to longer term, at a sector level, these indirect costs may increase in aggregate as behaviour change embed over time, alongside increases in the scale of benefits. This in turn, is often affected by revenue recycling incorporated into the tax.

As such in determining impacts, the specific design of the instrument can be as important as the instrument itself (Mirrlees & Adam, 2018). Precise and effective

([136]) These data are all taken from various studies cited on pages 6-9 of the SWD

([137]) Pages 54-62 of the SWD.

targeting of taxation instruments is challenging and behavioural responses to avoid the tax can result in damaging unintended consequences. The elasticities of demand assumptions incorporated into the earlier analysis therefore reflect several issues. These include the degree to which alternative products, processes or technologies are available. For example, where companies are 'locked in' to particular technologies, imposing a tax may simply make them worse off. There may be other market failures that mean that incentives do not feed through to behaviour change. Similarly, the literature provides extensive discussion of the so-called double dividend hypothesis (Shogren, 2013). This relates to where environmental tax revenues can be used to pay for cuts in other taxes, on employment or labour income, for example. These may offset some of the increased tax burden, and lead to wider benefits (e.g. increased consumer spending, or increased employment, lower prices, etc). It is not possible in the discussion that follows to reflect the nuances at Member State level, nor the potential for other taxation revenues to be reduced as a result.

5.7.1. Baseline assessment and benchmarking

Error! Reference source not found. below provides a summary of the baseline situation vis a vis the number of Member States with existing instruments. It also shows, were relevant, the range in taxation rates between Member States and the average rates under the baseline, scenario A and B. The purpose is to visualise the extent to which taxes currently diverge and would be harmonized under the two scenarios. Overall:

- Only a small number of Member States do not currently operate some form of waste to landfill and water effluent taxation instrument
- Conversely very few operate a pesticide tax, and none currently apply a fertilizer tax.
- There is currently significant diversity in the tax rates between Member States, particularly evident in the air pollutant instruments.
- Under both scenarios the instruments would be fully harmonised. Whilst differences in taxation rates would diminish there would still be a degree of diversity reflecting various national and/or local characteristics and considerations.

Table 5-57: Baseline assessment and hypothetical benchmarking

Instrument	Baseline	Range (L/H) Baseline	Range (L/H) Scenario A	Range (L/H) Scenario B
SO_2, emissions	MS with instrument: 11 MS without instrument: 16	0-2670 €/MT Average: 185	1,300 – 2,670 €/MT Average: 1,352	325 – 2,670 €/MT Average: 452

Instrument	Baseline	Range (L/H) Baseline	Range (L/H) Scenario A	Range (L/H) Scenario B
NOx emissions	MS with instrument: 12 (SE has two rates). MS without instrument: 16	0 – 4,500 €/MT Average: 230	1,300 – 4,500 €/MT Average: 1,414	325 – 4,500 €/MT Average: 488
PM2.5 emissions	MS with instrument: 6 MS without instrument: 21	0 – 382 €/MT Average: 21	1,300 – 1,300 €/MT Average: 1,300	325 – 382 €/MT Average: 327
Water Abstraction	MS with instrument: 17 MS without instrument: 10	0-0.57 (€M^3) Average: 0.04	0.04-0.57 (€M^3) Average: 0.15	0.009 – 0.57(€M^3) Average: 0.05
Water Effluent	MS with instrument: 21 MS without instrument: 6	0 -6.64 - €/Kg Average: 1.5	1.69 – 6.64€/Kg Average: 3.1	1.18-6.64 €/Kg Average: 2.3
Waste to Landfill	MS with instrument: 23 MS without instrument: 4	0 – 102 ([138]) €/MT Average: 36.2	0 – 102 €/MT Average: 69.2	8 – 102 €/MT Average: 33.2
Waste Incineration	MS with instrument: 9 MS without instrument: 17	0 - 75 €/MT Average: 8	0 – 75 €/MT Average: 23	8.1 – 75 €/MT Average: 14
Fertilizers	MS with instrument: 0 MS without instrument: 27	No tax applied	0.024 – 0.194 €/Kg Average: 0.09	0.06- 0.036€/Kg Average: 0.02
Pesticides[139]	MS with instrument: 1 MS without instrument: 26	No tax applied for all Member States except Sweden ([140])	0.00 – 3.00 (€/kg) Group 2 - 14.4 Group 3 – 19.7 Group 4 – 26.2	00 – 3.00 (€/kg) Group 2 – 7.2 Group 3 - 9.8 Group 4 – 13.1
Mineral Taxes	MS with instrument: 14 MS without instrument: 13	0 – 7.4 €/Kg Average: 0.9	3.12 – 7.36 €/Kg Average: 3.4	0.94 – 7.36 €/Kg Average: 1.5

Source: Own elaboration from modelling presented in section 4.

5.7.2. Single market costs and benefits checklist

This section examines the nature and likely significance of changes on the single market from scenarios A and B. We examine the likely benefits as well as the costs, using relevant checklists from the BRT Tool #25. First, we present the potential single market benefits, and second, the potential single market costs.

([138]) Note this is the average of existing rates in Wallonia and Flanders

([139]) Group 2 - active substances, Group 3 - active substances candidates for substitution, Group 4 - non-approved active substances.

([140]) Sweden €3.00/Kg

There are overlaps between the impact categories, and effects; many – many actors will face both costs and benefits, and these may differ over time and based on positions within affected value chains. Where impact categories appear in both the potential benefits and costs tables, the overall impact in will be a combination of the two.

Table 5-58: Single Market Benefits Checklist

Issue	Notes
Trade creation (++)	Reducing the differences in both what environmental pollution is subject to taxation and the rate of that taxation across the EU may materially reduce trade and investment distortions. Current differences in the environmental taxation landscape across Member States may result variations in costs, differences in incentives and competitive advantage that may be inadvertently acquired by polluters/polluting sectors. These variations may occur at several supply chain stages, directly and indirectly, for example: • direct costs incurred by producers of the same goods and services in different Member States (for example via additional costs of emission of air pollutants in the energy generation sector); • indirect costs incurred in downstream sectors (i.e. industrial users of energy or purchases of grain treated with fertilizers or pesticides). Increased harmonisation of input prices/production costs can contribute towards increased volume and value of trade between Member States (Schmidt et al., 2019). This may occur via incentives for product or process innovations and associated investment alongside the greater revenue opportunities that result. This can support firms to achieve increased scale, support increased integration of value chains (particularly within border regions and goods dependent on geographical proximity) or support outsourcing of goods and services. Such effects can benefit companies (and employees) via increased revenue, specialisation and productivity from access to larger markets. They may also reduce country specific adaptation costs and support scale effects (Schmidt et al., 2019). Precise impacts will reflect specific circumstances in affected sectors/Member States. A modelling study on the effects of introducing environmental taxes on international trade, in general, notes “the major result […] is that pollution taxation can either decrease or increase trade, depending on whether the tax raises the relative price of the pollutive good more in the country that exports that good than in the country that imports it” (Kohn, 2000).
More competitive markets (++) incl. efficiency gains / productivity (++)	As above, the argument for tax rate harmonization rests on EU wide economic efficiency and welfare enhancement (in this case including human and environmental improvements). In a 2024 assessment the IMF argue that further deepening of the single market is one of three priorities to boosting productivity (alongside reforms and coordination of industrial policy and domestic structural economic reforms). It suggests that by lowering intra-EU trade barriers levels similar to that experienced between US levels, long term productivity could increase by nearly 7% ([141]). As above, both scenarios A and B seek to reduce or remove tax distortions to enable more efficient allocation of resources within an integrated market. They involve convergence toward a more uniform tax burden on specific commodities or on factors of production in targeted sectors. This, in turn, is argued to support transparency for economic decision-making and to improved efficiency in resource allocation. Such decisions may have been influenced by a need to reduce the effects of cost differences in the location of production or investment (Kopits, 1992). As such harmonization can support businesses to scale their operations, achieve economies of scale, and allocate resources more efficiently, leading to increased competition, innovation and productivity gains. The benefits to businesses reflect their ability to attract or make investment, achieve that scale and capture new product markets, hence the distribution of costs and benefits to firms in different sectors, and sizes warrants careful attention. The benefits for consumers can include higher quality goods, greater choice as well as lower prices.

([141]) https://www.imf.org/en/News/Articles/2024/12/15/sp121624-europes-choice-policies-for-growth-and-resilience

Issue	Notes
Innovation (++)	There is an extensive technical and economic literature on the relationship between environmental taxation and innovation ([142]). For example, a study in 42 high-and middle-income countries between 1995 to 2019 concluded “environmental taxes stimulate technological innovation. For example, a 1% increase in environmental taxes was found to increase environment-related technological innovation by 0.57% and 0.78% on average for high and middle-income countries […] respectively (Karmaker et al., 2021). As such the benefits to innovation could be one of the most significant and arise in multiple ways, via: • The trade and efficiency/productivity benefits outlined above can support the level of revenue necessary to support larger scale investment in R&D, product and/or process changes. • The changes in incentives for businesses subject to the tax can influence their own incentives to invest to adopt innovation as well as what they are willing to pay to do so. • The specific revenue recycling measures in specific instruments may also be channelled in ways that support innovation investment/uptake of new technologies. However, the relationship is complex and subject to context specific as well as other external factors. These include the degree to which innovation investment is redirected toward meeting the taxation cost rather than R&D, toward process changes to mitigate taxation costs (rather than innovations per se) as well as “leakage” whereby activities with higher emissions intensity may be relocated outside of the EU but embodied emission associated with EU consumption remain unaddressed (Holladay et al., 2018).
Free movement of people (O)	The taxation instruments may support job opportunities across Member States and labour mobility more generally. However, this appears likely to be a secondary effect arising from changes in trade creation and associated investment described above. None of the taxation instruments directly affect skill and qualification structures, none address direct barriers imposed by authorities, trade unions, professional bodies or address differences that may arise via employment standards. The successful implementation of environmental taxation may well mean Member States decide that other taxation instruments, including for example those associated with employing new/additional staff or levied on employers based on their existing workforce may be reduced. This is beyond the scope of the current study.
Free movement of capital (+)	The discussion above in terms of trade creation, productivity and efficiency enhancements overlaps with and reflect potential benefits from increases in the scale/number of investment opportunities or scope for investment diversification.
Policy influence and synergies, cooperation and coordination (++)	The greening of the environment semester process reflects the benefits from coordination and cooperation in policy, which could contribute to increased convergence of environmental tax rates This may benefit individual Member States, as well as extra EU trade negotiations and potentially support the EU strategic autonomy by reducing dependencies on external markets ([143]).

([142]) See for example Murad et al. (2025) and Zhao et al. (2024).

([143])https://www.bankingsupervision.europa.eu/press/speeches/date/2025/html/ssm.sp250618~d3e4495ae9.en.html#:~:text=Deepening%20the%20internal%20market%20also,reducing%20dependence%20on%20external%20markets

Key:

++: Likely to be relevant and potentially significant

+: Likely to be relevant but impact appears marginal

O: Not expected to be relevant or significant

Table 5-59: Single Market Costs Checklist

Issue	Notes
Trade diversion (++)	The corollary of the trade creation benefit above, is the potential for existing trade in global markets to be diverted within the EU. As above, various complex and dynamic factors influence existing trade patterns. These include: volumes, quality, availability, capacity, production, labour and transportation costs and not least the use of tariffs by non-EU countries. In many, cases, non-EU production costs (particularly labour costs) will already be lower than those incurred by EU firms, with the latter tending to compete via quality, value added, innovation and specialisation. Overall, two key indicators provide an indication of an increased risk of trade diversion (Europe Economics, 2013): • An increasing proportion of global GDP and trade accounted for by non-EU countries, compared to EU countries. IMF (2025) expects global rates of GDP growth (3.2% in 2025 and 3.1% 2026) to continue to outpace EU rates (1.2% 2024 and 1.1% in 2026). This compares to 4.7% in emerging and developing Asia and 3.8% in Middle East and Central Asia, for example, in 2026 (IMF, 2025). • A reduction in the use of international tariffs. The general trend over preceding decades has been a significant reduction in the use of tariffs via several General Agreement on Tariffs and Trade (GATT) rounds. However, a complex set of tariff arrangements remain in place and more recently measures have been introduced by the United States and China ([144]).
Adaptation cost (++)	These relate to the costs that are incurred by companies as a result of the increased competition described above. This may mean that profit margins for some companies are adversely affected as companies reduce prices and/or lose market share and/or are required to invest. Key issues here are the distributional and temporal effects. For example, the adaptation costs will be felt unevenly in specific sectors, by firms of different sizes, with specific concerns for Small and Medium sized enterprises (SMEs). This could in turn affect market dynamics and the competitive position of existing players, those who hold dominant position in markets, technologies and supply chains. Such adaptation costs are likely to be felt in the short term, hence the implementation of the instruments warrants careful consideration.

([144]) See https://policy.trade.ec.europa.eu/news/joint-statement-united-states-european-union-framework-agreement-reciprocal-fair-and-balanced-trade-2025-08-21_en and also https://taxation-customs.ec.europa.eu/customs/calculation-customs-duties/customs-tariff/eu-customs-tariff-taric_en

Issue	Notes
Employment and companies (+)	Effects on employment and on specific companies are essentially the wider impacts of the adaptation costs, but the nature of such effects increases with complexity along value chains. As above effects may include loss of employment in uncompetitive sectors/companies (at least in short term) or potentially bankruptcy/closure of underperforming companies with significant losses of market share. These would be associated with corresponding social effects (unemployment, income scarring effects and costs in social security etc). However, by the same logic, there could be employment benefits for some, companies, and for those manufacturing making abatement equipment, or front runners selling new technologies, for example. The net position will be driven by the impact on extra-EU trade and the net position is therefore uncertain.
Impact on national budgets (+)	These costs reflect issues such as tax arbitrage and tax avoiding activities amongst affected industries. Give the instruments being assessed here involve application of taxation instrument across several pollution sources and involve a degree of convergence in both instruments and rates, the opportunities for such avoidance and arbitrage would likely diminish. Costs may be incurred however as a result of losses of corporation tax, revenue taxation receipts and costs of social security arising from adverse effects on employment and companies noted above. Again, this would be offset by the increases in revenues from the taxes themselves.
Costs for EU/national budget (+)	Where Member States have not previously administered a taxation instrument (such as for pesticides) additional resources will be required to establish, manage, monitor and enforce it. Where a taxation instrument has previously operated, the administrative arrangements may need to be enlarged and/or made more sophisticated. This will require dedicated administrative bodies/staff/cost which will need to be financed from national budgets (or via the revenues generated by the taxes themselves).
Administrative costs ([145]) (+)	This cost category reflects the costs for companies to comply with new administrative obligations (i.e. provide information on compliance and retention of data for record keeping). As above, these would only be expected to materially change where new instruments are being adopted.
Adjustment costs ([146]) (++)	These are the costs of the taxes themselves (i.e. the revenues that have been estimated for each instrument and Member State throughout section ●) alongside indirect costs of any behavioural response. As such they are by far the most significant source of costs. In terms of the single market, the assessment in section **Error! Reference source not found.** indicates convergence in the rates being imposed across Member States.

Key:

++: Likely to be relevant and potentially significant; +: Likely to be relevant but impact appears marginal; O: Not expected to be relevant or significant

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([145]) These costs are defined in Tool #56 of the BRT as costs borne by businesses, citizens, civil society organisations and public authorities as a result of administrative activities performed to comply with administrative obligations.

([146]) These costs are defined in Tool #56 of the BRT as investments and expenses that businesses, citizens, or public authorities have to bear in order to adjust their activity to the requirements.

5.8. Assessment of the long-term viability and cost of implementation

The assessment in section 4 examined emissions/resource use reductions and estimated revenues to 2030 and 2035. This section contains a qualitative assessment of the key factors affecting the longer-term viability of revenue from these benchmarked taxes. “Long term” here is the extent to which the revenue estimates will persist and be sustainable beyond 2035 and/or whether they are expected to grow or reduce, and at what rate. We use a simplified RAG rating for the exercise: Green where key factors suggest a low risk of significant decreases affecting viability; Amber where there considered to be a moderate risk; and Red where the risk is considered to be higher. Clearly this is a simplified analysis intended as an initial benchmarking exercise. It is subject to significant uncertainty and will depend on a host of macro-economic, social and political factors which will differ between Member States. The criteria used for the assessment explained in section 2.11, but repeated here for ease of reference:

- **Continued behavioural change** –whether the reaction to the introduction of the tax is likely to be predominantly immediate or short term (e.g. a high degree of shift away from plastic bags in a short period of time, as observed in practice in response to the Plastics Bags Directive), or will the behaviour change be more gradual (e.g. shifts in travel behaviour in response to Low Emission Zones and associated charges). This will in turn reflect the elasticity of demand, and the behavioural response options available to those affected. For example, where responses are readily available and relatively low-cost, there may be significant short term behavioural shift, perhaps reducing the potential for further variability in the medium to long-term. Alternatively, where available responses are less available or higher cost, behaviour change may be more gradual as technologies and the availability of alternatives evolve over time.

- **Change in the parameter to which the tax is pegged** – for example, where taxes are attached to fossil fuel use in energy generation and transport, there may also be underlying changes in the base energy prices. These exogenous changes will in turn impact on behaviour change and the effect of the taxation. For example, where petrol and diesel prices rise, this may drive higher levels of behavioural response and a quicker decline in tax revenues compared to an additional tax on petrol and diesel consumption. In this respect, viability would also be determined by how the tax is defined in each case, for example whether a tax is defined in relative terms as a percentage of the underlying fuel price, or in absolute terms as a fixed uplift on the underlying energy price.

- **Changes in underlying technology and range of alternatives available -** potential for broader technological changes which could impact on behaviour change and tax revenues. For example, with respect to vehicles there is ongoing underlying upgrade and renewal of the vehicle fleet which would affect a tax on older vehicles. In addition, fuel efficiency and environmental impacts of newer vehicles are being continually influenced by ever improving vehicle standards, and the range and cost of alternatives to Internal Combustion Engine (ICE) vehicles are increasingly improving as more and more of these vehicles are being taken up in the fleet. All these factors would influence the revenue from, for example, a tax on petrol and diesel consumption. This also therefore links to the expected innovation in response to the different instruments.

