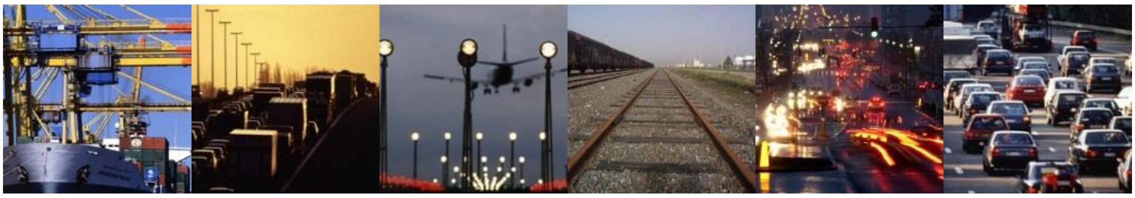
Proposal for a green tax reform

Date: 30/06/2022



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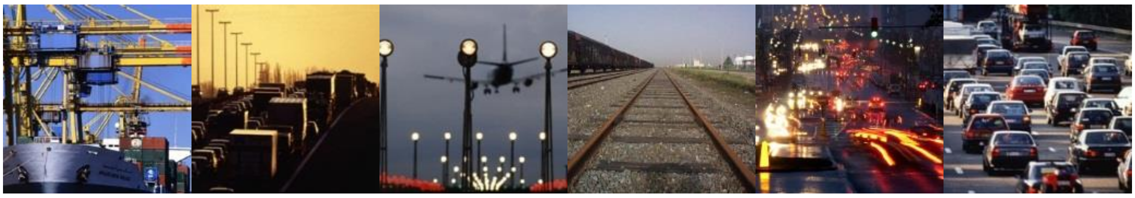
Proposal for a green tax reform

CONFIDENTIAL

Executive summary and policy recommendations

For the attention of FPS Finance

Date: 20/06/2022



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Executive summary

Context

The purpose of this study is to analyse potential avenues for reforming the federal tax system in order to make it more environmentally friendly. The analyses are framed in the Belgian institutional context. More specifically, the scope of the study is limited to fiscal reforms that can be implemented at the federal level.

The revision of the fiscal system to integrate environmental objectives is in line with the current government agreement (Regeerakkoord/Accord de coalition) that expresses the government's intention to introduce (a) fiscal instrument(s) to discourage the use of fossil fuels and introducing "polluter pays" principles. We distinguish two dimensions for reform:

1. the taxation of *energy products* through carbon taxation and increased excise duties as part of a climate tax shift
2. other measures for greening the federal tax system in several key areas (e.g. building, transport).

These are selected based on their potential to reduce CO_2 emissions or other environmental pressures.

In accordance with the governmental agreement, a reform should be based on two guiding principles: encouraging environmentally friendly behaviour and discouraging emissions and pollution. Taxing polluting activities or implementing fiscal rules in favour of sustainable alternatives are strategies to reach these objectives. In addition, existing subsidies (including tax benefits or reductions) to fossil fuels or polluting activities should be carefully assessed and reduced or even phased out.

Our research takes into account the broader policy and legal context at European Union (EU). We consider the proposals for the revision of the EU's Energy Taxation Directive (ETD) and the extension of the Emissions Trading System (EU-ETS under the Fit for 55 package . Reaching the ambitious emission reduction objective of Fit for 55[1] as well as the burden sharing agreement laid out in European Climate law[2] requires strong incentives for households and firms to reduce their consumption of fossil fuels.

We also investigate the reforms implemented or planned abroad, mostly those in neighbouring countries. This allows to evaluate best practices and lessons learned from countries facing similar challenges. The analyses are framed in the Belgian institutional context. More specifically, the scope of the study is limited to fiscal reforms that can be implemented at the federal level.

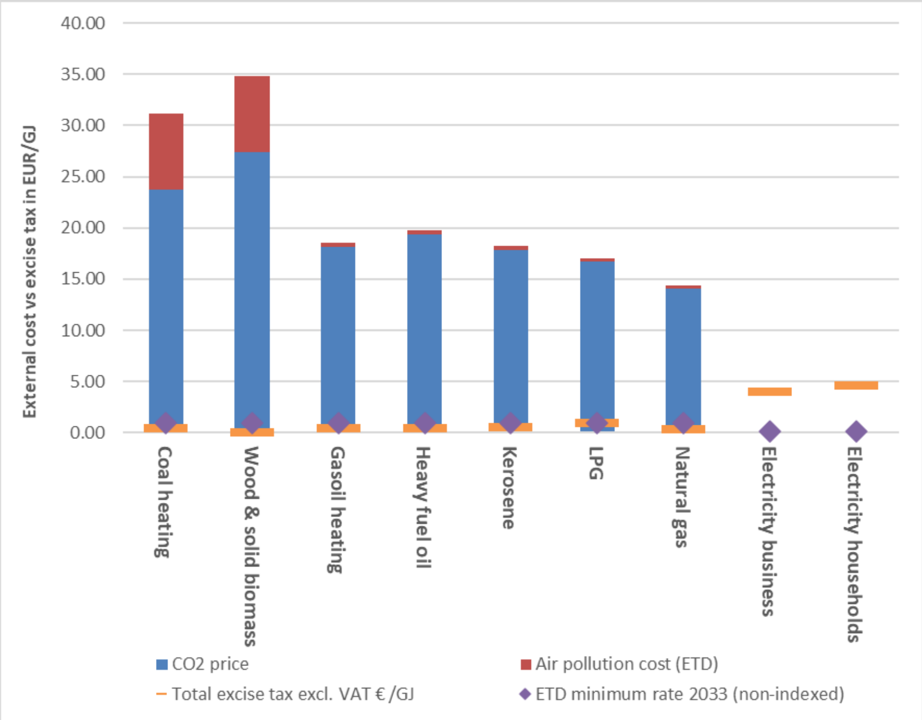
The current system of energy taxation in Belgium is unrelated to the environmental impact of this sector. This system, although in line with the current framework of the ETD, contains a wide range of fossil fuels subsidies. This is confirmed by recent research that points to substantial fossil fuel

[1] Referring to the objective of reducing GHG emissions with-55% in 2030 compared to 1990 levels.

[2] Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013, *OJ L 156, 19.6.2018, p. 26–42:* Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), *OJ L 243, 9.7.2021, p. 1–17*

subsidies[3] and unbalanced taxation of fossil fuels in Belgium[4] , we find that there are strong arguments for a green fiscal reform in Belgium.

To show the need for reform, we compare the level of current excise taxes on energy with external cost of using this energy in different activities. We provide figures below that normalize all costs and excise taxes by calorific content (in €/GJ). The total of each component is added in a column. The level of the current tax is indicated with a horizontal bar, the minimum rate proposed in the revision of the ETD (non-indexed after transitionary period) is indicated with a diamond marker.



[3] Estimated to be larger than 11 billion € in a study by FPS Finance in 2021

[4] Among others IEA (2022), PwC (2019).

Figure 0.1 : Comparison of current excise tax on heating with external cost based on assessment study ETD (incl. air pollution cost) and social cost of carbon equal to 250 €/tonne, source: EC (2021d) & own calculations

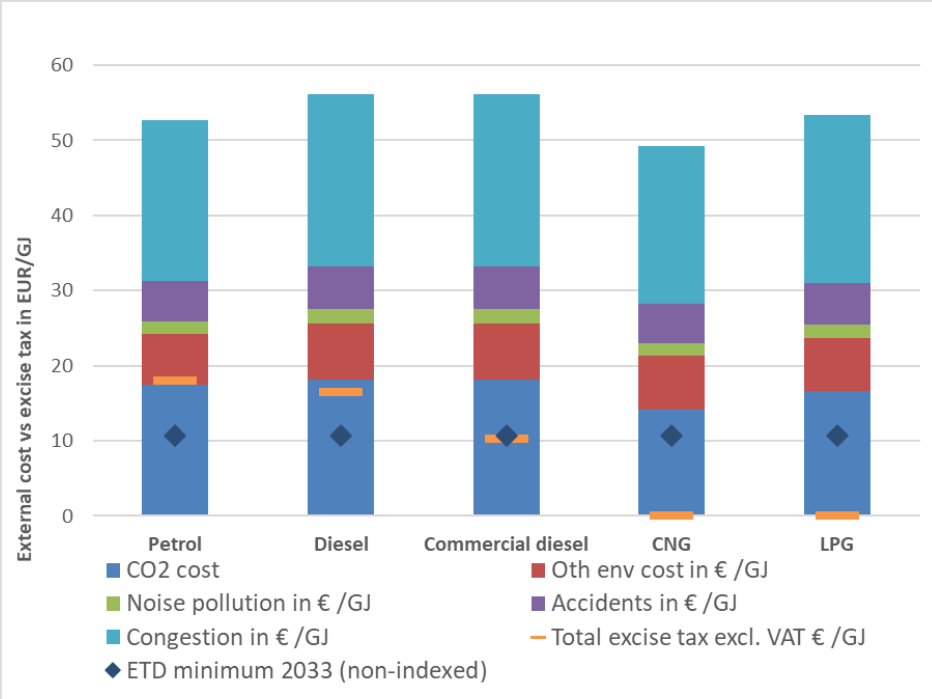


Figure 0.2 : Comparison of current excise tax on transport with external cost based on CE Delft (2019), EC (2021d) & Heyndrickx et al (2021) social cost of carbon equal to €250 /tonne, own calculations,

We find that the current excise taxes on energy are generally well below the benchmark set by environmental taxation, except for electricity which is taxed above its (external) environmental cost. Taxes on carbon content are largely absent in current heating fuels. Excise tax rates on LPG, kerosene, coals, gasoil and heavy fuel oil would need to increase substantially by 2030 to be consistent with recent estimates on the social cost of carbon emissions. Although natural gas has a relatively low environmental cost compared to other fossil fuels, there is a substantial margin to increase taxes in the light of environmental taxation. As with heating, the rate for industrial applications is much lower. However, some of the industrial sectors are covered by the European Emission Trading System (ETS). It is therefore possible that these emissions will still be subject to some form of taxation, albeit indirectly.

Motor fuels are taxed at higher rates which makes it more in line with environmental taxation. However, the excise tax is currently the only environmental tax on transport that is variable with vehicle usage[5]. While excise taxes on motor fuels are much higher than on fuels for heating and industry, they are still below the marginal external cost of transport. Given the relatively slow progress of the transport sector with respect to emission reduction[6] we conclude that there is a margin for additional fiscal measures.

[5] VAT on fuels as well as the VAT on the excise tax itself are not considered to be forms of environmental taxation (Eurostat 2013). Other taxes (ownership, registration, insurance) are not directly related to actual vehicle kilometers driven.
[6] [Transport emissions (europa.eu)]

Beyond 2030 we expect a quick increase in the social cost of carbon that reflects the ambition to reach net zero emissions by 2050. This means that the gap between the excise tax and the environmental cost energy use will likely increase even further in the absence of other policies.

General design of the reform

In light of this, we establish a two-parts scenario.

The first part of the scenario of reform integrates the revision of the ETD, .in the hypothesis of its adoption If the revision of the Energy Taxation Directive would not become European law, the same measures could be unilaterally adopted on the national level. The revised ETD aims to reform excise duties on energy products as of January 2023, to base these taxes on the environmental performance of energy production and on their energy (or 'calorific') content. It also aims to remove most of the fossil fuels subsidies it currently allows. The application of these **revised excise duties on energy products** is the first element in the energy tax reform that we consider in our analysis.

The second element of our scenario of reform is a **tax** levied on the CO_2content of fossil fuels in non-ETS sectors with revenue recycling. In this study we consider it in the form of a **budget-neutral climate tax shift**. We assess the environmental and socio-economic impact of an introduction of a carbon tax on transport and heating fuel of respectively €20/tonne CO_2 in the short run (2023) and € 70/tonne CO_2 in the medium run (2030). In the macroeconomic analysis, we also consider the impact of a carbon tax of €100/tonne CO_2.[7]

The level of the carbon tax under consideration is based on the carbon price options discussed in the Belgian National Debate on Carbon Pricing.[8] The **price trajectory** – a low entry rate that increases over time, is also in line with the National Debate and follows the approach taken by other countries (e.g. the U.K., Switzerland). Most countries that introduced a climate tax shift apply gradually increasing rates, or even determine the price trajectory in advance.

An important principle for the implementation of this tax shift is the **budget neutrality**, which reflects the hard budget constraint by the public sector We propose specific actions to recycle the tax revenues such that they are redistributed to the Belgian population. This is done by considering the social impact, to obtain a **fair distribution and avoid any regressive impacts**.

We also study other fiscal measures. We propose a list of specific priority measures that can be taken in five key areas. These measures, in combination with the proposed energy tax reform can be part of a green taxation policy mix, that contributes to a greater protection of the environment.

In what follows, we subsequently discuss the methods used in this study, the outcome of the analyses and the policy recommendations that follow from our results.

Methods

Our research is conducted based on three types of analysis. First, we assess the impact of a a climate tax shift at the **macroeconomic level**. For the macroeconomic analysis, we use a combination of literature review, in combination with the European Model for the Assessment of Income

[7] The consideration of a € 100/t CO_2 carbon tax is based on a recent publication by the EU that computes the current shadow price for carbon at approximately €100/t. This price is expected to rise to € 800/t by 2050 (EIB Group Climate Bank Roadmap 2021-2025). IEEP (2021) also uses a price of 100 €/tonne CO_2 for the external cost of carbon up to 2030.
[8] https://klimaat.be/doc/National_Carbon_Pricing_Debate_-_Final_Report.pdf

Distribution and Inequality Effects of Economic Policies (EDIP), which is a Computable General Equilibrium (CGE) model. This model is used to estimate the impact of different levels of carbon taxes on total CO_2-emissions from transport and buildings by 2030. The model also allows to estimate total fiscal revenues and assess the impact of different tax redistribution alternatives.

Second, we run **microeconomic simulations** to assess the impact of carbon tax shifts in 2023 and in 2030 on household budgets. Our analysis focuses on the distributional effects of these taxes on households, identifies the characteristics of the "winners" and "losers", and compares different revenue recycling options based on their potential to compensate the most impacted and/or most precarious households. Our computations are based on the 2018 Household Budget Survey (HBS) for which more than 6,000 households representative of the Belgian population reported their monthly spending.

Third, to determine priority measures for a green taxation reform in other areas than energy, we use the **Delphi method**, supported by **a synthesis of the literature** and **evaluation of country cases**. The Delphi method is a qualitative research approach in which a panel of experts is interviewed in two rounds. Expert opinions are subsequently aggregated and analysed. This is complemented by a comparative analysis of selected examples of environmental taxes in other countries.

Results

Macroeconomic impact of the energy tax reform

The macroeconomic analysis shows that a climate tax shift and the implementation of the revised ETD excise duties on heating fuels, is a valuable option to increase the pace of the energy transition. Applying revised minimum ETD rates and carbon prices in the transport and buildings sector equal to €20 /tonne CO_2 in 2023, raising to €70 /tonne by 2030 will lead to emission reductions between 3% and 12.5% in the absence of other policy. A higher level of carbon pricing €100/tonne would reduce emissions with 11.3% to 14% respectively in the buildings and transport sector. The results are cross-checked with other studies and are similar to the estimated impact of a comparable carbon tax in other countries. Our results are also in line with recent estimates by the IMF (IMF (2021a,2021b,2021c, 2020)). They are also in line with a recent impact study of an extension of the ETS sector for Flanders (Climact & Oko, 2021). The estimated amount of emission reduction, even at the higher level of carbon pricing (€100 / tonne), is below the objective of emission reduction required under Fit for 55 (between 45% and 50% compared to 2019 emissions).

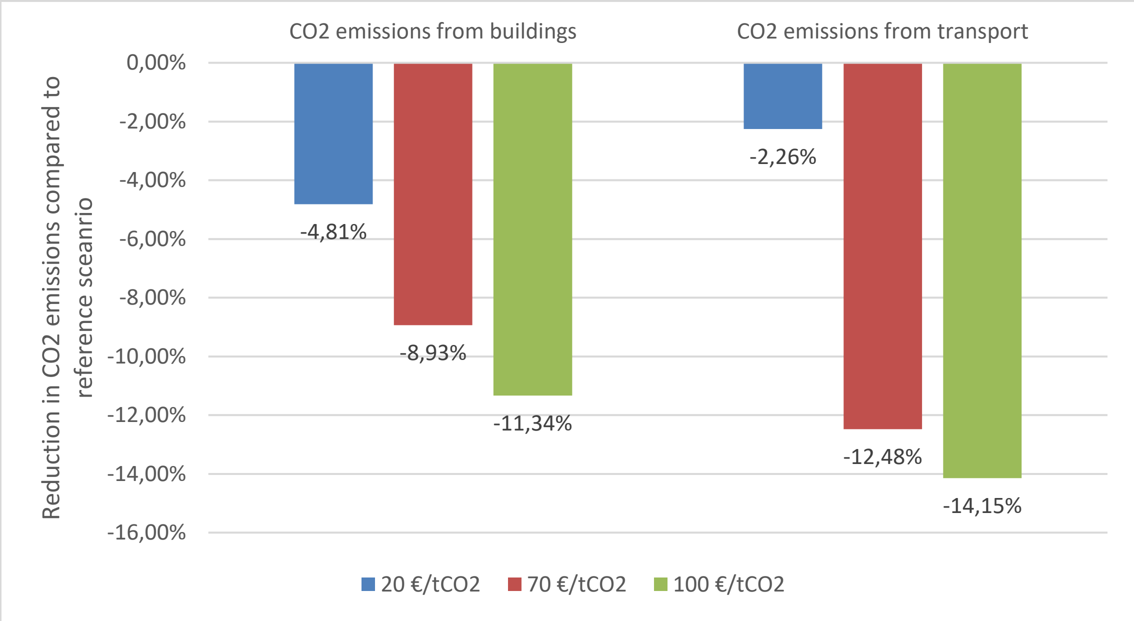


Figure 0.3 Impact of the Belgian energy tax reform on CO_2 emissions

Table 0.1: Expected revenue of carbon pricing at different levels in M€, source: Own calculations based on EDIP model

	Reference year 2023	Reference year 2030	
	€ 20 /tCO_2	**€ 70 /tCO_2**	**€ 100 /tCO_2**
Carbon tax collected from firms	248	625	830
Carbon tax collected from households	614	1312	1742
Total carbon tax	**862**	**1937**	**2572**
Impact revision of ETD rates on firm	95	52	49
Impact revision of ETD rates on households	149	82	79
Total ETD	**244**	**134**	**128**
Total impact on revenues	**1106**	**2071**	**2700**

The expected revenue of carbon pricing (Table 0.1)is around € **860million for a €20 /tonne CO_2 tax in 2023 and € 1.9 billion in 2030**. This is in line with estimates of the National Debate on Carbon Pricing in Belgium. We find that this revenue could be used to : reduce the tax burden on labor linearly by 2%In a sensitivity analysis, we also compute the tax revenues from a € 100 €/tonne CO_2 carbon price in 2030. This higher carbon price would result in fiscal revenues equal to € 2.57 billion. In combination with the revision of the Energy Taxation Directive we find that total revenues may amount to €1.1 billion for a €20 /tonne tax in 2023 and respectively €2.1 billion and €2.7 billion for carbon taxes of €70 tonne and €100 tonne.

Microeconomic impact of the energy tax reform

Belgian households spent an average of €72/month on heating fuels (excluding electricity) and €84/month on transport fuels in 2018 (HBS). The proposed tax reform in 2023 would add respectively €8 (+11%) and €4 (+4.7%) to these expenditures. If the fiscal revenues collected on households are redistributed equally among them, which constitutes the reference scenario, households would therefore receive a transfer of €12 per month.

On average, households in the first four deciles (lowest 40% incomes) gain as they are less affected by higher taxes on transport fuels. Indeed, data reveals that (i) heating fuel expenditures are relatively constant across income deciles (ii) the poorest households have fewer cars, use them less and/or have vehicles that consume less fuel. Deciles 5 to 10 are net losers, and the average effect becomes more negative as one moves up the deciles. The average impact is, however, rather small: it goes from a gain of €3 per month in the second decile to a loss of €2 in the 10th decile.

There is **considerable heterogeneity between the energy consumption** of households within deciles. Some use their car intensively while others do not have one, housing differs in terms of surface to be heated or insulation, etc. As a result, **the effect of the reform varies greatly between households within each decile**. We find that the additional taxes paid on average by the households that are heavily impacted are +/- €20 higher than for those that are slightly impacted, in each decile. As a result, the share of households that suffer from a net loss higher than 1% of their income is highest in the first decile and this rate decreases with deciles.

Before the reform, 30% of the households in the first decile are in energy poverty (*i.e.*, spend more than 14% of their income on energy used at home). This proportion decreases with deciles to reach 13% in the 5th decile. **The reform for 2023 reduces energy poverty at the population level from 10.6% to 10.2%, with a reduction by 1.5 percentage points in the first two deciles.** Even though the reform does not increase the number of households in energy poverty, its impact is on average negative for those that are currently energy poor (-€3.5 per month), and 10% among them are losing more than 1% of their income. As they are spending a large proportion of their total expenditure on energy goods, they are particularly vulnerable to the increase in fuel prices. Indeed, nearly all the households suffering a loss higher than 1% of their income are already energy poor before the reform.

We analyse how different categories of households are affected by the reform when we consider other dimensions than income. Our two findings are the following. First, **the households who heat mainly with heating oil are heavily impacted**: they lose an average of €9.9 per month, only 14% of them gain and 6.5% among them lose more than 1% of their total income. Second, **the type of housing matters**. Households living in a flat gain on average €4 per month while those living in a house lose, since houses are on average bigger and less energy efficient. Flats are also a more common type of housing in cities. Hence, expenditure on transport fuels is typically lower for people living in flats. These results are confirmed by our econometric analysis.

We simulate **alternative revenue recycling** options and compare their impact on households in energy poverty, on households in the first three deciles and on the entire population. Table 1.1 summarizes the results of a selection of these simulations.

(1): Energy_Poor (2): first 3 deciles (3): Total pop.	Avg. Impact		Winners			Big Losers (impact >1% of hh income)		
	(1)	(2)	(1)	(2)	(3)	(1)	(2)	(3)
Reference scenario	-3.5 €	1.7 €	41 %	67 %	58 %	10 %	4.3 %	1.9 %

Lump Sum 20%	-0.3 €	6.1 €	57 %	78 %	56 %	8.5 %	2.9 %	1.7 %
Lump Sum degressive	1.9 €	7.4 €	62 %	82 %	55 %	5.7 %	1.7 %	1.2 %
No carbon tax 20%	1.6 €	5.9 €	65 %	84 %	58 %	6.6 %	2%	1.4 %

In the scenario **"Lump Sum 20%"** (row 2 of Table 1.1), low-income households representing 20% of the population receive a lump sum of 20€ while the others receive 10€. Compared to the equal redistribution scheme, it would increase the share of winners among the households in energy poverty from 41% to 57% and reduce the share of households losing more than 1% of their income from 10% to 8.5%. Households in the first three deciles also benefit when looking at these criteria. At the level of the total population, on the other hand, the share of winners decreases, but this is also the case for those losing more than 1% of their income. In the scenario **"Lump Sum degressive"** (row 3 of Table 1.1), households receive a higher transfer if they belong to a low-income category. Households in the bottom 10% of the income distribution receive 25€ per month while those in the bottom 20%, in the bottom 40% and in the upper 60% of the income distribution would get 17€, 13€ and 8,5€ per month respectively.[9] This scenario is the most effective in protecting the most vulnerable households and/or those most affected by the reform. The rate of winners among the households in energy poverty or households in the first three deciles is indeed higher than in the other scenario studied where the transfers are targeted. Similarly, this is the scenario where the share of households losing more than 1% of their income is the lowest of all the scenarios studied, among the low-income households, among the households in energy poverty and in the entire population.

In the **"No carbon tax 20%" scenario** (row 5 of Table 1.1), low-income households representing 20% of the population are exempted from the carbon tax. All these households are winners in this case as they would not pay any carbon tax while they would receive a transfer. This scenario benefits 65% of the households in energy poverty and 84% of the households in the first three deciles while significantly reducing the rate of households losing more than 1% of their income in these categories. At the level of the whole population, the share of winners does not decrease compared to the baseline scenario, contrary to other targeted measures, since the cost of targeting is relatively low and there are therefore enough resources left to compensate the other households.

Finally, we project our analysis in 2030 to study the impact of higher carbon taxation combined with reduced energy use. We consider a carbon price of €70 per ton of CO_2 emissions in 2030 and a reduction in CO_2 emissions of -43% for transportation and -49% for residential sectors to be achieved between 2018 and 2030, in order to reach the Fit-for-55 objectives.[10]These fuel consumption reductions are assumed to be the same proportionally for all households. **We find that a household would contribute €21/month on average**. In each decile, the third of households that are most affected by the reform lose more than €10/month on average, while those who benefit the most gain about €15/month.

[9] We target the bottom 10% of the income distribution based on the criteria used to grant the social discount and the bottom 20% based on existing criteria to define the beneficiaries of the increased intervention - BIM. To make this scenario operational, we have created a new category that would target 40% of the population, by relaxing the income criteria used to define the beneficiaries of the increased intervention.

[10] These targets are in line with projections from the Climate.Be platform that shared their results during the "Fit For 55" conference held on the 6/10/2021. The presentation can be found on the following link: https://climat.be/doc/fitfor55-bog-1-non-ets-sectors.pdf

Additional measures

While carbon pricing improves incentives to invest in more energy efficient technologies and reduce emissions, it cannot reach the Fit-for-55 goals on its own. Either much higher levels of carbon pricing[11] or additional flanking policies are necessary to reach the target. Therefore, additional measures will be necessary to obtain the 55% emission reduction by 2030. There are several green tax reforms that the federal authority could consider, in the limits of its competences and with due consideration of the interactions with regional policies in the field of the environment.

Table 0.2: Overview of priority measures by key area

Key area	Priority measure	Type
Industry & Agriculture (case 1)	Increased taxes on fertilizer and pesticides	Indirect tax (VAT)
	Meat tax	Indirect tax (VAT)
	Tax on rents made by electricity producers	Direct tax (economic rents)
Transport (case 2)	Phase out reimbursement of excise duty on commercial diesel	Indirect tax (excise duty)
	Excise tax on LPG and CNG	Indirect tax (excise duty)
	Increased airplane ticket tax	Indirect tax (flat rate)
	Phase out company cars and fuel cars	Abolishment of direct tax credit
	Institutionalise bicycle commuting allowance	Direct tax credit
Circular economy (case 3)	Reform of beverage container tax	Reform of existing indirect tax
	Introduce a plastic packaging tax with differentiation based on recyclability	Introduce a new indirect tax
	Modify the investment deductions to counter rapid depreciation of equipment	Modify existing investment deduction regulations
Financial sector (case 4)	Temporary tax incentive for green bonds	Direct tax credit or subsidy
	Green tax credit for pension funds and long term savings	Reform of existing direct tax credit
Buildings (case 5)	Fiscal stimulation of collective financing mechanisms	Introduce tax deductions

We analyse potential measures to be taken in five key non-ETS sectors, notably (1) industry & agriculture, (2) transport, (3) circular economy, (4) finance and (5) buildings. The proposed measures (Table 0.2)were chosen based on the analysis of best practices in other countries, a literature study and input from 57 expert interviews. The results of these research methods are translated into concrete policy recommendations for each of the five cases. These are included in the policy recommendations in the next section As with carbon pricing, the environmental impact of these measures will depend on the broader policy mix both at the federal and other levels.

The results of this study are translated into concrete policy recommendations. We also discuss potential policy options and consider their advantages and disadvantages.

[11] on the basis IMF (2021) & EIB (2020) we estimate levels of 250 €/tonne and higher

Policy recommendations with respect to energy taxation

The results from the macro- and microeconomic analysis argue in favour of the revision of existing excise duties on energy so as to improve Belgium climate mitigation policy. We suggest to introduce a **carbon price on heating and transport fuel** as part of a climate tax shift, regardless of whether the Fit for 55 Package is adopted. This is supported by the following:

- Unlike the ETS sectors, there is currently not explicit price in heating and transport (save aviation). These sectors are currently not covered by the EU-ETS although they account for the largest share of GHG emissions in non-ETS sectors.
- Our macro-economic results show that a carbon price is an effective measure to reduce GHG emissions and contributes to the achievement of Belgium's targets for 2030 and 2050. Still, carbon pricing should be complemented with additional measures to reach the Fit-for-55 emission targets as we find that without any other complementing measures, a carbon pricing scheme would lead to only about a quarter of the required emission reduction.
- Following literature, expert review and experience from other countries we find that carbon pricing has a considerable impact on long term emission reduction and reinforces other government policy (see also OECD (2021) and Climact & Oko (2021))
- Many (neighbouring) countries have implemented this type of measure or plan to do so.

Building the reform on existing system of energy taxes is believed to foster administrative simplicity.

In line with the approach followed by other countries, we propose to apply an **increasing carbon price trajectory**. More specifically, the carbon tax should be introduced at a low rate that increases over time.[12] The price path for the tax should be **communicated well in advance and in a transparent way**. In the short run, a low rate is recognized to foster public acceptability and give time to households and companies to adapt. In the longer run, a "high" carbon tax rate should be attained to achieve sufficient emission reduction levels. The policy trajectory should be made complementary with the EU ETS for buildings and transport, if it is adopted.

We advise to use part of the additional tax revenues to **compensate households** since this can foster a greater public acceptance of measures.[13] Moreover, we recommend **targeting low-income households** with higher transfers as it would help reducing (energy) poverty. Indeed, the number of households benefiting from the carbon tax shift is higher when the revenue collected is targeted towards poorer households than when it is redistributed lump sum. This is true (i) among the households in the three first deciles, (ii) among the households in energy poverty and (iii) in the entire population. Targeting low-income households with higher transfers would also help fostering more public acceptance of a carbon tax shift. Empirical evidence indeed shows that higher income groups are more willing to incur a loss in purchasing power if that helps combating climate change. Hence, it makes sense to alleviate the contribution of vulnerable households. We also recommend **redistributing the revenue collected at the household level** rather than at the individual level as

[12] We do not compute optimal carbon pricing levels. To provide an indication of low and high carbon prices, the OECD uses €30/CO_2 as a low-end price benchmark, €60/t CO_2 as a mid-range price and € 120/t CO_2 as a central price needed in 2030 to decarbonise by 2050 (OECD, 2021).

[13] In the microeconomic analysis, the carbon tax revenues that were redistributed to households were those collected directly from their fuel consumption. We did not investigate the use of additional carbon taxes paid by firms.

it would increase the number of households benefiting from the tax shift within the three groups mentioned above.

We recommend targeting lower income households y providing them higher transfers rather than by reducing their energy price. Even though energy tax cuts or low-income households is attractive as it benefits mainly the most impacted households (those who consume a lot of fuel) among the poorest, **lowering taxes on fuels disincentivizes emissions reductions and therefore reduces the environmental effectiveness of the reform**. In addition, it has a negative impact on the targeted groups in the long term (at a time of higher carbon prices) who would not have been incentivized to invest in green technologies because of the lower prices they receive early enough.

Targeting 40% of the households with the lower income (adjusted for household size) rather than 20% of them is *more costly*. The number of winners among the non-targeted households would therefore be smaller. However, the *rate of winners* among households in energy poverty would be *higher* by targeting 40% of the households with the lower income. We therefore recommend proposing different transfers to different groups based on their income. We have run a scenario where households in the bottom 10% of the income distribution receive 25€ per month while those in the bottom 20%, in the bottom 40% and in the upper 60% of the income distribution would get 17€, 13€ and 8,5€ per month respectively. This scenario is the most effective in protecting the most vulnerable households and/or those most affected by the reform.

In the **macroeconomic analysis** we consider the impact of different redistribution options **through a linear cut in labour taxes or a reduction on VAT on electricity** to 6%. There is a trade-off between efficiency and equity in the choice of the revenue recycling option between lower labour taxes (better for GDP but higher income inequality) or a lump transfer (better to reduce inequality but higher economic costs). We find that itis possible to combine a cut of up to 2% % in social security contributions (or an equivalent linear tax cut) on labour with a proposed 70 €/tonne carbon tax in budget neutral tax-shift. We expect that a permanent reduction in VAT on electricity to 6% would reduce annual fiscal revenues with around €1.5 to €1.7 billion by 2030. Costs of this measure increase with the electrification of transport and heating, as such it may consume almost all of the available revenue from carbon taxation (€2.1 billion).

Compared to scenario where each household would receive a fixed amount of revenue from carbon taxation (lump-sum distribution), a linear cut in labour taxes would increase GDP with 0.04%, real disposable income with 0.10% and reduce unemployment with 0.66%. In absolute value at current levels of GDP and unemployment, this represents about €200 Million in GDP and 3000 FTE. The impact is roughly proportional to the size of the tax cut. Therefore a 3% cut has a roughly threefold impact. For a cut in VAT rates on electricity GDP would increase with 0.06%, real disposable income with 0.03% and unemployment with -0.34% compared to the lump sum scenario. This represents around €300 Million in GDP and 1500 FTE.

While using available revenue either for reform of labour taxes would lead to increased economic productivity, it comes at the cost of a reduction in equity of the scheme. Measured by different poverty indicators[14] and inequality indicators[15] we find that a lump sum redistribution of carbon tax

[14] Foster-Greer-Thorbecke indicators for intensity and inequality of poverty
[15] Generalized entropy indices and Gini coefficient

revenue could potentially have a beneficial impact on overall poverty and inequality (Figure 0.4). This impact largely disappears with a linear cut in labour taxes larger than 2%. A permanent reduction of VAT on electricity to 6% had a less clear impact on household inequality, although microsimulation implies that the result is less equitable than the lump-sum case.

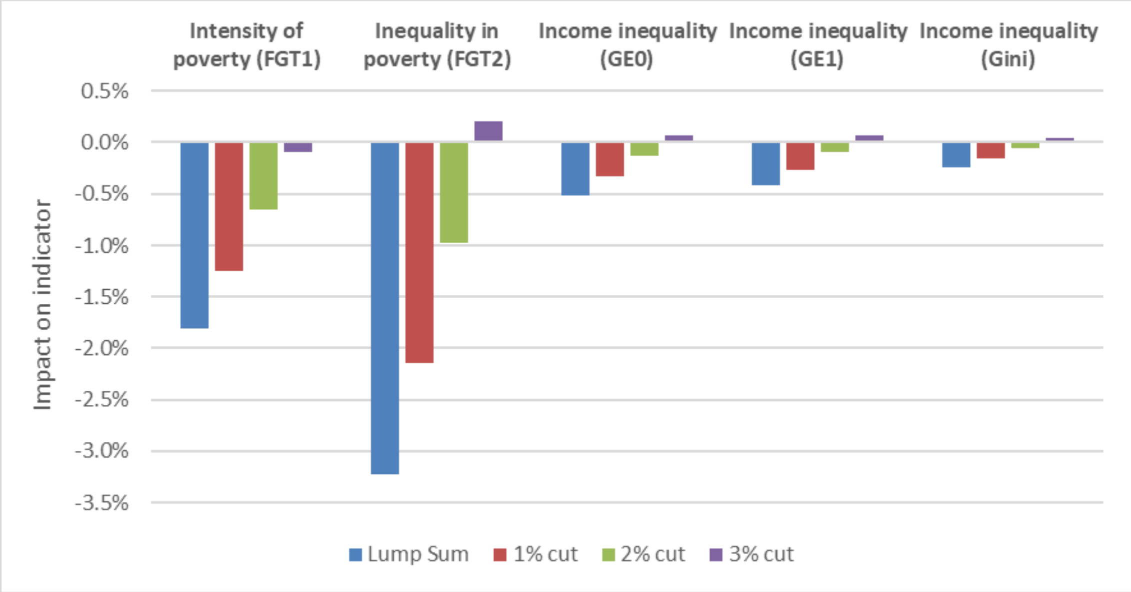


Figure 0.4: Impact of redistributing tax revenue from carbon taxation on poverty and inequality indicators, source: Own calculations with EDIP

A "rural climate bonus" as implemented in Austria **(rural targeted transfer**) has the potential to increase the number of winners since individuals in rural areas tend to be more impacted than those living in urban areas. However, the legal and administrative feasibility of this option should be assessed.

We stress the **urgency of the reform**. Emission reductions are the result of long-term investments (heating pump, electric vehicles, etc.). Because the impact of the reform is felt in the long run, inaction has a cost. The more one waits, the bigger the negative impacts. Therefore, in order to achieve its emission reduction target in non ETS sector by 2030, it is essential that policy action is taken today.

The **current high market prices for energy products will not induce sufficient structural emission reductions**. Andersson (2019) shows that **emission reductions are higher when the price increase is coming from a fiscal reform rather than from higher market prices**. This is because a fiscal reform is perceived as a permanent price shock. However, high energy prices do have an important impact on the political feasibility of the adoption of a climate tax shift. In the 2022 energy price crisis, a further price increase adopted by the federal government may suffer from a severe lack of public support.

Therefore, we **recommend the federal government to build resilience elements in the design of the tax shift**. This **can be done by using the so-called (regular and reversed) cliquet system**. It means that the introduction of the tax shift is postponed or moderated in times of high energy pricesprices and accelerated in when prices are dropping again. The system increases price stability and allows to moderate shocks in energy prices, and would be a way to increase public support for the fiscal reform. Furthermore, deciding on a climate tax shift now, but postponing its entry into force would be in line with the principle that taxation aimed at changing behaviour should be announced well in advance. Early announcement gives people the opportunity to anticipate to potential changes in their future consumption and investment decisions (e.g. insulation and/or a heat pump).

The carbon tax should be part of a **broader broader policy mix**. Our results show that a price on transport and heating fuel of €70/tCO_2 in 2030 alone will not be sufficient to achieve the needed emission reductions. This finding is in line with the literature. The climate tax shift will need to be complemented with existing or new GHG mitigation measures both at the federal and at other levels (i.e. European and regional level). As far as federal competences are concerned, we propose a set of additional measures below.

Furthermore, it is important that a climate tax shift puts particular emphasis on a decrease in the relative prices of electricity as compared to fossil fuel (), in order to accelerate the transition to a zero-emissions energy system, which is expected to be realized via electrification. The tax shift should create a much stronger incentive to opt for climate-friendly (and often electric) solutions such as heat pumps, which is currently missing. In sum, taxes on natural gas and heating oil should be increased more than taxes on electricity. Such a 'energy tax shift' is recommended even if no full climate tax shift would be implemented in Belgium.

Finally we suggest a reform of the current tax on nuclear rent and study a possible extension of the tax to other sectors (wind, solar, biomass, hydrogen) with high fixed cost and low variable cost of production. Since 2012 the revenue of the tax on rents of nuclear power producers in Belgium has declined from €550 Million (€11 / MWh) to €72 Million (€1.5 / MWh) in 2021. Even at a relatively low levels of taxation suggested in earlier reviews (6.2 €/MWh in Morbée et al, 2015) the annual revenue of the nuclear tax could be increased substantially

Table 0.3:Potential revenue of a reform in the rent on energy producers, Own calculations based on Febeg (2022)[16]

	Electricity production 2021 in TWh	Current rent in EUR/MWh	Potential reform A EUR/MWh	Potential reform B EUR/MWh	Old revenue	New revenue A	New revenue B
Nuclear	47.9	1.5	6.2	10	72	297	479
Wind	11.8	0	1.5	10		18	118
Solar	5.6	0	1.5	10		8	56
Hydro	1.3	0	1.5	10		2	13
Thermal	29.5	0	0	0		0	0
Other	0.4	0	0	0		0	0
Total	**96.3**				72	325	665

We could (Table 6.4) consider a conservative reform (A) that increases the nuclear rent to €6.2/ MWh. In addition we may consider a relatively low tax on renewables and hydropower at the current level of nuclear energy (€1.5 /MWh) which is comparable to the level of a similar tax in Norway. Applying a lower tax on renewables is justified as the LCOE of nuclear power is significantly lower than wind or solar power (IEA, 2020). The proposed reform would increase the revenue from €72 to €325 Million. The impact of the extension to renewables is relatively limited (about €28 Million).

[16] Statistieken elektriciteit | FEBEG Federatie van de Belgische Elektriciteits- en Gasbedrijven

The impact naturally depends on the rate applied. For comparison a uniform tax (B) of €10 /MWh would lead to €665 Million with €186 paid by renewable energy producers. Alternatives with different rates should be studied in more detail.

In conclusion, we suggest reviewing the tax rate on the profitability margin of nuclear power stations. For extending the tax to other sectors we recommend further study to avoid negative impacts on investment in the transition to renewable energy production.

It is important to **ensure the complementarity** between measures and across authority levels **through cooperation and dialogue**. Certain measures at the federal and at European or regional levelmay have a negative effect on the effectiveness of a carbon tax (e.g. aviation subsidies) or pose question of fairness (e.g. current fiscal treatment of company cars). Therefore, their revision should be considered.

Policy recommendations related to other key areas

In this part of the study, we analysed reform options that do not relate to energy taxation. The analysis is divided into five cases: industry & agriculture, transport, circular economy, finance, and buildings.

The analysis based on a combination of on expert interviews and literature containing comparisons with other countries. The aim of this part is to explore potential reform measures; in-depth studies on the exact impact of the explored measures were outside of the scope of this project, and would need additional research.

1) Industry & Agriculture

We recommend that taxes on fertilizer and pesticides are increased. We can look for inspiration for this reform to other EU countries that have implemented similar reforms (Denmark, Sweden, France) Sweden was the first country to introduce a special flat tax on pesticides. Denmark followed with an ad valorem tax on the highest existing wholesale price. The tax level of Denmark is comparably the highest level (5 – 10 times higher per equivalent volume as Sweden). The revenue in 2015 (Bocker & Finger, 2016) was equal to €80 Million. For Sweden it was around €7-8 Million. France has a scheme with rates between those of Sweden and Denmark, with an estimated revenue of €60 Million in 2013. Extrapolated to Belgium the potential revenue of such a tax would be between €10 and €80 Million depending on the design and rates. Pesticide sales in Belgium (2019) are 6126 tonnes (Eurostat data, 2021). A pesticide tax of 10€/kg (comparable to Denmark) would therefor lead to around €61 Million before behavioural change. While the Danish pesticide tax seems to be a promising measure for Belgium, more preparatory studies would be needed to identify and quantify the best tax base and the most efficient tax design.

A simpler measure would be to remove the preferential VAT rates for both fertilizer (currently 6% of 12%) and pesticides (12%). While this reform would have the advantage of its administrative feasibility, its environmental effectiveness would be significantly limited by the fact that an increase in VAT rate only has an impact on individuals, and not on companies.

As an additional priority measure in agriculture we suggest increasing the VAT on meat consumption to either 12% or 21% compared to the current 6%. Recent studies for the Netherlands (CE Delft 2018; Broeks et al, 2020) suggest that the current price of meat is substantially lower than its actual environmental cost. Extrapolating these studies to Belgium we find annual potential revenues from

€394 to €933 Million (with a respective increase in VAT to 12% or 21%) and external benefits of €108 up to €272 Million due to lower environmental damages. In addition there are significant long term health benefits to consumers that may compensate for losses in consumer surplus (Broeks et al, 2020).

2) Transport

As a priority reform, Belgium could phase out or reduce two important fossil fuel subsidies. The first is the reimbursement for commercial diesel, which is significantly higher than in neighbouring countries (€981 million payments in 2019), and more than half of the payments go to foreign countries. While the behavioural impact of the measure would partially crowd out the budgetary impact, we still recommend to consider a full but gradual phase-out of this subsidy. We consider two options. Either fully phasing out the subsidy with an estimated impact of €366 million in new revenues compared to 2019. Or a partial phasing out of the subsidy to the level of France (reducing reimbursement to €150 per 1000 l) which would bring in €151 Million in additional revenues. We also note that if the revision of the Energy Taxation Directive will be approved at EU level, fully phasing out the reimbursement will be legally required.

The second recommendation is the phase out the preferential tax treatment of company cars and associated fuel cards, which is more generous than in comparable countries as well (estimated budgetary cost of €2.3 billion in 2019). The third recommendation is to institutionalise the tax-free bicycle commuting allowance by making it mandatory in all sectors.

Fourth, to partially internalize the external costs of aviation, the existing embarkment tax could be increased from € 10 per ticket to € 20 per ticket (short-haul), from € 2 per ticket to € 8 per ticket for EU flights and from € 4 to € 30 per ticket for non-EU flights. This would align the tax with the rates of Belgium's neighbouring countries. The expected (additional) budgetary impact of this measure is €109 Million.

Inthe mid and long term, additional measures could be taken in aviation such as a VAT on airline tickets (6%, in line with rail passenger transport), and the introduction of excise duties on kerosine. These measures have large potential budgetary impacts if implemented. Introduction of a VAT on plane tickets would generate revenues between €200 & €400 Million by 2030. An excise tax on kerosene at the minimum rates required in the revision of the Energy Taxation Directive would lead to an additional revenue of up to €400 Million by 2030.

We also recommend phasing out introducing excise taxes on LPG and CNG at rates proposed in the revision of the Energy Taxation Directive. The budgetary impact would be small with revenues on CNG of €3-5 Million and LPG €16-22 Million.

A measure that can be considered, but should be assessed critically to avoid reverse modal shift from inland waterways to road transport is the reform of current exemptions on excise taxes for Inland Waterway transport. The revision of the ETD requires setting a low (€0.9/GJ) tax on diesel for inland waterways. We look specifically to two options. A) introducing a minimum tax at the rate set by the revised ETD B) introducing an excise tax at the minimum rate for motor fuels (10.75 €/GJ). We find that in option A) the potential revenue is equal to €7 Million, for option B) the potential revenue is €93.9.

3) Circular Economy

The study recommends to reform the existing beverage container tax in the following ways:

- An immediate compensation for the real tax rate reduction (27% since 2004) by an automatic annual indexation. If the tax rate reduction is compensated, this would lead to an additional €130 Million in revenues.
- Ensuring more differentiation in the tax design (e.g. between recycled and virgin material)
- Studying the pros and cons of other economic instruments (such as deposit return systems) which could replace or supplement the beverage container tax

Next, the study recommends to study the introduction of a more general plastic packaging tax[17] with differentiated tax rates based on the recyclability (virgin vs. re-used).

Finally, we recommend to modify the tax regime of investment deductions to stimulate the longer use of (electronic) equipment in companies.

4) Finance

In the financial sector, a temporary tax incentive for green bonds to support the growth of the green bond market, and increase investments in green projects and green innovation could be introduced. Ideally, this tax incentive would take the form of a temporary exemption on the withholding taxes on the bond's interest income. Alternatively, a reimbursement of the issuance costs or the costs for an external review could be considered. The incentive should be conditional upon certification of the bond (e.g. EU Green Bond Standard) to mitigate the risk for greenwashing.

- Furthermore, a green tax credit for pension savings could be implemented. The tax credit can be made conditional on the ESG[18] investment strategy of the fund (aligned with the Sustainable Finance Disclosure Regulation).

5) Buildings

In the sector of the built environment, the federal government's room for manoeuvre is relatively limited. However, tax credits (or other fiscal incentives) for collective financing mechanisms for heat grids could be considered.

[17] The EU has introduced a new levy on non-recycled plastic packaging waste from 1 January 2021. This is financed through Member State contributions. For Belgium, the revenues of this annual levy are expected to be around 153.4 million €.
[18] Environmental, Social, and Governance

1 Introduction

1.1 Objective of the study

The aim of this study is to make concrete proposals for the reform of federal taxation. There are many ways in which environmental taxes can be designed, depending on which policy goals are pursued. It is possible to maximise the environmental benefits and the economic efficiency of the measure, but it can also be desirable to balance this objective with other policy goals, such as fairness and collecting revenues. The determination of these goals and how to balance them is a policy choice. We restrain ourselves from making such choices, but we provide necessary guidance where relevant.

To conduct the economic analyses that will be carried out in this research, it is necessary to set up several scenarios with determined design elements. The purpose of these scenarios is to assess the consequences of certain designs, to better illuminate policy choices. These scenarios are developed based on the relevant legal developments at EU level and keeping the following overarching principles in mind:

- Any (additional) levy must be **as close as possible to the real impact on society** and fit within a strategic framework to deal with environmental issues (external cost internalisation).
- Taking the environmental cost into account, this means to discourage as much as possible the use of fossil fuels and phasing out subsidies for fossil fuels (see FPS (2021)).
- A CO_2 tax is seen as a tool that can either be implemented as a part of or additional upon existing excise duties and taxes. The objective of **revenue collection** through excise taxes and the **environmental objective** (reducing CO_2 emissions) **should be handled separately.**
- Because the impacts of climate change increase over time, we foresee an **increasing price trajectory**. This is also the reason behind the expected allowances price increases under the EU-ETS resulting from the increased stringency of the cap.
- **'Double taxation' should be avoided**. If an economic sector within the ETS system is subject to the CO_2 tax, the actual tax imposed should be discounted with the price of the ETS permit. This is the principle of a carbon floor.
- We design the reform as **budgetary neutral**. That is, any additional revenues would be redistributed to the population.
- The **social impact** of any measure must be **fairly distributed** among the population. The impact on lower-income households will therefore be central in the evaluation of measures.
- **Administrative costs and burden should not be disproportionate** compared to the potential revenue of the tax.
- As far as possible we wish to **avoid a leakage** (waterbed effect) of environmental impacts abroad. For example, strong incentives for electrification of vehicles in Belgium may lead to a reduction in incentives for electric cars abroad through the effort sharing mechanism. While these impacts may be hard to measure, we should avoid setting bad incentives.

- As far as possible, the reform needs to **consider externalities beyond CO_2 emissions**. For instance, private car use results in several significant additional externalities for the environment (e.g., air pollution) and town and country planning (e.g., parking, congestion), which can also be classified as undesirable for society.
- Wherever possible, we try to ensure **maximum synergy between federal and regional policy** instruments. At the very least, the reform should not have disproportionate impact on regional policies.

1.2 Federal competences and energy taxes

In the table below, we give an overview of the main existing taxes, of the competent authority (RG= Regional Government, FG = Federal Government) to determine their design elements (rate, basis and exemptions) and of the revenues in 2019. These findings are based on the fiscal memento (2021).

Table 1.1: Overview of tax revenues and furnishing government (based on Fiscal Memento 2021)

	Rate	Basis	Exemption	Total (M€)	%GDP	%Total
Personal tax	FG	FG	FG	**53 560**	**11.2**	**37.4**
Corporate tax	FG	FG	FG	**17 684**	**3.7**	**12.3**
Property tax	RG	RG	RG	5 712	1.2	4.0
Withholding tax	FG	FG	FG	4 055	0.9	2.8
VAT	FG	FG	FG	**31 701**	**6.7**	**22.1**
Registration & Mortgage	FG/RG	FG/RG	FG/RG	**5 574**	**1.2**	**3.9**
Inheritance tax	RG	RG	RG	2 447	0.5	1.7
Direct duties and taxes	FG	FG	FG	**3 244**	**0.7**	**2.3**
Customs and import duties	EU	EU	EU	1 673	0.4	1.2
Excise duty	FG	FG	FG	**9 797**	**1.9**	**6.3**
Packaging levy	FG	FG	FG	**350**	**0.1**	**0.2**
Taxes equivalent to income taxes[19]	RG (FG)	RG (FG)	RG (FG)	2 401	0.5	1.8

The table above shows that a there is a variety of relevant taxes levied at the federal level. Some are considerable in terms of revenues, in particular excise duties and VAT. Others are rather interesting from an environmental perspective (e.g. packaging levy). Income related taxes, namely the personal income tax and the corporate income tax, are important as part of a broader budgetary neutral environment, as they enable to redistribute income. This is known as a green tax shift. Finally, it must be emphasised that the federal authority may levy new taxes as long as the taxable objectis not already occupied by regional taxes[20]. This opens a wide range of possibilities for a fiscal reform.

[19] Met inkomstenbelasting gelijkgestelde belastingen / Impôts assimilés à l'impôt sur le revenu
[20] For an official answer about this aspect of Belgian fiscal federalism see answer question 6-825 https://www.senate.be/www/?MIval=Vragen/SVPrintNLFR&LEG=6&NR=825&LANG=fr

1.3 Guide to the report

This study provides a broad review of current energy and environmental taxes by the Belgian federal government. In broad terms we identify three main parts in the report.

1. A review of the policy context, mainly oriented at the EU level, in particular on the Fit for 55 package and its objectives
2. A detailed assessment of the impact of introducing carbon pricing at levels consistent with the National Debate on Carbon Pricing (2018)
3. An evaluation of specific measures for green tax reform for five key cases

Table 1.2: Guide to the report by issue and measure

Policy issues / measure	**How do we consider this?**	**Where to find in report?**
Context for reform		
Revision of policy at EU level: Energy taxation Directive, EU-ETS, CBAM in the context of the Fit for 55 package	Review of current EU policy and legal background	Section 2.3
Review of current excise taxes compared to environmental cost & external cost	Assessment based on current excise taxes and assessment of the revision of the ETD	Section 3.1
Proposal for reform	Proposal for reform including carbon pricing and revision of excise tax rates	Section 3.2
Assessment of carbon pricing and revision of the Energy Taxation Directive		
Impact of implementing minimum rates consistent with revision of Energy Taxation Directive	We consider the impact of increasing excise taxes consistent with rates introduced in the revision of the ETD. The impact of phasing out specific fossil fuel subsidies is assessed separately case by case (see Assessment of individual measures)	Sections 4.2, 5.4 & 5.5
Macro-economic impact of carbon pricing	We consider the impact of a carbon price equal to 20 €/tonne in 2023 and 70 €/tonne in 2030. Sensitivity analysis for a 100 €/tonne tax is added in section 4.2	Section4.1, 4.2,
Distributional impact of design of carbon pricing	Assessment of different tax recycling schemes: difference between lump-sum, linear reduction in labour tax rates and VAT reduction	Section4.1, 4.2
	Impact of carbon pricing on household level at levels of 20 €/tonne in 20203 and 70 €/tonnne in 2030 + impact of different tax recycling options	Section 5.4 & 5.5
	Literature review on carbon pricing design and revenue recycling options	Appendix A
Assessment of individual measures		

Case 1: Industry & agriculture		
Increased taxes on fertilizer and pesticides	Detailed assessment based on literature study and comparison with neighbouring countries	Section 6.2.3
Meat tax		
Tax on rents made by electricity producers		
Energy taxation of energy intensive sectors	Assessment on basis of literature	
Case 2: Transport		
Eliminate favourable treatment of diesel compared to petrol	Limited assessment and estimate of revenue based on volumes of 2019 and literature	Section 6.3.3
Introduce excise tax on LPG and CNG	Short assessment of current situation and possible revenue	
Phasing out of commercial diesel	Detailed assessment based on volumes of 2019 either fully phasing out or reducing discount to the level of France	
Increased airplane ticket tax	Detailed assessment based on literature study and comparison with neighbouring countries	
Phase out company cars and fuel cars		
Institutionalise bicycle commuting allowance		
Removing tax exemption for kerosene	Limited assessment on basis of literature	
Removing tax exemption for inland waterways		
Case 3: Circular economy		
Reform of beverage container tax	Detailed assessment based on literature study and comparison with neighbouring countries	Section 6.4.3
Introduce a plastic packaging tax with differentiation based on recyclability		
Modify the investment deductions to counter rapid depreciation of equipment		
Case 4: Financial sector		
Temporary tax incentive for green bonds	Detailed assessment	Section 6.5.3
Green tax credit for pension funds and long term savings	Detailed assessment	
Fiscal stimulation of collective financing mechanisms	Detailed assessment	
Case 5: Buildings		
Reform of tax rates for heating on natural gas, diesel and wood stoves	Limited assessment based on literature	Section 6.6.3

2 Policy context

2.1 Background

Over the past decades, the role of taxation to address the environmental and climate crises we face has been emphasised by many international institutions and authors. In this sense, the recent Report for the G20 Finance Ministers and Central Bank Governors concludes that explicit carbon pricing, through carbon taxes and emission trading, 'is particularly conducive to cost-effective climate change mitigation, provided that it is inclusive and supports economic development' (IMF/OECD 2021). If carefully designed, taxes can be economically efficient tools to address environmental problems such as climate change, whilst their possible distributional impacts can be addressed through support measures.

On July 14, 2021, the European Commission has proposed a package of measures, entitled 'Fit for 55 Package' (European Commission, 2021a), pursuant to the EU Green Deal (European Commission 2019a). With this package, the EU seeks to redefine EU legal landscape to deliver the transformational changes necessary to respond to climate change. Among the measures proposed is the revision of the Energy Taxation Directive (ETD) and of the European Union Emission Trading Scheme (EU-ETS.

The European context is important for two main reasons. First, Belgium bears responsibility to reduce GHG (greenhouse gas) emissions in non-ETS sectors. In accordance with the Effort Sharing Decision 2018/842 (Annex I),it is compelled to reduce GHG emission levels by 35% relative to 2005 levels, by 2030. The EU has increased this ambition level with the adoption of the European Climate Law[21] but this has not been distributed yet among Member States.

Even though this is a collective burden on Belgium (not as opposed to an individual burden on the federal authority), the federal authority has to enact policies to contribute to attaining this target. Second, the above Directives and their proposed modifications to are relevant to determine how federal eco-fiscality could/should be revised.

At the domestic level of Belgium, it should also be reminded that four entities, including the federal authority, have been condemned by the Tribunal of First Instance of Brussels (17 June 2021), for violating their duty of care by lacking sufficient mitigation measures and climate governance. Even though the Tribunal did not make an injunction to enact specific measures, it is clear that the federal authority is under duty to adopt more effective climate policies. The intricate federal structure of Belgium, as specified in the judgement, is not an excuse.

The shift towards a greater integration of environmental objectives in the fiscal system, including climate change mitigation, is also visible in other neighbouring and non-neighbouring countries (see literature review in Appendix A, World Bank 2021, Andersen 2019). Whereas Scandinavian countries have introduced a carbon tax already in the 1990s, other EU Member States have followed since then. Examples are France, Germany, and the Netherlands.

The importance of greening the prevailing fiscal system in Belgium was further stressed by expert interviews. During our study we have consulted a group of almost 30 experts with several questions on possible reforms towards green fiscality. Confronted with the question: "Are environmental taxes in Belgium currently too low, adequate or too high?" We got the following replies (

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[21] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), OJ L 243, 9.7.2021, p. 1–17

Figure 2.1). The vast majority of the experts (almost 80%) rated the environmental taxation in Belgium currently low or too low. Only 4.2% of the experts rated the current level of environmental taxes as adequate.

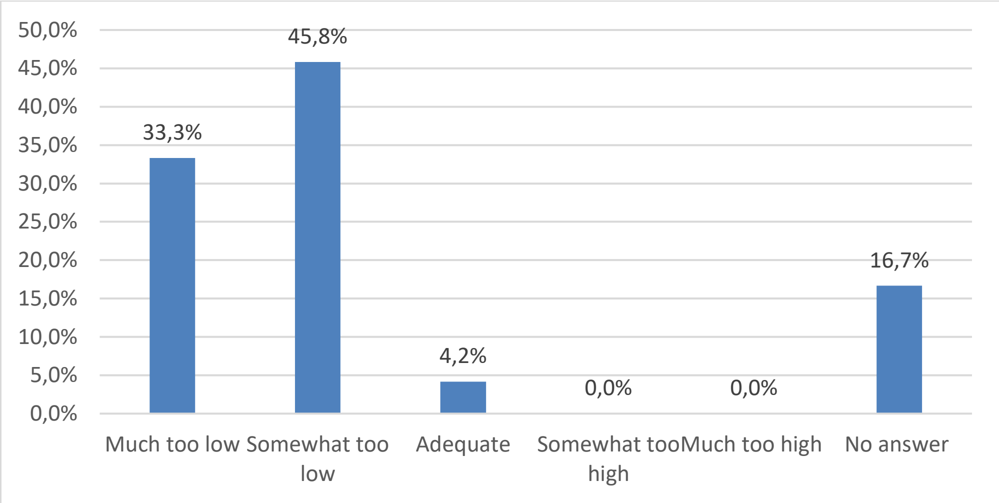

Figure 2.1: Expert opinion on adequacy of current environmental taxation in Belgium (n=24)

2.2 Conceptual distinctions surrounding environmental taxes

2.2.1 Environmental taxes, environmentally-related taxes and non-fiscal levies

Before we start, it is useful to make a number of conceptual clarifications about the concept of tax, of environmental tax and environmentally-related tax.

The first relevant concept is the concept of 'tax'. In Belgium, a tax is commonly defined as:

> "A tax is a levy by authority of the State, regions, communities, provinces or municipalities on the resources of persons living or having interests there, to be allocated to public utility services ".[22]

Example of taxes are eexcise duties on energy, the personal income tax, VAT and inheritance tax. By contrast, the characterisation of the EU-ETS has been discarded by the European Court of Justice.[23] In the same vein, a 'fee' which supposes a counterpart for a service is not a tax. It should also be noted that the name of the measure does not influence its characterisation in law; labelling a carbon

[22] Cass., 30 November 1950, *Pas.,* 1951, I, p. 191.

[23] See CJEU, (Grand Chamber) of 21 December 2011. Air Transport Association of America and Others v Secretary of State for Energy and Climate Change, C-366/10. It should be noted however that some of the features of the EU-ETS (e.g.stability reserve) make it increasingly resemble to a tax.. It should also be noted that the revenue of permits is considered as a tax in national accounting. The reason for that is that, as the atmosphere and natural resources are not considered as assets, payments for their use may not be considered as a fee.

tax as a 'climate contribution' will not disqualify it as a tax. These issues have been addressed in depth in the follow-up of the national debate on carbon pricing and we send you back to the relevant report. The question is how to link the concept of tax with the environment. This brings us to the definition of 'environmental tax'. While there is no consensus on how to define the concept of environmental tax in the literature, two main approaches are commonly used. The first one is by reference to the *tax base*. We follow the OECD and Eurostat. According to Eurostat, 'an environmental tax is a tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment'.[24] Eurostat distinguish four different categories of environmental taxes relating to energy, transport, pollution and resources (see Table 2.1).

The advantage of this approach is that it enables to objectively identify what is an environmental tax. However, such a definition is incapable of capturing whether the tax in question has a positive impact on the environment. In this definition it is also irrelevant of whether the tax levied is underpinned by an environmental objective, i.e. to discourage environmental damage and to provide an incentive for behavioural change. Therefore, this definition includes energy taxes, although they often levied for budgetary purposes, not to address environmental problems.

In light of these drawbacks, a second more subjective approach, has emerged. It refers to environmental taxes as "taxes with (potential) environmental effects that induce behavioural changes and that discourage environmental damage and/or a reduction in the use of natural resources. This definition requires a (potential) positive effect on the environment and a specific intent, so as to capture only taxes that are directed at protecting the environment."(Pitrone, 2015, p. 64).

In addition, the literature sometimes distinguishes environmental taxes from environmentally-related tax. The OECD defines this last concept as 'any compulsory, unrequited payment to general government levied on tax-bases deemed to be of particular environmental relevance'.[25] This definition is broader because it is not restricted to 'something that has a proven, specific negative impact on the environment'.[26] Nonetheless, in many cases, these terms are used interchangeably.

Table 2.1: Eurostat environmental tax bases (Statistical tax guide 2013)

Energy (including fuel for transport) — Energy products for transport purposes Eg. petrol, diesel, LPG, natural gas, kerosene — Energy products for stationary purposes Light & heavy heating oil, Natural gas, Coal, Electricity — Greenhouse gases	Resources — Water abstraction — Harvesting of biological resources (e.g. timber, hunted and fished species) — Extraction of raw materials (e.g. minerals, oil and gas) — Landscape changes and cutting of trees
Transport (excluding fuel for transport) — Motor vehicles import or sale (one off taxes) — Registration or use of motor vehicles, recurrent (e.g. yearly taxes) — Road use (e.g. motorway taxes) — Congestion charges and city tolls — Other means of transport (ships, airplanes, railways, etc.) — Flights and flight tickets	Pollution — Measured or estimated emissions to air e.g. NOx and SOx emissions — Ozone depleting substances e.g. CFCs or halons — Measured or estimated effluents to water — Non-point sources of water pollution e.g. Pesticides, fertilisers — Waste management

[24] According to Regulation (EU) N° 691/2011 on European environmental economic accounts,

[25] OECD, 2003, OECD Environmentally related taxes database, Paris.