- **Hypothecation of taxes** – the viability of a tax would also be in part influenced by what tax revenues are dedicated towards. If for example, environmental tax revenues – e.g. where a landfill tax is re-invested in recycling structures – this could help accelerate progress against the underlying environmental issue and also speed up the decline in tax revenues.

- **Political acceptability** – An important factor in the sustainability of any tax is whether this remains politically acceptable over time. Political acceptability in itself reflects a wide range of factors, such as hypothecation (if tax revenues are dedicated to also improving environmental outcomes, this may be more acceptable), but also communication and messaging, implementation of mitigation measures to tackle distributional risks, etc.

- Note we also consider available evidence on the **cost of implementation –** in terms of administrative complexity to businesses as well as authorities. This is distinct from the costs associated with the taxation revenues.

Table 5-60: Long-term viability of tax revenues

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	*Change in underlying peg*	*Change in underlying technology*	*Hypothecation of taxes*	*Political Acceptability*	*Costs of implementation*
Tax on NOx	Based on the targeted sectors listed in Table 5-29, NO_x emissions are most significant from the Electricity, gas, steam and air conditioning supply and Manufacturing sectors ([147]). Many of the most cost-effective measures to abate NOx have likely been implemented over decades of industrial regulation and permitting, particularly	This will be influenced by underlying economic growth and sector output. New installations would need to achieve a high general level of environmental protection in order to meet the requirements of the IED. Emission limit values adopted under the IED reflect Best Available Techniques (BAT), which typically have very high	Over time, the industry is continually mandated to reduce emissions, in particular via the IED 2.0, which will encourage permit setters to define more ambitious limits ([152]). New technologies are emerging for a number of sectors as part of ongoing innovation and process improvement. This would be expected to continue. Hydrogen is also being explored as an alternative fuel. Many of these	Risk differs based on the design of each instrument in Member States. If revenues are returned to companies with a condition of being spent on NO_x emissions reduction technologies, this will lead to the reduction of emissions base and a gradual decline in tax revenues. Examples from the EU include Slovakia, where NO_x tax revenues are partially returned to businesses for	Political acceptability of new/higher tax on NO_x can be increased if the general public understand the associated environmental damage of emissions and potential benefits of a tax (OECD, 2013). Whilst the tax generates comparatively modest revenues, political acceptability will depend on the design of the tax as well as how any changes are implemented.	Empirical evidence on the administrative and implementation costs is limited. This tax often faces high administrative complexity — particularly due to the need for direct measurement of emissions at source, which increases transaction costs (see 3.2.1). For businesses, measuring NO_x emissions can be an additional cost.

([147]) https://www.eea.europa.eu/en/topics/in-depth/air-pollution/national-air-pollutant-emissions-data-viewer-2005-2023

([152]) https://environment.ec.europa.eu/news/revised-industrial-emissions-directive-comes-effect-2024-08-02_en

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	under the IED ([148]) ([149]). Hence, installations may lack further cost-effective solutions that can be taken rapidly to reduce emissions. Further options – for example identified via BFEFs could be adopted - but on balance likely to be more expensive	emissions abatement efficiencies for NO_x ([151]). **The downward risk to tax revenue viability beyond 2035 appears low.**	technologies will take many years to become commercialised ([153]). **The downward risk to tax revenue viability beyond 2035 appears low.**	environmental projects, and Czechia, where revenues are earmarked for air protection measures. There is likely to be a mixed picture overall. **The risk to tax revenue viability beyond 2035 appears low to moderate.**	**The downward risk after 2035 appears low.**	

([148])https://www.eea.europa.eu/en/analysis/indicators/emissions-and-energy-use-in

([149])For example, see cost-effectiveness assessment of NOx emissions abatement techniques relevant to the mineral oil and gas refining sector: https://www.concawe.eu/wp-content/uploads/rpt_11-6-2011-03126-01-e.pdf

([151])See for example emissions abatement efficiencies associated with techniques identified in the CWW BREF: https://bureau-industrial-transformation.jrc.ec.europa.eu/sites/default/files/2019-11/CWW_Bref_2016_published.pdf

([153])Examples of emerging technologies: https://www.sciencedirect.com/science/article/pii/S0360319923051522, https://www.sciencedirect.com/science/article/pii/S0957582025002186,

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	([150]). **The downward risk to tax revenue viability beyond 2035 appears low.**					
Tax on SO_2	As above, based on the targeted sectors listed in Table 5-29, SOx emissions are most significant from the Electricity, gas, steam and air conditioning supply and Manufacturing sectors ( ). SO2 emissions reductions have been the	As above, where the tax is tied to the quantity of emissions, it will be influenced by underlying economic growth and sector output. New installations would need to achieve a high general level of environmental protection in	As above, the new IED 2.0 encourages permit setters to define more ambitious limits. Moreover, many EU Member States have a goal of phasing out fossil fuels in their power systems by 2035 ([154]), and cleaner technologies will be used for energy generation. Hydrogen and	If tax revenues are returned to companies with a condition of being spent on emissions reduction technologies, this will lead to the decline in emissions and, hence, tax revenues. We did not identify cases at the national or provincial level	The experience of Sweden demonstrates that the principle of an SO_2 tax can be acceptable by the public ([156]), however, this will clearly differ across MS due to a range of factors. Considering that SO_2 emissions are already relatively low, tax	Empirical evidence on the administrative and implementation costs is limited. This tax often faces high administrative complexity. The need for direct measurement of emissions at source can lead to additional costs for businesses (see 3.2.1).

([150]) The experience of Sweden supports this conclusion; NOx emissions have declined gradually as a result of the tax, between 1991 and 2014. See Sweden factsheet in this study.

([154]) https://beyondfossilfuels.org/government-2035-commitment-tracker/#s

([156]) Another reason for introduction of environmental taxes in Sweden was a demand for reduced income taxes without incurring budget deficit A. Pedersen (2016).

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	largest among pollutants reported under the NECD ( ). Many established cost-effective measures to abate SO2 in industry and energy supply are likely to have been taken through decades of industrial regulation and permitting, in particular under the IED, Air Quality Directive, and NECD. Hence, installations may lack further cost-effective solutions that can be taken rapidly to reduce emissions.	order to meet the requirements of the IED. Emission limit values adopted under the IED reflect Best Available Techniques (BAT), which typically have very high emissions abatement efficiencies for SO2 . Evidence of a partial decoupling of emissions from economic growth has occurred in the EU over the past decade . On the basis of high regulatory standards and evidence of decoupling, **the risk to tax**	electrification may partially replace fossil fuels in high-temperature industrial processes ([155]). New technologies may drive further reductions, incl. next-generation flue gas desulfurization (FGD) technologies, wet flue gas desulfurization etc. (Asghar et al., 2021). However, many of these technologies take many years to become commercialised. **The risk to tax revenue viability beyond 2035 appears low.**	where SO2 tax revenues are returned to the private sector in the EU. Although in Czechia revenues from air pollution fee (includes SO2) are earmarked for “air protection” measures. **The risk to tax revenue viability beyond 2035 appears low to moderate.**	effects are not expected to be significant. Recycling tax revenues to help businesses reduce emissions will also support acceptability. **The risk to tax revenues viability beyond 2035 appears low.**	

([155]) https://cleanenergyforum.yale.edu/2025/06/24/the-need-for-industrial-heat-in-clean-economy

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	However, less economically feasible options which may not have been adopted under BFEFs could be followed. **The risk to tax revenue viability beyond 2035 appears low to moderate.**	**revenue viability beyond 2035 appears moderate.**				
Tax on PM2.5	Based on the targeted sectors in Table 5-29, Electricity, gas, steam and air conditioning supply, Manufacturing, and waste management sectors are significant. Emissions of PM2.5 have dropped by 38% between 2005-2023. The assessment in sections 5 indicated	Where the tax is tied to the quantity of emissions, first, it will be influenced by underlying economic growth and sector output. Second, residual waste amounts, part of which is incinerated, will likely continue to decline. The EU is not on track to meet its 2030 target on	Similarly to taxes on NO_x and SO_2, Member States will further reduce the use of fossil fuels in their power systems and industry, develop renewables, and increase electrification, which will contribute to reductions of $PM_{2.5}$ emissions. This will likely continue over the longer term due to various net zero	The conclusions for NO_x and SO_2 taxes equally apply here. **The risk that tax revenues will decrease beyond 2035 appears low to moderate.**	Evidence on political acceptability of taxes on $PM_{2.5}$ emissions has not been identified. Factors determining political acceptability of a $PM_{2.5}$ tax will be comparable to those of NO_x and SO_2 taxes, which are targeted on the same sectors. **The risk to viability appears low but**	Empirical evidence on the administrative and implementation is missing. As this tax will require direct measurement of emissions at source, this will increase costs for businesses. Based on the experience of Czechia's tax on air pollution, if a tax base is limited to a set of pollutants, its cost-effectiveness increases.

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	emissions are expected to decrease by further 30% by 2030 (the IED would also play a role alongside any tax). Whilst $PM_{2.5}$ hasn't been the focus of BREFs to date, measures to address PM_{10} and dust emissions may also deliver effects in terms of $PM_{2.5}$ emissions ([157]). As a result, it is likely that there will be fewer cost-effective measures available for industrial,	residual waste ([158]), but further decline may occur after 2030-2035. Finally, partial decoupling of emissions from economic growth has already happened in the EU over the past decade (X. Pang et al., 2025). **The risk to tax revenue viability beyond 2035 appears low to moderate**	policies and initiatives. New technologies are also likely to drive further reductions, incl. plasma-assisted combustion (X. Pang et al., 2025), hybrid particulate collectors (Miller, 2011), wet-electrostatic precipitators (Jaworek et al., 2018), hot-gas ceramic filtration and others. These are at various stages of R&D, piloting, with some commercialisation. The introduction of a tax may accelerate development and		**will depend on the design of the tax.**	

([157]) For example, Waste Incineration BREF (2019) requires fabric filters adopted to abate PM_{10} emissions. This technology also delivers $PM_{2.5}$ emissions reductions: https://bureau-industrial-transformation.jrc.ec.europa.eu/sites/default/files/2020-01/JRC118637_WI_Bref_2019_published_0.pdf; https://statics.teams.cdn.office.net/evergreen-assets/safelinks/2/atp-safelinks.html

([158]) https://www.eea.europa.eu/en/european-zero-pollution-dashboards/indicators/reaching-the-2030-residual-municipal-waste-target-indicator-1

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	energy and waste incineration facilities not adopted at that point. Hence, emission reduction trajectories may well be flatter after 2035, leading to more stable tax revenues. **The risk to tax revenue viability beyond 2035 appears low.**		utilisation of these technologies, further lowering the emissions base and tax revenues. **The risk to tax revenue viability beyond 2035 appears moderate.**			
Water Abstraction	Sectors with the highest water abstraction are cooling power plants for electricity production, agriculture, public water supply, and industry ([159]). In	Factors such as demographic changes and economic growth may influence demand. As for the EU population, by 2050, Europe's urban	Technologies like internet of Things (IoT) -enabled smart water management systems could lead to lower water abstraction levels. Technological solutions that can	In those Member States, where there is a tax or a fee on water abstraction, its revenues are usually used for maintenance and improvement of the water supply system (Austria,	Water taxation is less studied in terms of public acceptance compared to other environmental taxes (Muhammad et al., 2021). To achieve more	There is limited empirical literature on the administrative and implementation costs associated with resource taxes. Section 3.1.1. suggests administrative and compliance costs may be relatively high. These costs stem from the need to monitor abstraction volumes and enforce accurate reporting, establish sector-specific tax bases, and address evasion risks.

([159]) https://www.eea.europa.eu/en/analysis/publications/water-savings-for-a-water-resilient-europe

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	general, demand for water is inelastic (see 5.1.4). In particular, studies have found that the long-run demand for water in the agricultural sector is also likely to be inelastic (Scheierling et al., 2006). Demand from households will likely reduce in response to a higher tax, but changes in price were found to have a relatively small effect on water abstraction, requiring non-price policies to complement	expansion will increase demand for water supplies in concentrated areas, even though per capita water consumption is expected to decrease due to higher efficiency. Overall, water abstraction may still rise in cities, as population growth and urbanisation intensify total demand despite declining individual usage (Scholten et al., 2025). In the energy sector, decreasing use of fossil fuels will lead to lower water abstraction, while development of renewable energy sources	reduce water abstraction are emerging but still face challenges in terms of feasibility, environmental and financial costs. Some of these solutions are already in or nearing practical implementation, e.g. full water recycling systems and water storage technologies for agriculture (Scholten et al., 2025). **The risk to tax revenue viability beyond 2035 appears moderate.**	Cyprus, Finland, Portugal), water projects (Croatia, Slovakia, Bulgaria) (see Factsheets). No examples were identified where tax revenues were returned to businesses for implementing technologies aimed at reducing water abstraction, specifically. **The risk to tax revenue viability beyond 2035 appears low.**	significant reductions in household water consumption, it is recommended that public authorities complement their price policies with non-price policies, such as education or awareness campaigns (Acteon et al., 2016). No EU examples have been identified where tax revenues are returned to businesses for water efficiency measures, in some countries, they are spent on “environmental projects” by the government or municipalities, for instance Bulgaria and Lithuania, (see Factsheets).	

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	them [160]. For industry, water demand is generally inelastic, yet sufficiently elastic for water prices to serve as an effective tool to encourage conservation (Gracia-de-Rentería & Barberán, 2021). THEEA notes “significant reductions in water abstraction are feasible [161]. **On balance, the risk to tax revenue viability beyond 2035**	such as concentrated solar power, bioenergy, and geothermal energy can offset these reductions in water abstraction, this may mean increased or stable water consumption by 2050 (Mapes & Larsen, 2023). No reliable forecasts on sectoral development and/or water abstraction trends for the post-2035 period were identified for manufacturing.			Such measures are assumed to increase public acceptance of the tax. **The risk to tax revenue viability beyond 2035 appears moderate.**	

[160] Overall, it can be observed that case study results are very diverse and they do not allow for a homogeneous interpretation of the overall effects of water pricing in determining demand (Acteon et al., 2016).

[161] https://www.eea.europa.eu/en/analysis/publications/water-savings-for-a-water-resilient-europe

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	appears moderate.	A shift towards services, decarbonisation, and the phase out of fossil fuel power could reduce EU demand for water, whilst in agriculture, sustainable farming methods could also reduce water use (Scholten et al., 2025). **On balance, risk to tax revenue viability beyond 2035 appears moderate.**				
Water Effluent – (BOD) in wastewater	Key sources of organic pollution are municipal wastewater and industrial wastewater	The underlying peg for this tax will be the load of pollutants discharged. Due to the existing regulation, such as UWWTD, IED, and BAT conclusions, large emitters	Emerging technologies include advanced secondary treatment technologies, such as advanced biological treatment (Młyńska et al., 2024), and tertiary	In those Member States, where there is a tax or a charge on wastewater, it is usually used to cover the cost of building and maintaining sewer systems, as well as for	In general, public awareness of environmental damage and confidence in the fee system's effectiveness in reducing it are important components (Hoffmann &	A tax on water effluent will lead to additional costs for businesses related to installation or upgrade of treatment, monitoring technologies, as well as costs for the governments related to enforcement and compliance, ongoing administration, monitoring, and reporting costs. Academic literature assessing such costs is limited.

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	([162]). In general, generation of water effluent is inelastic (-0.2, see 5.1.4). In 1992-2022 BOD pollution level has halved in EU rivers but has remained steady since 2010 ([163]). Additionally, 81% of sewage in 2020 was treated in line with EU legislation ([164]). Regulation has also been tightened, e.g. the revised Urban Wastewater Treatment	will likely be compliant before 2035, and new facilities will need to be compliant as well. Hence, major reductions from compliance will likely already have occurred by 2035. **This implies a low risk to tax revenue viability beyond 2035.**	treatment technologies – e.g. cloth media filtration and membranes, advanced oxidation processes (Fenton reactions etc.) (Pei et al., 2019), as well as digital optimisation (Wang et al., 2024). These technologies are at the early commercial stage and have limited full-scale adoption due to the additional investments needed (CAPEX/OPEX), operational complexity and	wastewater treatment (Austria, Belgium, Czechia) and environmental protections (Slovakia) (see Factsheets). In Poland, the revenues support environmental and energy transformation. In Germany, if a wastewater treatment facility reduces pollutant loads by at least 20%, investment costs may be deducted from the levy for up to three years before the plant	Boyd, 2006). In the EU, tax revenues are usually not recycled to businesses for improvements in water treatment (except examples in Poland and Germany). This is assumed to affect public acceptance. Whilst this depends on specific instrument design, **the risk to tax revenue viability beyond 2035 appears moderate.**	

([162]) https://www.eea.europa.eu/en/analysis/indicators/oxygen-consuming-substances-in-european-rivers

([163]) https://www.eea.europa.eu/en/european-zero-pollution-dashboards/indicators/oxygen-consuming-substances-in-european-rivers-indicator

([164]) https://water.europa.eu/freshwater/countries/uwwt/european-union

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	Directive (UWWTD) requires that by 2035, all agglomerations of ≥1,000 p.e. apply secondary treatment (removal of biodegradable organic matter, incl. BOD) before discharge. As for industry, IED regulates BOD pollution for certain sectors where relevant ([165]). Since many large plants and large load sources are compliant with EU regulation on wastewater treatment, further		other challenges (Babu Ponnusami et al., 2023). A tax may further incentivise their application, but uncertainties remain hence, **the risk to tax revenue viability beyond 2035 appears low to moderate.**	becomes operational. Beyond these cases, tax revenues do not appear to be returned to businesses for implementing technologies aimed at reducing water abstraction. Unless hypothecation is a part of the design of a new tax, there appears to be a **low risk to tax revenue viability beyond 2035.**		

([165]) For example, Pulp and Paper BREF (2015), Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector, Textile BREF and other

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	reductions after 2035 are expected to be small. **This implies a low risk to tax revenue viability beyond 2035.**					
Waste to Landfill	Landfilling accounts for 17% of EU waste management. There is therefore a wide tax base, despite substantial reductions. Continued behaviour change includes (1) shifting practices up the waste management hierarchy (e.g., reduction, recycling, material recovery), and (2) avoidance	In both traditional landfill taxes and pay-as-you-throw (PAYT) systems, the amount of generated waste may change as a result of: (1) change in economic (waste-generating) activities; (2) infrastructure and technologies to increase diversion from landfill, and (3) other policies and incentive schemes to	Certain waste streams (such as advanced recycling of construction and demolition waste) may still require innovation to be cost-effective as alternatives to landfilling. However, broadly there is continuous improvement to waste management systems and infrastructures to enable the reduction of landfilling rates. The expansion of the waste sorting sector is indicative	Current revenues generated are mostly directed at local authorities and used to fund waste management infrastructure or environmental services (such as recycling services and associated infrastructure). As a result, there appears to be a **moderate risk to longer-term viability post-2035,** assuming tax revenues continue to be invested in	The political acceptability of an increase in landfilling taxes depends on the magnitude of the increase (which will differ between Member States given the heterogeneity in current tax rates), the passthrough of costs to consumers, the prevalence of low-income and high-density communities which may face disproportionate costs under a tax increase, and the	It is difficult to ascertain the cost of implementation of an increase in tax rates due to the decentralised nature of waste management and low visibility of fees and charges (integration of pay-as-you-throw charges into service fees, and absorption of producer-facing landfill taxes into extended producer responsibility systems, which are less visible in public budgets). In general, most Member States already have a system in place for levying landfill taxes, as such a taxation infrastructure is already in place and could be built upon. Increasing the tax rate itself is thus unlikely to be costly, but if it is done in conjunction with a change to the tax system (e.g., pay-as-you-throw vs. flat-rate fees), the cost of implementation may increase. Enforcement costs may increase if tax rates prompt avoidant practices such as illegal dumping. The magnitude of the cost of must be assessed in conjunction with the stakeholders it falls on – if local authorities bear the full cost of implementation, their burden may be higher than for a national implementation.