[26] Pitonne 2016, Defining "Environmental Taxes": Input from the Court of Justice of the European Union, IBFD, 61

— Vehicle insurance (excludes general insurance taxes)	Collection, treatment or disposal ; individual products (e.g. packaging, beverage containers, batteries, tyres, lubricants) — Noise (e.g. aircraft take-off and landings)

2.2.2 Legal consequence of these categorisations

The characterisation as a tax has legal consequences, primarily on:

- the competence (what entities have jurisdiction to levy the tax?); with a tax, it is the fiscal distribution of competences that applies, as opposed to the material distribution of competences with other levies (e.g. fee or emission trading). Therefore, the federal authority can enact fiscal measures in relationto environmental matters for which it does not have a material competence.
- the procedure for adopting the norms in question, i.e. the principle of legality and principle of annuality, which both suppose the intervention of a democratically elected assembly;
- the content of the fiscal measure, in particular the principle of equality and non-discrimination and compliance specific rules in EU law (*e.g.* Article 110 of the TFEU or in state aids law).

The environmental objective of a tax can also has legal implications.

In the caselaw of the constitutional court, an environmental tax is lawful against the principles of equal treatment and non-discrimination if it complies with the polluter pays principle.[27] Typically, the Court rules that

> '*In the case of a tax based on the "polluter pays" principle, the rule of non-discrimination applies only if it reaches those who pollute and if it takes into account the extent to which each taxpayer contributes to the nuisance against which the tax is intended to act*'.[28]

This means that the tax must be designed in a way that those who pollute more are liable to pay more.

In a similar vein, the Court of justice examines whether the design of the tax is consistent with the environmental goal. If it is not the case, the Court can conclude to a violation of EU law.

Therefore, it is from a legal standpoint crucial to carefully design of the environmental tax in question. As regards carbon pricing (first part of the study), the main legal constraints applicable have been tackled at the occasion of the national debate on carbon pricing. As far as other fiscal measures are concerned (second part of the study), additional legal analyses will be needed but they go beyond the scope of this research.

[27]See National Debate Carbon Pricing
[28] Belgian Constitutional Court, 9 November1993 (n° 79/93).

2.3 EU context for reform

2.3.1 Importance of the EU context

Reforming energy taxes in Belgium, including to introduce CO2 differentiation, does not take place in a legal vacuum. EU law can have an influence on some of key design elements of such a reform. There are three main reasons for this:

1. EU law determines the conditions under which Member States are allowed to levy taxes on energy. These are obligatory upon Member States but they still have an important leeway in this regard.
2. As regards carbon pricing, is already in the EU legal order a carbon pricing scheme in place: the EU-ETS. The EU-ETS is relevant because it has the same goal as a carbon tax. . It is important to think about the interaction between the implementation of a carbon tax in Belgium and this scheme. This issue is becoming particularly relevant considering the proposed broadening of the EU-ETS in the context of the Fit for 55 Package.
3. These rules apply to Belgium's neighbouring countries that are also EU Members. Therefore, clarifying the EU legal context is directly relevant for the comparative analysis conducted in section 2 as it helps identify the scope for disparity or uniformity across Member States.

In particular we can distinguish two situations that would lead to considerable impact on Belgian energy taxation policy in the next decade, depending on whether the Fit for 55 Package is adopted (case 1) or not (case 2).

Case 1: The Fit for 55 Package is adopted

In this case the reforms of the Fit for 55 Package are implemented. The federal authority has a limited margin of appreciation given that it has to implement EU Directives. In particular the revision of the ETD (section 2.3.4), which constitutes the first main regulatory change implied by Fit for 55.

The second main change concerns the revision of the EU-ETS. The inclusion of the sectors of road transport, buildings and shipping into the EU-ETS means that CO_2 emissions from these sectors will be priced. This raises the question of the interaction between this scheme and energy taxes. The federal authority could consider two options:

1. Until the maritime sector (2023) and sectors of road transport and building (2026) are included in the EU-ETS, the federal authority could decide to levy an additional tax on the CO_2 emissions from these sectors. (see case below when Fit for 55 package would not be adopted)
2. A second element to consider is the carbon price level under the EU-ETS. Since this level is determined by the market and hence may vary, it may not lead to sufficient emission reductions. Consequently, a system of carbon floor could be introduced.

Case 2: The Fit for 55 Package is not adopted

It is possible that the Fit for 55 Package will not be implemented, or only partially. This means three things. Firstly, if the ETD is not revised, the federal authority will have more discretion to revise energy taxation, although it will still have to comply with several rules from EU law (e.g. the ETD and state aid law) and national law (e.g. distribution of competences). Secondly, such revision will not be coordinated with other Member States, which may raise an issue of competitiveness. Thirdly, outside the sectors currently covered by the EU-ETS, a carbon price will not arise from EU legislation.

In this case, the federal authority could consider the following options:

1. The **removal of fossil fuel subsidies**:
2. The **introduction of a CO_2 tax in non-ETS sectors:** such a tax was already implemented in our neighbouring countries. The final report of the National Debate on Carbon Pricing (2018) makes an in depth study of such a tax, with levels varying between € 20/tonne and € 100/tonne in 2030. The federal government can take the initiative to implement such a tax.

The remainder of this section is structured as follows. We first outline the main elements ofthe ETD. Next, we turn to the EU-ETS and subsequently to the Fit for 55 Package. Finally, we draw conclusions with respect to the design of a carbon tax in Belgium.

It should be noted that legal constraints arising from EU context have been examined following the context of the national debate on carbon pricing in Belgium.[29] We send the reader back to this document for complementary information, in particular on the issue of State aids rules.

2.3.2 The Energy Taxation Directive

Objectives

The ETD responds to the risk for the 'unity of the internal energy market' and for the liberalisation of energy markets started in 1996 in the field electricity and natural gas, caused by disparities between national tax policies.[30] This directive leaves a large margin of manoeuvre to Member States pursue of a variety of policies, *inter alia* in the fields of energy, environmental protection and transport.[31]

This Directive is widely recognised to have detrimental effects on the environment because it either allow or compels the maintenance of environmentally harmful subsidies (e.g. aviation).[32] Insofar, attempts to make energy taxes more in line with EU environmental objectives have failed.[33]

The ETD must be combined with the General Arrangement Directive 2020/262.[34] This Directive determines the conditions for the chargeability of excise duties in general (not only energy), the exemptions, the requirements under which excise goods must be suspended, etc.

[29] See Analyses juridiques liées à la mise en œuvre d'un mécanisme de tarification carbone dans les secteurs non-ETS belges, available at ; + summary
[30] Commission of the European Communities (1997). Proposal for a Council Directive restructuring the Community Framework for the Taxation of Energy Products, 12 March, COM(97) 30 final, p. 3.
[31] Ibid, Recitals, § 11; Commission of the European Communities (1997). Proposal for a Council Directive restructuring the Community Framework for the Taxation of Energy Products, *Supra* note, p. 4 ; D. Berlin (2012), supra note, p. 535.
[32] Notably J. van Eijndthoven (2011). Supra note.
[33] Commission of the European Communities (1992). Proposal for a Council Directive introducing a tax on carbon dioxide emissions and energy, Brussels, 30 June, COM(92) 226 final; European Commission (2011). Proposal for a Directive amending Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity, COM(2011) 169 final. See also European Commission (2011). Smarter energy taxation for the EU: proposal for a revision of the Energy Taxation Directive, Brussels, 13 April, COM(2011) 168 final.
[34] Council Directive (EU) 2020/262 of 19 December 2019 laying down the general arrangements for excise duty, *OJ L 58, 27 February 2020, p. 4–42.*

Material coverage

The scope of the ETD is restricted to an exhaustive list of products and to certain energy uses.[35] These include mineral oils (e.g. petrol, diesel, kerosene and gasoil), coal, natural gas and electricity. These products are demarcated on the basis of CN Codes.[36] The Energy Taxation Directive mainly covers energy products used for transport or heating purposes.[37] This means that other energy uses, including as raw materials have been excluded.[38]

Article 2(4) of the Directive also clarifies that harmonised tax arrangements do not apply to the dual use of energy products (e.g. chemical reduction, metallurgical processes). In the same vein, it does not cover energy used in mineralogical processes and to heat (e.g. cement).[39] In addition, the Directive does not cover electricity when it accounts for more than half of the cost of a product nor mineralogical processes.[40]

Where a product falls outside the scope of the ETD, Member States are free to levy a tax on that product, insofar they comply with EU primary law.[41] By contrast, where a product is covered by the ETD, the tax levied on that product must respect the harmonised tax arrangements. The consequence is that additional indirect taxes are in principle forbidden, to guarantee the functioning of the internal market.[42]

However, Member States remain authorised to levy 'other indirect taxes for specific purposes' than harmonised excise duties on that product (Article 1, § 2 of the General arrangement directive).[43] In that case, the tax in question must comply with two conditions: to pursue one or more specific purposes and comply with the excise duty or VAT's rules with respect to determination of the tax base, calculation of the tax and its chargeability and monitoring.[44] It is generally accepted that environmental protection is such a 'specific purpose'.[45]

Tax rates

The ETD prescribes minimum tax rates. This means that Member States are permitted to establish rates that go above these minima but not under. These rates are differentiated among motor fuel, motor fuel used for certain industrial and commercial purposes and heating fuels.[46] It is recognised

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[35] Energy Taxation Directive, Article 2, §§ 1-2.
[36] Energy Taxation Directive, in particular Article 2.
[37] Energy Taxation Directive, Article 2(4).
[38] European Commission, Proposal for a Council Directive amending Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity, *Supra* note, p. 7.
[39] As underscored by J. van Eijndthoven (2011). Supra .
[40] Energy Taxation Directive, Article 2(4).
[41] CJEU, Joined cases C-145/06 and C-146/06, Fendt Italiana Srl v. Agenzia Dogane – Ufficio Dogane di Trento, 5 July 2007.
[42] In this sense, Transportes Jordi Besora SL v. Generalitat de Catalunya, 27 February 2014, C-82/12. See also CJEU, Tallinna Ettevõtlusamet v Statoil Fuel & Retail Eesti AS, 5 mars 2015, C-553/13.
[43] Previously article 3 (2) of Directive 92/12/EC.
[44] Transportes Jordi Besora SL v. Generalitat de Catalunya, § 21-22.
[45] CJEU, Messer France SAS v. Premier Ministre, Commission de régulation de l'énergie, Ministre de l'Economie et des Finances, Ministre de l'Environnement, de l'Energie et de la Mer, 25 July 2018, C-103/17; On this topic see F. Pitrone (2015). Defining 'Environmental Taxes': Input from the Court of Justice of the European Union. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2567311. See also A. Pirlot (2020). Exploring the impact of European Union Law on Energy and Environmental Taxation, supra note.
[46] Ibid. See also Energy Taxation Directive, Recital, § 18: "Energy products used as a motor fuel for certain industrial and commercial purposes and those used as heating fuel are normally taxed at lower levels than those applicable to energy products used as a propellant."

that they do not reflect a consistent method to price energy products on the basis of their calorific content, as shown in the table below.

Table 2.2: *Minimum rates & correspondence in terms of calorific content, based on Commission Staff Working Paper Impact Assessment, SEC(2011) 409 final*

Type of energy use and electricity	**Type of energy product**	**Minimum rate level**	**Calorific content (in euro per GJ)**
Transport fuel	Unleaded petrol	359 (euro per 1000l)	11
	Gasoil	330 (euro per 1000l)	8.9
	Natural gas	2.6	2.6
Heating fuel	Gasoil	21	0.6
	Natural gas[1]	Business use : 0.15	0.15
		Non business use : 0.3	0.3
Industrial & commercial purposes	Gasoil	21	0.6
	Natural gas[2]	0,3	0.3
Electricity		Business use : 0,5/MWh	0.15
		Non business use : 1/MWh	0.3

[1] In euro per gigajoule gross calorific value.

[2] In euro per gigajoule gross calorific value.

The ETD sets forth specific rules for electricity.[47] This is explained by the fact that electricity is a secondary source of energy. The approach followed by the Energy Taxation Directive is to tax electricity as an output. Consequently, energy products and electricity used to produce electricity have been in principle exempted from taxation (mandatory exemption).[48]

Member States are allowed to unilaterally levy an input tax on fossil fuels used to produce electricity or to refund electricity producers using renewable energy sources or do nothing.[49] Accordingly, the Directive allows Member States to exempt of electricity from renewable sources and authorised Member States to derogate to the mandatory exemption in favour of energy products used to produce electricity for reasons of environmental protection.[50]

[47] Note that the specificity of electricity already appeared from the title of the Directive itself, with refers to the 'taxation of energy products *and* electricity'.
[48] Energy Taxation Directive, Article 14 (a).
[49] Ibid. See also Commission Staff Working Document (2019), Evaluation of the Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and Electricity, SWD(2019) 332 final}, p. 13.
[50] Energy Taxation Directive, Art. 14 and 15, 1, b. The Directive also allows Member States to 'refund to the producer some or all of the amount of tax paid by the consumer on electricity produced from products specified in paragraph 1(b)'. (Art. 15, 2).

Currently, biofuels are taxed at the rate of the convention fuel they replace, and this even though they are less carbon intensive than fossil fuels and that in general they have a lower energy content than the fossil fuel they replace. Therefore, existing rules are considered detrimental to the development of biofuels.[51]

Derogations

The ETD contains a wealth of facultative and mandatory derogations. *Mandatory* exemptions mean that Member States have no choice but to exempt certain energy products (e.g. energy products used to generate electricity).[52] The Directive also exempts international commercial aviation and maritime navigation, pursuant to EU's international commitments. This covers fuel used 'for the purpose of air navigation other than in private pleasure-flying', as well as 'for the purposes of navigation within Community waters (…), other than private pleasure craft, and electricity produced on board a craft'.[53] By contrast, Member States have remained free to tax jet fuels (aviation) and domestic or intra-community fights and navigation.[54]

On the other side, the ETD leaves Member States with the autonomy to introduce *facultative* tax reductions and exemption.[55] For instance, they can introduce tax reductions in favour of households and organisations recognised as charitable , in favour of energy intensive businesses, and of renewable energy. The Directive also allows Member States to differentiate between commercial and non-commercial gasoil and between business and non-business use of energy products.

These derogations are summarised in the appendix.

2.3.3 The EU-ETS

The EU-ETS was introduced by Directive 2003/87/EC (hereinafter 'ETS Directive). This mechanism puts a price on the GHGs emissions of large industrial installations. It takes the form of an emission trading (or cap-and trade) system. It has known extraordinary changes as the EU has followed a 'learning by doing' approach. The focus on this scheme is explained both by its proposed expansion under the Fit for 55 Package and the interaction between this scheme and national energy taxes.

We briefly present the general functioning of the EU-ETS, its coverage, and finally, how revenues are distributed, including among Belgian entities.

Functioning

The EU-ETS depends on permits, which are granted by national authorities. Installations covered by ETS Directive are compelled to hold a GHG emissions permit, in order to carry out their economic

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[51] In this sense 2019 Staff working document on the evalution of the Energy Taxation Directive.
[52] Ibid, Article 14, § 1, a.
[53] Ibid, Article 14, § 1, b et c. On the concept of commercial flights see CJEU, Systeme *Helmholz GmbH v Hauptzollamt Nürnberg*,1 December 2011, C-79/10.
[54] Ibid, Article 14, § 2. See also, European Commission, Commission staff working document - Annex to the Communication from the Commission: "Developing the agenda for the Community's external aviation policy", Brussels 11 March 2005, COM(2005)79 final.
[55] Energy Taxation Directive, Article 15.

activity.[56] The permit in question sets an obligation to surrender the number of allowances that cover their emissions level. Installations are also under duty of adequate monitoring and report of emissions.[57] In the case an installation fails to surrender enough allowances, it must pay a penalty.[58] These allowances are transferrable which ensures the cost-effectiveness and economic efficiency of the scheme.

Since the adoption of Directive 2009/29/EC, the EU-ETS is centralised. It is the EU that determines the cap, which is annually. Since 2021, this linear factor is 2.2 percent. The ETS Directive also sets a common method for allocating allowances across Member States.[59]

This method is a mix of auctioning (allowances must be purchased) and free allowances, which is determined as follows:

- Allowances of energy generators are fully auctioned
- Installations at genuine risk of carbon leakage (list determined by the Commission) receive their allowances for free, on the basis of a benchmark.
- Other installations receive part of their allowances for free, on the basis of a benchmark, and the rest of their allowances are auctioned.

The EU-ETS covers two types of installations, which are subject to distinct systems: stationary installations and aviation.

Stationary installations

The EU-ETS applies to stationary installations, namely 'a stationary technical unit where one or more activities listed in Annex I are carried out and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution'.

The list of covered installations comprises electricity generation, oil refineries, ferrous and non-ferrous metal, chemicals. In some cases (e.g. electricity generation), a minimum capacity threshold is applicable. This means that only the biggest installations are covered. The coverage of the EU-ETS is important because it implies that for many activities, including electricity generation, that some GHGs are already priced. This is important in the context of the reform of excise duties.

Table below provides an exemplative list of installations and GHGs covered by the EU-ETS.

[56] ETS Directive, Article 4, according to which "Member States shall ensure that, from 1 January 2005, no installation undertakes any activity listed in Annex I resulting in emissions specified in relation to that activity unless its operator holds a permit issued by a competent authority in accordance with Articles 5 and 6, or the installation is temporarily

[57] 2001 Proposal, Supra , p. 3 at 1.2 For a critical assessment of the enforcement side of the EU-ETS see M. Peeters (2006). Inspection and market-based regulation through emissions trading the striking reliance on self-monitoring, self-reporting and verification. Utrecht Law Review, 2(1), 177-196.

[58] ETS Directive, Article 16.

[59] New article 9

Table 2.3: Overview of installations covered by EU-ETS

Installation	gas
Combustion of fuels in installations with a total rated thermal input *exceeding 20 MW* (except in installations for the incineration of hazardous or municipal waste)	CO_2
Refining of mineral oil	CO_2
Production of coke	CO_2
Production or processing of ferrous metals (including ferro-alloys) where combustion units with a total rated thermal input exceeding 20 MW are operated	CO_2
Production of primary aluminium	CO_2 and perfluorocarbons
Production of cement	CO_2
Production of pulp from timber or other fibrous materials	CO_2

Aviation

The EU-ETS also applies to intra-EEA flights but not to other international flights. The latter are covered by the scheme, under the ICAO (ETS Directive, Article 3a and Annex I).[60]A separate system, however, is in force in this (ETS Directive, Chapter II). The cap applicable to aircraft operators is distinct and more advantageous, using 2004 as a baseline.[61]

The method for distributing allowances in this sector is also different. Since 1 January 2013, 15 % of their allowances are auctioned (ETS Directive, Article 3d, § 2). The remaining free allowances are allocated on the basis of verified tonne-kilometre data for the aviation activities (ETS Directive, Article 3e).

Revenues

Where allowances are auctioned, the EU-ETS generates revenues. Since the price level of an allowance will vary, , the revenues collected will vary too.

The EU-ETS has known many problems which have resulted in historically low prices. These have been addressed through the introduction of a stability reserve. The allowance price level is since May 2021 above 40 euros and in December 2021 exceeds 80 euros.

90 percent of the share of emissions that are auctioned are distributed among Member States based on their historical emission level (ETS Directive, Article 10, § 2). The remaining 10 percent follows a different system to ensure solidarity, growth and interconnections within the EU.

The ETS Directive requires Member States to use at least 50 percent of their revenues for specific purposes, including low carbon project and social support (Article 10).

Implementation in Belgium

Even though the EU-ETS is now centralised, national authorities are involved in its daily functioning. They remain in charge of the granting of permits and of the auctioning or free allocation of allowances.

In Belgium, these tasks are under the competence both of the regional and the federal authorities. They have thus required the conclusion of cooperation agreements.[62]

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61 https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/allocation-aviation_en

62 See in particular Cooperation Agreement between the Federal State, the Flemish Region, the Walloon Region and the Brussels-Capital Region on the organisation and administrative management of the Belgian national greenhouse gas registry in accordance with Directive 2003/87/EC of the European Parliament and of the Council, Regulation (EC) No 525/2013 of the European Parliament and of the Council, and on certain aspects of auctioning in accordance with Commission Regulation (EU) No 1031/2010

The revenues attributed to Belgium amount to 2,45% of auctioned allowances in the EU.[63] They are distributed among the different entities based on their respective emission share by a cooperation agreement.[64] This repartition is outlined in Table 2.4. It should be noted that there is normally a new key (burden sharing) to come into force from 2021 but this has not yet been fixed.

Table 2.4: Distribution of revenues from the EU-ETS among Belgian entities, cooperation agreement Article 39 of 12 February 2018

	For the first bracket of 326 millions euros	For the other revenues until 2020
Federal authority	10 %	9,05 %
Flemish Region	53 %	52,76 %
Walloon Region	30 %	30,65 %
Region of Brussels-capital	7 %	7,54 %

2.3.4 Fit for 55 Package

The Fit for 55 Package consists of a set of measures aiming to respond to the current climate and biodiversity crisis we are facing. This package comprises a variety of measures to transform EU legal landscape in the field of climate change mitigation. These measures, include a revision of the ETS Directive and of the ETD, namely:

- Proposal for a Directive restructuring the Union framework for the taxation of energy products and electricity, COM(2021) 563 final;
- Proposal for a Directive amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757, COM(2021) 551 final

These Proposals successively presented in the remainder of this Section.

It should be noted that the Fit for 55 Package does not prevent overlap between the EU-ETS and the Energy Taxation Directive. In other words, if both of the Proposals above become enacted, energy consumed by ETS participants will be covered by both schemes.

Revision of the ETD

As part of the Fit for 55 Package, the Commission has made a Proposal to revise the ETD described above.[65] The Proposal pursues simultaneously several objectives: to align the Energy Taxation Directive with the climate and energy framework as well as to ensure the proper functioning of the internal market, whilst preserving Member States' capacity to generate revenues.[66] Based on this backdrop, it intends to make the following changes to the tax arrangements in place:

[63] https://climat.be/actualites/2019/les-revenus-belges-provenant-de-la-mise-aux-encheres-des-droits-demission-depassent-la-barre-du-milliard-deuros
[64] Cooperation agreement of 12 February 2018 between the Federal State, the Flemish Region, the Walloon Region and the Brussels-Capital Region on sharing the Belgian climate and energy objectives for the period 2013-2020
[65] European Commission (2021). Proposal for a Council restructuring the Union framework for the taxation of energy products and electricity (recast), 14 July, COM(2021)563 final.
[66] Ibid, Explanatory Memorandum, p. 1.

1. to set higher rates for fossil fuels and lower rates for renewable energy products
2. to switch to energy content-based taxation
3. to rank energy products according to their environmental performance
4. to eliminate fossil fuels subsidies.[67]

The Proposal aims to move towards a two-headed tax, based on the *calorific content* and on the *environmental performance* of energy products.[68] The calorific content component is differentiated on the basis of environmental performance.

The Commission, however, remains vague as to the concept of 'environmental performance'. Instead, it classifies energy products, into four categories :[69]

1) fossil fuels (imposed at the reference rate);
2) fossil fuel characterised as 'less harmful' and still having 'some potential to contribute to decarbonisation in the short and medium term' (imposed at 2/3 of the reference rate during a transitional period of 10 years)
3) Sustainable but not advanced biofuels (imposed at ½ of the reference rate) and;
4) Renewable energy (imposed at the lowest rate).

The Proposal maintains the prevailing distinction between motor fuels, heating fuels and electricity. It also continues to differentiate between transport fuels used for the purposes set out by Article 8(2) of the Energy Taxation Directive (e.g. agriculture).[70] On the contrary, it removes the distinction between commercial and non-commercial gasoil and business and non-business use of heating fuels and electricity.[71]. Under the new proposal, electricity continues to be taxed as an output, but Member States are free to unliterally tax inputs, as long as they 'replicate the ranking between the minimum levels of taxation as laid down' by the Directive.[72]

In all, the relevant energy products will be subject to the following minimum tax rates (Annex I of the proposal). Table 2.5 below presents the rates for the main energy products. These rates will be indexed from 2024 (Article 5).

Table 2.5: Minimum tax rates for a selection of energy products, in euros per GJ, Annex I ETD proposal

	From 1 January 2023	From 1 January 2033 (before indexation)
Used as a propellant		
Petrol	10.75	10.75
Kerosene	10.75	10.75
Non sustainable biofuels	10.75	10.75
Gasoil	10.75	10.75
LPG	7.17	10.75

[67] Ibid, Explanatory Memorandum, p. 3.
[68] European Commission (2021). Proposal for a Council restructuring the Union framework for the taxation of energy products and electricity (recast), Supra note, Annex I.
[69] European Commission (2021). Proposal for a Council restructuring the Union framework for the taxation of energy products and electricity (recast), Supra note, Annex I. See also explanatory memorandum, p. 3, 12-3.
[70] Ibid, Annex I table B.
[71] Ibid Explanatory Memorandum, p. 14
[72] Ibid, Article 13.

Natural gas	7.17	10.75
Non sustainable biogas/non-renewable fuel	7.17	10.75
Sustainable biofuels	5.38	5.38
Advanced sustainable biofuels and biogas	0.15	0.15
Used as propellant – purpose article 8(2) ETD		
Gasoil	0.9	0.9
kerosene	0.9	0.9
LPG	0.6	0.9
Natural gas	0.6	0.9
Non sustainable biogas/non-renewable fuel	0.6	0.9
Sustainable biofuels	0.45	0.45
Advanced sustainable biofuels and biogas	0.15	0.15
Used as heating fuel		
Gasoil	0.9	0.9
Kerosene	0.9	0.9
Coal	0.9	0.9
Natural gas	0.6	0.9
LPG	0.6	0.9
Non sustainable biogas/non-renewable fuel	0.6	0.9
Sustainable bioliquids and biogas	0.45	0.45
Advanced sustainable biofuels and biogas	0.15	0.15
Others		
Electricity	0.15	0.15

The rates above are merely minima, as under the current regime of the ETD. This means that domestic excise duties can go beyond these rates. However, Member States are not totally free to decide the rates above these minima: they should replicate the relationship between the minimum levels of taxation fixed in the proposal for the various energy sources and uses. It is also specified that 'electricity should always be among the least taxed energy sources in view of fostering its use'.[73]

The proposal abolishes many of the facultative tax reductions and exemptions left at the discretion of Member States. These include among other things: the possibility to apply a level of taxation down to zero to energy products used for agricultural, horticultural works, and in forestry, to differentiate rates of energy products used by local public passenger transport (including taxis).[74]

One remarkable change proposed is the extension of the tax arrangements to commercial aviation and shipping, which were so far exempted from energy taxes.[75] This extension concerns both intra- and extra-EU navigation, but it is accompanied by derogations and a gradual phase in.[76] Member States may decide to maintain the exemption with respect to extra-EU navigation (both air and maritime).[77]

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[73] Explanatory memorandum p. 14.
[74] Modification of Article 2, § 4 and Articles 5, 14, 15 and 17-18 of the Energy Taxation Directive.
[75] Ibid, New Article 14.
[76] Ibid.
[77] Ibid, Explanatory Memorandum pp 15-16

As regards aviation, the provisions apply 'without prejudice of international agreements'. This considerably limits the impact of the provision as agreements such as the Chicago convention are deemed to prohibit taxes levied on aviation fuel.[78] The Proposal also exempts cargo-only flights.

Revision of the EU-ETS

The Fit for 55 Package plans for a major revision of the EU-ETS.[79] The following changes are particularly relevant for this research:

- The proposal aims to revise some elements of current system applicable to stationary installations and aviation
- It is proposed to introduce an adjacent ETS in the sectors of road and maritime transport and in buildings
- The proposal aims to modify free allocation rules, against the backdrop of the proposed Carbon Border Adjustment Mechanism (CBAM)

With its latest proposal, the Commission, puts greater emphasis on the distributional impacts of this scheme.Note that the Commission also introduced a separate proposal to revise the EU-ETS with respect to aviation, but it will not be discussed here.[80]

With the Fit for 55 Package, the Commission aims to adapt the EU-ETS by

- Increasing the cap reduction from linear reduction of 2.2% to 4.2% per year between 2021 and 2030 + adjustment of cap 2023 to year 2021
- By reducing free allowances to 0 by 2035

It also proposes to expand the scope of the EU-ETS to the road transport and building sectors, starting from 2026 and to maritime transport from 2023.

In these sectors, Proposal establishes a 'separate but adjacent emission trading' for these sectors, referred to as ETS2.[81] This means that the cap will be separate and that allowances, which will be fully auctioned, will sold on a different market. As these sectors involve diffuse emission sources, it is an upstream system that is established where fuel suppliers are designated as regulated entities. [82]

[78] See discussion infra about the Chicago convention.

[79] European Commission (2021). Proposal for a Directive amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757, 14 July, COM(2021) 551 final.

[80] European Commission (2021). Proposal amending Directive 2003/87/EC as regards aviation's contribution to the Union's economy-wide emission reduction target and appropriately implementing a global market-based measure, 14 July, 2021/207.

[81] European Commission (2021). Proposal for a Directive amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757, Supra note, New chapter Iva. It is added at p. 3 that 'Any possible merger of the two systems should be assessed only after a few years of functioning of the new emissions trading, based on experience. The extension to buildings and road transport requires an upstream approach to regulated entities.'

[82] Ibid, pp. 2 and 56.

Finally, the Proposal expands the EU-ETS to maritime transport -.[83] It will be incorporated into the same emission trading market as aviation and stationary installations whilst governing them temporarily by different rules. The proposal distinguishes between four categories of trips, where the emissions of only two of them are covered integrally.[84] A phase-in period is also introduced to smooth the transition. During this period, shipping companies must submit allowanced for an increasing share of emissions.[85]

Interaction with CBAM

Another key change to the design of EU-ETS is related to the introduction of the CBAM proposal.[86] This measure is intended 'to address the risk of carbon leakage and *reinforce* the EU-ETS'.[87] The EU-CBAM would complement the EU-ETS.[88]

Pursuant to a stepwise approach, the scope of this measure expands to a limited list of products, including cement, electricity, fertilisers, iron and steel, and aluminium.[89]

The ETS proposal, on the other side, aims to gradually phase out free allocation in sectors or sub-sectors at risk of carbon leakage, whilst the CBAM will gradually phase in.[90]

Addressing distributional impacts

The final point regards the distributional impacts of the EU-ETS. The proposal aims to address these impacts through three key measures:

- First, the proposal aims to increase the percentage of auctioning revenues that should be allocated to the Modernisation Fund, whilst changing its coverage to support 'Member States with GDP per capita below 65 % of the EU average in 2016-2018'.[91] It also intends to streamline the use of revenues to eliminate support to fossil fuels and to redirect investments towards renewable energy and energy efficiency measures.[92]

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[83] They are covered by a separate Chapter IVa.

[84] "Maritime transport activities shall apply in respect of fifty percent (50 %) of the emissions from ships performing voyages departing from a port under the jurisdiction of a Member State and arriving at a port outside the jurisdiction of a Member State, fifty percent (50 %) of the emissions from ships performing voyage departing from a port outside the jurisdiction of a Member State and arriving at a port under the jurisdiction of a Member State, one hundred percent (100%) of emissions from ships performing voyages departing from a port under the jurisdiction of a Member State and arriving at a port under the jurisdiction of a Member State and one hundred percent (100 %) of emissions from ships at berth in a port under the jurisdiction of a Member State."

[85] Ibid, recitals, § 17.

[86] European Commission (2021). Proposal for a Regulation establishing a carbon border adjustment mechanism, 14 July, COM(2021) 564 final.

[87] European Commission (2021). Proposal for a Regulation establishing a carbon border adjustment mechanism, Supra note, p. 3.

[88] Ibid, Article 1 'complement'.

[89] Ibid, § 28. Annex I. This list was based on level of GHG emissions in the relevant sectors covered by the EU-ETS and on exposure to a significant risk of carbon leakage; § 29 recitals; list carbon leakageDecision 2019/708

[90] European Commission (2021). Proposal for a Directive amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757, Supra note, new article 10a.

[91] Ibid, Article 10 as revised.

[92] Ibid, p. 3.

- Second, the Commission made a separate proposal to set up a 'Social Climate Fund'.[93] The purpose is to 'promote fairness and solidarity between and within Member States while mitigating the risk of energy and mobility poverty during the transition'.[94] Accordingly, it is planned that 25 percent of revenues from the revised ETS will come to this fund.[95]
- Third, the ETS Proposal encourages the use of auction revenues for social support measures.[96]

[93] European Commission (2021). Proposal for a Regulation establishing a Social Climate Fund. COM(2021)568 final.
[94] European Commission (2021). Proposal for a Directive amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757, Supra note, recitals § 52.
[95] Ibid.
[96] Ibid, p. 6.

3 Proposal for tax reform in Belgium

3.1 Current system compared to environmental taxation

3.1.1 Comparison with tax based on environmental cost

It is well known that excise duties on energy have been designed and levied for purposes which were unrelated to environmental protection or other negative impacts (e.g. congestion).

In the first place, excise duties have been levied as a way for the state to generate income. Historically, excise taxes have often been implemented on goods where the tax had a limited impact on the ultimate demand for the good. In economic terms, this is called a low elasticity of demand. The principle of taxing goods with low elasticity is also called the Ramsey rule (Ramsey, 1927). Classic examples of such goods, beside energy carriers, are alcoholic beverages and other products such as tobacco or coffee (Figure 3.1). The consequence is that, especially in the case of energy, excise duties have no clear link with the energy content of the fuel or its environmental impact. Excise taxes on fuel do represent two thirds (around €6.6 billion in 2019) of overall excise tax revenue, with €5.4 billion directly charged on derivates of mineral oil. Other important excise tax revenues are on tobacco (€2.4 billion in 2019) and excise taxes on alcohol and other beverages (€1 billion in 2019).

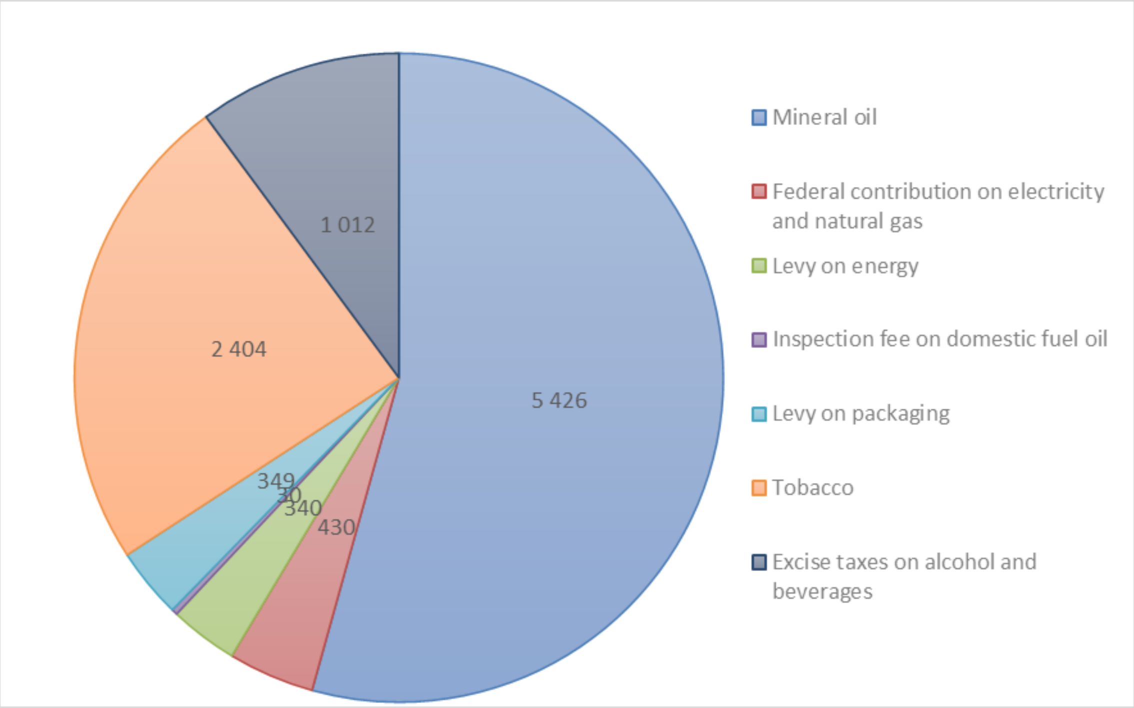

Figure 3.1: Total excise tax revenues Federal Government in 2019 in million €, source: OECD, Statbel

It is, however, clear that energy consumption, and in particular when generated with fossil fuel, has negative side effects for individuals and for society (e.g., climate change, air pollution). Moreover, oil and gas dependence are associated with a variety of problems, such as price volatility which provides an additional social rationale for levying excise duties on these goods. As a result, excise duties can also be interpreted as monetary compensation for negative effects on so-called 'bad goods'. The environmental economic theory describes this as a tax on externalities. Negative externalities mean that the social cost of an activity is not covered by the private cost. The concept of a Pigovian tax

(Pigou, 1920) is a tax rate that is equal to the marginal damage cost for society. In the case of alcohol and tobacco, this mainly concerns the health impact of consumption. In the case of fossil fuels, it is a question of both emissions and long-term pollutants, notably greenhouse gases and pollutants with long-term health effects (fine particulates, NOx, VOC, ozone, ...).

In practice Pigovian taxes can be difficult to estimate as it requires an estimate of the level of taxation that is required to offset marginal social cost. In the case of carbon emissions this is relatively straightforward as the emission of CO_2 occurs in an almost fixed and predictable ratio in relation to the amount of fuel. If we interpret the current excise taxes on fuels (excl. VAT) as implicit taxes on carbon emissions of particular fuels and set these out versus the total share of CO_2 emissions that are produced in combustion of these fuels we get Figure 3.2. Similar figures are produced by the OECD (2021b).

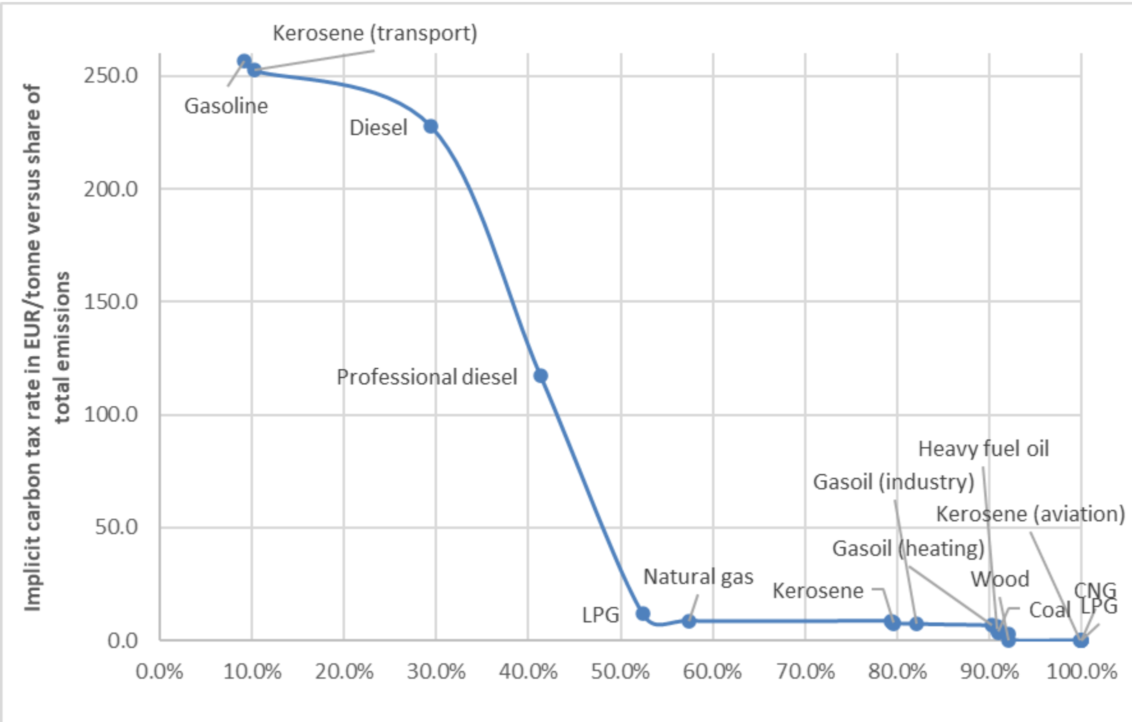

Figure 3.2: Implicit carbon tax rates (based on excise tax excl. VAT) versus overall share in emissions, source: Own calculations based on Volumes 2019 and OECD(2021b)

Figure 3.2 visualizes the large discrepancy in taxing carbon content of fuels in Belgium (see also below). A number of transport fuels that represent around 30-40% of overall emissions are subject to relatively high excise taxes while for other fuels taxations is nearly zero. It would be wrong to look at current excise taxes only from the view of CO_2 emissions. Public economists that study environmental taxes (see for example Sandmo A. (2011)) have pointed out that optimal (excise) taxes would take into account a variety of public objectives. Among those: generating revenues, taking into account external cost and trade-off social objectives. Another difficulty lies in estimating the true social cost of carbon. For emissions of other pollutants, such as NOx, both the amount of pollutant as its related health effects are location, time, and situation dependent. It should also be noted that emissions by ETS industry are subject carbon pricing, which serves indirectly as a carbon tax on fuels.

In its assessment of the impact of the ETD reform (EC 2021d), the European Commission has evaluated several options for reforming excise taxes and providing a more objective look at energy taxation, while avoiding tax competition between member states.

One of the aims of the revision of the Energy Tax Directive is to restructure the taxation on energy in a way that reflects the energy content of each type of fuel. For this we need to look at the Net Calorific Value (NCV) of each type of fuel, which is the effective heat released by combustion, net of possible losses due to evaporation of water in these fuels and is expressed in GJ. This can potentially be combined with a tax on carbon content and an additional component that reflects other air pollution by the fuel.

Following the logic of the impact assessment of the proposed revision of the ETD in EC (2021d) we compare current excise tax rates on common fuels in Belgium with the external cost caused in the use of the particular fuel. We take into account the social cost of carbon following the EIB Group Climate Bank roadmap 2021-2025. The EIB has revised the shadow cost of carbon based on modelling results that are consistent with a 1.5 °C target. For 2030 this leads to a €250 /tonne cost, which moves upwards to €800 /tonne by 2050. For assessing the social cost of carbon we will use €250 /tonne as reference value. All costs are normalized in €/GJ. We note to the reader that the social cost of carbon is a very dynamic estimate which reflects the commitment of the EC to reduce net emissions of CO_2 to zero by 2050. Therefore our reflections on the adequacy of current energy (excise) taxes in Belgium on fossil fuels as environmental taxes are mainly indicatory. To achieve rapid reduction of CO_2 emissions beyond 2030 there is a need for more stringent policy and an upward trajectory of carbon pricing that reflects the social cost. This explains the rapid increase in the social cost after 2030.

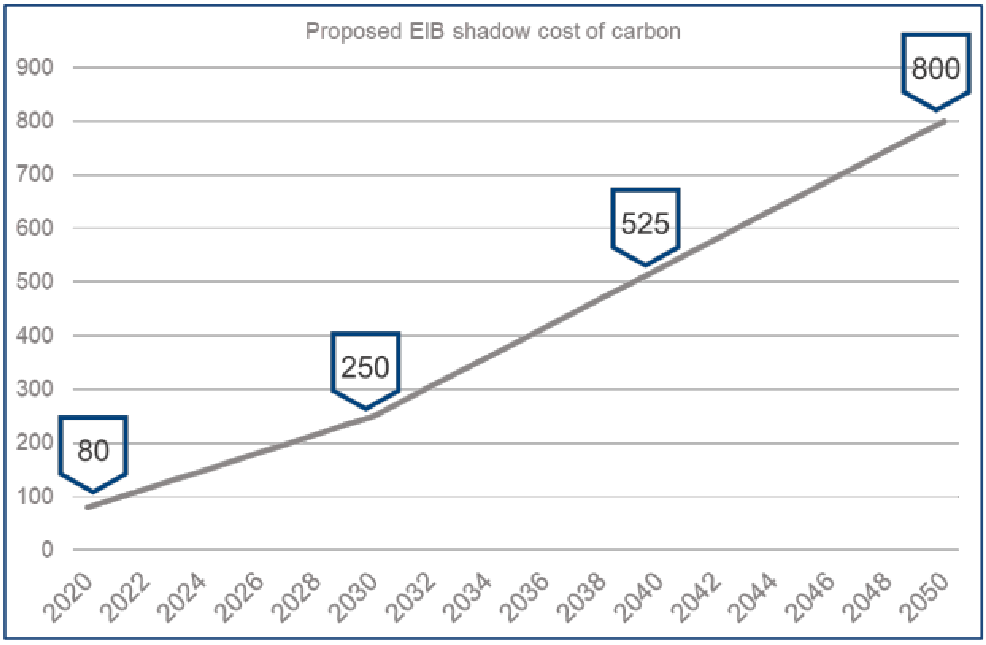

Figure 3.3: Shadow cost of carbon consistent with 1.5°C target, source EIB (2020)

For heating fuels we look at two elements in particular

1. The carbon content of the fuel with a cost estimated at 250 €/tonne

2. A mark-up for other air pollution cost based on EC (2021d) [97]

For transport fuels we take into account[98]

1. The carbon content of the fuel with a cost estimated at €250 /tonne
2. Other air pollution based on CE Delft (2019)
3. Noise pollution based on CE Delft (2019)
4. Congestion cost based on Heyndrickx et al (2021) at €5 /100km

In *Figure 3.4* and Figure 3.5, we give an overview of the most common fossil fuels and the total current excise tax on these products in €/GJ. The total of each component is added in a column. The level of the current tax is indicated with a horizontal bar, the minimum rate proposed in the revision of the ETD (non-indexed after transitionary period) is indicated with a diamond marker

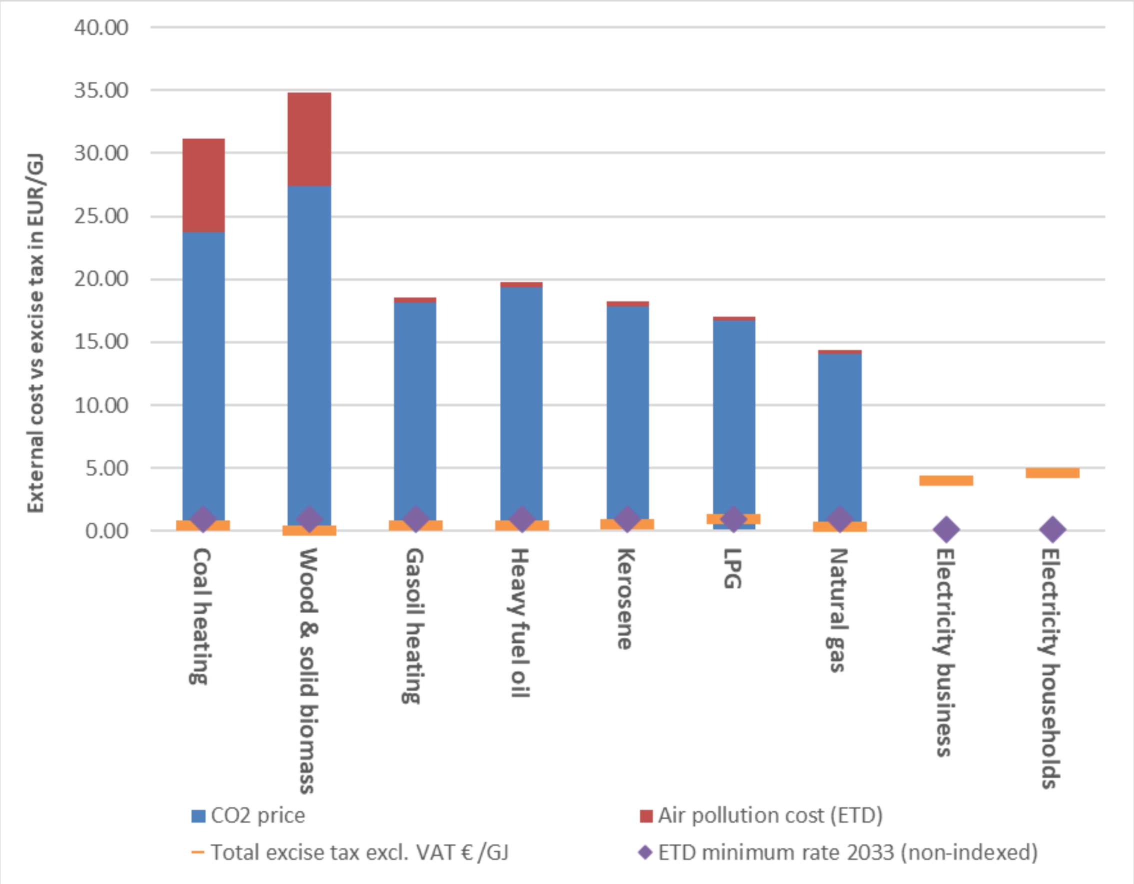

Figure 3.4: Comparison of current excise tax on heating with external cost based on assessment study ETD (incl. air pollution cost) and social cost of carbon equal to 250 €/tonne, source: EC (2021d) & own calculations

[97] We refer in particular to options 3b and 3c of the assessment report, see ETD (2021d) p. 44 and p.132 and following
[98] Calculated with a representative fuel consumption rate of 7 l gasoline / 100 km, 6 l diesel/100 km, 4.5 kg H-CNG/100 km, 9 l LPG / 100km and 17 kWh/100km for electric cars

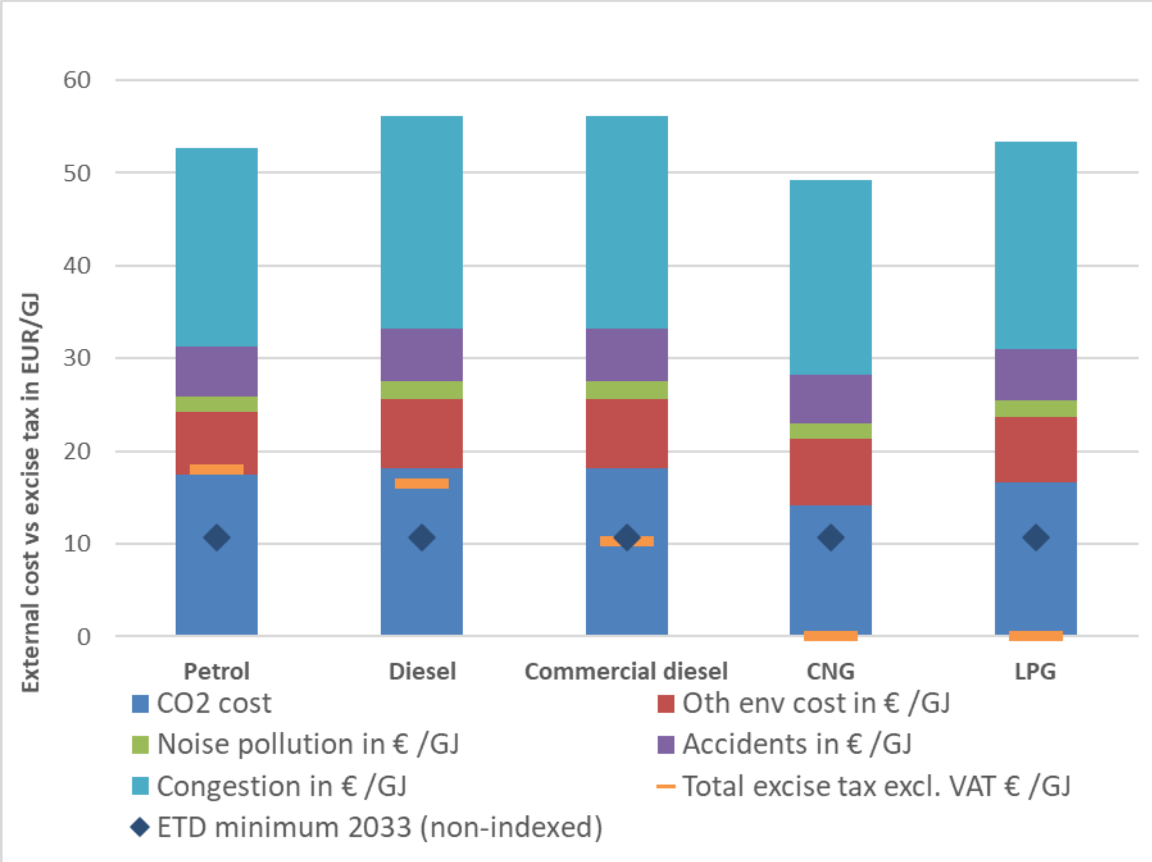

Figure 3.5: Comparison of current excise tax on transport with external cost based on CE Delft (2019), EC (2021d) & Heyndrickx et al (2021) social cost of carbon equal to €250 /tonne, own calculations,

3.1.2 The importance of social support for a climate tax shift

Numerous studies have confirmed that a climate tax shift can be a strong policy instrument in terms of environmental effectiveness, efficiency, and administrative feasibility (Aidt, 2010). However, an important drawback of this instrument, is that it suffers from limited support from the side of both households and companies. While all taxes run the risk of being unpopular (this phenomenon is called tax aversion), most people dislike environmental taxes even more than other taxes (Clinch et al. (2006). For many people, environmental tax aversion is so strong that they would even vote against a green tax reform when its impact would be financially net-positive for them (Kallbekken et al. (2011), thus reaching irrational proportions. As a result, policy makers are reluctant to implement ambitious climate tax shifts.

A couple of studies, including the 2021 federal climate, survey confirm that the general opinion on environmental taxation in Belgium is no different than in most other countries. Bachus (2019) concluded that support for a carbon tax in Belgium is generally moderate, although revenue recycling can increase acceptability. Moreover, he found that earmarking for the environment (e.g. by using the revenues for investments in wind energy) is the most popular revenue recycling option, followed by lowering labour taxes, reducing public debt, lump-sum repayments to citizens, compensating companies, and reducing corporate taxes.

Moreover, in times of high energy prices, such as at the time of publication of this research report in 2022, public support for environmental taxation is even lower, as the high energy prices have a very negative impact on many households' purchasing power. Consequently, periods of high energy prices are not a good context to launch a policy debate on the introduction of a climate shift.

One solution to the negative perception of citizens towards environmental taxes that has been used at multiple occasions in Belgium in the past twenty years, is the so-called cliquet system. This system is a way to mitigate strong fluctuations in energy prices. The mitigation effect can be brought about in both directions:

- The application of the ***cliquet system*** means that the excise tax rate on energy goes up simultaneously with a price decrease on the international markets. As such, the end user does not 'feel' the tax increase, since the net effect of both operations is still a price drop.
- The application of the ***reverse cliquet system*** means that the excise tax rate is reduced at moment of a market price increase, thus tempering the price increase.

Usually, the cliquet system is designed for a certain period or until the targeted degree of tax increase or decrease is reached (Bachus, 2016). Up to now, its use has been limited to transport fuels, because their price level is unambiguous (euro per litre), which is less the case for electricity and natural gas (depending on the user profile, with fixed and variable price components). For example, between 2015 and 2018, the excise tax rate difference between petrol and diesel was phased out as part of the federal tax shift. Each time the official maximum price of diesel dropped due to fluctuations on the international market, the cliquet system[99] was automatically activated, and an excise tax rate increase was automatically applied, at the rate of half the price decrease. The operation lasted for a period of three years until the goal of equalisation was reached (Bachus, 2020).

In times of extremely high energy prices, such as in 2022, public and political support for any measure that would further increase energy prices, such as a climate tax shift, is so low that it is unlikely for proposals in that direction to lead to decisions. However, considering the urgency and the ambition level of the Fit for 55 policy package and the new climate law (which is already operational since 2021), it would not be wise to postpone the policy debate about it until the (undefined) moment that prices have dropped 'low enough' to start the debate. The cliquet system is a useful instrument to prepare the way for a climate tax shift in Belgium, but with a clause that the implementation date is (1) postponed until prices have dropped below a certain level, and (2) spread over time to avoid a price shock, which could harm public support. An additional advantage is that the time lag between the approval of the *principle* of the revenue-neutral climate tax shift and its actual *implementation* would be quite far apart. This time gap will give people the time to get used to the idea, and anticipate to potential changes in their future consumption and investment decisions (e.g. insulation and/or a heat pump).

We note that the cliquet system as part of a budget-neutral tax shift should not only apply to transport fuels, but also to heating fuels, which has not been applied before. The determination of the exact energy price threshold under which the cliquet system and the climate tax shift would (automatically)

[99] Combined with – to a lesser extent – the reverse cliquet system for petrol.

enter into force is not a scientific question, but a political decision, which will need to find a balance between climate ambition and urgency on the one hand, and social support on the other hand.

In conclusion, we recommend to start designing the climate tax shift with the cliquet system in the very short run, and to already adopt it, but with a starting date that will depend on the energy price level on the international markets.

3.1.3 Conclusion

Several conclusions can be drawn from paragraph (3.1.1)

We find that the current taxes are generally well below the benchmark set by environmental taxation. Taxes on carbon content are largely absent in current heating fuels. Excise tax rates on LPG, kerosene, coals, gasoil and heavy fuel oil would need to increase substantially by 2030 to be consistent with recent estimates on the social cost of carbon emissions. Although natural gas has the lowest environmental cost of all heating fuels, there is a substantial margin to increase taxes in the light of environmental taxation. Beyond 2030 we expect a quick increase in the social cost of carbon that reflects the ambition to reach net zero emissions by 2050. This means that the gap between the excise tax and the environmental cost of the fuel will likely increase even further in the absence of other policy.

Despite their relatively high CO_2 emissions and air pollution cost, coal, lignite, coke and wood are subject to very low excise duties or even zero rates. It should be emphasised that coal heating concerns a very limited number of households (<0.1%). There are, however, a significant number of households (4%) that still use wood as primary source of heating.

The current federal tax on electricity is above minima proposed in the revision of the ETD. In fact it is currently, in terms of energy content, taxed at the highest rate per energy content. It should be considered to reduce the federal excise tax rates on electricity to the minimum set in the revision of the ETD. This is equal to 0.15 €/GJ or 0.54 €/MWh. Besides this, the electricity bill contains a number of hidden components, such as public service obligations, over which the federal government has only little (direct) impact. It is also important to note that CO_2 emissions from electricity production are covered by the ETS and should not be subject to additional (carbon) taxation.

As with heating, **the rate for industrial applications is much lower**. However, some of the industrial sectors are covered by the European Emission Trading System (ETS). It is therefore possible that these emissions will still be subject to some form of taxation, albeit indirectly.

Concerning motor fuels the following things can be noted:

Motor fuels are taxed at considerably higher rates, in this sense the current excise taxes on fuels are more in line with environmental taxation. However, the excise tax is currently the only environmental tax on transport that is variable with vehicle usage[100]. The absence of a road congestion tax provides further justification for applying higher tax rates even if it. remains a suboptimal substitute (Heyndrickx et al, 2021). In particular:

[100] VAT on fuels as well as the VAT on the excise tax itself are not considered to be forms of environmental taxation (Eurostat 2013). Other taxes (ownership, registration, insurance) are not directly related to actual vehicle kilometers driven.

- Gasoline (petrol) used for transport is taxed at the highest rate in terms of energy content of all fossil fuels[101]. Translated to an equivalent carbon tax, this represents a tax of around €250 /tonne. Diesel is taxed at a slightly lower rate[102]consistent with an implicit carbon tax of around €227 /tonne.

- Commercial use of diesel/gasoil is still subject to a large discount, this is true even after the reform on 1/1/2022. The effective excise duty is currently lower than the proposed minimum rate (€10.27 /GJ), however this may be irrelevant. The revision of the ETD will have a large impact as a distinction between commercial and non-commercial use is no longer allowed. We return to this issue in detail in section 6.3

- For CNG and LPG excise taxes are zero. For **LPG** the rules are very complex. In theory the excise tax is replaced by an ownership tax. In practice the impact of this ownership tax is limited due to reductions in registration taxes. As such LPG cars can be considered duty free. Natural gas for transport (generally in the form of compressed natural gas or CNG) is currently duty free, while the revised ETD sets a minimum tariff. We return to this in detail in section 6.3.

- Kerosene for aviation will become subject to excise taxation upon approval of the revision of the ETD. At that point the minimum level of taxes are expected to reach €10.75 /GJ (non-indexed rate) after a transitory period.

While excise taxes on motor fuels are much higher than on fuels for heating and industry, they are still below the marginal external cost of transport. **Given the relatively slow progress of the transport sector with respect to emission reduction[103] there is a margin for additional fiscal measures**. Moreover, after 2030 the estimated social cost of carbon is expected to increase rapidly (see figure above & EIB (2020)) to €525 /tonne in 2040 and €800 /tonne in 2050.

3.2 Reforms of energy taxation considered

3.2.1 Setting and objective

As we indicate in section 3.1.1 the current system of energy taxation in Belgium has little relation to environmental impact. The fiscal system, although in line with the current framework of the ETD, contains a wide range of fossil fuels subsidies. A study by the Ministry of Finance and the Ministry of Public Health (FPS, 2021) estimated fossil fuel subsidies at a level of € 11 billion in 2019.

Approval of the Fit for 55 package on EU level would lead to substantial short-term and long term changes in energy taxation and would help to improve alignment of energy taxation with environmental objectives. However, its full approval in its present form is not certain (see section 2.3.1). Nevertheless, even in the case of non-approval of all or elements of the package, Belgium will need to honour its obligations concerning emission reduction. In the light of the last IPPC report

[101] 17.95 €/GJ for an energy content of 33.433 GJ/1000 l
[102] 16.51 €/GJ for an energy content of 36.348 GJ/1000 l
[103] Transport emissions (europa.eu)

(IPPC, 2022) urgent action is necessary to reduce the use of fossil fuels and limit global heating to 1.5 C.

3.2.2 Revision of minimal rates consistent with revision Energy Taxation Directive

The revision of the Energy Tax Directive offers clues on how (minimum) excise tax rates could be set according to calorific content, while distinguishing heating and transport use. It suggests (low) minimum rates for electricity and renewable hydrogen.[104] Besides this the revised ETD offers a clear hierarchy of excise tax rates on biofuels that distinguish the primary (same minimal rate as other fuels or € 10.75/GJ), second (half the rate or € 5.38/GJ) and third generation (same rate as electricity and hydrogen). We suggest that even if the Fit For 55 Package and in particular the revision of the ETD would fail, the federal government can look at the revised directive and measures as inspiration for reform.

Table 3.1 gives an overview of the tax rates on the most common transport fuels. The rates are based on rates that are representative for 2021 and early 2022. We note that the year 2022 was a very volatile year in terms of energy pricing. As a reaction, the federal government imposed substantial (temporary) reductions in excise taxes on fuels.[105] More important, a reform of commercial diesel was implemented on 1/1/2022 that reduced[106] the discount from € 247.62 /1000l (€-6.81 /GJ) to € 226.97 /1000l (-€ 6.24/GJ).

The only transport fuels that are currently taxed below the revised ETD rates proposed for 2023 are commercial diesel, LPG and CNG. Commercial diesel is a special case here. The revision of the ETD would no longer allow a distinction between commercial and non-commercial use of fuels. Thus it implies fully phasing out the discount. We discuss this in more detail in the next paragraph and in section 6.3.3. In 2033, an excise duty for air transport (kerosene) should be introduced as well. Although it will only have a minimal impact on tax revenue and excise taxes given the current low volumes, we add the proposed rates for a number of biofuels. Currently, excise taxes make no distinction between traditional diesel and biodiesel. The revised ETD, on the other hand, suggests reduced base rates for biodiesel of type 2 and type 3.

[104] €0.15/GJ or €0.54/MWh for electricity and hydrogen from renewable sources ('green' hydrogen)

[105] (30/5/2022) rate of gasoline and diesel is €455.5305 /1000l. Excise taxes are planned to return to the previous value currently on 1/10/2022.

[106] Since 1/01/2022 the discount was reduced from €247.62/1000l to €226.9716/1000l. Later on 19/3/2022 the discount was further reduced to €220.9716 /1000l temporarily due to the temporary reduction of excise taxes. After 2023 the discount will be reduced to €205.0665 /1000 l and then progressively each year with €1 /1000l to 2026.