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	practices (e.g., open burning, illegal dumping, or waste exporting, which has been increasing in the EU). In the case of (1), demand for waste services is relatively inelastic, and as landfilling alternatives are available, behaviour change is expected to continue. However, this will be heterogeneous across: **sectors** (e.g., advanced recycling of construction and demolition waste still faces cost barriers); **across Member States** (e.g., most with above-average landfilling rates	divert waste from landfill, e.g., by incentivising recycling and recovery rates. For (1), since 2010, the EU has observed a degree of decoupling of waste generation from economic growth. Drivers (2) and (3) may cause a change in the underlying peg, but how this translates into a change in tax revenue depends on the system design (flat rate vs. pay-as-you-throw). For (2), changes in the EU's waste mix suggest an expansion of the waste sorting sector, which will likely contribute to	of an increase in the adoption of underlying technologies and infrastructures for waste management. Other policies already in place, such as the Landfill Directive and the Waste Framework Directive, are also influencing landfilling rates and incentivising waste reduction (e.g., specific incentives for reducing plastic use and disposal). The pace of adoption varies by Member State: some of the countries trailing in achieving their Landfill Directive targets are also those with a potentially slower pace of adoption alongside enforcement	measures that lead to a reduction in landfilling rates. This is likely to be greater in countries with very low current landfill tax rates and high amounts of landfilling, which would significantly increase their tax revenues under the simulated tax rates in this study (e.g., Romania). These revenue increases could fund significant investments in measures to reduce landfilling rates.	dependence of local authority budgets on landfill tax revenues. Harmonising the landfill tax rate to a more ambitious level would have the highest impacts in terms of the difference to the current rate in small countries such as Croatia, Malta, and Lithuania, as well as countries in Eastern and Southern Europe. As such public resistance to tax increases may be a concern. Messaging around the importance of tax revenues to fund environmental services may temper resistance to increases in	

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	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	are in Eastern and Southern Europe); and **tax system designs** (e.g., household flat rate fees generating less response than pay-as-you-throw charges). In the case of (2), revision of the EU Regulation on shipments of waste has banned the export of all waste for disposal within the EU. Whilst its impact remains to be seen, it can be assumed that increasing stringency of waste shipment restrictions will reduce avoidance practices, maintaining the tax base for	further reduction in landfilled waste. For (3), numerous policies and schemes for incentivising waste reduction exist at the EU and national levels, which would reduce the amount of waste generated. If PAYT systems are linked to the amount of waste generated and seen to be more efficient in incentivising behaviour change, they may continue to expand across the EU, leading to an increase in the number of landfill tax systems pegged to waste quantities and a further reduction in landfilling.	challenges. Although there will likely be a mixed picture, ***the risk to viability appears moderate.***		landfill tax rates. There is thus likely a **low to medium risk to viability, although this depends on implementation**.	

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	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	landfill taxes in the long term. However, this is dependent on the use of unit-based tax systems (see next column). **Overall, the risk to tax revenue viability beyond 2035 appears moderate due to continued behaviour change.**	Combined, this could lead to a decrease in tax revenue. **On balance, risk to tax revenue viability beyond 2035 appears moderate to high reflecting expected changes in waste generated in the EU.**				
Waste Incineration	Incineration taxes typically complement landfilling taxes, with the aim of shifting waste management practices up the hierarchy. As such, the continued behaviour change is closely associated. However,	Similar to landfill taxes, incineration taxes are generally levied on a per-tonne basis of incinerated waste, and on waste incineration companies. A change in the underlying peg (the quantity of waste destined	In addition to the aspects mentioned for landfill taxes above, an important policy uncertainty affecting waste incineration is the potential inclusion of the sector in the EU Emissions Trading System, following a feasibility assessment by the	Revenue from waste incineration taxes may also fund local authorities' budgets and be directed towards funding environmental services. As a result, issues of long-term viability are likely to be similar to those identified	The political acceptability of waste incineration taxes will depend on context. For example, in countries where waste incineration plays a significant role in energy production (and has been historically	For waste incineration, similar observations can be applied as to the landfill tax, but on a smaller scale, given the low share of waste incineration in EU waste management, compared to landfilling. For countries currently without waste incineration taxes, the cost of implementation could be significant, especially in jurisdictions facing enforcement issues around illegal open burning.

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	incineration behaviour will also be driven by landfill taxes, as incineration is a potential avoidance practice or alternative pathway to landfilling (see Waste to Landfill tax above) – as such, it is important to not assess incineration taxes in isolation, but rather as part of the broader waste taxation system. Incineration typically represents a smaller share of waste management pathways compared to landfilling or material	for incineration) could occur for the same reasons outlined for landfill taxes, as well as in response to a landfill tax rate increase which makes incineration more cost-effective as a pathway. In cases of countries where waste incineration with energy production is an important part of the energy mix, an increase in energy demand or a shift in fuel mix away from fossil fuels may also drive an increase in the amount of waste destined for incineration. The overall direction of change in	European Commission due by mid-2026. This would likely to work in conjunction with existing landfilling reduction initiatives, and would likely further incentivise recycling, sorting, and waste prevention. Technological changes in specific sectors could lead to an increase in incineration by entities which are not strictly waste processors or management companies. For example, the cement industry regularly uses municipal waste for co-incineration to substitute fuels such as coal or pet coke in industrial heat production; the	for landfilling taxes, with increased rates of taxation leading to increased funding for incineration alternatives, such as recycling infrastructure. However, the cross-price elasticity with landfill taxes is likely to also play a key role. As such, the impact on long-term viability is unclear. We assume a **moderate risk to long-term viability**, given the potential for waste incineration to become a revenue-generating activity for some waste incinerators,	exempted from taxation), increasing or introducing a waste incineration tax could risk political challenges. In countries where waste incineration is uncontrolled (e.g., open-air burning) and/or does not include energy recovery, political acceptability may pose less of a risk to long-term viability but will still be closely linked to any regressive effects on end consumers, particularly low-income, high-density residential areas generating municipal waste for incineration.	

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	recovery, and as such there is room for it to expand, particularly if done without energy recovery or as open burning, where infrastructure investments are not required. This may manifest more in the case of municipal waste, given that municipalities are found to be much more sensitive to landfill tax rates in terms of shifting from landfilling to incineration. As a result, **the risk to long-term viability**	quantities of waste is thus subject to the influence of a range of factors and is difficult to determine. As in the previous criterion, given the overall low share of waste incineration in the EU's waste management pathways, ***the overall risk to long-term viability is likely to be low.***	share of co-incinerated waste is currently estimated to be at 58%, with industry ambitions to increase it further ([166]). If coupled with carbon capture, waste co-processing could also become a revenue stream for cement plants due to the potential generation of negative emissions credits (this would also apply to dedicated waste incinerators if they are eventually included in the EU ETS). This could lead to an increase in incinerated waste in the cement industry, but its	such as the cement industry.	Furthermore, an increase in waste incineration costs where this is then passed through to consumers, and where the waste incineration produces energy, which is then also sold to consumers, may face public resistance if energy prices are also high. Overall a **low-moderate risk of impact on long-term viability**, is assumed but with significant heterogeneity by Member State.	

([166]) https://cembureau.eu/media/hbdhpv0s/what-is-co-processing-brochure_pm-version.pdf

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	*Change in underlying peg*	*Change in underlying technology*	*Hypothecation of taxes*	*Political Acceptability*	*Costs of implementation*
	of incineration tax increases is likely to be low to medium if implemented in isolation (given the small share of incinerated waste at the EU level), but **sensitive to the trajectory of landfill taxes**. These risks will also be highly heterogeneous, as the share of waste incinerated varies strongly by Member State.		effect is again highly dependent on the cross-price elasticity to the waste incineration tax rate as well as the landfill tax rate. Given the long lead times of carbon capture projects and the lack of clarity regarding emissions pricing for waste incinerators, the impact on long-term tax rate viability is likely to be more influenced by the pace of adoption of landfilling alternatives other than waste incineration, suggesting **moderate risks to long-term viability** (as above).			
Fertilizers	In general, demand for fertilizers is	An underlying peg in this case is agricultural	Alternative products include biological	In Sweden, for example, tax revenue was	Fertiliser taxes are politically sensitive due to	Evidence on the implementation costs of agricultural pollution taxes is scarce. Although comprehensive data are lacking, simplifying the tax

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	inelastic (-0.3 elasticity, see 5.1.2). Based on the experience of Denmark, after the introduction of the tax in 1998, total sales of nitrogen in fertilisers had declined by 2012 by 29%. Thereafter sales fluctuated but with an overall decline of 22% in 2023 compared to 1998) ([167]). But importantly in the case of Denmark farmers are exempt from	activity. The EU agriculture sector is expected to grow more slowly than in the past, according to the EU Agricultural Outlook for 2024-2035. EU crop production may increase slightly in the future, as sustainable farming practices may counterbalance negative factors such as climate change and reduced availability/ affordability of some inputs	ammonia fertilizers utilising nitrogen-fixing bacteria that convert atmospheric nitrogen into ammonia, providing a natural alternative to synthetic nitrogen fertilizers. However, such fertilisers will add nitrogen to the soil. This technology is currently at the R&D stage ([168]). Another option is slow-release or enhanced efficiency fertilizers, which do not replace nitrogen fertilisers,	initially allocated to research and environmental initiatives administered by the government, and later directed to the central budget, but revenues were not directed to farmers (see Factsheets). Existing taxes on fertilizers and pesticides sometimes incorporate a mechanism to return tax revenues as compensation to farmers (UNEP, 2020). If so, they will have more financial means	their impact on production costs and competitiveness in the agriculture sector. In the case of Sweden, the tax was cancelled due to rising global fertiliser prices and the financial crisis of 2008-2009 (see Factsheets). Political acceptance may require targeted exemptions, gradual introduction, and linkage to visible environmental benefits (see 3.2.3). European evidence on	base and recycling revenues can significantly reduce implementation costs (see 3.2.1). As for the costs for the governments, pesticide and fertiliser taxes imply low policy-related transaction costs in the range of 0.1-1.1% of tax revenue (OECD, 2022). In Sweden, the cost of administering and collecting the tax was estimated at around SEK 0.5 million (EUR 50,000) per year (see Factsheet).

([167]) https://www.statbank.dk/statbank5a/selectvarval/define.asp?PLanguage=1&subword=tabsel&MainTable=KVAEL2&PXSId=243645&tablestyle=&ST=SD&buttons=0

([168]) https://rmi.org/green-fertilizer-markets-innovation/

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	the tax (see Factsheets). In Sweden, consumption of nitrogen in fertilisers had been decreasing between 1987-2008, before the tax was repealed (Statistics Sweden, 2025). Irrespective of taxation, use of nitrogen fertilisers is expected to decline at least by 2035 due to improved input management (European Commission, 2024). Based on this, there is a **moderate risk to viability given reductions in**	(European Commission, 2024). If the production of crops remains stable, **there appears to be a low risk to viability.**	but reduce the required synthetic input (Asadu et al., 2024). As this type of fertilisers is already commercially available and used, its application may increase when a tax is introduced. Finally, if the EU introduces a more ambitious target on organic farming for after 2030, this will likely reduce the use of N fertilisers in the future ([169]). **This suggests a moderate risk to viability beyond 2035.**	to apply new technologies or practices that require less use of fertilizers. On this basis - if this is a part of the new tax design, there appears a **low to moderate risk to viability beyond 2035**.	fertilizer taxation suggests that earmarking tax revenues for specific purposes can enhance the perceived legitimacy of the tax policy and confirms that taxes closely reflecting the actual environmental damage are often viewed as fair (Söderholm & Christiernsson, 2008), but overall there appears a **higher risk to viability beyond 2035.**	

([169]) https://www.eea.europa.eu/en/analysis/indicators/agricultural-area-used-for-organic

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	nitrogen consumption in fertilisers.					
Pesticides	In general, demand for pesticides is inelastic (-0.5 elasticity, see 5.1.3). From the experience of Sweden, while the tax had an effect on plant protection products, the effect was relatively limited, and since the mid-1990s, the amount of active ingredient sold	An underlying peg in this case is agricultural activity. As above, if the production of crops remains stable, **there appears to be a low risk to viability.**	Commercially available alternatives to pesticides include Integrated Pest Management ([171]), biopesticides ([172]), and precision spraying ([173]), as well others at the stages of R&D, pilot, and early commercial. The latter includes sterile insect technique ([174]) and RNA-based pesticides (Székács et al., 2021). Hence,	In the case of Sweden, until 1995, the proceeds of the fee were used for agri-environmental programmes aiming to reduce pesticide application and to promote integrated pest management (Böcker et al., 2016a). Since 1995, the revenue has been directly allocated to the	Studies have found that a tax policy should be paired with complementary measures that encourage preventive practices in integrated pest management (Böcker et al., 2016b). Public acceptance can also be increased if tax revenues are earmarked, for example, to compensate	Evidence on the implementation costs of agricultural pollution taxes is scarce. Although comprehensive data are lacking, existing cases show that simplifying the tax base and recycling revenues can significantly reduce implementation costs (see 3.2.1). As for the costs for the governments, pesticide and fertiliser taxes imply low policy-related transaction costs in the range of 0.1-1.1% of tax revenue (OECD, 2022).

([171]) https://food.ec.europa.eu/plants/pesticides/sustainable-use-pesticides/integrated-pest-management-ipm_en

([172]) https://food.ec.europa.eu/food-safety-news-0/eu-commission-adopts-new-rules-facilitate-approval-biological-pesticides-2022-08-31_en

([173]) https://data.consilium.europa.eu/doc/document/ST-16521-2024-INIT/en/pdf

([174]) Early commercial stage refers to its use in the crop protection against a broad range of pests (Bourtzis & Vreysen, 2021).

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
	has remained stable (see Factsheets). In Denmark, sales of active ingredients have declined by 18% between 2010-2022, while their consumption has been relatively stable (Østergaard Martensen, 2022). However, studies have found that demand is more elastic in the long run (170). Considering the above, **the risk to viability beyond 2035 appears to be low**.		**there appears a higher risk to viability beyond 2035** due to alternatives being available at the market and more widely used.	general budget (see Factsheets). In Denmark, the government reimburses pesticide tax revenues to farmers through reductions in other land taxes (A. B. Pedersen, 2016). Based on this experience, taxes on pesticides sometimes incorporate a mechanism to return tax revenues to farmers or to promote the reduction of pesticide use. If this is a part of the new tax design, there appears **a moderate risk**	farmers transitioning to sustainable agriculture, or to protect "public health and the environment"; the specific uses are not described (Bjornavold et al., 2023). Both EU Members States that have a pesticide tax, used or use this strategy. In Denmark, in particular, this was done to reduce farmer opposition while still achieving environmental objectives (A. B. Pedersen, 2016). **The risk to viability appears moderate but will depend on**	

(170) https://www.research-collection.ethz.ch/server/api/core/bitstreams/a34ce3cd-650d-48bb-be74-d07056f39c2f/content

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
				to viability beyond 2035.	**the design of the tax.**	
Mineral Taxes	In general, demand for minerals is inelastic (-0.2 elasticity, see 5.1.8). It was estimated that minerals extraction will decline in 2030 but will resume its growth by 2035 even in the presence of a tax (see 5.1.8). From the experience of Sweden, a tax on gravel has led to a reduction in its extraction, shifting demand to its alternative – crushed rock, however, the trend of reduction of	Demand for mineral resources is related to construction and industrial activities. Building stock, in particular, is expected to increase by 2050 (Lotz et al., 2024). No long-term forecast for other industries has been identified. Based on this, **the risk to viability beyond 2035 appears low to moderate**, as consumption trends from industrial	Alternative materials are being developed that could substitute part of the demand for primary minerals in construction. For example, recycled concrete and reclaimed aggregate (early commercial stage) (Robayo-Salazar et al., 2020), recycled aggregates from construction and demolition waste (CDW) (commercialisation level mature) (JRC, 2023), and manufactured aggregates (commercialisation level mature) ([175]). EU policies will	In Sweden and Hungary, revenues from the tax and royalty were not earmarked. In Czechia, revenues are returned to municipalities (see Factsheets). These resource revenue sharing systems can compensate affected areas for the social and environmental impacts of exploitation and depletion of natural resources (Bauer et al., 2016). However, it appears that tax revenues are	Research on public perceptions of a tax on minerals is limited and is mainly in developing countries. It is assumed that returning tax revenues to municipalities and local communities will increase the political acceptability of a tax. **The risk to revenues viability beyond 2035 appears low** but will depend on the design of the tax**.**	Studies quantifying the costs of taxes on minerals were not identified. The administrative cost would tend to be higher if the information requirements of the policy are higher. The administrative costs (both of the government and of businesses) tend to be higher for profit-based royalties than for output-based royalties. Hence, the costs of implementing a tax will depend on the design of the tax.