Table 3.1: Overview of tax rates on transport fuels with respect to calorific content and comparison with revised (non-indexed) ETD rates, source: own calculations and EC (2021d)

Fuel	Unit	GJ/unit (NCV)[107]	Base Rate €/GJ	Minimal ETD rate	
			Current	2023	2033
Gasoline	1000 l	33.43	17.95	10.75	10.75
Diesel	1000 l	36.35	16.51	10.75	10.75
Diesel (Commercial) [108]	1000 l	36.35	10.27	10.75	10.75
Kerosene	1000 l	35.04	18.05	10.75	10.75
Kerosene (Aviation)	1000 l	35.28	0.00	0.00	10.75
LPG	1000 l	24.84	0.00	7.17	10.75
Natural gas (CNG)	1000 kg	40.68	0.00	7.17	10.75
Renewable hydrogen	1000 kg	120.00	0.00	0.15	0.15
Biodiesel type I	1000 l	32.57	18.43	7.17	10.75
Biodiesel type II	1000 l	32.57	18.43	5.38	5.38
Biodiesel type III	1000 l	32.57	18.43	0.15	0.15

Table 3.2 gives an overview of the current taxes on heating fuels versus the minimal rates set in the revision of the ETD.

Table 3.2: Overview of tax rates on heating fuels with respect to calorific content and comparison with revised (non-indexed) ETD rates, source: own calculations and EC (2021d)

Fuel	Unit	GJ/Unit (NCV)	Base rate	Minimal revised ETD rate	
			Current	2023	2033
Kerosene	1000 l	35.04	0.56	0.90	0.90
Gasoil	1000 l	36.35	0.47	0.90	0.90
Natural gas	MWh	3.6	0.28	0.60	0.90
Butane	1000 kg	47.3	0.41	0.60	0.90
Propane	1000 kg	36.4	0.40	0.60	0.90
Wood	1000 kg	16.20	0.00	0.60	0.90
Coal	1000 kg	28.20	0.42	0.90	0.90

For heating fuels most energy taxes in Belgium are below the minimal rates set in the ETD. In practice this would mean a near doubling of the excise tax rate.

3.2.3 Introduce carbon pricing

We propose to introduce a tax on carbon content that will progressively increase, starting from a low baseline in 2023 (€ 20/ tCO_2) and increasing to at least €/70 tCO_2 in 2030. This level of carbon pricing is in line with the National Debate on Carbon Pricing. We assume that this tax takes the form of an additional component to the base rate of excise duties, consistent with the proposed reform of the ETD (see also section 3.1.1). The CO_2 rate would be uniform across the different energy products and uses, i.e. each tonne of CO_2 would be priced at the same level regardless who emits it and for what purpose. For comparison we also add a level of €100 /t$CO_2$and €250/tCO_2 (see Figure 3.6)

[107] Numbers on calorific value of fuels may vary. These values are consistent with calculations made by the EC in EC (2021d)

[108] This rate is indicative only. The revision of the ETD would no longer allow a distinction between commercial and non-commercial use of fuels.

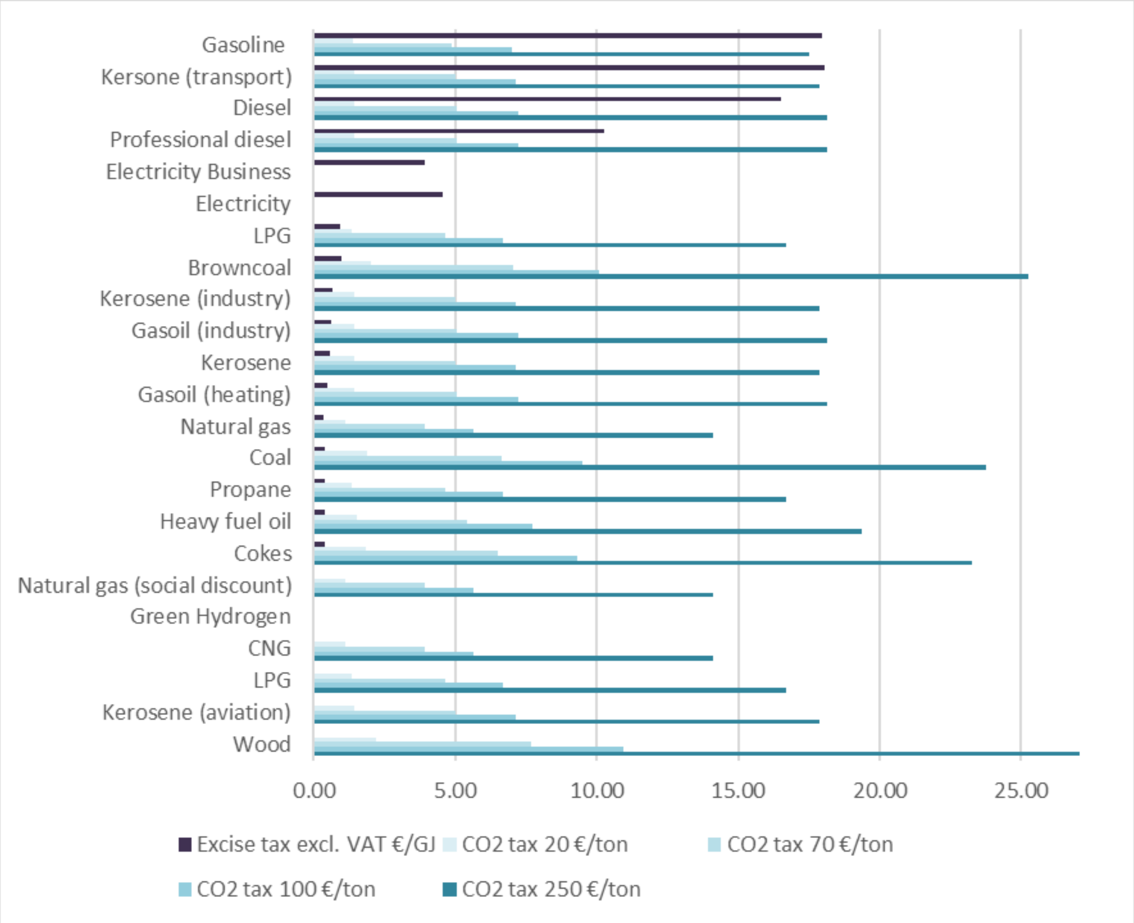

Figure 3.6: Current excise taxes (excl. VAT) in EUR/GJ vs uniform carbon tax of 20, 70, 100 & 250 EUR/tonne

Comparing the current (volume based) excise taxes to equivalent carbon taxes (also volume based) we come to Table 3.3 & Table 3.4. This is respectively for heating / agriculture / industry and other purposes versus transport use of fuels.

Table 3.3 : Overview of current (volume based) excise tax per unit on heating, industry, agriculture and water transport versus equivalent carbon content tax at rates of 20, 70, 100 and 250 €/tonne

Heating/agriculture/industry	Units	**GJ/unit**	***Excise tax excl. VAT***	**CO2 tax 250 €/ton**	**CO2 tax 100 €/ton**	**CO2 tax 70 €/ton**	**CO2 tax 20 €/ton**
Wood	1000 kg	*16.20*	*0.0*	443.9	177.6	124.3	35.5
Coal	1000 kg	*28.20*	*11.8*	669.8	267.9	187.5	53.6
Browncoal	1000 kg	*11.90*	*11.8*	300.5	120.2	84.1	24.0
Cokes	1000 kg	*28.20*	*11.8*	655.7	262.3	183.6	52.5
Heavy fuel oil	1000 kg	*41.00*	*16.3*	793.4	317.3	222.1	63.5
Propane	1000 kg	*46.40*	*18.6*	773.7	309.5	216.6	61.9
Natural gas	1 MWh	*3.60*	*1.2*	50.8	20.3	14.2	4.1
Gasoil (heating)	1000 l	*36.35*	*17.3*	658.8	263.5	184.5	52.7
Gasoil (industry)	1000 l	*36.35*	*22.9*	658.8	263.5	184.5	52.7
Kerosene (industry)	1000 l	*35.04*	*22.9*	626.3	250.5	175.4	50.1
LPG	1000 kg	*47.30*	*44.7*	788.7	315.5	220.8	63.1
Green Hydrogen	1000 kg	*120.00*	*0.0*	0.0	0.0	0.0	0.0
Electricity	1 MWh	*3.60*	*16.5*	0.0	0.0	0.0	0.0
Electricity Business	1 MWh	*3.60*	*14.2*	0.0	0.0	0.0	0.0

Table 3.4 : Overview of current (volume based) excise tax per unit on motor fuels versus equivalent carbon content tax at rates of 20, 70, 100 and 250 €/tonne

Motor / transport fuel	**Units**	**GJ/unit**	**Excise tax excl. VAT**	**CO2 tax 250 €/ton**	**CO2 tax 100 €/ton**	**CO2 tax 70 €/ton**	**CO2 tax 20 €/ton**
Electricity	1 MWh	*3.60*	16.5	0.0	0.0	0.0	0.0
Kerosene	1000 l	*35.04*	19.6	626.3	250.5	175.4	50.1
Kerosene (aviation)	1000 l	*35.28*	0.0	630.6	252.3	176.6	50.5
LPG	1000 kg	*47.30*	0.0	788.7	315.5	220.8	63.1
CNG	1000 kg	*40.68*	0.0	573.6	229.4	160.6	45.9
Professional diesel	1000 l	*36.35*	373.2	658.8	263.5	184.5	52.7
Diesel[109]	1000 l	*36.35*	600.2	658.8	263.5	184.5	52.7
Kerosene (transport)	1000 l	*35.04*	632.5	626.3	250.5	175.4	50.1
Gasoline	1000 l	*33.43*	600.2	585.1	234.0	163.8	46.8

A critical question is the potential impact on fiscal revenues of carbon taxation. Based on volumes of 2019 we can estimate the impact of a non-discriminate level of carbon taxation at different levels before change in volumes (the 'next-day' effect) (Figure 3.7).

[109] Diesel for inland waterway transport and maritime transport is currently not subject to excise taxes

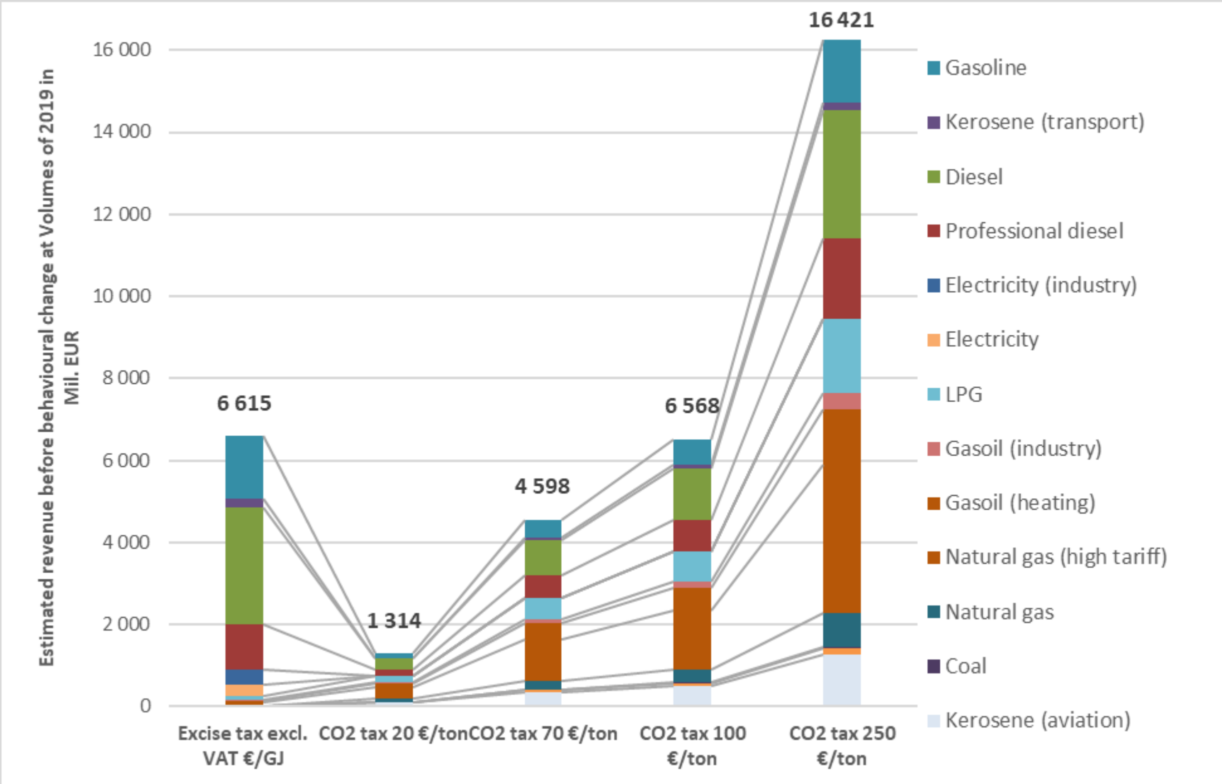

Figure 3.7: Impact of implementing a universal tax on carbon content versus current excise taxes without changes in volumes, source: Own calculations

The figure above can be interpreted in two ways. The first is the <u>additional fiscal revenue</u> from carbon pricing at different levels (€20, €70, €100 and €250) without any sectoral and social exemptions and without any change in energy use compared to 2019[110]. The second way to interpret the graph is as the <u>potential revenue of excise taxes that would be based on carbon content alone,</u> at the same energy use of 2019.

A €100 tonne carbon tax on all energy carriers would lead to a similar revenue as current excise taxation if energy use would not change. If all energy carriers would be taxed at the social cost of carbon (€250/tonne) recommended by the EIB for 2030, this would lead a fiscal revenue of slightly over €16 billion. This is similar to findings of OECD (2021b). At more conservative levels of €20 and €70 /tonne of CO_2 we would respectively add an estimated €1.3 and €4.6 billion at current levels of energy use (based on 2019). This would be a serious overestimation of the potential revenue however. Energy use will decrease both due to the impact of the tax as well as other policies in the line with fit for 55 objectives.

The actual potential revenue is calculated in sections 4.2, 5.4.3 and 5.5.3. This amounts to approximately €860 million for a carbon tax of €20/tonne in 2023, €1.9 billion for a carbon tax of €70 /tonne in 2030 and €2.6 billion for a carbon tax of €100/tonne in 2030.

[110] We use 2019 as volumes of 2020 are severely biased due to the Covid-19 crisis. At the time of writing not all data for 2021 was available yet.

3.2.4 *Phasing out fossil fuel subsidies*

There is currently no consistent method to set the tax rates across energy products (e.g. calorific content). In addition, certain energy users benefit from a tax reduction or exemption (e.g. aviation). In the absence of a consistent method, different rates are applied for different users.

Based on the revision of the Energy Taxation Directive we can take a number of clear examples of fossil fuel subsidies that should be phased out in Belgium (European Court of Auditors (2022), EC (2021d))

- Eliminating the favourable treatment of diesel compared to petrol in motor fuels. This can be done explicitly by harmonizing the diesel and petrol rates on the basis of calorific content and not on volume based metrics.
- Introduce excise taxes duties on LPG and CNG fuels
- Removing the distinction between business (commercial) and non-business use of gasoil. This would imply fully phasing out the discount on commercial diesel in Belgium for freight >7.5 tonnes, taxi's and buses
- Removing the tax exemption of kerosene for passenger air transport for intra EU journeys
- Removing the tax exemption of heavy fuel oil for maritime transport for intra EU journeys
- Cancelling full exemption from taxation the energy consumption of energy intensive businesses and agriculture or reduce their taxation below the minima
- Extend the scope of excise duties to include solid (non-renewable) biomass such as wood and pellets

We should note that the revision does allow temporary exemptions for vulnerable households.

We assess these measures in more detail in section 5 of the report.

4 Impact of carbon taxation on macro-level

4.1 Results from modelling and empirical studies

There are broadly speaking two types of analyses of the economic impacts of carbon taxes; one relies on large-scale computable general equilibrium models and the other are empirical ex-post analyses. We first give an overview of the main results on the impacts on emissions before reviewing the impacts on GDP and employment.

4.1.1 Impact on emissions

A summary of the economic outcomes form a U.S. carbon tax can be found in Barron et al (2018). They summarize the results from a major study (EMF32) comparing 11 economic models' outcomes. The models found that a $25 per ton of energy in 2020 will immediately reduce emissions by 6 to 18 percent, while a $50 tax reduces emissions between 11 and 25 percent. Over a ten-year period increasing the $25 tax at an annual rate of 1 percent lowers the emissions by 11 to 30 percent after ten years. An annual increase of 5% of the $50 tax, reduces emission by 22 to 38 percent by 2030. Goulder et al (2019), uses the E3 CGE model to analyse the impact of a $40 per ton carbon tax starting in 2020 and subsequent annual tax increase in real terms of 2%. The tax reduces emissions by 17 and 33% by 2020 and 2035 respectively, mostly due to a substitution away from coal-fired generation of electricity towards natural gas and non-fuel generation.

Although very useful, these results are outcomes of modelling exercises which depend heavily on a priori assumptions and baseline scenarios. It is therefore interesting to look at ex post assessment of carbon pricing and their impact on emissions. The empirical ex post studies give a slightly different and mixed picture than the modelling exercises. Lin and Li (2011), for example, estimate the impact of carbon taxes on the growth rate of emissions by comparing countries with carbon taxes (Finland, the Netherlands, Norway, Denmark, and Sweden) with a set of control countries. Only for Finland they find a statistically significant drop in the growth rate of emissions of 1.7 percent. In contrast, a more recent analysis for Sweden (Andersson, 2019) which focusses on the impact on transport emissions finds a reduction of 11 percent of which 6.3 percent can be attributed to the carbon tax alone. They also find that the carbon tax elasticity for gasoline is three times larger than the price elasticity, implying that people respond more strongly to change in carbon taxes than equivalent market-bad price changes. Rivers and Schaufele (2015) who consider the impact of British Columbia's carbon tax find comparable results. They compare the effect of a one cent per litre increase in the price of gasoline with the effects of a one cent per litre carbon tax and find that the effect of an increase in carbon tax is 4 times larger than the effects of a similar price increase. Metcalf (2019) runs difference-in-difference regressions between British Columbia and provinces that have not imposed carbon pricing over the period 1990-2017. They find a tax reducing emission in BC between 5 and 8 percent since the tax went into effect, again more in line with Andersson (2019). Rafaty et al (2021), however, point out that most empirical assessments do not consider the lack of standardized carbon pricing data across countries and thus do not adjust for variations in industry exemptions, rebates and sectoral coverage that can differ. In addition, the initial price level and subsequent evolution is often not specified. They investigate the impact of carbon pricing across five sectors for a panel of 39 countries from 1990 to 2016. They find much smaller effects: they find a reduction of annual emission growth of 1-2% and an approx. 0.1% reduction for each additional \$1/tCO_2 (0.01% for the manufacturing sector, 0.2% for the electricity and heat generation, 0.15% in buildings, 0.75% in road transport and 0.15% for the economy as a whole). They conclude that carbon taxes alone are unlikely to be sufficient to meet the emission reduction required by the Paris Agreement. In the same line, (Danish Council on Climate Change, 2020), suggests that even a \$100 t/CO_2 carbon price in 2030 would reduce emission by 19%, half of the needed reduction. To reach a 70 percent reduction by 2030, carbon prices around \$200-250 are suggested.

4.1.2 Impact on GDP and employment

The impact on GDP and employment is more consistent, both across models and when comparing ex-ante and ex-post analyses although the latter remain scarce. While different models give different results, most find a very modest reduction in GDP and employment after the introduction of a carbon tax. Goulder et al (2019) find that the \$40 t/CO_2 tax with an annual increase of 2% would reduce GDP by 0.13-0.28% depending on how revenues are recycled (with lump-sum transfers generating the largest losses and recycling the revenues to lower the corporate taxes the lowest). These results are similar to Baron et al (2018), who find modest impacts on GDP and where most models also show that using the revenues to reduce existing taxes reduces the costs compared to lump-sum transfers. Recent estimates for Denmark show that prices even as high as \$200-250 per tonne will amount to an economic cost of less than one percent of GDP (Danish Council on Climate Change, 2020). As mentioned, ex post assessments are not abundant. Martin et al (2014) conducted an analysis using panel data from the UK production census to estimate the impact of a carbon tax on manufacturing plants. They find a strong negative impact on energy intensity and electricity use but no significant impact on employment, revenues, or plant exit. Bernard et al (2018) tests whether gasoline and diesel carbon taxes in British Columbia have any impact on the GDP changes of the province but find no significant effect. A more elaborate ex-post study was performed by Metcalf and Stock (2020). Their analyses include 31 European countries that are part of the ETS system. They estimate the impact of a \$40 per ton increase in the country's tax rate and find no evidence of a negative effect of a carbon tax on GDP growth or employment. In general, they find a small positive effect, albeit not always statistically significant and thus consistent with little effect of the tax on GDP growth and employment.

4.2 Results of the EDIP macroeconomic model

4.2.1 Use of the model and interpretation

Section 4.1 makes a review of the impact of CGE modelling on emissions and GDP. In this section we add the results of introducing carbon pricing on non-ETS sectors using the EDIP model for Belgium. A full description of the model is added to the Appendix (part B). These results should be interpreted additional to the review in section 4.1. We do not claim that these results represent a final assessment of carbon taxation on non-ETS for Belgium. Rather we use the model to indicate the direction of the analysis and construct a narrative on the efficiency-equity trade-off in carbon taxation.

4.2.2 Model set-up and assumptions

EDIP is a static model that calculates counter-factual equilibria for specific policy changes compared to a baseline scenario. Most of the results are therefore represented as a % deviation from a baseline scenario. The data of the model is principally based on 2019. This is the most recent year for which reliable information is available. For 2020 data was available, but because of the economic crisis caused by the Covid-19 pandemic, we judged it too biased. Data for 2021 was at the time of writing not available yet. As such our results should be interpreted mainly as illustrative and as an extension of section 4.1. Therefore as a complimentary, but not only view. We also note that making predictions based on the current energy markets is complicated by the pandemic and the war in Ukraine.

We depict two situations, one that can be referred to as 2023 and which assumes no changes compared to 2019. Another situation that can be referred to as 2030 and includes reductions in CO_2 emissions and energy use consistent with the Fit for 55 objectives. We consider a carbon tax policy on non-ETS sectors equal to € 20/ton in 2023 and € 70/ton in 2030 as main scenarios. In addition, we consider the impact of the revision of the Energy Taxation Directive. This set-up is identical to the analysis on household level in the next chapter (see section 5.1). To test the sensitivity of carbon taxation in 2030 we apply an additional high (€100/tCO_2) rate to our macro analysis. These are not treated in the micro-economic analysis of carbon taxation in section 5.5.

We summarize the scenario set-up in Table 4.1.

Table 4.1: Scenario set-up EDIP model

	Reference situation 2023 (no energy transition)	**Reference situation 2030 (incl. energy transition)**
Carbon dioxide emissions	No change compared to 2019[111]	Reduction according to Fit for 55 objectives (55% reduction in emissions compared to 1990 level of emissions)
CO_2 price level	€ 20/tonne CO_2	€ 70/tonne CO_2
Additional policy	Revision of excise rates on heating and transport consistent with minimum rates of revised Energy Taxation Directive for 2023 (see Table 2.5)	Revision of excise rates on heating and transport consistent with minimum rates of revised Energy Taxation Directive for 2033 (see Table 2.5)
Sensitivity analysis	/	Higher rate: € 100 /tonne CO_2

By 2030 emissions in Belgium should reduce in line with the objective put forward in fit for 55. We will assume that these targets are met. The overall emission reduction target of 2030 is matched in the macro-economic model (EDIP) (see appendix B) by assuming exogeneous reductions in energy use of fossil fuels and therefore in emission intensity in each sector.

In practice we create a simple background scenario for 2030 that entails four economy wide shifts

- A 50% increase in energy efficiency compared to the 2019 base year
- A 50% shift of energy use away from fossil fuels and towards electricity compared to 2019
- An electrification of the car fleet equal to 25% overall

[111] The situation on the energy market, due to ongoing Covid-19 pandemic and the war in Ukraine remains very unpredictable. While it is reasonable that emissions will be lower in 2023 compared to 2019, we decided to use the most reliable and unbiased dataset available to us at the moment.

- A reduction of 10% in own transport use

The main idea is not to create a fully detailed policy scenario that entails all options for emission reductions. In fact such a tool already exists and is available on the website of climate.be as an expert tool.[112] Emission reductions applied in the reference scenario of EDIP are in line with the CORE95 scenario (see Table 4.2). The EDIP model is mainly used to study tax recycling options in the framework of a tax shift. By construction we are not able to take into account the investment dynamics that underlie the energy transition. Therefore we do not report any results on sectoral level, as they are possibly biased due to the missing link with the investment sector.

Our focus is on adequately estimating three critical variables that can be compared with wider literature and both earlier and ongoing research:

- The sensitivity of the economy and in particular the buildings & transport sector to carbon pricing
- The possible revenue of carbon pricing for Belgium
- The efficiency-equity trade-off that exists when using revenue from carbon pricing either for lumpsum distribution, a tax shift to the labour market or an alternative reduction of VAT for electricity

Table 4.2: CORE 95 reduction in CO_2 emissions (source: Climate.be expert tool, 2022)

	2019	**Target 2030**	**Required emission reduction**	**Source**
CO_2eq agri (Mt CO_2 eq)	12.7	9.33	-26.4%	Climate.be CORE 95 scenario
CO_2eq power (Mt CO_2 eq)	15.4	7.36	-52.1%	
CO_2eq industry (Mt CO_2 eq)	34.6	24.62	-28.8%	
CO_2eq transport (Mt CO_2 eq)	26.9	12.1	-55.1%	
CO_2eq buildings (Mt CO_2 eq)	21.2	10.9	-48.5%	

4.2.3 Estimated revenues from carbon pricing

Table 4.3 presents estimates of the potential revenues of a carbon tax on non-ETS sectors in Belgium in addition we also take into account a potential revision of the ETD rates consistent with fit for 55 objectives. We find that for the year 2023, the potential revenue for a carbon tax of € 20/tCO_2 is equal to € 862 M of which € 614 M from households and € 248 M collected from non-ETS sectors. In addition to this we also consider the revenue impact of a potential revision of ETD rates for 2023. The impact on revenues is lower and equal to € 244 M.

[112] Klimaat.be

Table 4.3: Estimated impact on tax revenue from carbon pricing in M€, source: EDIP results

	Reference year 2023	Reference year 2030	
	€ 20 /tCO_2	**€ 70 /tCO_2**	**€ 100 /tCO_2**
Carbon tax collected from firms	248	625	830
Carbon tax collected from households	614	1312	1742
Total carbon tax	**862**	**1937**	**2572**
Impact revision of ETD rates on firm	95	52	49
Impact revision of ETD rates on households	149	82	79
Total ETD	**244**	**134**	**128**
Total impact on revenues	**1106**	**2071**	**2700**

For 2030 we expect in the case of our main scenario (€ 70/tCO_2) slightly over € 1.9 billion in revenue. For which € 1.3 billion paid directly by households. The impact of the ETD is very limited as can be expected due to big reduction in fossil fuel use assumed under this scenario.[113] For the € 100/tCO_2 scenario we find almost € 2.6 billion in revenues.

We note here that our estimates are below the estimates of the National Debate on Carbon Pricing in Belgium. The final report of that study claimed a possible revenue for carbon pricing (taxation) of € 2.6 billion.[114] This difference can be attributed to two elements. 1) the emission targets have become more stringent in Fit for 55, as the required emission reduction targets have moved from -43% to -61% in buildings and -29% to -40% in transport (compared to 2005). 2) differences due to modelling and in behavioural assumptions.

4.2.4 Expected CO_2 reduction with different levels of carbon pricing in buildings and transport

We find that the proposed scenarios in Table 4.1 at the level of carbon pricing suggested, reduce emissions for buildings and transport with 4.81% and 2.26% in 2023. For our main 2030 scenario (carbon pricing equal to € 70/tCO_2) we find that emissions reduce with 8.93% for buildings and 12.48% in transport. A higher level of carbon pricing (€ 100/tCO_2) eventually translates in a 11.41% and 14.09% reduction in CO_2 emissions.

[113] During the study we received preliminary assessment of the impact of the revision of the ETD on the basis of volumes of 2019. This assessment found an eventual difference (assuming no changes in volumes) of 193.64 M€ applying rates representative for 2023 and 364.79 M€ applying (indexed) rates representative for 2033. We thus find a more limited impact of the revision of ETD rates.

[114] Main results (climat.be)

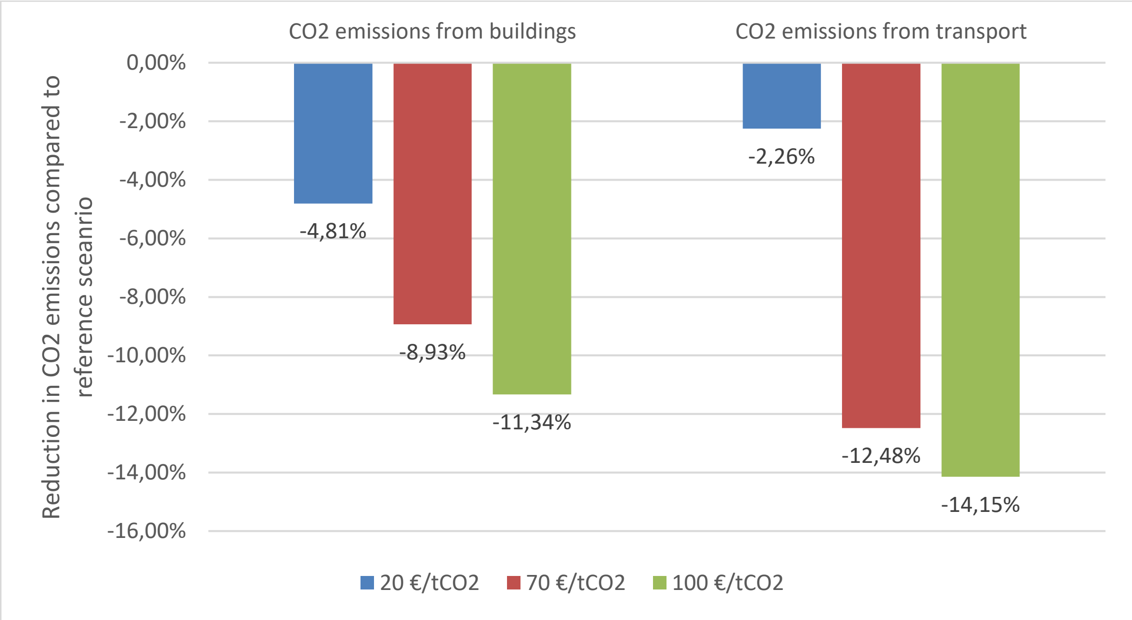

Figure 4.1:: Impact of CO_2 pricing in buildings & transport sector, comparison of different scenarios to baseline data

It is valuable to immediately compare this result with other studies. In particular we look at the study of PwC (2019) and Climate-OKO (2021). Both study carbon pricing in the buildings & transport sector in Flanders.

PwC (2019) reports reductions of 7% of CO_2 emissions compared to 2016, with levels of carbon pricing going up to € 100/tCO_2 in 2030. The sensitivity for carbon pricing in the building sector is larger and results in reductions up to 20%. PwC then argues that carbon pricing might be more effective in the buildings sector.

Climate-OKO (2021) finds only small additional decrease in carbon emissions due to carbon pricing on buildings and transport in Flanders. The find a reduction in emissions in a baseline scenario for 2030 without carbon pricing equal to -6% for transport and 31% for buildings. Introducing carbon pricing at rates of respectively € 70/tonne and € 100 /tonne price lead to -11% and -15% reduction in CO_2 emissions in transport, and -33% and -34% in buildings. When carbon pricing is used in conjunction with other policies (Effort Sharing Regulations or ESR) and not as the main policy the impact is larger. In this case emission reductions in the transport sector up to -23% and - 26%, and for building sector of -40% and -42% are possible. This with respective carbon pricing rates of € 70 tonne and € 100/tonne.

4.2.5 Impact of tax recycling

In this paragraph we reflect on different tax recycling options. We do this exercise primarily on the basis of the reference situation in 2030. The reason is that the amount of revenue of € 20/tonne tax in 2023 is limited and was not judged adequate to cover all options we want to consider in tax-neutral shift.

We consider 5 options for tax recycling.

1. Option 1: lump sum redistribution of tax revenues on a per capita basis. This is the reference case for redistribution of revenues
2. Option 2,3 and 4. A reduction in the social security contributions of respectively 1, 2 and 3% - divided equally between employer and employee. Any additional revenues from carbon taxation are distributed lump-sum to households. If the revenues from carbon taxation do not suffice to finance the cut, existing transfers to households are reduced instead.
3. Option 55 (VatRed): A reduction in the VAT on electricity to 6%. Any additional revenues are redistributed lump sum (see option 1)

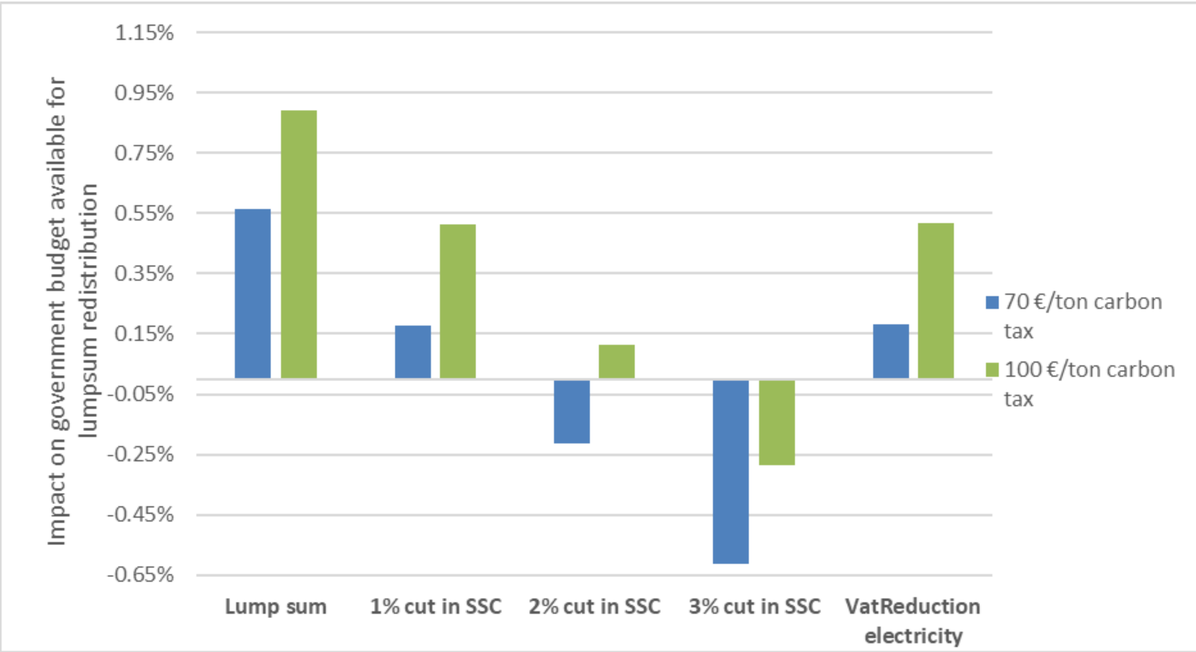

Figure 4.2::Impact of carbon pricing on government budget available for lump sum redistribution

The results in Figure 4.2 should be interpreted as such. In all cases considered above, a 1% cut in social security contributions can be financed out of the extra revenues from carbon taxation. Cuts of 2% in social security contributions require either additional revenues from other sources or a higher level of carbon tax (€ 100/tCO_2). A cut in social security contributionscontributions larger than 2% would need outside revenues in any case.[115].

The macro-economic impact of either the cut in social security contributions or the reduction in VAT can be considered separately and are summarized below in Table 4.4.

[115] The impact on the graph is close to zero and hence not visible

Table 4.4: Impact of tax recycling on main macroeconomic indicators compared to lump sum redistribution in % change compared to the BAUBAU scenario

Economy	1% cut	2%cut	3%cut	VAT 6% on elec
GDP	0.04%	0.08%	0.12%	0.06%
Real disposable household income	0.10%	0.20%	0.30%	0.03%
Total exports	0.03%	0.06%	0.09%	-0.11%
Total imports	0.05%	0.09%	0.14%	0.16%
Unemployment	-0.66%	-1.32%	-2.00%	-0.34%

Table 4.4 should be interpreted as follows. Take a 1% cut in social security contributions as example. Compared to the lump sum scenario this would increase GDP with 0.04%, real disposable income with 0.10% and reduce unemployment with 0.66%. This is true for any scenario combination. A 3% cut has a roughly threefold impact. For a cut in VAT rates on electricity GDP would increase with 0.06%, real disposable income with 0.03% and unemployment with -0.34% compared to the lump sum scenario.

In the next figure we evaluate the impact of each tax recycling option on a number of indicators for poverty and inequality. We used the scenario 2 in combination with the deeper excise (full) reform We show the impact on 2 indicators for poverty and 3 indicators for inequality that target specific elements of the income distribution. Specifically, we use the Foster-Greer-Thorbecke indicators type I and type II which respectively measure poverty intensity and inequality in poor incomes (Foster, Greer, Thorbecke, 1984). These are indicated below with FGT1 & FGT2. Inequality is measuredmeasured by the generalized entropy indices type I and II (Shorrocks, 1980) and the Gini index. The advantage of the lesser used generalized entropy indices is that they are more sensitive for changes in the lower half (poorest) part of the income distribution.

What we show in Figure 4.3 is the classical trade-off between efficiency and equity in tax reforms. Use of a lump sum redistribution reduces poverty and inequality, while reducing CO_2 emissions. Tax reforms that target the labour market lead to larger benefits for higher income households and hence higher income inequality and poverty, but also reduced economic costs. In the specific casecase of Figure 4.3, it seems that the cut-off point for an increase in inequality and poverty is for cuts in labour taxes above 2%.

For reduction in VAT on electricity to 6%, we did not find a large difference with lump sum redistribution on inequality. The results of section 5.5.4 on detailed household level however do suggest that a reduction in VAT leads to a more unequal distribution than lump sum. We could not confirm this on the basis of the current model results.

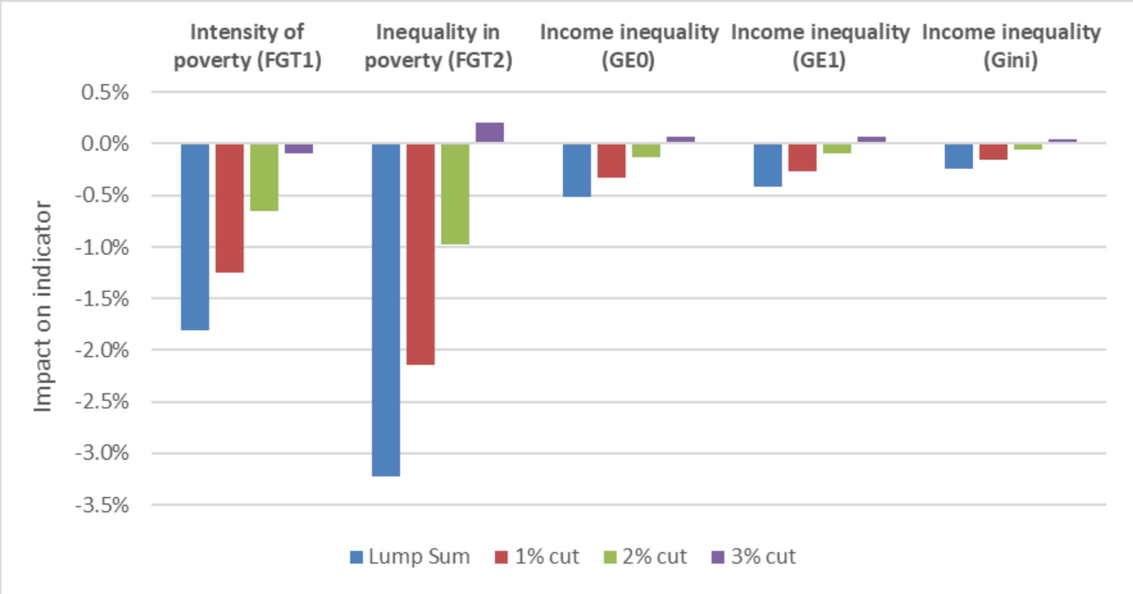

Figure 4.3: Impact of different tax recycling measures in the main scenario, source: EDIP results

4.2.6 Sensitivity and comparison with results IMF model carbon pricing with higher levels of carbon pricing

In the course of the project on a green tax reform our team was in contact with the IMF team working on green tax reform and carbon pricing. They have been at the origin of a number of publications concerning tax reforms in EU countries, among those IMF (2021a,2021b,2021c, 2020). We were in the opportunity to test a preliminary version of a dashboard type Excel model that was implemented by the team and gave comparable results to the EDIP model. While the model was in a prototype phase for Belgium, we found that both models reacted in a remarkably similar way in terms of sensitivity for carbon taxation on emission reduction.

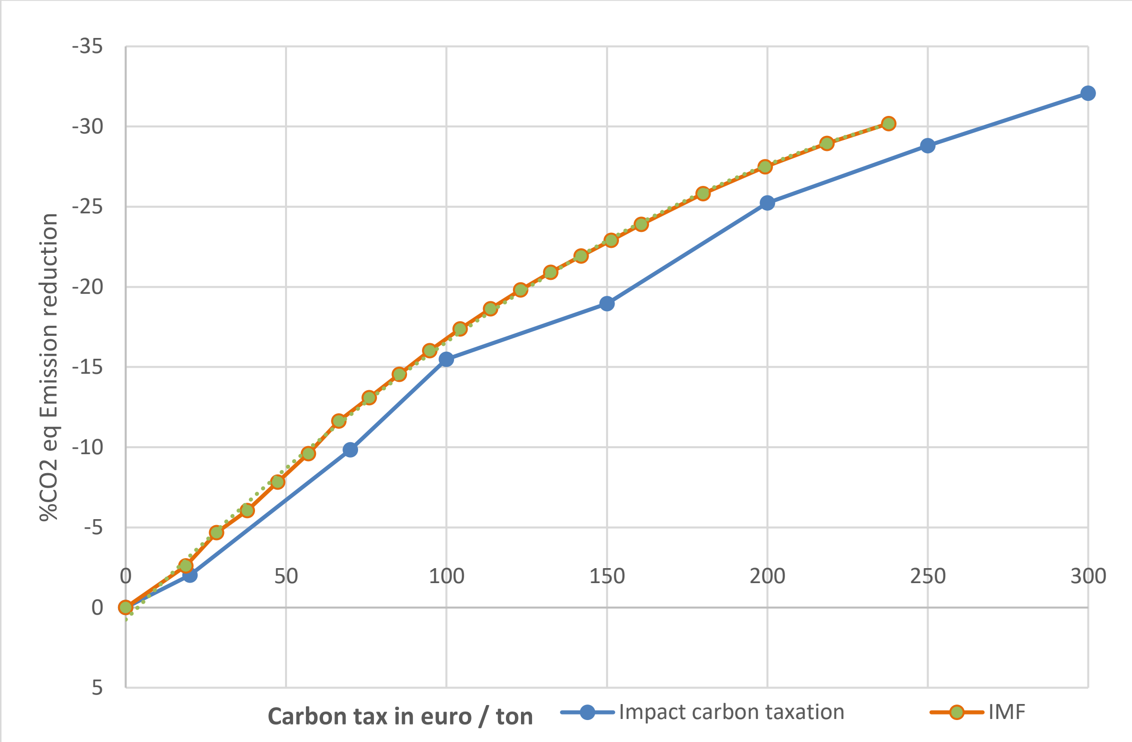

Figure 4.4: Comparison of relative emission reduction under a universal carbon tax in EDIP versus prototype IMF model for Belgium– own calculations

As can be seen, in both models there is some flattening of the CO_2 emission reduction with high levels of carbon taxation. It is not entirely clear if this is due to limits in the modelling mechanisms of either EDIP or the IMF tool. Comparing this with literature research (see section 4.1.1), we find that the expected emission reduction is in line with other predictions and can be stated as around 1% to 1.5% reduction in CO_2 emission reduction for every € 10/ton in carbon pricing.

What we can say with relative certainty, is **that it is quite unlikely that we can achieve the required reduction in CO_2 emissions by 2030 set forward by fit for 55 (around -46% reduction) with the proposed level of carbon pricing alone.** Achieving the objective with carbon pricing as only tool, would require very high levels of either carbon taxation or allowance prices (under an ETS scheme).

4.3 Expert opinion on the impact of a carbon tax shift

4.3.1 Positive impacts

When deciding on the potential introduction of a national carbon tax, the broader context should be taken into account. With the binding EU emissions target to reduce greenhouse gas emissions by at least 55% by 2030 compared to 1990, the original 2030 objective has been considerably tightened (cf. section 2.3.4). According to the experts, the debate should therefore shift from the question of whether or not we want a carbon tax **to which is the best way to achieve the 2030 objectives.** In other words, urgent action is needed. According to most experts, the climate plan can *only* be realised by introducing a carbon tax. In general, additional fiscal measures will be necessary to achieve the targets in an economically responsible manner. According to the experts, they are an important instrument to achieve cost-effective environmental gains because of the principle that a marginal external (environmental) cost must be internalised in a tax. The introduction of a carbon tax is therefore, according to most experts, the only possible way.

The fact that a carbon tax ensures that the external cost is internalised in a tax is therefore cited by the majority of experts as the main strength of a carbon tax. The **Pigouvian principle of *"the polluter pays"*** is often explicitly emphasised. According to most experts, punishing harmful behaviour is also more efficient and effective than rewarding good behaviour. A carbon tax is therefore considered to be an important trigger for a transition to more sustainability by *'putting the market to work'*. Other ways of changing the price ratio (such as targeted investment premiums or adjustments to other fiscal instruments such as VAT) seem less sustainable in the longer term compared to a carbon tax which, once implemented, will acquire a **permanent character**.

Another advantage of introducing a carbon tax, often mentioned by experts, is its **clarity and simplicity**, especially compared to the ETS system where the planned extension is perceived as very complex. Consequently, the expansion of the ETS system is expected to result in high operational and monitoring costs. An introduction of a carbon tax, on the other hand, can be done more straightforwardly according to the experts.

4.3.2 Negative impacts

Although, with a few exceptions, all experts (see appendix C.3) see merit in the introduction of a carbon tax in Belgium; almost all of them also point to potentially negative impacts that need to be taken into account . The occurrence of potential **regressive effects** is put forward as the most important point of attention. Thus, every fiscal reform generates losers. According to the experts, the introduction of a carbon tax could be **regressive** on various levels. First of all, it is expected that households living in poorly insulated houses and using less economical cars may be disproportionately affected. A carbon tax would make the lives of such (and other) households instantly more expensive. In addition, according to the experts, there is also a detrimental effect in the longer term because such households often do not have the financial possibilities to make the transition to less polluting options (e.g. by renovating their house or buying an electric car). Consequently, they risk not being able to escape the higher costs resulting from the introduction of a carbon tax, even in the longer term. In addition, the introduction of a car tax can lead to **Matthew effects** whereby the "*poorer people risk further impoverishment because of the higher taxes*". The majority of the experts are therefore convinced that the revenues from the carbon tax must be used, at least in part, to deal with this. Despite the importance of taking such negative effects into account in the introduction of a carbon tax, a number of experts make the comment that the current situation with numerous reductions and exceptions to the excise duties is already regressive in nature. Moreover, in case of a carbon tax, the revenues can be used to make it a progressive reform.[116]

Because of the existing reductions and exemptions on excise duties for many companies, the Christian trade union ACV-CSC therefore believes that tackling this should be the first priority. According to them, the introduction of a carbon tax is not a priority at the moment, as it would put lower income groups at an additional disadvantage, while many companies would continue to enjoy reductions and exemptions that are not in line with the environmental objectives. According to the employers' organisation VBO-FEB, simply abolishing the existing exemptions and discounts would

[116] This is shown in the microsimulations in section 9.

create a significant competitive disadvantage compared to companies in other EU countries. Consequently, adding burden to companies strongly impacted by such a shift will not help them. On the contrary convincing those companies to operate the transition and accompanying them (financially) to secure their transition would be the key. In this context, technology subsidies (cf. section 10.2.5) can play an important role. The existing exceptions and reductions (on excise duties) that are not in line with the climate objectives can thus be abolished/extinguished, while companies could still be (financially) supported (if they go along with the transition).

Besides the danger of potential redistributive effects *between* income groups, the experts also refer to shifts *within* income groups. Some examples that are given are:

- Commuters who have to travel long distances by car to commute to work (especially in Wallonia) will be disproportionately affected by higher fuel prices compared to workers who live close to their place of work;
- Poor households in poorly insulated rental housing experience a greater disadvantage from higher heating costs (gas/oil) compared to poor households in a recent (renovated) social housing.

Such **horizontal disparities** make it particularly difficult for policymakers to intervene appropriately. While regressive effects along the traditional poor-rich axis allow for income-related compensatory measures, redistributive effects within income groups often make it more complex to intervene appropriately.

In addition to the possible regressive effects on the household level, many experts also mention the possible **competitive disadvantages** for companies/industries if a carbon tax is introduced in Belgium without harmonisation on a broader international level (EU or international). The polluter pays principle is welcomed as such, but '*the polluter must remain to exist*' meaning that it should be taken into account that a carbon tax should not jeopardize the existence of Belgian companies. However, the expected competitive disadvantage can be partly nuanced since the carbon tax would be implemented in the non-ETS sectors (i.e. mainly in the buildings and transport sector) where potential competitive disadvantages are likely more limited and options exist to deal with them. Also many of our neighbouring countries have already implemented carbon pricing. Consequently, a large number of experts refer to the importance of agreements at EU level to guard against this (cf. section 2.3.4).

Another comment on the Pigouvian principle (the polluter pays) is that, according to some experts, '*the polluter will pay*'. An example often quoted in this context is that, for many people, car use will not decrease with a higher fuel price. In other words, one should not expect too much of the effect of a carbon tax on a possible **change in behaviour**, certainly in the case of high income households and profitable companies/industries (which can, moreover, pass on higher prices to their customers). The simple imposition of an (additional) tax will, in their view, certainly not be sufficient for many to change their behaviour. On the other hand, poorer households are often unable to change their behaviour, however much they would like to. Consequently, other measures are absolutely necessary.

Finally, according to a number of experts, it is not always clear whether "*the one who pollutes will actually pay the price for it*". Think, for example, of a household living in a poorly insulated rental home that, as a result of the carbon tax, has to pay higher heating prices while this is not the (full) responsibility of the person renting the house.

4.3.3 Acceptability

Population

In general, the experts expect that the idea of a carbon tax can count on relatively little enthusiasm among a large part of the population. According to many experts, the need for a carbon tax comes close to an '*elite consensus*', which means that while most experts agree, this is far from being the case among the population. An important reason for this is the already high degree of tax aversion within large groups of the population. The experts also refer to the popularity of a number of political parties/politicians who propagate populist views against a carbon tax. French-speaking experts moreover often refer to the 'gilets jaunes'. Some experts make the comparison with high energy prices due to the geopolitical situation. The reason why the protest against this is still relatively limited, according to them, has to do with the fact that the cause is seen as an external circumstance. When the government *itself* decides to introduce a carbon tax, the situation is completely different and large parts of the population will find it much harder to accept. However, it is important to stress that these expert expectations are not in line with the results of the survey conducted in the context of the National Debate on carbon pricing (in 2018). Based on the results on the population survey (with almost 1,800 participants), it was concluded that, within the Belgian population, there is a large potential support for the implementation of a mechanism of carbon tariffication to counteract climate change: 33% (fully) agreed on this matter whereas 39% did not have a clear opinion on the matter leading to a potential acceptance level of 72%. This potential support level would even increase to 81% if the carbon pricing mechanism is to be budget neutral.[117]

Moreover, in order to increase the acceptability among the population, it must be emphasised that there are also benefits as a result of the revenues of such a tax. According to the experts, the decision and the communication about the use of the revenues of a carbon tax are therefore extremely important. Hence, the way the revenues are used will play a key role for the acceptability among the population. Moreover, the experts refer to the importance of clear communication about the needs of a carbon tax. It must be made clear to the population why a carbon tax or, more generally, drastic measures are necessary in view of the goals to be achieved. In other words, they should act proactively and explain why something is being done and what can be done with the revenues of such a tax.

With regard to the acceptability among the population, reference is often made to examples from abroad. In Sweden, for example, the carbon tax was initially opposed by the population. After some time, this protest largely subsided because many Swedes realised that the carbon tax also brought great opportunities. According to several experts, the French government also learned a lot from the protests of the gilets jaunes by clearly communicating what they would do with the revenues of the tax afterwards. Emphasising such good practices can also help to increase support.

Industries/companies

With regard to the possible resistance of companies/industries to a carbon tax, most experts expect fewer problems compared to the general population. With the exception of a number of industrial sectors that make intensive use of fossil fuels, the experts in fact expect that most companies, in the event of higher costs resulting from the carbon tax, will simply pass this on in the final price of their

117

product. They argue that this will also happen with higher energy costs due to geopolitical tensions. The biggest loser remains the final user (usually households) who cannot pass it on and therefore must bear the full burden of the price increase.

Again, according to the experts, it is important to look at what has happened in countries that have already introduced a carbon tax. For example, in Sweden, SMEs were initially disadvantaged by the introduction of the carbon tax due to higher costs. However, over time it has given many companies a competitive advantage over other companies (in other countries) because they have created an innovative advantage due to an accelerated transition.

5 Analysis of carbon taxation at the household level

5.1 Introduction

The main objective of this chapter is to simulate the impact of the energy taxation reform discussed in this report on household budgets. The first part of the reform is an increase in the level of excise duties on heating fuels (natural gas and heating oil) as in the proposed revision of the Energy Taxation Directive (ETD). The second part of the reform is the introduction of a carbon price on heating and transport fuels (diesel and gasoline) in proportion to their carbon content. Both measures increase the price of energy for Belgian households, which raises questions about purchasing power and income distribution. Our analysis focuses on the distributional effects of these reforms and identifies the characteristics of the "winners" or "losers" of the envisaged tax reform. We will also compare different revenue recycling options based on their potential to compensate the most affected and/or most precarious households.

In the remainder of this chapter, we first review briefly the literature on the distributive impact of carbon prices on households (5.2) and present our data (5.3). We then analyse the impact of a carbon price of € 20/tCO_2 in 2023 (5.4) and of a carbon price of € 70/t CO_2 in 2030 (5.5).

5.2 Literature Review

5.2.1 Distributional Impact of a Carbon Tax

Economists have long studied the issues associated with the implementation of a carbon tax, particularly in terms of income distribution (Poterba, 1993 & Metcalf, 1999). This literature often finds that a carbon tax is regressive: since poorer households tend to spend a larger share of their income on energy goods on average (Lévay *et al.*, 2019 for Belgian figures), a carbon tax affects them proportionally more than the richest. Moreover, even within the same income category, households can be affected very differently depending on their energy needs (*e.g.,* houses vs. apartments, travel mode) (Burke *et al.*, 2020).

Decoster (1995) is the first, to our knowledge, to have used a consumption model to study the distributional impact of an increase in fossil fuel prices in Belgium. He found that, on average, richer households are less affected by the reform than poorer and older ones. Similar results were found in France: Berry (2019) assesses the distributional impacts of the 2018 fuel tax increase; she also concludes that such a reform has an initial (pre-redistribution) regressive effect. Studying the same reform, Douenne (2020) finds that the additional tax may be more related to characteristics other than income, especially for low-income households. Thus, while the regressive trend holds on average, it appears that some poor people are much more affected than others; the main drivers of the tax incidence being the type of energy used for heating and geographic location.

5.2.2 Revenue Recycling

However, the previous conclusions may be challenged when considering a budget-neutral tax reform, for which revenues from the carbon tax are redistributed to taxpayers. Lump-sum transfers can decrease the regressivity of such a tax reform (Belgian National Carbon Pricing Debate, 2018). Nevertheless, because energy expenditures vary considerably between and within income classes

(*Ibid.*), targeted redistribution may be necessary to compensate (poorer) households whose purchasing power would otherwise be significantly impacted.

Another option for revenue recycling is to reduce the tax burden on labour; the reform would then aim to reduce CO_2 emissions while creating more jobs. The choice of revenue recycling then leads to the traditional equity-efficiency dilemma. Vandyck and Van Regemorter (2014) replicated this result in the case of an increase in fuel excise taxes in Belgium. They found that an equal transfer to each household is the best option to compensate the poor, but that the negative impact of the reform on GDP can be better tackled by reducing taxes on labour.

A third way is to reduce taxation on other less polluting energy sources, and in particular on electricity. This solution has the advantage of facilitating the energy transition to less carbon-intensive energy sources that can be further greened by the shift to renewable energy. However, such a measure can be costly and *ultimately* benefit large energy consumers who are mainly found in the upper part of the income distribution. Nevertheless, if electricity expenditures represent a larger share of the income of the poorest, lowering the VAT on electricity would benefit proportionally more the poorer categories.[118] Thus, Gore (2022) shows that a progressive impact of such a reform is possible in Europe, provided that the poorest are favoured by exempting them from certain taxes[119] and/or by targeting income redistribution policies. As the results found in Belgium vary greatly according to the policies considered, different tax revenue recycling schemes - both in terms of type and coverage - are examined and compared in this study.

5.2.3 Energy Poverty

Energy poverty[120] is also at the heart of the carbon tax debate. Indeed, as energy-poor households already spend a large proportion of their total expenditure on energy goods, they are particularly vulnerable to an increase in fuel prices. It has been shown that appropriate revenue recycling schemes can potentially compensate energy-poor households (Berry, 2019); this would require specific policies that successfully target these households. Addressing energy poverty in a context of rising energy prices is therefore a challenge for future public policymaking.

5.3 Data

We use the Household Budget Survey (HBS) conducted in 2018 (report published in 2020) for which more than 6,000 households representative of the Belgian population accurately reported their expenditure over a 15-day period. We multiply these expenditures by two to obtain monthly values. Among these data, we are specifically interested in expenditures on transport fuels (gasoline and diesel) as well as heating fuels (natural gas and heating oil). We also have information on the characteristics of these households such as income, age and employment status of each member;

118 Another discussion is whether the amount redistributed to households should not be independent of the amount of energy consumed in order to encourage them to save energy in all cases.
119 The Energy Taxation Directive reform provides opportunities for exemptions for households at risk of poverty (Gore, 2022).
120 Households in energy poverty are those who spend a significant share of their total expenditures on paying their energy bill. We define this notion precisely in section 5.4.4.

family composition, region, housing occupied (house/apartment and owner/renter), and equipment in durable goods (cars, appliances) of the household.

We note an inconsistency between the macroeconomic aggregates and the total quantities obtained at the Belgian level based on the HBS observations. A large difference is identified in the quantities of heating oil consumed by households in 2018 (30% underestimation in the HBS). We decide to address this by calibrating the household heating oil quantities and expenditures to the national greenhouse gas emissions inventory (2018) figures. As the reported quantities of natural gas are very close to the official figures, we keep the survey data as they are. Regarding the quantities of transport fuels, we attribute the observed differences (-5% for gasoline and -40% for diesel) to cars owned by a legal entity. While the fuels consumed by these cars are accounted for at the national level, their cost should not be imputed to households since they do not bear these expenses. Indeed, ± 90% of company car owners have a fuel card (May, 2019). Knowing that more than 90% of these cars run on diesel (*Ibid.*), it makes sense that the HBS would greatly underestimate households' spending on this fuel; much of their consumption is actually paid for by their employers.

5.4 A carbon Tax of 20€/tCO_2 in 2023

5.4.1 Reference Scenario

In this part of the chapter, we simulate the introduction of a carbon tax in Belgium in 2023, which amounts to €20 per ton of CO_2 emissions. This "carbon price" multiplies the carbon content of each fuel (in tons of CO_2 emissions per unit) to give the amount of the carbon tax. This tax only applies to transport (gasoline and diesel) and heating (natural gas and heating oil) fuels. It is added on top of existing excise duties and is subject to a VAT of 21%.

In parallel, we consider the entry into force of the Energy Taxation Directive (ETD), which raises the minimum amount of excise duties on energy for the member states of the European Union. The new minima for 2023 are not binding for transport fuels, as Belgian excise duties on these are already quite high today. On the other hand, excise duties on heating fuels would have to increase in order to meet the ETD minima. We assume that the tax on fuel purchased by households is fully passed on to consumers, Andersson (2019) provides empirical evidence that this is a reasonable assumption. The price increases on the different fuels resulting from these additional taxes is presented in Table 5.1. In relative terms, transport fuels are less impacted by the carbon tax than heating fuels because their consumption is already taxed at a much higher level.

Table 5.1: Transport and heating fuels price increase due to the 2023 fiscal reform

Fuel	Price increase, VAT inc.	Relative price increase[121]
Petrol	0.057 €/liter	+ 3,9 %
Diesel	0,064 €/liter	+ 4.2 %
Heating Oil	0.064 €/liter	+ 9 %
Heating Oil, ETD inc.	0.082 €/liter	+ 11,5 %
Natural Gas	4.84 €/MWh	+ 8,6 %

[121] The relative price increase is calculated in proportion to the average prices observed in Belgium in 2018.

Natural Gas, ETD inc.	6.23 €/MWh	+ 11,1 %

All revenues from the tax increases that are collected on households are redistributed to households. This means that the general budget of the Belgian government is not affected by the proposed tax reform. In our main scenario, this redistribution takes the form of a lump sum transfer of an equal amount to each household. We will compare this scenario with other forms of targeted redistribution in the section 5.4.7.

5.4.2 Methodology and Assumptions

To simulate a carbon tax, we first calculate the quantities of fuel consumed by dividing households' energy expenditures by reference consumer prices. These prices are obtained in two different ways. For transport fuels, we have the quantities corresponding to each recorded expenditure. By dividing the amount of the expenditure by the quantity purchased, we obtain the average price paid by each household. Since there is a great deal of variation in the prices obtained this way, we prefer to use the average of these as a reference price. For heating fuels, we use the average prices from official statistics. The price of heating oil in 2018 is available from StatBel (2022), while the prices of natural gas (social and normal rates) are available from the CREG reports.[122] Once the quantities are obtained by dividing the expenditures by the average price paid for each fuel, we calculate the financial impact of the tax reform on the budget of each household. To do so, we assume that energy consumption remains unchanged. We therefore study the "day-after effect" of the reform.[123] Finally, no change is assumed in the structure of the population, in household income or in prices between 2018 and 2023. We also rule out automatic wage indexation in the simulation. We will come back to some of these issues in the discussion at the end of this part.

5.4.3 Macroeconomic Results

Two sources of public revenue are distinguished in this report. First, the imposition of ETD-2023 minima on heating fuels used by households would raise €107 million for the Belgian government. Second, the revenues of a carbon tax at €20/tonne CO_2 on household fuel expenditure are estimated at €591M. Together, these two measures combined would bring in almost €700M. The breakdown of this amount between each fuel is detailed in Table 5.2. We observe that almost 70% of this new revenue is collected on heating fuels. This is due to a larger amount of energy consumed for heating in absolute terms, but also to the additional revenues generated by the revision of the ETD which only impacts the price of heating fuels.

Table 5.2: Contribution of each fuel to the additional after-reform tax revenues, 2023 scenario

Petrol	Diesel	Heating Oil	Natural Gas

[122] The average price paid by households is reported in a CREG (2019) study. The social rates are published on their website (https://www.creg.be/fr/consommateur/tarifs-et-prix/tarif-social). Based on these two pieces of information and the proportion of households benefiting from the social rate, we obtain the average price paid by households not benefiting from the social rate.

[123] This assumption is not far from being verified in reality at least in the short run. In his meta-analysis, Labandeira et *al.* (2017) finds price elasticities of demand ranging from -.29 to -0.02 for the energy sources studied here.

14 %	17.4 %	34.1 %	34.5 %
€ 98 M	€ 122 M	€ 238 M	€ 241 M

In three following sections, we study the financial effect of the reform on households. We first describe its impact in function of household income and then identify the characteristics of households that are most heavily affected. We then conclude with an econometric analysis of the determinants of the net monetary effect.