([175]) https://scrreen.eu/wp-content/uploads/2023/08/SCRREEN2-factsheets_AGGREGATES.pdf

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	*Change in underlying peg*	*Change in underlying technology*	*Hypothecation of taxes*	*Political Acceptability*	*Costs of implementation*
	natural gravel extraction had started before the tax. Based on the existing evidence, it is assumed that in the presence of a high tax and alternatives, an extraction pattern may shift towards alternatives. However, because the benchmark tax is rather comprehensive, **the risk to viability after 2035 appears low.**	sectors is uncertain**.**	likely continue to incentivise recycling of CDW. However, while in 2020 the recycling rate for CDW was 89% at the EU level, the most prevalent recovery route was filler material in road construction or as backfilling material. Moreover, in that case, the recovered materials did not achieve the necessary technical properties to fulfil the functions for which the original material was designed for (Caro et al., 2024). In the presence of a tax, the market of recycled materials that can fulfil the same function as original materials may develop in the long run,	usually not returned to businesses in the mining sector. The **risk to viability of revenues beyond 2035** will depend on the design of the tax, but unless tax revenues are returned to the private sector, **appears low**.		

ARCHETYPE	ASSESSMENT CRITERIA					
	Continued behavioural change	***Change in underlying peg***	***Change in underlying technology***	***Hypothecation of taxes***	***Political Acceptability***	***Costs of implementation***
			leading to a higher substitution rate of primary minerals. **Hence, there appears a moderate risk to viability beyond 2035.**			

6. Conclusions

Taxes on pollution, waste and resource use continue to offer significant potential to reduce environmental externalities and to mobilise revenues that can be deployed strategically: either to offset other fiscal burdens, to finance investments in cleaner technologies, or to cushion possible social and competitiveness effects. The evidence from the modelling exercises under Scenarios A and B confirms that, when designed coherently and applied across Member States, such instruments can simultaneously advance environmental objectives and strengthen fiscal resilience.

Environmental taxation is not new in the EU, yet its potential remains only partially realised. Over the past three decades, Member States have gained substantial experience with a range of instruments — such as NOx, landfill, and wastewater taxes — with mixed outcomes. Successful examples in Sweden, Denmark and the Netherlands demonstrate that well-calibrated and predictable taxes can deliver meaningful environmental improvements. Conversely, low tax rates, narrow bases, weak enforcement and political resistance have often limited effectiveness elsewhere.

The assessment presented in Section 5 shows that environmental and resource tax reform could yield notable environmental and fiscal gains. Under the more ambitious Scenario A, total additional revenues could reach around **€62 billion by 2030**, equivalent to nearly a fivefold increase relative to 2023 pollution and resource taxes. Even under the more moderate Scenario B, revenues of **€26 billion** are projected, an increase of about 80 per cent compared with the 2023 baseline. Environmental effects are similarly substantial: by 2030, reductions in emissions, waste discharges and resource extraction generally reach double-digit percentages, with the most pronounced gains in water effluents, water abstraction and mineral extraction.

These results confirm that, even with conservative elasticity assumptions, environmental taxation can meaningfully reduce harmful pressures while generating stable and predictable revenue streams. The most significant fiscal contributions arise from **water-related taxes** (abstraction and effluents), which together account for roughly three quarters of the total additional revenue. **Waste management and mineral extraction taxes** also deliver substantial returns, reflecting both their large taxable bases and relatively high environmental damage costs.

At the same time, the assessment suggests that overall macroeconomic and social impacts are modest. Evidence from modelling studies, including Mottershead et al. (2021) and others, shows that the direct effects on employment and household income are small, typically well below 0.1 per cent of baseline values, even under higher tax rates. The results for Scenarios A and

B reinforce this finding: distributional effects are limited and generally neutral, while competitiveness impacts are confined to a few resource-intensive sectors and can be mitigated through well-designed revenue recycling mechanisms. Where taxes are higher, especially on water abstraction or wastewater discharges in water-scarce Member States, recycling measures, such as lowering labour taxes or supporting efficiency investments, would help offset transitional effects and enhance public acceptability.

Despite these positive prospects, substantial challenges remain. Many Member States still apply environmental tax rates well below levels that would internalise environmental externalities. As a result, the behavioural responses and environmental improvements remain modest. Political economy factors — such as public resistance to perceived cost increases, the complexity of tax base definitions, and limited administrative capacity — continue to hinder progress. Furthermore, ensuring coordination across Member States is essential to avoid competitive distortions and preserve the integrity of the Single Market.

Nevertheless, the analysis underscores that environmental taxation remains a robust and underused policy tool. If implemented coherently and supported by transparent communication on revenue use, it can contribute to several EU policy goals simultaneously: promoting resource efficiency, supporting the circular economy, reducing pollution, and generating revenue for social or green investments. The dual dividend, environmental improvement and economic efficiency, remains within reach, provided that revenue recycling is effectively integrated into policy design.

Looking forward, further consideration will be needed to address the **distributional and competitiveness impacts** of higher taxes, particularly in more vulnerable Member States or sectors. Governance and feasibility issues will also require attention. Some Member States may still resist adopting benchmark rates or may prefer gradual implementation. Continuous dialogue, knowledge sharing, and the exchange of best practices will therefore be essential to ensure convergence and maintain political support.

Finally, the European experience offers valuable lessons for future policy cycles. Strong administrative systems, transparent reporting, and effective monitoring are critical to the success of environmental taxes. The most successful examples combine clear environmental objectives, stable rate trajectories, and credible enforcement mechanisms. When accompanied by effective public communication and social safeguards, environmental taxation can play an important role in greening the European Semester, while advancing the EU's competitiveness and sustainability agendas, and strengthening fiscal foundations for the transition to a low-carbon, resource-efficient economy.

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Annex 1 - Overview of CSRs related to environmental taxation or tax base shift (2019–2024)

Table A1-1: Overview of CSRs related to environmental taxation or tax base shift (2019–2025)

Member State	Year	CSR Language on Environmental Taxation
Austria	2025	“Improve the tax mix to reduce the high tax wedge on labour and support inclusive and sustainable growth in a challenging fiscal environment.”
	2024	“Further improve the tax mix to reduce the tax wedge and support inclusive and sustainable growth.”
	2023	“Improve the tax mix to support inclusive and sustainable growth.”
	2022	“Improve the tax mix to support inclusive and sustainable growth.”
	2020	“Make the tax mix more efficient and more supportive to inclusive and sustainable growth.”
	2019	“Shift taxes away from labour to sources less detrimental to inclusive and sustainable growth.”
Belgium	2025	“Take specific steps to phase out fossil fuel subsidies, in particular in the transport and heating sector, including by shifting excise duties from electricity to fossil fuels.”
	2024	“Reform the tax and benefits system to strengthen incentives to work by shifting the tax burden away from labour and by reviewing the design of benefits. Finance the labour tax reduction, including by reducing tax expenditure.”
	2023	“Pursue the reform of the taxation and benefits system to reduce disincentives to work by shifting the tax burden away from labour and by simplifying the tax and benefits system. Review tax expenditures to reduce their economic, social and environmental harmful impact.”
	2022	“Reform the taxation and benefit systems to reduce disincentives to work by shifting the tax burden away from labour and by simplifying the tax and benefit system. Reduce tax expenditures and make the tax system more investment-neutral.”
	2020	“Enhance the effectiveness of the tax system, in particular by removing distortive tax expenditures.”
Bulgaria	2020	“Shift taxes to more growth-friendly and green sources.”
	2019	“Improve tax collection through targeted measures in areas such as fuel and labour taxes.”
Cyprus	2020	“Step up action to address features of the tax system that facilitate aggressive tax planning by individuals and multinationals.”

Member State	Year	CSR Language on Environmental Taxation
	2019	"Address features of the tax system that may facilitate aggressive tax planning by individuals and multinationals, in particular by means of outbound payments by multinationals."
Czech Republic	2025	"Reduce the tax burden on low-income workers."
	2019	"Improve the effectiveness of the tax system, including by shifting taxation towards environmental bases."
Denmark	2023	"Implement the new property tax system in order to restore the link between market prices and taxes and ensure fairer taxation."
	2022	"Implement the new property tax system in order to restore the link between market prices and taxes and ensure fairer taxation."
Estonia	2025	"Broaden the tax base by tapping into taxes that are less detrimental to growth."
	2024	"Broaden the tax base and improve access to and financing of healthcare and long-term care."
	2023	"Continue efforts to increase the share of sustainable transport by electrifying the rail network and through taxation that incentivises the gradual renewal of the vehicle stock towards zero or low-emission vehicles."
	2020	"Shift the tax burden away from labour to more growth-friendly and green sources."
France	2024	"Reduce the complexity of the tax system by better targeting tax expenditures, removing the least efficient ones and limiting their overall budgetary impact."
	2020	"Continue to improve the regulatory environment, reduce administrative burdens for firms and simplify the tax system."
	2019	"Continue to simplify the tax system, in particular by limiting the use of tax expenditures, further removing inefficient taxes and reducing taxes on production."
Germany	2025	"Improve the tax mix to support inclusive growth and sustainable competitiveness, in particular for second earners."
	2024	"Improve the tax mix for more inclusive growth and sustainable competitiveness, also by reducing disincentives to increase hours worked, in particular for second earners."
	2023	"Improve the tax mix for more inclusive and sustainable growth, in particular by improving tax incentives in order to increase hours worked"
	2022	"Improve the tax mix for more inclusive and sustainable growth, in particular by improving tax incentives in order to increase hours worked"
	2019	"Shift taxes away from labour to sources less detrimental to inclusive and sustainable growth."
Greece	2025	"Continue efforts to improve tax compliance, including through further centralisation and digitalisation of customs and tax inspections and improve the tax system's predictability."
	2023	"Building on reforms undertaken as part of the recovery and resilience plan, improve the investment friendliness of the taxation system by introducing a wider advance tax-ruling system, enlarge the tax base, including by reviewing the current taxation structure for the self-employed, and strengthen tax compliance by extending the use of electronic payments."
	2022	"Building on reforms undertaken as part of the recovery and resilience plan, improve the investment-friendliness of the taxation system by introducing a wider advance tax-ruling system and review the structure of the tax burden on the self-employed."

Member State	Year	CSR Language on Environmental Taxation
Hungary	2022	“Continue simplifying the tax system.”
	2020	“Strengthen the tax system against the risk of aggressive tax planning.”
	2019	“Continue simplifying the tax system, while strengthening it against the risk of aggressive tax planning.”
Ireland	2025	“Reduce the risks related to the high degree of concentration in Ireland’s tax revenue, including by broadening the tax base and reviewing the scope and impact of tax expenditures.”
	2020	“Broaden the tax base. Step up action to address features of the tax system that facilitate aggressive tax planning, including on outbound payments.”
	2019	“Limit the scope and number of tax expenditures, and broaden the tax base. Continue to address features of the tax system that may facilitate aggressive tax planning, and focus in particular on outbound payments.”
Italy	2025	“In line with fiscal sustainability objectives, make the tax system more conducive to growth, by further fighting tax evasion, reducing the labour tax wedge and the remaining tax expenditures, including those related to value added tax and environmentally harmful subsidies, as well as updating cadastral values as part of a broader review of housing-related policies, while ensuring fairness.”
	2024	“Make the tax system more supportive to growth, with a focus on reducing the tax wedge on labour and in line with fiscal sustainability objectives, including by reducing tax expenditures and updating cadastral values, while ensuring fairness and progressivity and supporting the green transition.”
	2023	“Further reduce taxes on labour and make the tax system more efficient by adopting and duly implementing the enabling law on tax reform while preserving the progressivity of the tax system and improving fairness, in particular by streamlining and reducing tax expenditures, including VAT and environmentally harmful subsidies, and by reducing the complexity of the tax code. Align the cadastral values with current market values.”
	2022	“In order to further reduce taxes on labour and increase the efficiency of the system, adopt and appropriately implement the enabling law on the tax reform, particularly by reviewing effective marginal tax rates, aligning the cadastral values to current market values, streamlining and reducing tax expenditures, also for VAT, and environmentally harmful subsidies while ensuring fairness, and by reducing the complexity of the tax code.”
	2020	“Shift the tax burden from labour to other sources, particularly by removing environmentally harmful subsidies.”
	2019	“Shift taxation away from labour, including by reducing tax expenditure and reforming the outdated cadastral values.”
Latvia	2025	“Make public finances fit to cope with rising structural spending needs including for defence, healthcare and social protection, such as by broadening taxation to sources less detrimental to growth, moving informal or undeclared activities into the formal economy, and redirecting expenditure to priority areas based on public spending reviews.”
	2024	“Broaden taxation, including of capital and property, and strengthen the adequacy of healthcare and social protection.”
	2023	“Broaden taxation, including of property and capital, and strengthen the adequacy of healthcare and social protection.”
	2022	“Broaden taxation, including of property and capital, and strengthen the adequacy of healthcare and social protection.”
	2019	“Reduce taxation for low-income earners by shifting it to other sources, particularly capital and property, and by improving tax compliance.”

Member State	Year	CSR Language on Environmental Taxation
Lithuania	2025	"Improve tax compliance and broaden the tax base to sources less detrimental to growth."
	2020	"Ensure the coverage and adequacy of the social safety net and improve the effectiveness of the tax and benefit system to protect against poverty."
	2019	"Improve tax compliance and broaden the tax base to sources less detrimental to growth. Address income inequality, poverty and social exclusion, including by improving the design of the tax and benefit system."
Portugal	2025	"Improve the effectiveness of the tax system, particularly by strengthening the efficiency of its administration and reducing the associated administrative burden."
	2024	"Improve the effectiveness of the tax system, in particular by strengthening the efficiency of its administration and reducing the associated administrative burden."
	2023	"Improve the effectiveness of the tax and social protection systems, in particular by prioritising the simplification of both frameworks, strengthening the efficiency of their respective administrations, and reducing the associated administrative burden."
	2022	"Improve the effectiveness of the tax and social protection systems, in particular by prioritising the simplification of both frameworks, strengthening the efficiency of their respective administrations, and reducing the associated administrative burden."
	2020	"Continue the green tax reform and consider broadening the environmental tax base."
	2019	"Strengthen tax compliance and collection."
Slovakia	2025	"Make the tax mix more efficient, including by reducing disincentives in the labour market, and making stronger use of taxes less detrimental to growth such as environmental and recurrent property taxation."
	2024	"Make the tax mix more efficient, including by reducing disincentives on the labour market, and making a stronger use of environmental and recurrent property taxation."
	2023	"Make the tax mix more efficient and more supportive of inclusive and sustainable growth, including by leveraging the potential of environmental and property taxation."
	2022	"Make the tax mix more efficient and more supportive of inclusive and sustainable growth, including by leveraging the potential of environmental and property taxation."
	2020	"Shift taxes away from labour towards more growth-friendly and green sources."
Slovenia	2025	"Ensure the fiscal sustainability of social protection and rebalance tax revenues towards more growth-friendly and sustainable sources."
	2024	"Ensure the fiscal sustainability of social protection and rebalance tax revenues towards more growth-friendly and sustainable sources."
	2023	"Rebalance tax revenues towards more growth-friendly and sustainable sources."
	2022	"Introduce compensating measures to finalise the shift from labour taxes, including by rebalancing towards more green and growth-friendly taxes."

Member State	Year	CSR Language on Environmental Taxation
Spain	2025	"Further strengthen fiscal sustainability by reviewing and simplifying the tax system, including by shifting part of the tax burden from labour towards environmental, consumption and immovable property taxation, to support economic growth and employment, cohesion and the green and digital transition."
	2024	"Ensure fiscal sustainability including by: (i) reviewing and simplifying the tax system to support economic growth and employment, cohesion and the green transition; and (ii) improving the quality, efficiency and equity of public spending."
	2020	"Use taxation to support environmental objectives, including through green tax reforms."