5.4.4 Results by Income

Energy expenditures

The average household expenditure is presented in Figure 5.1 for each equivalent income decile and on average for the whole population.[124] Belgian households spend on average about €85 per month on transport fuel (green) and €70 per month on heating fuels (red). Expenditures on heating fuel are relatively stable with income, while they increase with the deciles for transport. The new taxes paid (in blue and purple) represent a small share of total energy expenditure after the reform: since consumption does not change by assumption, total expenditure increases in the same proportions as the price, *i.e.*, by about 4% for transport fuel and 11.5% for heating fuel.

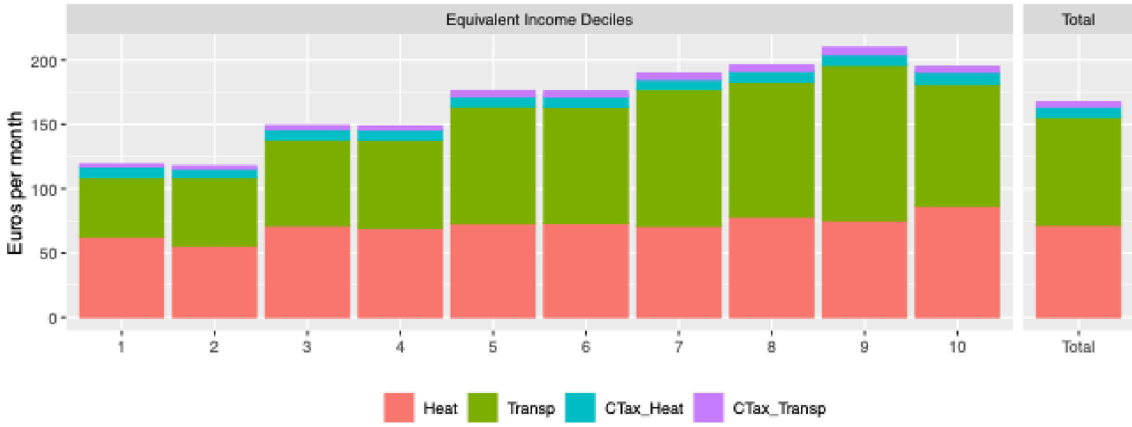

Figure 5.1: Total fuel expenditures (additional taxes included) per decile (in €/month), 2023 scenario

Inter-deciles effects

When we consider only the effect of the reform on households, we see that households pay on average €12 in additional taxes per month, €8€ for heating and €4 for transportation. Since all tax revenues collected from households are redistributed equally among households, each household receives a monthly payment of €12 (or an annual payment of €142). Households whose taxes increase by more than €12 are therefore losers, while the others are net winners. Figure 5.2 (diamonds) shows that, on average, households in the first four deciles gain as they are less affected by the higher taxes on transport fuels. Deciles 5 to 10 are net losers, and the average effect becomes more negative as one moves up the deciles.

[124] Equivalent income is obtained by adding the incomes of all members of a household and dividing this total household income by the modified OECD equivalence scale, given by 1 + (number of adults - 1) x 0.5 + number of children x 0.3

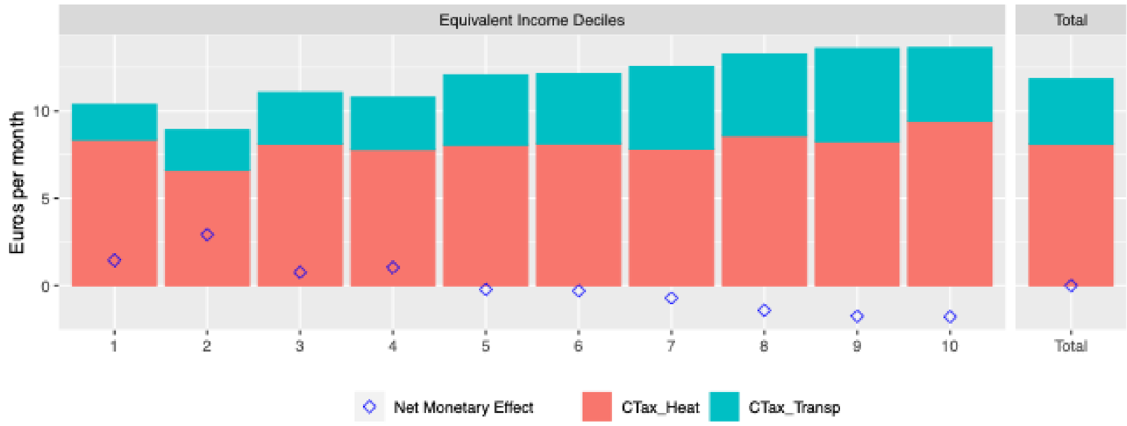

Figure 5.2: Additional taxes on heating and transport fuels and net monetary effect per decile (in €/month), 2023 scenario

In Table 5.3, we observe that the proportion of households that benefit financially from the measure (Winners) is greater than 60% in each of the first four deciles, while it is less than 60% in the other deciles. We also see in this table that more than 70% of the new taxes come from heating fuels consumption (Share Heat) in the first 4 deciles, while this rate is below 70% in the last 6 deciles. These results suggest that the poorest households have fewer cars, use them less and/or have vehicles that consume less fuel. They are therefore less affected by the increase in the price of gasoline and diesel. We also see in the table that even if the rate of winners is higher in the first deciles, it is also in the bottom of the income distribution that the rate of households experiencing a loss of more than 1 % of their net income (we call them "big losers") is higher.

Table 5.3: Summary of the tax reform impact by decile

Decile	Avg. Impact (€/month)	Winners	Big Losers	Share Heat
1	1.4 €	66 %	7.1 %	81 %
2	2.9 €	73 %	2.1 %	74 %
3	0.8 €	61 %	3.9 %	73 %
4	1 €	62 %	1.8 %	72 %
5	-0.2 €	56 %	1.7 %	67 %
6	-0.3 €	55 %	0.9 %	67 %
7	-0.7 €	56 %	0.3 %	62 %
8	-1.4 €	50 %	0.7 %	65 %
9	-1.8 €	52 %	0.7 %	61 %
10	-1.8 €	52 %	0 %	69 %
Total	0 €	58 %	1.9 %	69 %

Poverty and Energy poverty

According to the definition proposed by the "Fondation Roi Baudouin" (2021), a household is in energy poverty if it belongs to the first five deciles and spends more than twice the median ratio between energy bill and disposable income (after deduction of housing costs). In our database, any household in the first five deciles spending more than 14% of its income on energy is considered energy poor.[125]

Before the reform, 30% of the households in the first decile are in energy poverty. This proportion decreases with the deciles to reach 13% in the 5th decile. The reform reduces energy poverty at the population level from 10.6% to 10.2%, with a reduction by 1.5 percentage points in the first two deciles while there is virtually no change in the other deciles.

Figure 5.3: Percentage of energy-poor households before and after the reform, by decile

Table 5.4 summarizes the impact of the reform on households in poverty and in energy poverty. [126] Only 41% of households in energy poverty before the reform benefit from the reform while they lose on average €3.5 per month. We find that 89% of the extra cost for these households comes from the increase in the price of heating because these households have on average fewer cars (36% do not have a car while only 17% of other households do not have a car), use it less (those with a car spend on average 54 €/month on transport fuels against 105 €/month on average) and/or live in homes heated by oil (45% against 21% in the rest of the population). Interestingly, nearly all the big losers are energy poor (10% of the households in energy poverty are big losers versus 1% for the other households)

[125] At the time of writing (March 2022), the threshold and rate of energy poverty are higher than the figures we obtain based on 2018 data given the recent rise in fuel prices. Nonetheless, in this study we are interested in the effect of a tax reform on energy poverty (among other things) by calculating the variation in spending by different households. These variations in carbon tax expenditures do not depend on fuel prices, but on the quantities of fuel consumed, which have changed only slightly since 2018.

[126] A household is poor if the equivalent income of its members is below 60% of the median equivalent income. The following table shows the effect of the reform on households in poverty and in energy poverty.

The reform has a positive monetary impact for 67% of the households in poverty. The average net impact is positive (+ €1.64 per month) for these households and the share of household in poverty that are energy poor is reduced by 1.6 percentage points.

Table 5.4: Summary of the tax reform impact by poverty and energy poverty status

Variable	Avg Impact (€/month)	Winners	Big Losers	Share Heat	Variation of Energy pov.
Energy Poor	-3.5	41 %	10 %	89 %	/
Not Energy Poor	0.42	60 %	1 %	65 %	/
Poor	1.64 €	67 %	6.8 %	79 %	-1.6 p.p.
Non-Poor	-0.19 €	57 %	1.3 %	67 %	-0.2 p.p.

In Table 5.5 we decompose the impact of the reform on households in energy poverty per decile. Even if the reform reduces energy poverty in the two first deciles, only 49% and 50% among them are winners. The loss is on average bigger than the gain on these households since the average impact is negative (-3.1 €/month). In higher deciles, the energy consumption of energy poor households is much higher. The average monetary impact of the reform is therefore stronger, and the share of winners is smaller than in lower deciles.

Table 5.5: Impact on energy-poor households, by decile

Decile	Avg. Impact (€/month)	Winners	Big Losers
1	-3.1 €	49 %	11%
2	-3.1 €	50 %	8%
3	-5.2 €	32 %	13%
4	-6.3 €	37 %	7%
5	-7.3 €	28 %	12%
Total	-3,5 €	41 %	10%

Intra-decile effects

There is considerable heterogeneity between the energy consumption of households within the same decile. Some use their car intensively while others do not, and housing differs in terms of surface to be heated or insulation, etc. As a result, the effect of the reform varies greatly between households within each decile. In Figure 5.4, we have decomposed the households in each decile into 3 groups of equal size: the first consists of households for which the net effect is the most negative (red – heavily impacted), the third is made up of households for which the net effect is the most positive (blue – slightly impacted), while the second is composed of the remaining households (green – moderately impacted). At the population level, the heavily impacted lose on average a little more than €10 per month, while the slightly impacted gain a little less than €10 per month. We also see that the average loss of the heavily impacted increases significantly with the deciles.

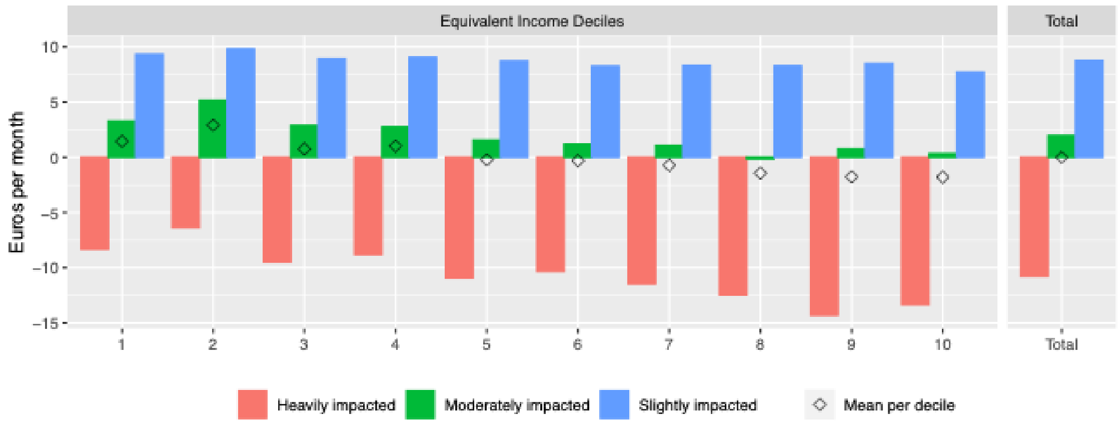

Figure 5.4: Intra-decile distribution of the net monetary effect (in €/month), 2023 scenario

5.4.5 Results by Socio-demographic Characteristics

In this section we investigate the monetary effect of the reform on categories of households, according to the type of heating they use, the type of dwelling, the ownership of cars, the presence of children in the household, the age and professional status of the reference person, the risk of energy poverty and the region.

Table 5.6 shows the proportion of households in energy poverty before the reform, the average monetary effect of the reform (Avg. Impact), the proportion of households that benefit (Winners), the proportion of households that lose more than 1% of their total income (Big Losers), the share of the new heating taxes in the total of the new taxes (Share Heat), and the change in energy poverty following the reform (Variation of Energy pov.).

Table 5.6: Summary of the tax reform impact by heating type, housing, car ownership and household categories

Variable	Energy Poverty	Avg Impact (€/month)	Winners	Big Losers	Share Heat	Variation of Energy pov.
Heating_Oil	20 %	-9.9	14 %	6.5 %	80 %	+ 1.6 p.p.
Heating_Gas	8 %	1.5	65 %	0.6 %	75 %	-0.7 p.p.
Heating_Other	6 %	8.3	94 %	0 %	0 %	-1.9 p.p.
House Owner	9 %	-2.27	48 %	2.5 %	65 %	+ 0.2 p.p.
House Renter	19 %	0.16	56 %	1.6 %	67 %	-1.8 p.p.
Apartment Owner	4 %	3.58	77 %	1.3 %	69 %	-0.2 p.p.
Apartment Renter	15 %	4.94	81 %	0.5 %	77 %	-1.6 p.p.
No car	20 %	5	84 %	1.6 %	92 %	-2.4 p.p.
One car	11 %	0.2	58 %	2.3 %	64 %	+ 0.2 p.p.
2 or more	3 %	-4.2	40 %	1.3 %	60 %	-0.1 p.p.
With children < 18	5 %	-1.02	54 %	1 %	63 %	+ 0.2 p.p.

Without children < 18	13 %	0.43	60 %	2.3 %	70 %	-0.6 p.p.
Age_Ref_Pers_ [65,99]	16 %	-0.23	58 %	3.1 %	76 %	-0.1 p.p.
Age_Ref_Pers_ [18,65)	9 %	0.08	58 %	1.5 %	65 %	-0.5 p.p.
Among 18-65: Working	5 %	-0.45	56 %	1.1 %	63 %	0 p.p.
Unemployed	24 %	2.16	68 %	3.1 %	73 %	-2.2 p.p.
Among Working (< 65): Self-employed	8 %	-1.09	55 %	0.8 %	63 %	-0.4 p.p.
Employee	5 %	-0.48	55 %	1.3 %	62 %	-0.2 p.p.
Unspecified	3 %	-0.19	57 %	1 %	64 %	+ 0.2 p.p.

The results show that the households most likely to be in energy poverty before the reform are those who heat with oil (20%), who do not have a car (20%), house renters (19%) and households where the reference person is under 65 and unemployed (24%) or over 65 (16%).

From this table, it appears that the household that heats mainly with oil deserves special attention. Indeed, the reform significantly increases their energy expenses: they lose an average of €9.9 per month, only 14% of them gain, 6.5% of them lose more than 1 % of their total income and the proportion of these households in energy poverty increases by 1.6 percentage points. This is therefore not only a category of household that was energy-poor before the reform, but also a category that would be heavily impacted by its implementation.

Among other household categories, there is always a majority of winners following the reform, with the exception of house owners and households with two or more cars: 52% and 60% respectively are net losers from the reform.

Another category of household draws our attention, namely households where the reference person is over 65. On average, these households do not benefit from the reform, and 3.1% of them are strongly affected by the measure. The increase in their expenditure is mainly due to the increase in the price of heating fuels (76% compared to 65% for the complementary category). However, the energy poverty rate in this group does not increase as a result of the reform.

The type of housing is another important characteristic. Households living in a flat gain on average €4 more while those living in a house lose on average, since houses are on average bigger and less well insulated. Flats are also a more common type of housing in cities. Hence, expenditure on transport fuels is typically lower for people living in flats. Renters, who are more affected by energy poverty, benefit the most from the reform, both among households living in a house and among those living in a flat. We expected that homeowners would invest more in their homes to make them more energy efficient, while renters would be forced to deal with an owner whose interests are divergent. If this intuition is correct, its effect is offset by another mechanism. It is for example possible that owners have on average larger dwellings. We lack data such as the energy performance or the surface area of the dwellings in order to explore these explanatory paths.

The additional taxes on petrol and diesel only affect those who have a car, resulting in a difference in average financial impact depending on this characteristic. Households with two or more cars are negatively impacted by an average of €4.2 per month. Nevertheless, this category is hardly at risk of energy poverty. Households with one car are not particularly affected while those without a car benefit from the reform (84% are net winners) with an average effect of €5 per month and a drop from 20% to 17.6% of energy poverty in this category.

The average net effect is negative for households with children whereas it is positive for households without children, given the link between household size and heating and transport expenditure. Households with children are nevertheless less affected by energy poverty (4% versus 12% for others), mainly because there are more frequently two sources of income in the household.

Amongst the under 65s, households with a non-working reference person gain on average, reducing energy poverty in this group by 2.2 percentage points. Conversely, households with a working reference person lose on average (-0.45 € per month). For these households, 37% of the extra cost is related to taxes on transport fuels for workers, compared to 27% for households where the reference person does not work, suggesting that the latter travel less by car and/or heat their homes more. Status (employed or self-employed) does not appear to play a role in the size of the effect.

5.4.6 Econometric Analysis

We carry out an econometric analysis to distinguish the socio-demographic dimensions that determine the impact of the reform on households. It is based on the Ordinary Least Squares (OLS) method. The dependent variable of our regression is the monetary impact of the reform. The independent variables are the type of heating, the type of housing, the region, the number of cars, the professional status of the reference person and the size of the household.[127]

Except for household size, all variables are categorical. We determine our reference group by choosing, for each categorical variable, the category that benefits most from the reform. Our analysis reveals that our reference group is composed of households who heat their home with other sources than natural gas or heating oil (*i.e.*, with electricity mainly), live in Flanders, rent a flat, do not own a car, and whose reference person is employed. A household combining all these criteria will see its purchasing power increase by €14.54 per month on average after the reform, an amount corresponding to the value of the constant (*intercept*) in Table 5.7.[128] It is in relation to this reference

[127] We do not have access to all the variables that may play a role in the monetary effect of the reform. For example, we do not have information on the characteristics of the dwelling (year of construction, surface, insulation, etc.), the distance between the home and the work of individuals, etc. Other unobservable factors also play an important role (individual preferences, environmental concerns, etc.). Nevertheless, our variables explain 48% of the variation in effects ($R^2 = 0.48$). Moreover, the correlation between the explanatory variables is low, which guarantees that our estimation does not suffer from a multi-collinearity bias (for each of the explanatory variables, we obtain a *variance inflation factor* (VIF) lower than 2).

[128] In this table, we find the coefficients of the linear regression associated with each variable. These are to be interpreted in terms of the variation in the net monetary impact of the reform in relation to the characteristics of the reference household, all other things being equal. Below this coefficient, the standard deviation is mentioned in brackets. The stars refer to the level of significance estimated using the p-value.

household that the coefficients of other variables must be interpreted. They are all negative by construction.

Table 5.7: OLS Regression Results

Dependant variable: Avg. Impact (€/month)			
Variable	**Coefficient OLS (Standard error)**	**Variable**	**Coefficient OLS (Standard error)**
(Intercept)	14.54 *** (0,39)	MS_CARS_1	-2,18 *** (0,26)
Heating_Source_Gas	-6.76 *** (0.24)	MS_CARS_2 or more	-4.82 *** (0.34)
Heating_Source_Oil	-16.57 *** (0.29)	Ref_Pers_Self-employed	-1.14 *** (0.39)
CD_Region_Brussels	-0.62 * (0.32)	Ref_Pers_Unemployed	-0.65 ** (0.31)
CD_Region_Wallonia	-1.79 *** (0.21)	Ref_Pers_Retired	-0.68 *** (0.26)
Apartment Owner	-0.48 (0.35)	Ref_Pers_Working_Unspec	-0.02 (0.24)
House Renter	-2.35 *** (0.36)	MS_SIZE	-0.64 *** (0.26)
House Owner	-2.61 *** (0.27)	*** p < 0.01; ** p < 0.05; * p < 0.1.	

Thus, all other parameters being equal, heating with gas results in an average loss of €6.76 per month compared to households that heat with electricity, while the loss amounts to €16.57 for those who heat their home with oil. The heating method is therefore by far the most important observed characteristic influencing the average impact.

Next come the number of cars and housing. A household with one car will lose about €2.2/month compared to the same household without a car. Owning two cars (or more, which is quite rare) results in a loss of €4.8. Living in a house rather than a flat results in a loss of ± €2.5 per month. It seems that owning or renting does not significantly influence the average impact, as discussed in the previous section.

The other dimensions observed seem to play a less important role. When the reference person is self-employed, the household tends to lose €1.14/month compared to the case where the latter is employed. Finally, an additional person causes the household to lose on average €0.64/month as a result of the tax reform, all other parameters being equal.

The econometric analysis confirms the intuitions we made in the previous section regarding the variables that play an important role. The type of heating is the characteristic that has the greatest impact on the household budget. Car ownership and type of housing complete the podium of variables that have an explanatory role on the monetary effect of the reform.

We have seen in the previous section that households with an unemployed reference person benefit on average by almost €3 more than households with a working reference person. The econometric analysis reveals that this effect is not related to employment status directly, but rather to other variables correlated with unemployment status such as car ownership or housing size.

5.4.7 Targeted Revenue-Recycling Schemes

In this section, we explore alternative revenue-recycling options aimed at more effectively fighting energy poverty and better protecting the lowest-income households.

Existing targeted policies

Some households benefit from a special rate for their heating fuels' consumption. Households living in social housing or those receiving an allowance from the "Centre Public d'Action Sociale" (CPAS - Social Welfare Center), from the "Direction Générale des Personnes Handicapées" (DGPH - Directorate General for Persons with Disabilities) or from the National Pensions Office benefit from a social rate on their gas and electricity bills. The gas price for social rate beneficiaries was on average €33/MWH instead of €60/MWH in 2018. There are also price reductions on heating oil for households that are recipients of the increased intervention (BIM), *i.e.*, for households for which the sum of gross income in 2018 was below €1592 plus €294 per dependent person. These households were entitled to a refund of €0.14 per litre of heating oil purchased in 2018, if they applied for it to the CPAS. In our calculation, we have accounted for the social rates on gas and electricity bills and the energy cheques, assuming that there was a full take-up of those cheques. Other measures have since been taken in response to the exceptional increase in energy prices. Apart from one-off financial interventions, the social rates on gas and electricity were extended to beneficiaries of the increased intervention on 1st February 2021.

The targeted group in our simulations

In the baseline scenario, the revenues from the carbon tax are redistributed equally among all households. In this section, we consider reforms aiming at better protecting the vulnerable households. We define two target groups, the BIM' and BIM40. Households for which the sum of the after-tax income of its members is less than €1450, plus €250 per dependant are BIM' while they are BIM40 if the after-tax income of its members is less than €2100, plus €250 per dependant.[129] In this way, we assign a BIM' status to 19% of households, which is approximately the share of households that were recipients of the increased intervention in 2018.[130] There are a few households that receive a social rate on gas but are not BIM. We also include these households in the BIM' group, which with this addition includes 20% of the population. By construction, 40% of households have the BIM40 status.

Table 5.8 shows the share of households in targeted categories (social discount, BIM' and BIM40) in each decile. All households benefitting from the social discount (10% of the population) are BIM' (20% of the population), and all BIM' are BIM40 (40% of the population). Almost all BIM' households are in the first 3 deciles: 91% of the households in the first decile, 61% of the households in the second decile and 41% of the households in the 3rd decile are BIM' households. Nearly all the households in the first decile are BIM40, the rate of coverage in the second decile is 50% higher for BIM40 than for BIM' while it is the double in the third decile. While there are nearly no household with the BIM' status in the decile 4, 5 and 6, a bit less than 50% of them are BIM40. Table 6.8 also present the rate of households in energy poverty per decile and the share of these households that are in the different targeted groups. We see that 86% of the households in energy poverty are BIM40 while only 53% of the energy poor are BIM' and 35% of them have a social discount. These rates are decreasing over the deciles, very sharply for the BIM' in the deciles 4 and 5 where only 1% and 2% of the households in energy poverty are BIM'. On the other hand, respectively 74% and 49% of them are BIM40. Targeting on households in the BIM40 category rather than on those in BIM' therefore covers a larger share of the households in energy poverty, especially in the 4th and 5th deciles.

Table 5.8: Share of households in targeted categories and in energy poverty per decile

decile	1	2	3	4	5	6	7	8	9	10	Total
Social Discount	51%	22%	15%	4%	1%	2%	1%	1%	0%	0%	10%
BIM'	91%	61%	41%	4%	1%	2%	1%	1%	0%	0%	20%
BIM40	99%	93%	80%	60%	36%	34%	1%	1%	0%	0%	40%
Energy Poverty	30%	24%	20%	19%	13%	0%	0%	0%	0%	0%	11%
Ene. Pov. in Social Discount	71%	42%	27%	1%	2%	0%	0%	0%	0%	0%	35%
Ene. Pov. in BIM'	93%	73%	51%	1%	2%	0%	0%	0%	0%	0%	53%
Ene. Pov. in BIM40	99%	97%	86%	74%	49%	0%	0%	0%	0%	0%	86%

[129] We have data in the Household Budget Survey about the after-tax income of each individual in the household, whereas the criteria for granting BIM status are defined on gross income. We are therefore unable to accurately identify beneficiaries of the increased intervention in the Household Budget Survey because we do not have all the information that allows us to reconstruct gross income from net income. For example, we do not have information on tax reductions that would be related to childcare expenses, service title expenses, donations, pension savings, etc. Rather than attempting to reconstruct gross income from net incomes in an imperfect manner, we have chosen to assign a BIM' status to households in our database based on criteria defined on their net incomes rather than their gross incomes.

[130] In 2018, 28% of Brussels households (Observatoire de la Santé et du Social de Bruxelles, 2019), 22% of Walloon households (IWEPS, 2022) and 15% of Flemish households (Gemeente-Stadsmonitor, 2022) were beneficiaries of the increased intervention (BIM).

Simulation of targeted reforms

We analyse the impact of different targeted reforms. The reforms differ in the group they target (BIM' or BIM40) and on the form of the benefit proposed (transfer versus price cut). We study the impact of different reforms on 3 categories of households: (1) households in energy poverty (2) households that are in the first 3 deciles and (3) the general population. For each category considered, we compute the average net effect of the measure on households (Avg. Impact), the share of winners (Winners) and the share of households that lose more than 1% of their total income (Big Losers). In each scenario, the portion of revenue that is not spent under the targeted policy (% available for L.S.) is redistributed equally among all households.

Our results are presented in Table 5.9. The first row of the table shows the information from the reference scenario, where income is redistributed equally among all households. We can see that households in energy poverty lose an average of 3.5 € per month, that only 41% of them gain, while 26% are big losers. This result contrasts sharply with the situation of households in the first three deciles, who gain an average of €1.7 per month, while 67% of them benefit and only 13% are big losers. At the level of the whole population, the net effect is nil, since all the new tax revenues are redistributed (we therefore omit a column for the net effect at the population level). The share of winners (58%) is lower than that of households in the first three deciles, which is also the case for the proportion of big losers (8%). We can deduce that the net effect of the measure on households in the last 7 deciles is negative on average (-0.7 € per month), that only 54% of them benefit from the measure and that few of them lose more than 1% of their income (6%).

Table 5.9: Summary of targeted reforms' net impact on different groups of interest

(1): Energy_Poor (2): first 3 deciles (3): Total pop.	Avg. Impact		Winners			Big Losers			% available for L.S.
	(1)	(2)	(1)	(2)	(3)	(1)	(2)	(3)	
Reference scenario	-3.5 €	1.7 €	41 %	67 %	58 %	10 %	4.3 %	1.9 %	100 %
Lump sum 20%	-0.3 €	6.1 €	57 %	78 %	56 %	8.5 %	2.9 %	1.7 %	83 %
Lump sum 20% × 3	2 €	9.2 €	60 %	80 %	53 %	8 %	2.7 %	1.8 %	71 %
Lump sum 40%	0.3 €	6 €	59 %	79 %	56 %	6.1 %	2.3 %	1.3 %	71 %
Lump sum degressive	1.9 €	7.4 €	62 %	82 %	55 %	5.7 %	1.7 %	1.2 %	71 %
Broad BIM'	-0.1 €	5.7 €	38 %	65 %	53 %	12 %	5.6 %	2.5 %	86 %
Excl BIM'	1.6 €	5.9 €	65 %	84 %	58 %	6.6 %	2%	1.4 %	84 %

In all alternative redistribution scenarios, households that are not in the BIM' category receive a lump sum transfer that is less than €12 per month. Thus, for at least 80% of households, the reform is financially more advantageous when it is not targeted.

Targeted Transfers

The next two rows of the table report the results of scenarios where BIM' households receive a lump sum that is larger than others. In the "Lump sum 20%" scenario, BIM' households receive a lump sum that is twice as high as the others. Given that they represent 20% of households and that the average monthly transfer is equal to €12 per month, they receive in this scenario a transfer of €20 per month while the others receive €10 per month. The additional €10 support to BIM' households requires the use of 17% of the carbon revenue so that 83% of this revenue is redistributed equally among all (last column of the table). This reform would allow households in energy poverty to (i) have an average net loss of almost zero (- €0.3 per month on average), (ii) increase the share of winners from 41% to 57% and (iii) reduce the share of big losers from 26% to 20%. Households in the first three deciles also benefit when looking at the three criteria studied. At the level of the total population, on the other hand, the share of winners decreases, but this is also the case for the big losers, who are strongly concentrated in the first deciles. In the "Lump sum 20% × 3" scenario, BIM' households receive an amount that is 3 times higher than that of the others, *i.e.*, they receive €25.5 while the other households receive €8.5. The additional €17 support to BIM' households requires the use of 29% of the carbon revenue so that 71% of this revenue is left for an equal redistribution among all households. The net effect of this reform on households in energy poverty or on those in the first 3 deciles is higher than in the previous scenario on average (+2 €/month and +9.2 €/month). Nevertheless, it only results in a small increase in the share of winners among these households and even implies an increase in the proportion of big losers among the households in energy poverty. Indeed, it can be shown that 92% of the households in the BIM' group were already winners of the reform in the "Lump sum 20%" scenario. It is therefore not by being more generous towards these households that we can effectively compensate the losers among energy-poor households or those in the first 3 deciles. On the other hand, the greater generosity towards BIM' households in the "Lump sum 20% × 3" scenario than in the " Lump sum 20%" scenario comes at the expense of non-BIM' households so that the share of winners in the population is lower in " Lump sum 20% × 3" while the number of big losers is higher.

In the scenario "Lump sum 40%", BIM40 households receive a lump sum that is twice as high as the others. The revenue needed to enlarge the targeted group to BIM40 is similar as the one needed to compensate more the BIM' household in the "Lump sum 20% × 3" scenario (71% of the carbon revenue remain available for the equal redistribution). Compared to the scenario where only BIM' households have a transfer twice as high as the other households, the number of big losers is smaller, while the net monetary effect and the rate of winners are similar, in each population studied.

We consider a last scenario "Lump sum degressive" where households receive different amounts depending on their status. Beneficiaries of a social discount receive 25€ per month, an amount 3 times higher than the non-BIM40 who get 8,5€ per month; BIM' households not eligible to a social discount receive 17€ (twice as much as non-BIM40 households); and those who are BIM40 but not BIM' receive 13€ (1.5 times more than non-BIM40 households). This scenario is the most effective in protecting the most vulnerable households and/or those most affected by the reform. The rate of winners among the energy poors or households in the first three deciles is indeed higher than in the other scenario studied where the transfers are targeted. Similarly, this is the scenario where the share of big losers is the lowest of all the scenarios studied in the entire population, but also among the low-income households and among the energy poor.

Many social benefits are granted to households with BIM status (*e.g.*, more generous reimbursement of health care costs). This makes the BIM status a natural and pragmatic criterion for organising the targeting of carbon tax revenue redistribution. However, increasing the role of this status in the granting of social assistance may lead to undesirable strategic behaviour or to inequitable situations.

Compared to the other scenarios, the "Lump sum degressive" scenario also has the advantage of reducing the importance of obtaining or losing the BIM status.

Targeted price cut

The next 2 scenarios aim to reduce the cost of energy expenditures of BIM' households compared to the reference scenario by reducing the unit price of heating fuels.