Source: CSR database: https://ec.europa.eu/economy_finance/country-specific-recommendations-database/

Annex 2 - Tax inventory

Table A2-1: General characteristics of pollution taxes in the EU

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
Taxes on NO_X, SO_X and other pollutants				
Environmental tax	Belgium	1993	Amount of pollutant emitted (tons of SO_2, NO_2, fine particles)	Varies by pollutant type and amount
Clean Air Act taxes	Bulgaria	2004	Not available	Not available
Taxes on pollution	Bulgaria	2001	Not available	Varies by pollutant type and amount
Tax on NO2 emissions	Croatia	2004	30 kg of NO2 emissions per source per year	€41.12 per tonne of NO_2
Tax on SO2 emissions	Croatia	2004	More than 100kg of SO2 per year	0 kuna per tonne of SO_2
Air pollution tax	Czech Republic	1967	Various emissions (e.g., Ammonia, NOx, Methane, Sulphur dioxide)	In 2021, rates per tonne were as follows: €573 TSP, €191 SO_2; €152 NO_X, €382 NMVOCs.
Sulphur tax	Denmark	1995	Sulphur content in fuels	DKK 26.5 per kg SO_2 (varies by fuel type)
CFC, HFC, PFC, and SF6	Denmark	1988	Quantity of substances on the market	Varies by chemical type
Chlorinated solvents	Denmark	1996	Weight of chlorinated solvents	DKK 2 per kg of solvent. However, the tax base for this has virtually been eliminated, and the national tax list reports a revenue value considered as zero.
Nitrogen Oxides	Denmark	2010	Quantity of NO emissions	DKK 5/kg (in 2015)
Air, water and waste pollution charges	Estonia	1991	Per tonne of pollutant emitted	Different rates per pollutant (e.g., CO2: €2/ton)
Air load tax	Hungary	2003	Weight-based rates per kg	50 Ft/kg for SO_2, 120 Ft/kg for NO_2
SO2 and NOx pollution tax	Italy	1998	Emissions in tonnes of SO2 and NOx	€106 per tonne/year of SO_2, €209 per tonne/year of NO_x
Environmental pollution tax from stationary sources	Lithuania	1991	Amount of pollutant emitted into the environment (air, water, and the surface and deeper layers of the earth).	As per Annexes 1 & 2 of Law on Environmental Pollution Tax

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
Environmental pollution tax from mobile pollution sources	Lithuania	1991	Fuel consumption in mobile sources. Take-off and landing cycles for air transport	Rates vary by vehicle type
Taxes on environmental exploitation (release of gas and dust to air)	Poland	2001	Gas and dust emissions	Max PLN 447.75/kg
Taxes connected with air pollution	Slovakia	2004	Amount of emission to air or consumption of organic solvents	Based on annual emissions
Tax on volatile organic compounds	Slovenia	2007	By kg of product	Annual compensation for keeping records of producers and purchases of products containing organic solvents and the unit of load of the air with emissions of volatile organic compounds
Taxes and charges on environment and pollution	Spain	1996	Measured emissions (tons)	Varies by pollutant type and quantity
Tax on fluorinated greenhouse gases	Spain	2014	Weight of fluorinated gases in kg	Coefficient 0.015 multiplied by global warming potential of gas (with a maximum limit of €100 per kilogram)
Excise duty - Sulphur tax	Sweden	1995	Amount of pollutant emitted (tons of SO_2, NO_2, fine particles)	For solid and gaseous products the rate is set at SEK 30 per kg of sulfur in the fuel. The sulfur tax on liquid fuels is SEK 27 per m3 of oil for each tenth of a per cent by weight of the sulfur content.
NOx tax	Sweden	1992	Boilers with a yearly production of at least 50 GWh, lowered to 40 GWh in 1996, and again lowered to 25 GWh in 1997	50 SEK/kg NOx (€4.5)
Tax on noise emission				
Regional tax on aircraft noise emissions	Italy	2001	Weight at take-off, departure time, location, acoustic emission classification	Max €0.50 per 1000 kg (set by regions)
Aviation noise tax	Netherlands	1990	Per unit of sound produced	€ 58.75 per noise unit and a separate levy of € 0.50 per ton of maximum take-off weight is also applied

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
Tax on noise	Portugal	2006	Factors like event type, location, noise level, time of day	Rates vary by municipality
Taxes on agricultural activities				
Intensive agriculture tax - Tax on Environmental Impacts from Farming	Belgium	2016	If a farmer has a minimum livestock of three environmental charge units (UCE), holds crops of at least half a hectare, or holds a grassland of at least 30 hectares	€10 per environmental charge unit (UCE)
Tax on manure	Belgium	<1995	The tax is calculated based on the quantity of manure produced, stored, or processed by the agricultural operation	The specific tax rates are determined by the Flemish regional government and can vary based on several factors, including the volume of manure produced and the environmental sensitivity of the area. In general, there are three tariffs: €2.48 per ton import; €0.99 per kg nitrogen and phosphorous production above the amount allowed; and 0.99 € per kg nitrogen and phosphorous not processed or exported, which applies to farmers who have not met requirements concerning the obligatory processing or export of manure.
Excise duty - Pesticides	Denmark	1995 (updated in 2013)	Calculated pesticide load of each product	The overall tax is the sum of the taxes in nr. 1-4: Pesticides 1. Health duty: Per kg/ litre of pesticide times the health affect per kg/ litre of substance: DKK 140.00 2. Environmental impact duty: Per kg/ litre of active ingredient times the environmental impact per kg/ litre of substance: DKK 140.00 3. Environmental behaviour duty: Per kg/ litre of active ingredient times the environmental behaviour affect per kg/ litre of substance: DKK 140.00 4. Basic duty: Per kg/ litre of active ingredient: DKK 20.00

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
				Chemical biocides - Products falling under point 1: 40 % of the taxable value, excluding VAT. - Products falling under point 2: 30 % of the taxable value, excluding VAT. - Products falling under points 3 to 7: 3 % of the taxable value, excluding VAT.
Excise duty - Nitrogen	Denmark	1998	Ammonia falling within 2814 in the EU Combined Nomenclature. Potassium nitrate and calcium nitrate falling within 2834 in the EU Combined Nomenclature. Ammonium chloride falling within 2827 in the EU Combined Nomenclature. Fertilisers falling within 3102 and 3105 in the EU Combined Nomenclature. Nitrogen content in organic fertilizers which is granulated, powdered or otherwise processed, and intended for sale in packs of 50 kg or less. A tax is only paid when the nitrogen content in the manure exceeds 2 per cent of the total weight.	5 DKK per kg of nitrogen. A tax is only paid when the nitrogen content in the manure exceeds 2% of the total weight.
Mineral phosphorous	Denmark	2005	The weight of mineral phosphorus in animal feed phosphates.	DKK 4 (€0.53) per kg of phosphorus
Fertiliser tax / Agrochemical Market Placement Tax	France	2014 (updated in 2020)	Determined based on the type of application submitted for the marketing authorization of the mentioned products. The rates vary depending on the nature of the application and the specific product.	The rates vary depending on the type of product and the nature of the application. For example, for a marketing authorization application for a plant protection product containing at least one active substance considered a candidate for substitution, the tax is €78,000 if France acts as the zonal or interzonal reporting member state and €46,000 if France is a concerned member state. For other plant protection products, the rates are €60,000 and

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
				€34,500, respectively. Fees for other types of applications, such as modifications or renewals of authorizations, vary accordingly.
Tax on non-point source pollution	France	2008	The tax is calculated based on the quantity of active substances classified and sold within a given year to the end-user. A ministerial order specifies the active substances categorized into different classes, considering their toxicity and environmental impact	Pesticide products based on mineral Active Substances (AS) are charged at €9.00 per kg: For substances classified due to their carcinogenicity, mutagenicity, or reproductive toxicity. €5.10 per kg: For substances classified due to acute toxicity or specific target organ toxicity. €3.00 per kg: For substances classified as acutely toxic to the aquatic environment (category 1) or chronically toxic to the aquatic environment (categories 1 or 2). €0.90 per kg: For substances classified as chronically toxic to the aquatic environment (categories 3 or 4). €5.00 per kg: For substances no longer meeting the criteria for market placement but still being sold. €2.50 per kg: For substances considered for substitution.
Manure surplus levy State	Netherlands	1995	Tonne of phosphate and nitrogen	€ 11 per kg of excessive phosphate and € 7 per kg of excessive nitrogen
Tax on pesticides	Sweden	1995	Kg of active substance of the pesticide	SEK 34 (€3) per kilogram of active substance of the pesticide.
Taxes on plastic bags and plastic packaging				
Garbage tax	Austria	2002	The taxes are based on the size of the container (litres) and the number of emptying per year.	The taxes are based on the size of the container (litres) and the number of emptying per year. For example, 52 collections of 120 litre bins amount to around €288.97 per year in Vienna and to €248.71 in Salzburg.
Packaging tax	Belgium	1993	The tax base is determined by the volume of the beverage contained within the packaging.	Reusable Packaging: €1.41 per hectolitre of product. Non-Reusable (Single-Use) Packaging: €9.86 per hectolitre of product.

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
			Specifically, it is calculated per hectolitre (100 litres) of the beverage product.	
Waste management act taxes	Bulgaria	2003	The act does not specify a direct tax base for waste management activities. Instead, it establishes obligations for waste producers and operators to ensure environmentally sound waste management practices. Locally determined	According to the Waste Management Act (Art. 151), the fines that can be levied range from BGN 3 000 (€1 500) to BGN 10 000 (€5 000), in case of, inter alia, failure to prevent the disposal of waste in unauthorized places, the creation of illegal landfills or lack of cleaning up, as well as lack of measures to implement separate collection. The Bulgarian packaging tax (product tax) is rather a form of sanction for those entities that do not fulfil their EPR obligations. The Waste management act and the Ordinance for determining the order and amount for payment of product taxes define a product tax in BGN/kg for the different packaging materials. The amount is calculated on the basis of the total expenses related to collection and treatment of different materials.
Waste packaging management tax and deposit tax	Croatia	2006	Packaging and packaging waste, single-use plastic products and fishing gear containing plastic that are placed on the market.	The waste packaging management tax is calculated as a waste management fee per kilogram or tonne of packaging, with unit rates differentiated by packaging material (e.g. plastic, glass, paper/cardboard, metal, multilayer, wood, textiles) and adjusted by ecomodulation and reporting coefficients. For example, indicative unit fees include €54.42/t for PET and aluminium packaging, €49.77/t for paper/cardboard, €29.86/t for steel cans, and €99.54/t for certain multilayer or polymer packaging, applied to the mass of packaging placed on the market. Packaging covered by the deposit-refund system is subject to a deposit (return fee) of €0.10 per unit of primary beverage packaging, refundable to the final consumer upon return.

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
Plastic Bag tax	Cyprus	2018	per bag	min €0.05/bag + 19% VAT (sellers can charge more if they decide)
Tax on registration and recording of packaging	Czech Republic	2002	Packaging or packaged goods. Registration fee and record fee.	The registration fee is paid only once during registration: 800 CZK (€33.3) or 2000 CZK (€83.3). The record fee is paid every year by 15 February for the past year in the amount of CZK 800 (€33.3).
Tax on certain packaging, disposable tableware, and PVC film wrapping and certain bags of paper or plastic etc.	Denmark	1977 (packaging for most beverages), 1999 (weight-based tax is levied on plastic foil foodstuff-packaging manufactured from soft PVC) 1994 (weight-based tax on paper and plastic carrier bags has been in effect) 1988 (value tax on disposable tableware)	The tax is payable on: A. Packaging and multi-packaging with a cubic content of not more than 20 litres for: Volume-based tax 1. Spirits, wine and fruit wine; 2. Beer, mineral water, lemonade and similar beverages containing carbonic acid, falling under customs tariff items 22.01 and 22.02, blends of non-alcoholic drinks with spirits with an alcohol content of no more than 10% vol.; Note: Most of the items under A.2 are part of the return and refund scheme. For these items under the return and refund scheme the tax is abolished from July 1st 2019. B. Plastic or paper bags with a cubic content of not less than five litres. C. Disposable tableware. D. Film wrapping product of soft polyvinyl chloride (PVC) used for wrapping foodstuff	Depending on capacity, containers or laminates of various materials are taxed from DKK 0.09 (€0.01) per item (containers with a capacity of less than 10cl) to DKK 1.10 (€0.15) per item (containers with a capacity of above 160 cl). The tax on other materials ranges from DKK 0.14 (€0.02) per item (<10cl) to DKK 1.78 (€0.24) (>160cl) Containers for A2 containers for goods (beer, mineral water, lemonade and similar beverages containing carbonic acid) are taxed from DKK 0.06 (€0.008) per item (<10cl) t0 DKK 0.71 (€0.09) per item (>160cl) The tax on bags mentioned under point B amounts to: per kg bags of paper DKK 33.39 (€4.5) bags of plastic DKK 73.46 (€9.9) The tax on disposable tableware mentioned point C amounts to: per kg: DKK 64,11 (€8.6) The tax on film wrapping mentioned point D amounts to: per kg: DKK 43,71 (€5.9) The revenue listed below is the sum of revenues of taxes in the detailed list named Duty on certain retail

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
				containers, Duty on disposable tableware, Duty on carrier bags made of paper or plastic, etc. and duty on PVC film.
Packaging excise tax	Estonia	2017	The excise duty is calculated based on the weight of the packaging material placed on the market.	In order to obtain an exemption from excise duty, the recovery rates of packaging must be complied with during the period of taxation and taxable period is, in general, one quarter. The excise duty rates for packaging in Estonia are as follows: glass packaging is subject to a rate of €0.6 per kilogram, plastic and metal packaging each carry a rate of €2.5 per kilogram, while paper and paperboard, including composite paperboard, are taxed at a rate of €1.2 per kilogram. Wood packaging also has a rate of €1.2 per kilogram.
Beverage packaging tax	Finland	2011	litre of packaged product	€0.51 per litre of packaged product
Single-use plastic tax	Germany	2024	weight (kg)	Depends on the product: the rate is 0,177 €/kg for food containers and 0,876 €/kg for bags and foil packaging with food contents
Tax on Plastic bags	Germany	2016	per bag, depends on the thickness and size of the bag	ranges from 5 cents to €1
Landfill tax	Greece	2012, but implemented in 2014. However, the fee was never paid in practice and was replaced in 2019.	tonne (weight)	Starting at €20 per tonne in 2022, the tax is supposed to increase to €55 in 2027.
Tax on plastic bags	Greece	2018	per bag	0.09 €/ bag
Recycling tax	Greece	2022	per bottle	0.08 €/bottle
Tax on plastic products	Greece	2022	per product	0.04 €/ product

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
Product charge on batteries, tyres, packaging materials, refrigeration and cooling equipment, electronics, advertising paper, other plastic products, other chemical product, office paper	Hungary	2011	weight (kg)	Depends on the material and the specific products. For lubricants, it is 114Ft/kg (0.30€/kg), for plastic flower/leaf/fruit (its parts and products made out of them) it is 1900 Ft/kg (4.98€/kg), for plastic bags (except biodegradable) it is 1900 Ft/kg (4.98€/kg), for biodegradable plastic bags it is 500 Ft/kg (1.31€/kg). For other chemical products like soaps, detergents, and organic surfactants it is 11 Ft/kg, for beauty and body care products it is 57 Ft/kg (0.15€/kg)
Plastic Bag tax	Ireland	2002	Each plastic bag supplied	€0.22 per shopping bag
Packaging tax	Netherlands	2008	Amount per kilogram	The rate (€/kg) depends on the type of packaging.
Tax on plastic bags	Poland	2019	Plastic bags purchased to carry shopping	The recycling fee rate is 0.2 PLN/unit, regardless of thickness.
Product tax	Poland	2013	Packaging of all types and tyres, oil and lubricant preparations, batteries and accumulators	The product fee is calculated by multiplying the difference between the achieved recycling rate (if it is below the minimum target) and the target rate by the fee rate for each packaging material. In 2024, the product fee rate for plastic packaging was 2.70PLN/kg with a minimum recovery rate of 45% and, for single use plastics, 0.20PLN/kg.
Excise duties on lightweight plastic bags	Portugal	2015	The contribution applies to lightweight plastic bags with a thickness of 50 micrometres (¬µm) or less, commonly used for carrying goods at points of sale.	The contribution is set at €0.08 per lightweight plastic bag, plus the applicable Value Added Tax (VAT) at the prevailing rate. For example, with a VAT rate of 23%, the total cost to the consumer would be €0.0984 per bag
Excise duties on single-use packages	Portugal	2022	The contribution applies to single-use packaging placed on the market in Portugal. This includes packaging used for products such as beverages, food, and other consumer goods.	The levy is set at € 0.10 per package in Portugal mainland and can be passed along the economic chain. The final charge levy to the final consumer cannot be less than € 0.20 per package. As for the plastic bags, it is foreseen a levy of € 0.08 for plastic bags.

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
Tax on imported non-reusable beverage packaging	Portugal	2022	The tax applies to single-use packaging produced, imported, or acquired in mainland Portugal.	As of July 1, 2022, a rate of €0.30 per plastic or mixed plastic packaging is applied. The rate for aluminium or mixed aluminium packaging was initially set for January 1, 2023, but postponed to September 1, 2023.
Fee on non-reusable beverage packaging	Portugal	2022	The tax applies to single-use packaging produced, imported, or acquired in mainland Portugal.	As of July 1, 2022, a rate of €0.30 per plastic or mixed plastic packaging is applied. The rate for aluminium or mixed aluminium packaging was initially set for January 1, 2023, but postponed to September 1, 2023.
Tax on waste pollution	Slovenia	2004	Depends on the type of waste (landfill, waste water, etc.)	a) Landfill: €0.0022 per one unit of soil load, €0.0125 per one unit of air pollution; b) Waste water: €26.4125 per unit of waste water load; c) Waste electronic and electrical equipment: yearly reimbursement - €33.38 rate per unit of environmental load - €0.0083; d) Waste pneumatic tyres: yearly reimbursement - €33.38 rate per unit of environmental load - €0.0054; e) Packaging waste: yearly reimbursement - €33.38 rate per unit of environmental load - €0.0017.
Excise tax on non-reusable plastic containers; 'Excise tax on non-reusable plastic containers (import)	Spain	2023	The tax base is the amount of non-reusable plastic used in the packaging, measured in kilograms	The applicable tax rate is ,€0.45 per kilogram of non-reusable plastic used in the packaging.

Source: Own elaboration

Table A2-2: General characteristics of resource taxes in the EU

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
Taxes on mining				
Mining tax	Cyprus	2012	Value, m^3	Depends on the material extracted from 1-5% of the value, calculated from the m^3 extracted
Mining charge	Estonia	2009	Management of land, soil and forest resources	The mining charges for various materials are as follows: Cement clay is charged at 2.90 EEK per cubic meter (0.19 €), Cement limestone at 8.80 EEK per cubic meter (0.56 €), Construction gravel at 8.90 EEK per cubic meter (0.57 €), and Construction limestone and dolomite range from 3.6 to 5.8 EEK per cubic meter (0.23-0.37 €). Construction sand is charged at 5.80 EEK per cubic meter (0.37 €), Decorative dolomite at 11.60 EEK per cubic meter (0.74 €), High-decomposing peat at 2.70 EEK per cubic meter (0.17 €), Industrial dolomite at 21.50 EEK per cubic meter (1.37 €), Industrial sand at 6.90 EEK per cubic meter (0.44 €), Low-decomposing peat at 4.30 EEK per cubic meter (0.27 €), and Oil shale at 4.90 EEK per tonne (0.31 €).
Mining taxes	France	2017	The tax base includes the value of extracted minerals, the area of land occupied by mining operations, and the environmental impact of the activities. For example, royalties are calculated based on the quantity of extracted product, and property taxes are assessed on the land used for mining.	Tax rates vary depending on the type of tax and the specific mineral extracted. For instance, royalties are set per tonne of extracted product, and property taxes are determined by the value of the land occupied. Additionally, a general tax on pollutant activities is levied on the delivery of extraction materials to the domestic market
Mining/resources tax	Hungary	1993	weight (kg)	It is determined by a specific formula: Quantity extracted*specific material cost*mining royalty rate=mining tax value. The royalty is based on the value and volume of the extracted materials, and the rate depends on the type of material. Some of the rates are: 0% for coal, 2% for geothermal energy, 5% for non-metallic mineral raw materials which are not energy sources. The rate for natural gas and petroleum is dependent on the market-

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
				price of the product: the higher the market price, the higher the royalty rate.
Annual tax for mining activity	Romania	2003	The tax is calculated based on the area covered by the mining activity, measured in square kilometres (km²).	The tax rates are updated periodically to reflect inflation and other economic factors. As of 2024, the rates are: Prospecting Activity: 528 lei (€106.1) per km² (increase from 478 lei per km² in 2023). Exploration Activity: 2,122 lei (€426.3) per km² (increase from 1,922 lei per km² in 2023). Exploitation Activity: 53,041 lei (€10,656.8) per km² (increase from 48,044 lei per km² in 2023).
Landscape protection and nature conservation levy	Austria	2019	Tonne	Depends on the mineral extracted - in Vorarlberg, for example, it is set at €0.21 per tonne of stone, and €0.41 per tonne of sand, gravel and bulk material
Municipal taxes on extraction of quarry materials - Local Taxes and Fees Act	Bulgaria	<1995	The tax is typically calculated based on the volume of materials extracted, the area of extraction, or other criteria established by the local municipality.	The rates can vary significantly between municipalities, as each local authority has the discretion to set its own rates within the framework provided by the national legislation
Taxes on water abstraction / water use				
Water act charges	Bulgaria	1999	The tax base includes the volume of water abstracted, the area of water bodies used, and the level of pollution discharged into water bodies. Specific charges apply to various activities, such as irrigation, industrial use, and wastewater discharge.	The rates are determined by the Council of Ministers and vary based on the type of water use and the environmental impact. For example, charges for water abstraction are set per cubic meter of water used, with rates differing for various sectors
Water usage charge	Estonia	1991	The charge applies to the use of water for various purposes, such as industrial use, drinking water supply, and other consumptive uses	The rates for water usage can vary depending on the type of use. Industrial use might have a different rate compared to municipal water supply or agricultural irrigation. For example, companies, the fee ranges from 5 to 18.64 EEK (€0.32-€1.19) per cubic meter. For households, the charge is between 4 and 10.59 EEK (€0.25-€0.68)per cubic meter (rates in 2009)

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
Charge on water abstraction	France	2005	The tax base is determined by the volume of water extracted during the year, measured in cubic meters (m³). This volume must be recorded using an appropriate measuring device.	Rates vary depending on the use of the extracted water and the classification of the extraction area. For irrigation, the 2025 rates for surface water are as follows: Irrigation in Category 2, ZRE zone: €0.035 per m³. Irrigation in Category 1, Base zone: €0.019 per m³. For gravity-fed irrigation, rates are lower: Category 2, ZRE zone: €0.002 per m³. Category 1, Base zone: €0.0014 per m³. Drinking water supply: €0.05 per m³ Agricultural irrigation: €0.005 per m³ Other economic activities: €0.025 per m³ These rates may be adjusted by the water agencies depending on local specifics and financing needs.
Taxes on forest felling				
Contributions for forest	Croatia	1990	Forest exploitation products	Pay a contribution to local-self-government units in relation to the sale price of the product. As a rule, the forest contribution is paid in the amount of 5% (in relation to the sale price of the product), except in local self-government units with the status of assisted areas determined by a special regulation and in local self-government units in hilly and mountainous areas where it is paid in the amount of 10%.
Forestry fund tax	Hungary	1996	m3 (of the gross volume of timber harvested)	Based on a specific formula, depending on which region it is situated, what kind of trees are found there
Taxes on tree felling	Poland	1992	Trees and shrubs being removed	Depends on size of trees (trunk circumference)
Forest felling charge	Romania	2008	The tax base depends on the specific activity and the applicable legislation. For example, in forest exploitation, the tax base may be based on the	Specific tax rates for forest exploitation are determined by the Romanian Fiscal Code and are subject to change. For example, the tax on income from the exploitation of natural

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
			volume of timber extracted or the commercial value of timber sold.	resources, including timber, is calculated based on the value of the extracted resources.
Vienna Tree Protection Act	Austria	1995	Trees with a circumference of at least 40 centimetres, measured at a height of 1 meter (certain trees are exempt)	Standard rate per tree: €5000
Mandatory deductions from income for sold raw timber and uncut forest	Lithuania	1995	Mandatory deductions must be calculated from the income received by the forest manager during the tax period from the sale of raw timber harvested in the forest under his management and from the sale of unfelled forest under his management.	In order to meet general forest needs and other needs of the state budget or municipal budgets, mandatory deductions of 15 percent shall be established for state forest managers in accordance with the procedure established by the Government, and 5 percent deductions shall be established for private forest managers from the income from sold raw timber and uncut forest.
Taxes on agricultural land				
Levy on withdrawal of land from agriculture	Czech Republic	1966	Land that is being permanently removed from agricultural use.	Complex formula: The amounts of levies are calculated according to the Annex to the Act on the Protection of the Agricultural Land Fund. They are based on the basic price of land according to BPEJ (evaluated soil ecological unit), which is set in the valuation decree and increases in the event of a negative impact on environmental factors (e.g. protective zones of water resources, specially protected areas) and the basic rate determined in this way is multiplied by the coefficient of the protection class. In limited cases, the ecological weight of the impact shall not be used.
Taxes on hunting and fishing				
Hunting and fishing duties (D59F)	Austria	1995	Per Year	Depends on the municipality, in Karnten the fishing license is €73.20 for the first issue. Hunting licenses are more expensive, varying from €3400 to 55000 €/year
Hunting and fishing licenses (D59D)	Bulgaria	2003	The fees for hunting and fishing licenses are determined by the type of activity, the duration of the license, and the specific regulations set by the relevant authorities	The cost of a fishing license varies based on its duration and the type of fishing permitted. For example, an annual fishing permit costs approximately 25 Bulgarian leva (about €13). Hunting license fees are determined by the

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
				Executive Forest Agency EFA and may vary depending on the type of game and hunting area
Hunting license (D59D)	France	2000	The tax base is determined by the type of hunting license and its duration. The amount of fees varies depending on whether the license is national or departmental, as well as whether it is annual or temporary.	The following rates apply (2024/2025): National annual fee: €49.07 National temporary fee (9 days): €34.18 National temporary fee (3 days): €24.26 Departmental annual fee: €19.00 Departmental temporary fee (9 days): €12.00 Departmental temporary fee (3 days): €7.50
Hunting and fishing charges (D59D)	Germany		The hunting and fishing tax is a local tax in Germany, assessed annually. It is based on the value of hunting privileges or, if leased, on the rental price paid by the lessee. The fishing tax is levied on the number of fishing districts. The legal framework is set by state (Länder) laws and local authority by-laws. Typically, districts and independent towns collect and retain the revenue. The taxpayer is generally the person holding the hunting rights.	Tax rates are set regionally and thus vary considerably across the country. For instance, in 2022, Baden-Württemberg increased the annual hunting levy from €38.65 to €50 for residents and €25 for daily licenses for non-residents.
Hunting and fishing licenses (D59DB)	Portugal	1986	Hunting Licenses: The tax base for hunting licenses is determined by the type of license issued. Portugal offers various hunting licenses, including general, regional, and municipal licenses, each authorizing hunting activities in different geographical scopes. The specific tax base is defined by the scope and privileges associated with each license type. Fishing Licenses: The tax base for fishing licenses is similarly determined by the type of license and the scope of fishing activities permitted.	Hunting Licenses: The tax rates for hunting licenses vary depending on the type of license. For instance, the general hunting license, which permits hunting across the entire mainland and adjacent islands, has a different rate compared to regional or municipal licenses. Specific rates are established by the relevant authorities and may be subject to change. Fishing Licenses: The tax rates for fishing licenses are determined by the type and duration of the license. Specific rates can be obtained from the relevant authorities.
Hunting and fishing taxes (D59D)	Spain	1987	The fee paid for the issuance of the hunting or fishing license. The number of hunting days or the area of	Varies by region and specific tax.

Tax Name	Country	Entry into Force	Tax Base	Tax Rate
			land used for hunting; The total amount charged for the service	

Source: Own elaboration

Table A2-3: Mapping of pollution taxes per Member States

	Other pollution taxes	Taxes on agricultural activities	Taxes on noise emission	Taxes on NOx, SOx and other pollutant emissions	Taxes on plastic bags and packaging	Taxes on polluting products	Taxes on waste disposal	Taxes on waste water
Austria							1	
Belgium	1	2			1		2	
Bulgaria				1			1	
Croatia	1			1			7	
Croatia				1				
Cyprus					1		2	1
Czech Republic				1	1	1	3	2
Denmark		3		4	1	5	1	1
Estonia				1	1			
Finland					1		1	
France	2	1				1	2	2
Germany					2		4	1
Greece					2		3	
Hungary				1		2	3	2

	Other pollution taxes	Taxes on agricultural activities	Taxes on noise emission	Taxes on NOx, SOx and other pollutant emissions	Taxes on plastic bags and packaging	Taxes on polluting products	Taxes on waste disposal	Taxes on waste water
Ireland					1		1	
Italy	1		1	1			2	
Latvia							1	
Lithuania				2	1	1	1	
Luxembourg								1
Malta	1				1	8		
Netherlands	2	1	1		1		1	4
Poland				1	1	2	2	2
Portugal			1		4		1	1
Romania							1	
Slovakia				1			1	1
Slovenia				1			4	1
Spain	2			2	1		2	
Sweden		1		2		3	1	
Grand Total	**10**	**8**	**3**	**20**	**20**	**23**	**48**	**19**

Source: Own elaboration

Table A2-4: Mapping of resource taxes per Member States

	Other resource taxes	Taxes on hunting and fishing	Taxes on land use	Taxes on mining	Taxes on tree felling	Taxes on water abstraction / water use
Austria		1			1	
Belgium						3
Bulgaria	1	2				1
Croatia	2				1	3
Croatia						
Cyprus	2			2		2
Czech Republic	2		4	2		1
Denmark				2		1
Estonia		1		1		1
Finland		1				
France	2	2	1	1		4
Germany		1		1		4
Greece		1				2
Hungary	1	2	1	1	1	2
Ireland		1				
Italy						
Latvia						
Lithuania	1	1		1	1	1
Luxembourg						

	Other resource taxes	Taxes on hunting and fishing	Taxes on land use	Taxes on mining	Taxes on tree felling	Taxes on water abstraction / water use
Malta		1				
Netherlands						1
Poland			1	1	1	2
Portugal						2
Romania				2	1	
Slovakia				1		1
Slovenia						1
Spain	1	3		2		1
Sweden				1		
Grand Total	**12**	**17**	**7**	**18**	**6**	**33**

Annex 3 - Estimating reductions in emissions using a tax elasticity

A Tax on a homogenous pollutant or commodity

In all cases except pesticides, we assume a homogenous product being taxed (emissions or quantities of a commodity). The following applied to calculate the emissions reductions in such cases will depend on the form the relationship between emissions and tax rates takes. We consider two forms.

A. Linear

This is taken for the case where the base case has a zero tax. The initial emissions are E_0 and the function is given by:

$$E = E_0 - \alpha T. \alpha < 0$$

Where α<0 and T is the tax rate. At the new tax rate T_2 the elasticity of E with respect to T (μ) is given by:

$$\mu = \alpha \frac{T_2}{E_2}$$

Hence at the point E_2, T_2 where the equation for E gives

$$E_2 = E_0 + \mu E_2$$

Or

$$E_2 = \frac{E_0}{(1 - \mu)}$$

If the tax and emissions point at which the elasticity is estimated is an average tax rate $\bar{T}$ then the expression for the elasticity μ is

$$\mu = \alpha \frac{\bar{T}}{\bar{E}}$$

And the emissions at tax rate T_2 which apply for a given Member State are given by

$$E_2 = E_0 + \alpha T_2 = E_0 + \mu \frac{\bar{E}}{\bar{T}} T_2$$

Since $\bar{E} = \frac{E_0}{(1-\mu)}$ the expression for E_2 becomes

$$E_2 = \left[1 + \frac{\mu}{(1-\mu)}\frac{T_2}{\bar{T}}\right]$$

This formula has been used when new tax rates differ across Member states.

In applying the formula to Scenario B, where the tax rate (T_B) is lower, the new quantity E_B is given by

$$E_B = E_0 + \alpha T_B = E_0 + \frac{E_2 - E_0}{T_2} T_B$$

B. Log Linear

Where there is a significant tax already in place (T_1) a log linear relationship is taken as a linear one gives very large changes in emissions. The form is

$$E = AT^{\mu}$$

At the original tax point E_1, T_1 this equation for E gives

$$E_1 = AT_1^{\mu}$$

Hence

$$A = \frac{E_1}{T_1^{\mu}}$$

And for the new tax rate T_2 the emissions are given by

$$E_2 = \frac{E_1}{T_1^{\mu}} T_2^{\mu} = E_1 (\frac{T_2}{T_1})^{\mu}$$

The year 5 is chosen for the full effect of the tax to allow for time to adjust emissions. For years 1-4 the size of the effect will be respectively 20%, 40%, 60% and 80% of that given by equation (2).

For very low initial tax rates even the log linear version gives large and unreasonable emissions reductions. In such cases we have assumed the initial tax to be zero.

Taxes on a commodity that has different categories

In the case of pesticides, we have three categories with different levels of toxicity and different tax rates applied. Class 1 is the least toxic and has the lowest tax, class 2 is more toxic and has a higher tax and class 3 is the most toxic and has the highest tax. There are two effects to account for: the direct price effect and the cross-price effect. The own price effect gives the reduction for pesticide (i) as:

$$\Delta Q_i = \gamma Q_0 \frac{\Delta P}{P_0} .$$

Where
γ is the own price elasticity, Q_0 is the initial quantity and $\frac{\Delta P}{P_0}$ is the percent change in price doe to the

For the cross-price effect we assume that some users previously using class 3 will shift to class 2 and some using class 2 will move to class 1. This move from class 2 to class 1 is:

$$\Delta Q_{21} = \mu Q_2 (T_2 - T_1)$$

Where μ is the cross-price elasticity and T_2 and T_1 are the tax rates for classes " and 1 respectively in percent terms of the prices. Similarly, the move from class 3 to class 2 is:

$$\Delta Q_{32} = \mu Q_3 (T_3 - T_2)$$

The own and cross price effects are added up to calculate to total effect.

Annex 4 - Survey on environmental taxes: implementation, impact, and potential

Survey questionnaire

Environmental taxation is one of the key tools in addressing climate change, fostering sustainable growth, and staying the course with the European Green Deal. The **European Semester** is the European Union's annual framework to coordinate economic, fiscal, employment and social policy within the European Union. In alignment with the European Semester’s goals, environmental taxes could contribute significantly to achieving competitiveness, sustainability and social fairness. These taxes, guided by the "polluter pays" principle enshrined in Article 191(2) of the Treaty on the Functioning of the European Union, aim to encourage sustainable behaviour, shift the tax burden from labour to pollution, and as such accelerate the green transition.

This survey is part of an assessment commissioned by the European Commission to a consortium formed by RPA Europe, CEPS, Logika, and Metroeconomica to deepen understanding and enhance the implementation of environmental taxes across the Member States. The project seeks to:

1. **Identify the most effective non-energy, non-transport environmental taxes**: Build on existing research to map tax types with the greatest potential to mitigate environmental harm while promoting economic and social fairness.

2. **Evaluate implementation across Member States**: Assess the current adoption and success factors of environmental taxes, including the socio-political conditions that facilitate their introduction.

3. **Analyse potential impacts**: Estimate the environmental, social, and economic benefits of new environmental tax policies while considering feasibility and competitiveness implications.

This survey specifically aims to gather insights and data from stakeholders, including policymakers, businesses, academics, and civil society, to complement existing knowledge. Your responses will play a crucial role in:

- Mapping the landscape of environmental taxation in all Member States.
- Identifying barriers and opportunities for implementing new taxes or refining existing ones.
- Evaluating the socio-economic impacts and best practices for effective environmental tax policies.

Your responses will contribute to a broader understanding of how non-energy, non-transport environmental taxes can reduce negative externalities, influence behaviour, generate revenue, and affect competitiveness.

Survey overview

The survey contains 18 questions and is divided into thematic sections. It should take approximately 30 minutes to complete.

If you have any questions about this survey, please contact us at info@rpa-europe.eu

N.B. You do not need to answer all the questions at the same time, as you can save your progress and complete the survey later. To return to the survey, you must provide a valid email address via the toolbar. A continuation link is sent to the provided email. When you use the Save and Continue feature, all survey progress up to that point is saved (including on the active page). Please note it is very important you click the Save and Continue button at the end of the survey to ensure your answers have been recorded!

We will keep your answers **anonymous and confidential**. In presenting and summarising the findings of our consultation activities, we will aggregate and anonymise individual answers, so it will not be possible to identify an individual expert or link their answers with any personal information. Survey responses will be stored safely on password-protected SharePoint sites and available only to our researchers involved in the interview data analysis. We will keep survey responses for a maximum of five years from the completion of the assessment. The Privacy Statement outlines detailed measures for data processing and safety.

Thank you for sharing your knowledge and expertise with us!

Note: For the purpose of this survey, we use the OECD definition of environmental tax: any compulsory, unrequited payment to the government levied on tax bases deemed to be of environmental relevance, i.e., taxes that have a tax base with a proven, specific negative impact on the environment. Taxes are unrequited in the sense that benefits provided by the government to taxpayers are not in proportion to, or in return for their payments. Charges or fees are defined as compulsory requited payments to the government that are levied more-or-less in proportion to the services provided. The main difference between taxes and fees or charges is the type of beneficiary: fees are paid for government services directed at a specific beneficiary, while taxes are used to raise revenue to fund government expenditure. Please note however that other organisations or in your country/region, the terms “tax”, “levy”, “fee” and “charge” may be used interchangeably.

Section 1: General Information

1. **About you.** Your personal data will not be published.

Name*: [Open text box]

Email address*: [Open text box]

Name of your institution and department*: [Open text box]

Country*: [Drop-down list of EU Member States]

Region: if relevant

***mandatory fields**

Section 2: Environmental taxes and externalities

2. **Are you aware of any inventory of (non-energy non-transport environmental) taxes implemented at national and/or regional levels in your country?** If yes, please provide a link or any useful information in the textbox below. You can upload documents at the end of the survey.

[Open text box]

3. **Which non-energy non-transport environmental taxes are currently implemented in your country?** (Select all that apply).

	Yes, it is implemented	No, it is not implemented	Don’t know
NOx Tax (Air Pollution Tax)			
Landfill Tax (Waste Disposal Tax)			
Incineration Tax (for waste)			
Taxes on primary raw materials			
Pay-as-You-Throw Tax (for waste)			
Pesticide Tax			
Fertiliser Tax			
Wastewater Pollution Tax			
Intensive Agriculture Tax			

	Yes, it is implemented	No, it is not implemented	Don't know
Forest Felling Tax			
Other (please specify):			

4. How effective are these environmental taxes in reducing externalities and changing behaviours? In theory, environmental taxation should attempt to improve the market efficiency of the environmental goods and services by imposing a price on such goods and services equal to the marginal costs of their use (marginal environmental damage costs). However, good estimates of the marginal environmental damage may not be available. Therefore, '**environmental effectiveness**' can be assessed by measuring the effect of the tax on environmental pollution or the use of scarce resources (**environmental effect**) — i.e., how much have the external costs been reduced — and by comparing the tax rate with marginal pollution abatement costs or, as a proxy, average abatement costs of measures taken by the tax payers (**incentive effect**) — i.e. how much the levels of activity that generate the externalities have been modified. (Rate each tax on a scale of 0–5, with 0 "Not effective" and 5 "Very effective"). Please provide some explanation and, if possible, references to studies / evidence).

	1 Not effective	2	3	4	5 Very effective	Evidence / references to studies
NOx Tax (Air Pollution Tax)						
Landfill Tax (Waste Disposal Tax)						
Incineration Tax (for waste)						
Taxes on primary raw materials						
Pay-as-You-Throw Tax (for waste)						
Pesticide Tax						
Fertiliser Tax						
Wastewater Pollution Tax						
Intensive Agriculture Tax						
Forest Felling Tax						

	1 Not effective	2	3	4	5 Very effective	Evidence / references to studies
Other (please specify):						

Section 3: Revenue, pricing behaviour and competitiveness

5. Please rate on a scale of 1 to 5 the revenue generation potential of the environmental taxes listed below in the short term, where 1 "very low revenue generation potential" and 5 "very high revenue generation potential". Please provide some explanation and, if possible, references to studies / evidence).

	1 very low revenue generation potential	2	3	4	5 very high revenue generation potential	Evidence / references to studies
NOx Tax (Air Pollution Tax)						
Landfill Tax (Waste Disposal Tax)						
Incineration Tax (for waste)						
Taxes on primary raw materials						
Pay-as-You-Throw Tax (for waste)						
Pesticide Tax						
Fertiliser Tax						
Wastewater Pollution Tax						
Intensive Agriculture Tax						
Forest Felling Tax						
Other (please specify):						

6. Please rate on a scale of 1 to 5 the revenue generation potential of the environmental taxes listed below in the long term, where 1 "very low revenue generation potential" and 5 "very high revenue generation potential". Please provide some explanation and, if possible, references to studies / evidence).

	1 very low revenue generation potential	2	3	4	5 very high revenue generation potential	Evidence / references to studies
NOx Tax (Air Pollution Tax)						
Landfill Tax (Waste Disposal Tax)						
Incineration Tax (for waste)						
Taxes on primary raw materials						
Pay-as-You-Throw Tax (for waste)						
Pesticide Tax						
Fertiliser Tax						
Wastewater Pollution Tax						
Intensive Agriculture Tax						
Forest Felling Tax						
Other (please specify):						

7. **What proportion of the tax is typically passed on to consumers through pricing behaviour?** (For each tax, indicate approximate percentage).

	0-25%	26-50%	51-75%	76-100%	Don't know
NOx Tax (Air Pollution Tax)					
Landfill Tax (Waste Disposal Tax)					
Incineration Tax (for waste)					
Taxes on primary raw materials					
Pay-as-You-Throw Tax (for waste)					
Pesticide Tax					
Fertiliser Tax					

	0-25%	26-50%	51-75%	76-100%	Don’t know
Wastewater Pollution Tax					
Intensive Agriculture Tax					
Forest Felling Tax					
Other (please specify):					

8. **What is the estimated price elasticity of demand for the taxed goods or services?** The price elasticity of demand is the marginal change in quantity demanded to a change in price for a good or service. It is determined by a number of factors, such as availability of substitutes, necessity, duration of the price change, and brand loyalty. The more the demand elasticity is low, and supply elasticity is high, the more the tax is shifted to consumer prices. If, on the other hand, the demand is elastic and the supply inelastic, the production side, or the factors of production, would bear the burden of the tax.

	Very inelastic (<-0.5) The quantity demanded varies slightly	Mildly inelastic (>-0.5 <-1) The quantity demanded varies moderately	Elastic (^{3}-1) The quantity demanded varies significantly	Don’t know
NOx Tax (Air Pollution Tax)				
Landfill Tax (Waste Disposal Tax)				
Incineration Tax (for waste)				
Taxes on primary raw materials				
Pay-as-You-Throw Tax (for waste)				
Pesticide Tax				
Fertiliser Tax				
Wastewater Pollution Tax				
Intensive Agriculture Tax				
Forest Felling Tax				
Other (please specify):				

9. **What is the estimated price elasticity of supply for the taxed goods or services?** The price elasticity of supply is the marginal change in quantity supplied to a change in price for a good or service. It is determined by a number of factors, such as stock, number of producers, ease of switching and availability of substitutes, ease of storage, and spare capacity. If price elasticity of supply > 1 then % change in quantity supplied > % change in price.

	Very inelastic (<0.5) The quantity supplied varies slightly	Mildly inelastic >0.5 <1 The quantity supplied varies moderately	Elastic (³1) The quantity supplied varies significantly	Don't know
NOx Tax (Air Pollution Tax)				
Landfill Tax (Waste Disposal Tax)				
Incineration Tax (for waste)				
Taxes on primary raw materials				
Pay-as-You-Throw Tax (for waste)				
Pesticide Tax				
Fertiliser Tax				
Wastewater Pollution Tax				
Intensive Agriculture Tax				
Forest Felling Tax				
Other (please specify):				

10. **Are there any positive or negative impacts to the competitiveness of the economic sectors of the taxpayers?** Sectoral competitiveness in the context of environmental taxes refers to the ability of specific economic sectors or industries to maintain or enhance their productivity, market share, and profitability while complying with environmental tax policies aimed at reducing environmental harm. It examines how environmental taxes impact particular sectors' performance and their ability to adapt and thrive within domestic and global markets.

	Text box
NOx Tax (Air Pollution Tax)	
Landfill Tax (Waste Disposal Tax)	
Incineration Tax (for waste)	
Taxes on primary raw materials	
Pay-as-You-Throw Tax (for waste)	
Pesticide Tax	
Fertiliser Tax	
Wastewater Pollution Tax	
Intensive Agriculture Tax	
Forest Felling Tax	
Other (please specify):	

Section 4: Indirect effects and revenue use

11. **What indirect effects have been observed from implementing these taxes (e.g., impact on other EU markets (or potentially non-EU markets if relevant), income distribution)?**

	Text box
NOx Tax (Air Pollution Tax)	
Landfill Tax (Waste Disposal Tax)	
Incineration Tax (for waste)	
Taxes on primary raw materials	
Pay-as-You-Throw Tax (for waste)	
Pesticide Tax	
Fertiliser Tax	
Wastewater Pollution Tax	
Intensive Agriculture Tax	

	Text box
Forest Felling Tax	
Other (please specify):	

12. **How are revenues from the identified environmental taxes used in your country?** (Select all that apply).

	They are legally or politically earmarked to deal with the problem the tax is intended for	Consolidating public finances	Reducing other taxes (e.g., labour or capital taxes)	Direct transfers to households	Investments in green skills	Investments in clean technologies	Other (please specify):	Don't know
NOx Tax (Air Pollution Tax)								
Landfill Tax (Waste Disposal Tax)								
Incineration Tax (for waste)								
Taxes on primary raw materials								
Pay-as-You-Throw Tax (for waste)								
Pesticide Tax								

	They are legally or politically earmarked to deal with the problem the tax is intended for	Consolidating public finances	Reducing other taxes (e.g., labour or capital taxes)	Direct transfers to households	Investments in green skills	Investments in clean technologies	Other (please specify):	Don't know
Fertiliser Tax								
Wastewater Pollution Tax								
Intensive Agriculture Tax								
Forest Felling Tax								
Other (please specify):								

Section 5: Costs and benefits

13. **What are the main administrative costs (for tax authorities and for taxpayers) associated with the implementation of these taxes?**

	Text box
NOx Tax (Air Pollution Tax)	
Landfill Tax (Waste Disposal Tax)	
Incineration Tax (for waste)	
Taxes on primary raw materials	
Pay-as-You-Throw Tax (for waste)	

	Text box
Pesticide Tax	
Fertiliser Tax	
Wastewater Pollution Tax	
Intensive Agriculture Tax	
Forest Felling Tax	
Other (please specify):	

14. **How would you assess the cost-benefit ratio of these environmental taxes?** For the assessment, please consider the social costs — e.g. regressive impacts on low-income households, reduced competitiveness — and the social benefits — value of reduced environmental damages and any social gains. For each tax, rate on a scale of 1–5, with 1 “Costs significantly exceed benefits” and 5 “Benefits significantly exceed costs”

	1 Costs significantly exceed benefits	2	3	4	5 Benefits significantly exceed costs	Not applicable	Don’t know
NOx Tax (Air Pollution Tax)							
Landfill Tax (Waste Disposal Tax)							
Incineration Tax (for waste)							
Taxes on primary raw materials							
Pay-as-You-Throw Tax (for waste)							
Pesticide Tax							
Fertiliser Tax							
Wastewater Pollution Tax							
Intensive Agriculture Tax							
Forest Felling Tax							
Other (please specify):							

Section 6: Challenges and Limitations

15. **What are the main factors limiting the effective application of the identified taxes in your country?** (Select all that apply).

	Public resistance	Lack of political support	Administrative complexity	Insufficient data or research to justify such a tax	Excessive costs	Other (please specify)	Don't know
NOx Tax (Air Pollution Tax)							
Landfill Tax (Waste Disposal Tax)							
Incineration Tax (for waste)							
Taxes on primary raw materials							
Pay-as-You-Throw Tax (for waste)							
Pesticide Tax							
Fertiliser Tax							
Wastewater Pollution Tax							
Intensive Agriculture Tax							

	Public resistance	Lack of political support	Administrative complexity	Insufficient data or research to justify such a tax	Excessive costs	Other (please specify)	Don't know
Forest Felling Tax							
Other (please specify):							

16. **What recommendations would you make to overcome these limitations?**

[Open text box]

Conclusion

17. **After completing this survey, are you willing to be contacted for any clarification and/or a follow-up interview?**

- Yes
- No

18. **Please upload a document if you wish to share a more extensive contribution or any background materials that will help us understand your answers.**

19. **Please provide any other information, comments or suggestions that would help us in understanding of how non-energy environmental taxes can reduce negative externalities, influence behaviour, generate revenue, and affect competitiveness.**

Thank you for completing this survey! If you have additional comments, please share them below: [Open text box]

Survey results

Twelve complete and valid responses were submitted from nine different countries.

Q2. Are you aware of any inventory of (non-energy non-transport environmental) taxes implemented at national and/or regional levels in your country?

The survey responses indicate a mixed level of awareness regarding the existence of **national or regional inventories** of non-energy, non-transport environmental taxes. A notable proportion of participants either left the question unanswered or stated that they were not aware of any such inventory, suggesting a general lack of knowledge or uncertainty about the availability of these records. Some responses indicated that there is no federal or regional tax inventory in their respective countries, while others referenced broader databases, such as the OECD Pine Database, without specifying national sources. Environmental taxes may be implemented at regional or municipal levels, leading to inconsistencies in national documentation.

Q3. Which non-energy non-transport environmental taxes are currently implemented in your country?

Certain taxes, such as the landfill tax (10 out of 12) and the incineration tax (8 out of 12), appear to be more commonly implemented, with multiple respondents confirming their existence. In contrast, others, such as the pesticide tax, the fertiliser tax, and the intensive agriculture tax (all 1 out of 12), are less frequently reported as being in place. Five respondents reported the following additional environmental taxes:

- Environmental tax on thin plastic bags
- Environmental tax on plastic packages/cups/lids
- Environmental tax on products which package's label contains PVC
- Climate change resilience tax on tourist accommodation
- Environmental tax on PVC
- Environmental tax on phthalates
- Groundwater abstraction tax

Q4. How effective are these environmental taxes in reducing externalities and changing behaviours?

Responses regarding the perceived **effectiveness of the environmental taxes in influencing behaviour and reducing externalities** highlight variations in opinions across different tax types, reflecting differences in implementation, enforcement, and economic impact.

Taxes such as landfill taxes and NOx taxes are generally seen as more effective in reducing environmental harm. Landfill taxes have been credited with reducing waste disposal in landfills, encouraging recycling and alternative waste management practices. NOx taxes, which target air pollution, have been identified as effective in certain regions where emissions-based pricing has led to cleaner industrial processes and transportation shifts.

Conversely, some taxes on primary raw materials and incineration taxes received mixed responses regarding their effectiveness. While these taxes are designed to discourage excessive resource extraction and high-emission waste management methods, their **actual impact depends heavily on the availability of viable alternatives and the level of enforcement**. Some respondents noted that taxes on primary raw materials could drive up production costs without significantly changing behaviour unless complemented by subsidies or incentives for sustainable practices.

The responses also reveal that **the effectiveness of environmental taxes is influenced by the socio-political context** in which they are implemented. In countries where environmental policies are well-integrated with economic planning, these taxes tend to achieve higher compliance and generate meaningful behavioural shifts. However, in jurisdictions where enforcement is weak or where businesses and consumers lack alternative choices, the taxes may be seen as more burdensome than transformative.

Q5. short-term revenue generation potential

Regarding **short-term revenue generation potential**, there is a clear divergence in perceptions, with some taxes seen as highly effective in generating revenue, while others are regarded as having limited financial viability.

Landfill taxes are generally rated as having a strong revenue generation potential. This is likely due to their widespread implementation and the continued reliance on landfill disposal in many regions. Governments that have adopted landfill taxation have observed substantial revenue streams, particularly in countries where alternative waste management practices are not yet fully developed.

Incineration taxes received mixed evaluations, with some respondents acknowledging their potential to generate revenue, while others pointed out that the financial returns may not be as significant as those of landfill taxes. **The effectiveness** of such taxes in raising funds **depends on the volume of waste incinerated and the availability of waste-to-energy alternatives** that may reduce taxable activities.

Taxes on primary raw materials were often viewed as having **moderate to low revenue potential in the short term**. While they can encourage resource efficiency and circular economy practices, their revenue generation **depends on the scale of extraction and the elasticity of demand for these materials**. In some cases, respondents noted that such taxes could lead to higher prices but may not necessarily generate significant immediate government income.

Pay-as-you-throw schemes, designed to charge households and businesses based on waste production, were regarded as a promising revenue source in areas with effective waste collection systems. However, **their revenue potential depends on enforcement mechanisms and public acceptance**, as they require behavioural adaptation and logistical coordination.

Q6. long-term revenue generation potential

Regarding **long-term revenue generation potential**, the responses indicate that while some taxes are expected to maintain or even increase their revenue streams over time, others may experience diminishing returns as they successfully influence behaviour and reduce taxable activities.

Landfill taxes are perceived as having strong revenue generation potential in the short term but are expected to decline in the long term. This is due to their **effectiveness in incentivising waste reduction and promoting recycling**, which gradually reduces the volume of taxable waste. However, in jurisdictions where alternative waste management solutions are not fully developed, revenue from landfill taxes may remain stable over an extended period.

Incineration taxes present a similar pattern, with long-term revenue potential being dependent on waste treatment policies and technological advancements. If policies shift towards more sustainable waste management practices, the taxable base will shrink, leading to lower revenues. Conversely, in regions where incineration remains a dominant waste disposal method, these taxes could continue to generate significant income.

Taxes on primary raw materials are considered to have moderate long-term revenue potential. As sustainability and **circular economy principles** become more integrated into economic systems, **demand for raw materials may decline** due to increased recycling and substitution with secondary materials. **This transition could limit the revenue base for such taxes, though they may remain a valuable tool for discouraging resource depletion**.

NOx taxes, aimed at reducing air pollution, are viewed as having a declining revenue trajectory over the long term. As industries and transport sectors **adopt cleaner technologies and emission-reduction measures, taxable pollution levels are expected to decrease,** leading to reduced revenue from these taxes. The effectiveness of NOx taxation in driving technological improvements contributes to this anticipated decline.

Pay-as-you-throw schemes for waste disposal may sustain their revenue potential in the long run, particularly in urban areas with continued population growth and evolving waste management needs. The extent to which these schemes generate revenue **depends on enforcement, compliance, and the**

availability of alternatives such as composting and extended producer responsibility initiatives.

Q7. What proportion of the tax is typically passed on to consumers through pricing behaviour?

The analysis of responses regarding the **proportion of environmental taxes typically passed on to consumers** through pricing behaviour reveals significant variation across different tax types, depending on market structures, competitive dynamics, and regulatory environments.

Taxes on landfill and incineration are often passed on to consumers to a moderate or high degree. Waste disposal companies and municipalities tend to incorporate these costs into service fees, meaning households and businesses ultimately bear a substantial proportion of the tax burden. In regions where waste management alternatives, such as recycling and composting, are well-developed, the pass-through effect may be lower, as consumers and businesses can adapt their behaviour to reduce costs.

NOx taxes, which target air pollution, exhibit mixed results in terms of pass-through rates. **In sectors where firms operate in competitive markets with little pricing power, businesses may absorb a portion of the tax to remain competitive**. However, **in industries with limited competition or strong regulatory enforcement, the tax is more likely to be transferred to consumers through higher prices on goods and services**.

Taxes on primary raw materials tend to have a moderate to high pass-through rate, particularly in industries where raw material costs constitute a significant share of production expenses. Manufacturers often adjust pricing to reflect increased costs, meaning end consumers experience price rises. **The extent of this pass-through depends on the availability of substitute materials and the degree of competition within affected industries**.

Pay-as-you-throw schemes, which charge households and businesses based on the volume of waste they produce, exhibit a direct pass-through effect. The costs associated with these schemes are designed to influence behaviour by making waste generation financially consequential. The level of pass-through is generally high, as these charges are explicitly structured to reflect usage.

Overall, the extent to which environmental taxes are passed on to consumers is influenced by market conditions, regulatory frameworks, and the ability of businesses and households to adapt. **Taxes imposed on essential services, such as waste management and raw material use, tend to be transferred to consumers at higher rates, whereas those affecting competitive sectors may be partially absorbed by businesses seeking to maintain market share**.

Q8. What is the estimated price elasticity of demand for the taxed goods or services?

The analysis of responses regarding the **estimated price elasticity of demand for taxed goods or services** highlights significant variation in elasticity depending on the type of good or service taxed, market conditions, and the availability of substitutes.

Goods and services with low price elasticity of demand, such as landfill disposal and primary raw materials, tend to exhibit limited behavioural change in response to taxation. Consumers and businesses continue to use these services despite price increases because there are few viable alternatives or because the taxed activity is essential. In such cases, taxation primarily serves as a revenue-generating mechanism rather than a strong deterrent.

In contrast, **goods and services with high price elasticity, such as certain forms of waste disposal and emissions-intensive products, experience greater shifts in consumption patterns when taxed.** Consumers and businesses are more likely to seek alternatives, reduce usage, or invest in efficiency measures to avoid higher costs. **This is particularly evident in markets where sustainable alternatives, such as recycling schemes or low-emission technologies, are readily available and financially accessible.**

Taxes on pollution, including NOx emissions, show a mixed range of elasticity. In heavily regulated industries, firms may have limited short-term flexibility to alter production processes, leading to inelastic demand. However, **over the long term, industries may innovate and transition** to cleaner technologies, making demand more elastic as businesses adapt to avoid taxation.

Pay-as-you-throw schemes for waste disposal are typically associated with higher price elasticity, as they directly incentivise households and businesses to reduce waste generation. The extent of **elasticity depends on factors such as public awareness, the availability of waste reduction options, and local enforcement measures**.

Overall, the responses indicate that **environmental tax effectiveness is closely tied to demand elasticity.** Taxes on inelastic goods primarily generate revenue, while taxes on elastic goods drive more significant behavioural and market changes. The degree of elasticity varies across sectors, highlighting the need for complementary policies such as subsidies, regulations, and public awareness campaigns to enhance the impact of environmental taxation.

Q9. What is the estimated price elasticity of supply for the taxed goods or services?

The analysis of responses regarding the **estimated price elasticity of supply for goods and services** subject to environmental taxation indicates that supply elasticity varies significantly depending on the type of good or service, the availability of alternatives, and industry-specific constraints.

Goods and services with low price elasticity of supply, such as landfill disposal and certain raw materials, tend to exhibit a relatively fixed supply response to taxation. Landfill capacity, for example, is limited by regulatory approvals and infrastructure investment, meaning that short-term supply is largely inelastic. Similarly, **the extraction of primary raw materials is often constrained by geological factors, regulatory frameworks, and capital-intensive production processes, making immediate supply adjustments difficult.**

On the other hand, **goods and services with higher supply elasticity, such as recyclable materials and alternative waste management services, show a greater ability to respond to price changes induced by taxation**. In sectors where suppliers can readily expand capacity or shift to alternative production methods, taxation can lead to increased availability of lower-cost substitutes. This effect is particularly relevant in circular economy initiatives, where higher taxes on raw materials can incentivise the development of secondary materials and recycling industries.

Environmental taxes on emissions, such as NOx taxation, present a mixed range of supply elasticity. In industries with rigid production processes and capital-intensive infrastructure, firms may struggle to reduce emissions in the short term, leading to inelastic supply responses. However, over time, technological advancements and policy incentives may enable greater flexibility, increasing supply elasticity as firms invest in cleaner technologies.

Pay-as-you-throw waste management schemes often have moderate to high supply elasticity. As waste disposal costs rise, service providers may introduce additional options such as composting, waste-to-energy solutions, and extended producer responsibility programmes. This elasticity is influenced by regulatory policies and the extent of market competition among waste service providers.

The findings suggest that **the effectiveness of environmental taxes in shifting supply patterns depends on industry-specific constraints and the potential for innovation**. Taxes imposed on inelastic supply markets primarily raise costs without immediate supply adjustments, whereas taxes on more flexible markets encourage shifts towards sustainable alternatives. The degree of supply elasticity plays a crucial role in determining the long-term impact of environmental taxation on market dynamics.

Q10. Are there any positive or negative impacts to the competitiveness of the economic sectors of the taxpayers?

The analysis of responses regarding the **positive and negative impacts of environmental taxes on the competitiveness of economic sectors** highlights that while some industries face increased costs and competitive pressures due to taxation, others benefit from incentives to innovate and transition towards more sustainable practices.

Sectors heavily reliant on taxed activities, such as waste disposal, heavy industry, and energy-intensive manufacturing, report significant negative impacts on competitiveness. Increased taxation on landfill, emissions, and raw material extraction raises production costs, which may be passed on to consumers or absorbed by businesses, leading to **reduced profitability**. In highly competitive global markets, companies operating in jurisdictions with strict environmental taxes may **struggle against competitors in regions with more lenient regulations**. This situation can lead to concerns over carbon leakage, where firms relocate operations to countries with lower environmental costs. Conversely, some industries benefit from environmental taxation through shifts in demand and policy-driven market incentives.

The renewable energy sector, waste management industries, and providers of low-carbon alternatives often gain a competitive advantage as taxes on pollution and resource use make sustainable options more attractive. Businesses that invest in circular economy models, energy efficiency, and emissions reduction technologies can leverage environmental taxes as a mechanism to differentiate themselves and secure long-term market stability.

The responses also suggest that **the impact of environmental taxes on competitiveness is influenced by government policies and support mechanisms**. In regions where tax revenues are reinvested into green subsidies, research, and infrastructure, businesses find it easier to transition towards low-carbon solutions. However, in cases where taxation is purely a financial burden without complementary policies, firms may struggle to maintain competitiveness while complying with environmental regulations. The respondents indicated that environmental taxation affects different economic sectors in varied ways. While it can create cost pressures for certain industries, it also provides opportunities for innovation and market adaptation. The extent of the impact depends on sectoral exposure, the availability of alternatives, and the policy environment in which businesses operate.

Q11. What indirect effects have been observed from implementing these taxes (e.g., impact on other EU markets (or potentially non-EU markets if relevant), income distribution)?

Regarding **indirect effects resulting from the implementation of environmental taxes**, respondents indicated that these effects extend beyond the immediate objectives of reducing negative externalities and influencing behaviour, impacting broader economic, social, and environmental dynamics.

While environmental taxes serve their primary purpose of discouraging harmful activities, they also trigger broader systemic effects. These can be positive when they drive innovation, market transformation, and reinvestment in sustainability, but they may also introduce challenges related to competitiveness, economic disparity, and policy implementation. The long-term success of environmental taxation depends on a balanced approach that accounts for these indirect consequences.

One observed indirect effect is the **acceleration of innovation and technological development in industries affected by taxation**. Businesses facing higher costs due to environmental levies often seek efficiency improvements, invest in cleaner production processes, or develop alternative materials. This trend is particularly evident in waste management, where landfill and incineration taxes have encouraged advancements in recycling technologies and circular economy practices.

Another consequence is the **redistribution of market competitiveness,** with some industries gaining a strategic advantage while others face increased financial pressures. Sectors that provide low-carbon alternatives, such as renewable energy and sustainable materials, often experience a boost in demand as environmental taxes make polluting options less financially viable. In contrast, industries with high reliance on taxed activities, such as heavy manufacturing and fossil fuel-dependent sectors, may struggle to maintain their market position without substantial investment in cleaner alternatives.

Environmental taxation also generates fiscal effects, with revenue often used to fund sustainability initiatives or offset other tax burdens. In jurisdictions where tax revenues are reinvested into green infrastructure, research grants, or subsidies for sustainable businesses, the long-term benefits can be substantial. However, where revenues are absorbed into general budgets without targeted reinvestment, businesses may view taxation purely as a financial burden rather than an opportunity for transition.

Social impacts have also been noted, particularly regarding **income distribution and affordability**. In cases where taxes on waste or emissions are passed on to consumers, there are concerns about disproportionate impacts on lower-income households. This has led to discussions on how best to design environmental taxation to mitigate regressive effects, such as through exemptions, rebates, or complementary social policies.

Q12. How are revenues from the identified environmental taxes used in your country?

Respondents also provided insights into **how revenues from environmental taxes are allocated in their countries and regions**, indicating significant variation in revenue usage, depending on national and regional policies, economic priorities, and the degree of commitment to sustainability initiatives.

In some countries and regions, environmental tax revenues are **earmarked for green investments**, including renewable energy projects, energy efficiency schemes, and waste management improvements. **Investments in research and development for cleaner technologies** are also common, particularly in jurisdictions aiming to support green innovation and industrial transformation. A portion of tax revenues is also used **for public infrastructure projects**, including transport and urban development initiatives that promote sustainability. Countries and regions with strong environmental policies often direct funds towards the expansion of public transport networks, cycling infrastructure, and electric vehicle incentives to encourage low-emission mobility solutions.

In other cases, environmental tax revenues are **integrated into general government budgets** rather than being ring-fenced for environmental projects. This can be controversial, as it raises concerns about whether the primary motivation for taxation is revenue generation rather than environmental protection. While some governments argue that these funds contribute to broader public services such as healthcare, education, and social welfare, critics suggest that failing to allocate revenues to environmental initiatives undermines the effectiveness and public acceptance of green taxation policies.

Some countries and regions use environmental tax revenues to **offset other taxes**, particularly those on labour and income. This tax-shifting approach aims to reduce distortions in the labour market by lowering income or payroll taxes while maintaining overall government revenue. Some respondents argue that this strategy helps stimulate employment while incentivising sustainable behaviour, but its success depends on the balance between tax reductions and environmental impact.

The responses also highlight cases where revenues are **partially redistributed to businesses or households to mitigate potential negative economic impacts**. For example, some governments provide subsidies or compensation to industries heavily affected by environmental taxes to support their transition towards cleaner practices. Similarly, financial assistance for lower-income households is sometimes introduced to prevent environmental taxes from disproportionately affecting vulnerable groups.

Respondents broadly agree that while environmental tax revenues can be an effective tool for financing sustainability efforts, their impact depends on how they are allocated. Countries that prioritise reinvestment in environmental and social programmes tend to see stronger public support and more meaningful ecological benefits, while those that integrate revenues into general taxation face greater scrutiny regarding the true purpose and effectiveness of their tax policies.

Q13. What are the main administrative costs (for tax authorities and for taxpayers) associated with the implementation of these taxes?

With regard to the **main administrative costs associated with implementing environmental taxes**, respondents highlighted that administrative burdens vary depending on the complexity of tax design, enforcement mechanisms, and compliance requirements. For tax authorities, the most significant costs are related to **monitoring, enforcement, and compliance verification**.

The need to track emissions, waste disposal, or resource extraction requires investment in data collection infrastructure, reporting systems, and regulatory oversight. In cases where environmental taxes target specific pollutants or activities, authorities must establish reliable measurement and reporting frameworks, which can be resource-intensive.

The enforcement of environmental taxation also requires personnel training, auditing mechanisms, and legal frameworks to address non-compliance. Taxpayers, including businesses and individuals, incur administrative costs in the form of reporting obligations, compliance documentation, and adjustments to internal accounting systems. Firms operating in sectors affected by environmental taxes must track their taxable activities, calculate liabilities, and submit reports to tax authorities. This process often necessitates investment in specialised software, consultancy services, and legal compliance strategies to ensure adherence to tax regulations.

For businesses subject to **complex or variable taxation**, administrative burdens increase significantly. Companies that need to measure environmental impacts, such as emissions or waste generation, may need to implement monitoring technologies, conduct periodic assessments, and integrate tax compliance into their operational strategies. In some cases, administrative costs are mitigated through digitalisation and streamlined reporting mechanisms.

Countries that have implemented **automated tax reporting systems or simplified tax structures tend to reduce compliance costs for both authorities and taxpayers**. However, where tax regulations are fragmented or frequently updated, businesses may struggle to keep up with changing requirements, leading to increased administrative burdens.

Q14. How would you assess the cost-benefit ratio of these environmental taxes?

For all the taxes that received ratings, the average scores were 4 or above. This suggests a broad perception among respondents that the societal and environmental benefits of environmental taxes tend to outweigh their economic costs. In particular, taxes such as the landfill tax, PAYT and pesticide tax appear to be seen as effective and worthwhile tools for steering behaviour and reducing environmental harm. Notably, the intensive agriculture tax did not receive any ratings, which may reflect limited familiarity with the concept.

Overall, the findings indicate a strong level of stakeholder support for pollution- and resource-based environmental taxation, and a perceived policy opportunity to further develop such instruments, provided they are well-designed and supported by adequate implementation mechanisms.

Q15. What are the main factors limiting the effective application of the identified taxes in your country?

Regarding the **main factors limiting the effective application of environmental taxes across different countries and regions**, one of the most frequently cited limitations is **political resistance and lack of public acceptance**. Environmental taxes are often perceived as an additional financial burden, particularly in regions where there is scepticism about their effectiveness or fairness. In some cases, opposition from industry groups and lobbying efforts from high-emission sectors have influenced policy decisions, leading to weaker tax enforcement or exemptions for certain industries.

Another key challenge is the **absence of viable alternatives** that would enable businesses and consumers to shift away from taxed activities. If environmentally harmful practices remain the most convenient or cost-effective option due to limited green infrastructure, taxation alone may not be sufficient to drive meaningful behavioural change. For instance, waste disposal taxes are less effective if recycling facilities are inadequate, and emissions taxes have limited impact in areas with insufficient access to clean energy sources.

Administrative complexity and enforcement difficulties also present significant obstacles. Some environmental taxes require sophisticated monitoring and reporting systems, which can be costly and difficult to implement, particularly for smaller businesses. In cases where tax authorities lack the necessary resources or technological infrastructure to track taxable activities accurately, enforcement becomes inconsistent, reducing the credibility and effectiveness of the tax.

Economic competitiveness concerns also play a role in limiting the application of environmental taxes. Businesses operating in global markets fear that high environmental taxes could place them at a disadvantage compared to competitors in regions with lower regulatory costs. This has led some governments to either lower tax rates or introduce compensation measures, reducing the overall impact of the taxation system.

A further limitation is the **risk of tax regressivity**, where lower-income households bear a disproportionate financial burden. Without targeted mitigation measures such as rebates or subsidies, environmental taxes can lead to increased living costs for vulnerable populations, generating resistance and political pressure for reforms or reductions.

Q16. What recommendations would you make to overcome these limitations?

Respondents provided some **recommendations to overcome the limitations of environmental taxes**, focusing on policy adjustments, economic incentives, and administrative improvements.

One of the key recommendations is to **ensure that environmental taxes are accompanied by reinvestment in sustainable alternatives.** This includes funding for renewable energy, waste management infrastructure, and public transport systems to provide businesses and consumers with viable options for reducing their reliance on taxed activities. Without such alternatives, taxation alone may not drive the intended behavioural changes.

Another frequently suggested measure is the **simplification and streamlining of tax administration**. Reducing the complexity of tax reporting and enforcement processes can enhance compliance while lowering administrative costs for both tax authorities and businesses. **Digitalisation and automated reporting systems** can improve efficiency and ensure accurate monitoring of taxable activities.

Several responses emphasise the importance of **public engagement and awareness campaigns**. Resistance to environmental taxation often stems from a lack of understanding about its objectives and benefits. Transparent communication about how tax revenues are used, as well as educational initiatives to highlight the environmental and economic advantages of taxation, can improve public acceptance and reduce political opposition.

Economic support mechanisms, such as tax rebates or targeted subsidies, are also seen as essential to mitigate potential negative effects on low-income households and vulnerable industries. By ensuring that environmental taxes do not disproportionately impact certain groups, policymakers can create a more balanced and socially equitable taxation framework.

To address competitiveness concerns, recommendations include the **gradual implementation of tax policies and the use of complementary measures such as border tax adjustments or international agreements**. These approaches can help ensure that domestic industries are not unfairly disadvantaged while maintaining incentives for sustainable practices.

Other information

Finally, the competent authorities of one Member State are currently investigating the possibility of creating a financing mechanism for compensating the health and environment costs of PFAS pollution under the framework of the “polluter pays” principle, and are therefore very interested to follow the developments of this project and discuss further how they could complement the work being done under this topic.

Annex 5 - List of participants in consultation activities

Interviews

The following list presents the job positions, organisations and Member States of the individuals who took part in semi-structured interviews conducted as part of this study. These interviews provided in-depth insights on the implementation, impacts and feasibility of environmental taxes across Member States, complementing the desk research and literature review.

Table A5-1: List of interviewees

Member State	Organisation	Position
Austria	WIFO (Austrian Institute of Economic Research)	Senior Economist
Belgium	Health, Food Chain Safety and Environment. DG Environment. Climate Change Service	Senior expert climate policy
Belgium	Health, Food Chain Safety and Environment. DG Environment. Climate Change Service	Senior climate change expert
Belgium	Health, Food Chain Safety and Environment. DG Environment. Climate Change Service	Climate policy expert
Croatia	Institute of Public Finance	Researcher
Italy	Ministry of Environment and of Energy Security	Chief economist
Portugal	Universidades Catolica Portuguesa	Green Tax Reform Committee member
Slovakia	Ministry of Finance	State Secretary of the MoF SR 2
Slovenia	Faculty of Public Administration of the University of Ljubljana	Professor of public sector economics
Spain	University of Vigo - Department of Applied Economics	Professor of Economics
Sweden	National Institute of Economic Research (NIER)	Head of Division - Environmental Economics Research

Online survey

The following list presents the authorities and organisations that responded to the online survey carried out in February 2025. Their contributions offered valuable perspectives on the current use and potential of environmental taxation, helping to ensure that the assessment reflects a broad range of national and sectoral experiences.

Table A5-2: List of survey participants

Member State	Organisation
Austria	Ministry of Finance
Belgium	Public service of Wallonia (SPW)

Member State	Organisation
Belgium	Public service of Wallonia (SPW)
Belgium	Federal Ministry of Finance (FPS Finance)
Belgium	Public Waste Agency of Flanders (OVAM)
Belgium	FPS Health and Environment
Czech Republic	Ministry of Environment
Denmark	Ministry of Taxation
Greece	Independent Authority For Public Revenue / Directorate for the Implementation of Indirect Taxation
Greece	Ministry of Environment and Energy
Italy	Ministry of Economy and Finance - Department of Finance
Lithuania	Ministry of Environment

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