The first of these price-related reform consists in extending the group of social rate beneficiaries to BIM' households ("Broad BIM' "). The monetary effect of the measure would be nil on average for households in energy poverty (-0.1 €/month) whereas households in the first 3 deciles would be net beneficiaries on average (+5.7 €/month). Households in energy poverty gain more than in the " Lump sum 20%" scenario while the opposite is true for households in the first 3 deciles, which is explained by the fact that households in energy poverty are by construction relatively large energy consumers who can therefore strongly benefit from the significant price decrease studied here. Nevertheless, the reform reduces the share of winners and increases the share of big losers among households in energy poverty and among households belonging to the first 3 deciles. 74% of non-BIM' households in energy poverty, and 54% of the non-BIM' in the three first deciles have a net loss in this scenario. The figures for this scenario are also worse at the level of the total population, as significant resources are devoted to a limited number of households, so that the lump sum granted to non-BIM' households is only 10 €/month.

The second measure acting on the price aims at exempting all BIM' households from the carbon tax ("Excl BIM' "). By construction, all BIM' households are winners in this case as they would not pay any tax while receiving a lump sum. This scenario benefits 65% of the households in energy poverty and 84% of the households in the first three deciles while significantly reducing the large losers in these categories. At the level of the whole population, the share of winners does not decrease compared to the baseline scenario, contrary to other targeted measures, since the cost of targeting is relatively low and there are therefore enough resources left to compensate the other households.

Lump sum transfers are more effective than price reductions in terms of providing an incentive to reduce energy consumption but exempting BIM' households from the carbon tax is more effective in protecting the energy poor (*i.e.*, those who consume the most energy relative to their income) in the short term. However, lower energy prices are expected to reduce investments in energy efficient infrastructure and therefore increase energy bills in the long run, especially as the carbon price trajectory is expected to increase.

5.4.8 Alternative Scenarios

We study three other reforms in this section. In the first, redistribution is organized by adult rather than by households. In the two others, the VAT rate is reduced to 6% for electricity and for all energy products. The results are presented in Table 5.10.

Table 5.10: Comparison of alternative reforms' net impact – 6% VAT rate on electricity

(1): Energy_Poor (2): first 3 deciles (3): Total pop.	Avg. Impact (1)	 (2)	Winners (1)	 (2)	 (3)	Big Loser (1)	 (2)	 (3)	% av-ailable for L.S.
Reference scenario	-3.5 €	1.7 €	41 %	67 %	58 %	10 %	4.3 %	1.9 %	100 %

Lump sum per adult	-5.6 €	0.3 €	33 %	57 %	56 %	17 %	7.6 %	3.5 %	100 %
6 % VAT Elec.	-3.5 €	0.8 €	35 %	57 %	54 %	12 %	6%	2.5 %	25 %
6 % VAT Ene.	1.9 €	-0.2 €	61 %	46 %	50 %	2%	2.6 %	0.8 %	-50 %

Transfer per Adult

We assume in our reference scenario that the revenues from the carbon tax are redistributed to households. It is also possible to offset the effect of the increase in energy bills by proposing a redistribution per adult rather than per household. Compared to our reference scenario, it would hurt households composed of one adult and benefit those with more than one adult. As single adult households are proportionally more numerous in the first deciles and among the households in energy poverty, this alternative scenario does not compensate the poorest / most affected. Table 5.10 reveals that the average amount received among the households in the three first deciles or those in energy poverty is smaller than in the reference scenario. Similarly, the rate of winners is smaller while the rate of big loser is higher in these population. The same is true at the population level.

VAT rate at 6% on electricity

A popular policy proposal consists of lowering prices of less polluting energy sources, such as electricity, in order to foster the ecological transition. This can be done through lower VAT rates. We simulate a scenario where part of the revenue collected with the new taxes are used to reduce the VAT rate on electricity from 21% to 6% for all households (line 4 of Table 5.10), the remaining revenue being redistributed equally among households. We see that while the VAT reduction on electricity for all has the same average impact on energy-poor households than the reference scenario, it decreases the proportion of net winners and increases the number of big losers within this category. It also reduces the share of winners and increases the share of big losers both among the households in the three first deciles as well as in the entire population.

VAT rate at 6% on energy products

In a final scenario, we reduce the VAT rate for natural gas, heating oil and electricity from 21% to 6% (line 5 of Table 5.10). This reform would cost one and a half times the revenue from the carbon tax, which means that the government would have to find other sources of funding to achieve such a reform. To bridge this gap in our simulation, we assume a lump sum contribution of €6 from each household. Our results show that it would be particularly beneficial for households in fuel poverty, as they are heavy energy consumers. However, the average impact and the share of winners for this category are comparable to the figures found in the "LS Phasing Out" scenario. On the other hand, the situation would be worse for low energy consumers who are over-represented in the first deciles. Finally, the share of winners among the whole population would be the lowest of all scenarios

5.4.9 Discussion

Income level and willingness to pay for climate change policies

We only look at the financial aspect of the reform to identify the winners and losers. However, public support for this reform does not depend solely on the net financial impact. For instance, the reform will encourage households to reduce their CO_2 emissions, which benefits everyone. Empirical evidence shows that willingness to pay for climate change policies increases with income (Hersch &

Viscusi, 2006; Kotchen et al, 2013). This result is also found in the specific case of carbon taxation (Kotchen et al, 2017; Rotaris & Danielis, 2019). High income households are therefore more likely to support the reform, even if it hurts them financially, because they value more the environmental benefits that should flow from it. Moreover, behavioural experiments suggest that fiscal revenue-recycling schemes that lower income inequality gather stronger political support because of inequality aversion (Kallbekken et al., 2011). For these two reasons, revenue-recycling options that target poorer households may therefore foster political acceptability of a carbon tax shift.

The price per ton of CO_2

We performed the simulations with a price of €20 per ton of CO_2. Since we do not model household behaviour, our results are almost proportional to the chosen price, except for the effect (discussed below) of the ETD reform on heating fuels prices. For a price of €40/ton of CO_2, each household would be about twice as impacted as it is in our main scenario.

The ETD Reform

We assumed that the Energy Taxation Directive (ETD) reform was passed and that excise taxes were adjusted upward to meet the minimums if this was not currently the case. If this reform were not adopted, the price of gas and fuel oil would increase less. The ETD reform is responsible for about 25% of the increase in the price of heating fuels when the price of a ton of CO_2 is 20 €. This is not negligible. Nevertheless, our results are quite similar if we assume that the ETD reform does not take place. Households that heat with electricity would benefit slightly less from the reform while the net effect of the reform would be slightly more beneficial for households that heat with gas and oil.

Prices of other goods

We do not model the impact of the reform on firms in this chapter. Our analysis assumes that the only prices that change as a result of the introduction of the tax are fuel prices. Firms' production costs are also affected by the reform studied, which affects all fuels, not just those purchased by households. When firms' production costs change, this is at least partly reflected in the prices they charge and thus affects the purchasing power of households. A more advanced analysis could assess the effect of the reform on firms' prices and study the distributional effect of these adjustments by considering the individual consumption patterns of households. Although we are not able to address this issue, we have assumed that only the new tax revenues associated with consumers fuel consumption are redistributed to consumers. Additional taxes paid by firms are not used to compensate consumers and thus may allow for funding of compensating measures that help firms. If the taxes paid by firms are redistributed to firms, there will be less upward pressure on costs and thus on prices, which may justify our fixed price assumption. If the taxes paid by firms are not redistributed to them, we should expect to underestimate the effect of the reform on households by ignoring this price effect.

Indexing revenues

The price of heating fuels is included in the health index and is therefore included in the calculation of the indexation of wages and social transfers. Indexation is an important aspect of the reform, as it allows households to cope with the price increase induced by the tax. However, our analytical framework does not allow us to deal with this issue satisfactorily, since we are reasoning at given prices. If wages increase as a result of indexation, we should expect this wage increase to be passed on to prices by firms through the price-wage loop. Considering that households pay taxes that are then fully redistributed to them while receiving a wage increase but keeping the other prices fixed would be misleading. In order to discuss the effect of indexation on the purchasing power of households, we have carried out simulations in which part of the new tax revenue finances the indexation of social transfers and a reduction in social security contributions, which makes it possible to keep the cost of labor unchanged. Our simulations show that this reform would be regressive: individuals with higher incomes benefit more from indexation, while its financing considerably reduces the resources that can be redistributed to households. We have previously shown that heating expenses depend little on income. The increase in heating costs therefore tends to be the same in the different deciles, whereas the increase in income after indexation would be greater in the highest deciles.

Expenditure rather than income approach

We have chosen to present our results in terms of equivalent income deciles. It is also possible to present them by grouping the population by decile of equivalent expenditure. The correlation between income and consumption is not perfect, so that the two approaches lead to different groupings of the population in the deciles. There is no consensus in the literature on which approach is preferable. Consider the case of an individual with a low income but high expenditures. If this individual did not work all year by choice, the expenditure approach seems more appropriate: his or her income was abnormally low in the year under consideration. Conversely, if this individual is in debt and unable to maintain his or her lifestyle, the income approach seems more appropriate: his or her expenses were abnormally high in the year under consideration.

In Table 5.11, we present the net monetary effect of our reference scenario when we group households by equivalent expenditure deciles and compare it to the initial grouping by equivalent income. We find that the reform is even more progressive when the deciles are constructed in this way. The overall range for the average net impact goes from +3.86 €/month in the first decile to -3 €/month in the last one.

Table 5.11: Comparison of average net impact (€/month) among equivalent expenditure or income deciles

decile	1	2	3	4	5	6	7	8	9	10	Total
Eq. Exp	3.86	2.83	1.76	0.35	0.01	-1.03	-1.49	-1.27	-2.02	-3.00	0.00
Eq. Inc	1.45	2.92	0.76	1.03	-0.22	-0.30	-0.71	-1.42	-1.76	-1.79	0.00

Tax credit versus direct transfer

One way to redistribute the revenue from the carbon tax if the redistribution is organized at the individual level (each adult) rather than at the household level could be to propose an income tax credit. One weakness of this instrument is that there is a delay of 2 years between its implementation and its impact on households' income.

5.5 Analysis for 2030

5.5.1 Reference Scenario

In this scenario, we look ahead to 2030 in order to anticipate the medium/long-term effects of the measures considered above. First, the proposed revision of the Energy Taxation Directive foresees a further increase in excise duties between 2023 and 2033 which is binding in the case of natural gas only. We are applying the increase planned for 2033 from 2030. Then we consider an increasing trajectory of the carbon price to reach €70 per ton of CO_2 emissions in 2030.[131]

The table below shows the increase in fuel costs associated with these measures. Compared to 2018 levels, heating fuel prices would increase by more than a third while transportation fuel prices would increase by +/- 14%. We study the effect of these measures when the additional tax revenue generated by these new taxes is redistributed equally across all households.

Table 5.12: Transport and heating fuels price increase due to the 2030 fiscal reform

Fuel	Price increase, VAT inc.	Relative price increase
Petrol	0.2 €/liter	+ 13,6 %
Diesel	0,22 €/liter	+ 14.8 %
Heating Oil	0.22 €/liter	+ 31.4 %
Heating Oil, ETD inc.	0.241 €/liter	+ 33.9 %
Natural Gas	16.94 €/MWh	+ 30,2 %
Natural Gas, ETD Inc.	19,64 €/MWh	+ 35 %

5.5.2 Methodology

To construct this scenario, we assume a reduction in household fuel consumption. This reduction is calibrated to reach the European "*Fit for 55*" objectives, *i.e.*, an overall reduction of 55% of greenhouse gas emissions compared to the 1990 level. This effort is distributed differently between heating and transport: we implement a 60% reduction for the residential sector and a 45% reduction in the passenger transport sector compared to 2005 levels. .[132] This equates to an additional effort of -43% for transportation and -49% for residential to be achieved between 2018 and 2030. These fuel consumption reductions are assumed to be the same proportionally for each household. A significant

[131] This increase in carbon price could be the result of two different and mutually exclusive policies: either through a higher federally implemented tax (as in 2023) or due to the possible emergence of the European ETS-BRT market. The redistribution of revenues from the quota system between EU countries would be done according to a distribution key fixed at the European level. In parallel to the introduction of the ETS-BRT, the European Union proposes the creation of a "Social Climate Fund" to compensate households. More information about this last proposal can be found at: https://ec.europa.eu/info/sites/default/files/social-climate-fund_with-annex_en.pdf

[132] These targets are in line with projections from the CLIMAT.BE platform that shared their results during the "Fit For 55" conference held on the 8/10/2021. The presentation can be found on the following link: https://climat.be/doc/fitfor55-bog-1-non-ets-sectors.pdf

portion of the reduction in transportation-related CO_2 emissions will come from the electrification of the corporate vehicle fleet by 2030.[133] We assume that 10% of CO_2 emissions from household car travel will be reduced through this intermediary.[134] We reason in a context where the European "*Fit for 55*" targets are met, regardless of the policy to achieve them. This means that fuel excise tax revenues will fall, with or without carbon pricing. When we impose budget neutrality in 2030, we redistribute the tax revenues from the additional taxes paid to households, but do not use those revenues to offset the loss of excise and VAT. We will return to this discussion later. Finally, no change is assumed in the population structure, household income or the general price level between 2018 and 2030.[135]

5.5.3 Macroeconomic Results

The additional tax revenues are higher than in 2023. Even though fuel consumption falls by about half, the increase in taxes per unit is about three times higher than in 2023 so that the revenue from the new measures amounts to €1.23 billion, of which €80 million is related to ETD minima. The source of this revenue is detailed below.

Table 5.13: Contribution of each fuel to the additional after-reform tax revenues, 2030 scenario

Petrol	Diesel	Heating Oil	Natural Gas
17.6 %	21.9 %	29.1 %	31.5 %
216 M €	269 M €	357 M €	387 M €

The average household would contribute more to the tax reform in 2030, up to 250 € per year, or 21 €/month. The change in total energy expenditure as a result of a low-carbon transition is difficult to predict since it requires massive investments and household electricity consumption is likely to increase. These adjustments are discussed at the end of the chapter.

5.5.4 Distributional Effects

As a result of the changes in price and quantity of energy consumed, households would monthly spend €49.1 on heating fuels (natural gas and fuel oil) and €61.5 on transportation fuels in 2030, including €12.6 and €8.2 respectively for additional (excise) taxes. The distribution of these averages by decile is

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[133] This assumption is the consequence of a political will to eliminate tax benefits for company cars with combustion engines. Thus, starting in 2028, the tax deductibility will be reduced to zero for these vehicles in order to accelerate the transition to other modes of travel. A reading of the contents of the tax reform proposal is available at: https://www.lecho.be/economie-politique/belgique/federal/que-prevoit-la-reforme-fiscale-des-voitures-de-societe/10306555.html?msclkid=9f98f177addf11ec99d06e0d350c7200

[134] This is a very conservative estimate based on May (2019) figures. If all cars owned by a legal entity were converted to electric cars, the order of magnitude would be more around a 15% decrease in emissions from household car use.

[135] We could have reweighted the Household Budget Survey data to reconstitute a database corresponding to the forecasts that can be made for 2030, for example in terms of population size. We preferred to avoid this exercise, which would have required making numerous and sometimes arbitrary assumptions and would not have led to very different results in terms of the distributional effects of the reform.

shown in

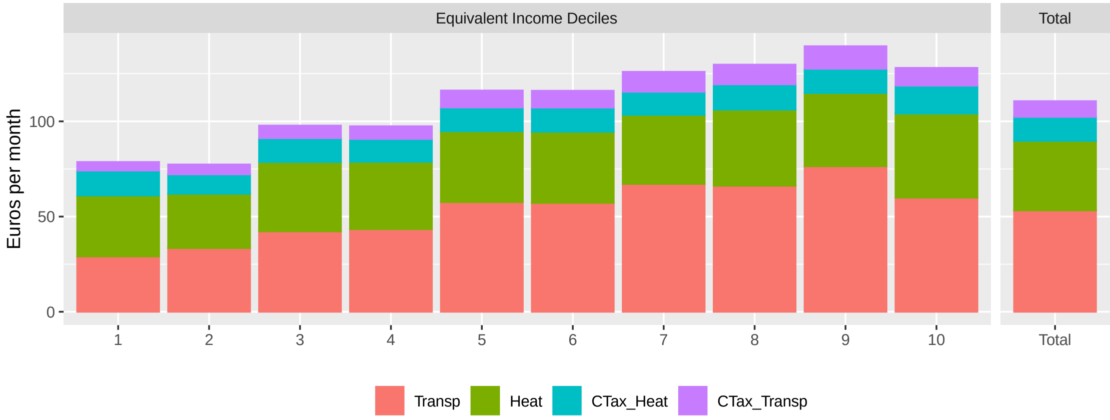

Figure 5.5, the net effect of the reform is shown in Figure 5.6, and the decomposition of the effect within each decile is shown in Figure 5.7. The trends observed for the 2023 scenario remain valid in 2030 as the reduction in consumption between 2023 and 2030 is proportional for all households. Thus, transportation fuel expenditures increase with deciles while heating expenditures are relatively stable. The additional taxes paid therefore increase with the deciles, resulting in a net monetary effect (*i.e.*, after redistribution) that is positive for households in the first deciles and negative for those in the last deciles. There is a strong variation in monetary impacts among households with comparable incomes. In each decile, the 33% of households in the decile that are most affected by the reform (heavily impacted) lose more than €10/month on average, while those who benefit the most gain about €15/month.

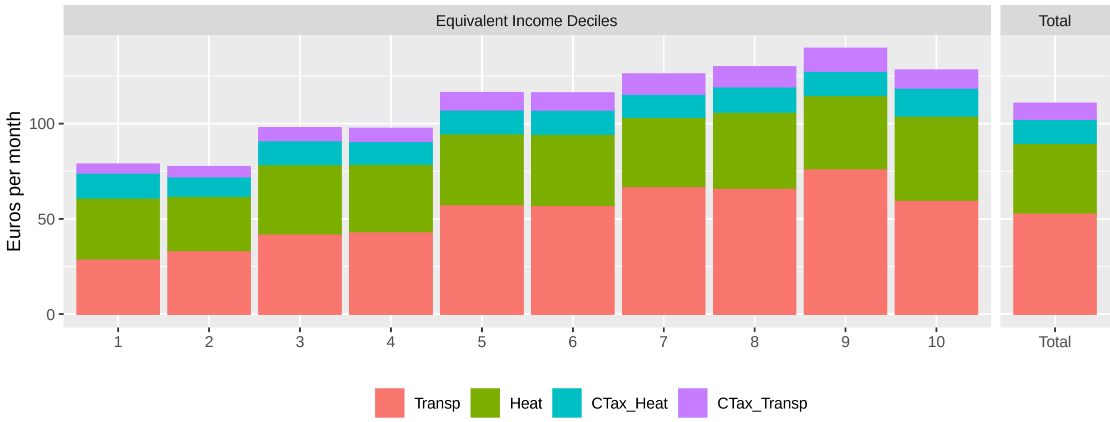

Figure 5.5: Total fuel expenditures (additional taxes included) per decile (in €/month), 2030 scenario

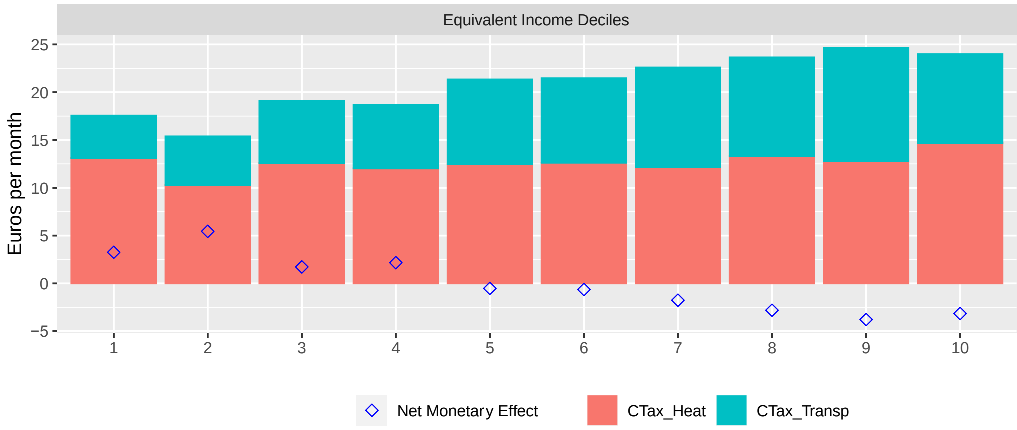

Figure 5.6: Additional taxes on transport and heating fuels and net monetary effect per decile (in €/month), 2030 scenario

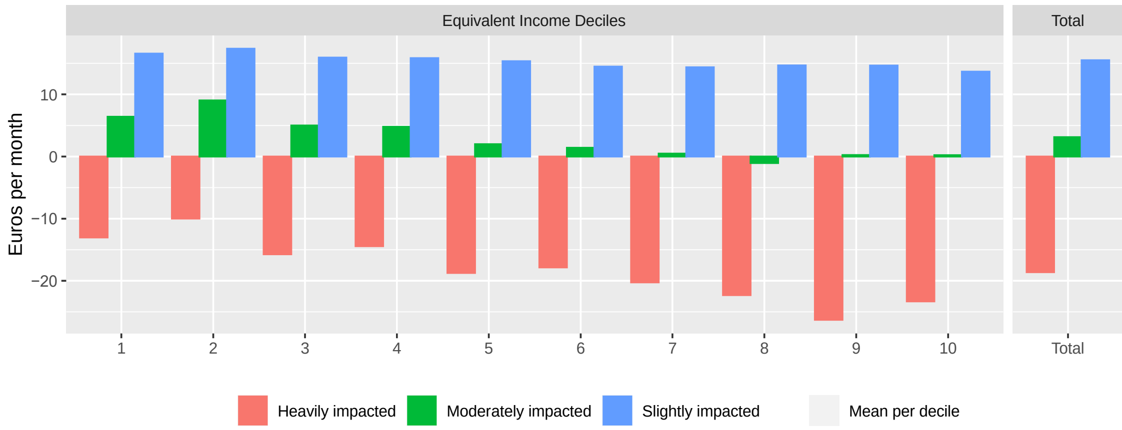

Figure 5.7: Intra-decile distribution of the net monetary effect (in €/month), 2030 scenario

5.5.5 The evolution of household spending between 2023 and 2030

We assessed the budgetary impact on households of implementing a carbon price by assuming that their energy consumption decreased, but that this reduction was not linked to the carbon price. Decreased consumption of gasoline, diesel, gas, and fuel oil implies both savings and other costs as investments in durable goods will be required, tax revenues will be lost, and electricity consumption will increase. We have implicitly assumed that these energy savings and costs are the same with or without a carbon price, so they do not play a role in our results. We mention these aspects in this section, which open the discussion to the effect of the energy transition on the evolution of household expenditures rather than to the effects of the policy implemented here.

Lower fuel costs

In 2030 the price of fuels subject to carbon pricing will be higher than in 2023 (the producer price is constant by assumption while the carbon price increases), but the consumption of these fuels will be lower. The net effect is to the advantage of households, who would pay on average about €110 per month in 2030 for their fossil fuel consumption (see Figure 5.5) compared to about €170 per month in 2023 (see Figure 5.1).

Electricity expenses

The transition involves replacing fossil fuels with (green) electricity. The energy bill of households will therefore decrease by less than 60€ per month (*i.e.*, the average reduction of the energy bill associated to the lower fossil fuel consumption) since electricity expenses are expected to increase.

Durable expenses

The energy transition will not be achieved without significant financing from households to renovate their homes, change their means of heating or transportation, review their consumption habits, etc. Not all households will be equal when faced with the necessary adaptations. It is possible that low-income households suffer from liquidity constraints that prevent them from investing in less energy-consuming/polluting equipment. On the other hand, the households in the lowest deciles might cut more easily their emission if they currently live in less insulated houses, have less energy efficient heating system and less electric vehicle. The transition will certainly involve direct (subsidies) or indirect (public investments, *e.g.*, public transport) support from the state. The distributional effects of the investments that will be made to reduce emissions are outside the scope of this study.

Reduction of revenues from existing taxes and excise duties

The sharp decline in fuel consumption that we assume in 2030 would cause the Belgian government to lose 1.7 billion in excise and VAT revenues on an annual basis. The ecological transition will in any case imply a fiscal shortfall, with or without a carbon price, which is why we have considered in our reference scenario that new tax revenues should not be used to make up this shortfall. Nevertheless, other revenues will have to finance it. If the government decided to make it up through additional taxes on households, this would result in an increase of the tax burden of almost €30 per month on average per household.

6 Overview of specific green tax reform measures

6.1 Introduction

The objective of this chapter is to provide an overview of specific fiscal measures at the federal level that give incentives for environmental reform. Since we have already discussed the impact of a possible introduction in carbon taxes extensively in the previous chapters, these measures should be seen as supporting or reinforcing the impact of the tax shift. We look specifically at 5 key areas:

1. Industry & agriculture
2. Transport
3. Circular economy
4. Financial sector
5. Buildings

In addition to an overview of other possible tax measures with their potential impact (in tables) and comparative analyses based on practices abroad, this chapter will elaborate on the proposals made by the case experts during the interviews. In this chapter, we only discuss proposals that are relevant for the federal policymakers. Given that the experts also made interesting proposals that are more relevant for other policy levels (mainly regional), we opted to include them in Annex C.

6.2 Case 1: Industry and agriculture

6.2.1 Introduction

In 2020, greenhouse gas emissions from the industrial processes sector, which includes emissions from industrial activities but not emissions from fossil fuel combustion, represented 17.7% of the total emissions. These greenhouse gas emissions were mainly caused by the chemical industry (47% of emissions, of which 41% for the petrochemical industry and 13% for ammonia), mineral products (22% of emissions, of which 64% for cement production and 29% for lime) and metal production (16% of emissions, decreasing since 2009 due to the economic crisis). If the total emissions from this industrial processes sector is combined with the industrial energy conversion sector and the emissions resulting from industrial combustion, the total industry-related activities are responsible for 48% of the total greenhouse gas emissions in Belgium. In addition, agricultural activities account for 11.2 % of the total emissions in Belgium in 2020 (FOD Volksgezondheid, Veiligheid van de voedselketen en leefmilieu, 2022). Taking into account the enormous impact of the industrial and agricultural sector on the emissions of greenhouse gasses, it is important to acknowledge that many of the proposed measures included in Part 1 of this study will also have a significant impact on the industrial and agricultural sector. Indeed, the introduction of a carbon tax or the tackling of existing reductions in excise duties may also have a direct and far-reaching impact on (energy-intensive) companies in the industrial and agricultural sectors.

However, this section will mainly look at what other possible fiscal measures can be taken to further reduce emissions in industry and agriculture. These are mainly measures specifically aimed at industry and/or agriculture. Before looking in more detail at proposals for measures in the context of federal taxation, we will first consider a number of practices in other countries that can serve as important sources of inspiration.

6.2.2 *Lessons learned from other countries*

The Danish pesticide tax

The Danish pesticide tax has had a long history that starts in 1972. Its current form comes from the reform of 2013, where it became a tax on environmental load that covers all types of pesticide consumption. The tax in question takes the form of an excise duty. It concerns both households and the agricultural sector, but almost the totally of pesticide use in Denmark is agricultural.

The tax is calculated individually for each approved pesticide. It has four parts: a health duty, an environmental impact duty, an environmental behaviour duty and a basic duty. The rates are the following:

- Health duty: Per kg/ litre of pesticide times the health affect per kg/ litre of substance: DKK 112.88 (€15.06/kg)
- Environmental impact duty: Per kg/ litre of active ingredient times the environmental impact per kg/ litre of substance: DKK 112.88 (€15.06/kg)
- Environmental behaviour duty: Per kg/ litre of active ingredient times the environmental behaviour affect per kg/ litre of substance: DKK 112.88 (€15.06/kg)
- Basic duty: Per kg/ litre of active ingredient: DKK 52.57 (€7/kg) (European Commission, 2022).

In 2019, the revenue collected through this tax amounted to €79.064 Million, which represents 0.0255 % of Danish GDP and 0.0545 % of total tax revenues. The revenues of the tax are recycled back to farmers through a reduction in reduction in land tax on farms. There is also a specific compensation to potato farmers, as they were higher users of pesticide with more limited alternatives (IEEP, 2021).

An evaluation by Pedersen et al. (2015) indicates that the pesticide tax overall had only a very small effect. According to the authors, one of the main reasons for this relatively small impact is that most farmers put more weight on optimizing yield than on prices on pesticides and crops. Given the rather low price elasticity on pesticide taxes, the price increase seemed insufficient to stimulate a behavioural change among many Danish farmers (Pedersen et al., 2015). Similar findings were made with respect to France and Sweden (OECD, 2020 / OECD, 2018).

The Swedish fertilizer tax

The Swedish tax on mineral fertilisers had been in force for 25 years when it was repealed in 2009 as a reaction to the financial crisis. Initially, the tax targetedtargeted both nitrogen and phosphorus, but the cadmium present in phosphorus replaced the latter tax base after the first ten years. The tax rate for nitrogen, set at SEK 1.80 (EUR 0.18) per kg N, was relatively modest, whereas the tax rate on cadmium of SEK 30 (EUR 3) per gram was more significant.

The average annual revenue from the fertiliser tax until it was abolished in 2009 was about SEK 350 (equivalent to about EUR 35 million). Due to the price increase, the optimal fertiliser dose for wheat decreased from 145 to 135 kgN/ha. In an evaluation of the fertiliser tax, the National Institute of Economic Research (NIER) found that that a fertiliser tax of EUR 0.18 per kg N would lead to an annual reduction of 10,042 tonnes of nitrogen. Figure 6.1shows this relation between the price of the nitrogenous fertiliser tax and the consumption with a clear impact of the height of the tax on the consumption of the fertiliser (Sjöberg, 2005).

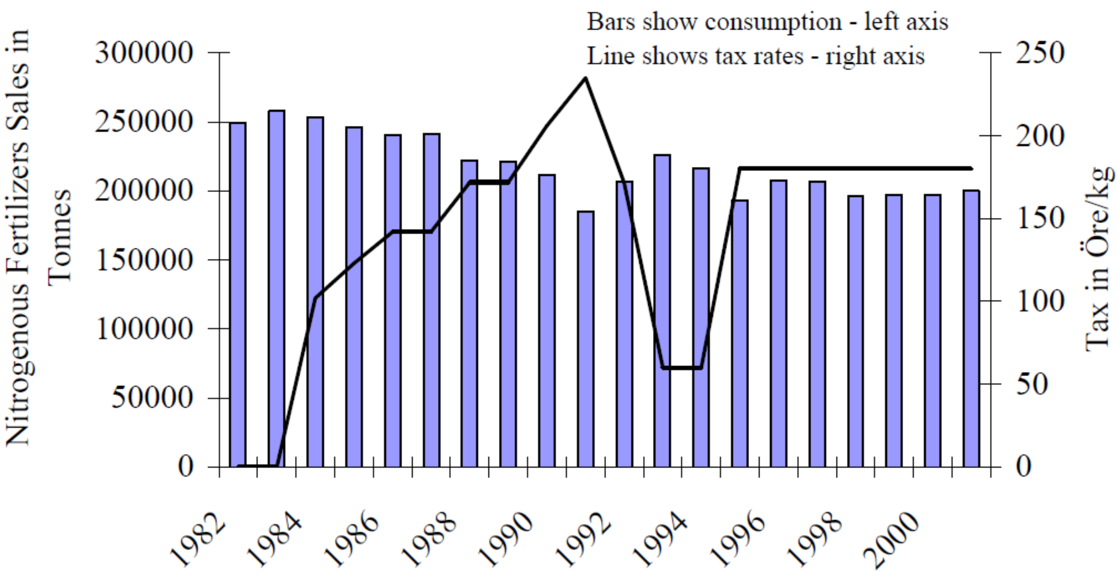

*Figure 6.1***Consumption and tax rate on nitrogenous fertilisers (***Sjöberg, 2005)*

Given that most other European countries did not impose a fertilizer tax and the tax revenues were not fully recycled to the farmers, the tax led to a competitive disadvantage for Swedish agricultural products (Andersen, 2016).

The Swedish Nox tax

Since 1992, Sweden taxes nitrous oxide, which is levied on NOx emissions from stationary combustion facilities. The goal is to regulate pollutants that contribute to acid rain.

The NOx tax applies to installations generating more than 25 MWh/year, which corresponds to the threshold for inclusion in the ETS. The rate per tonne is set at 50 SEK. It exempts industries facing particularly high abatement costs. Sweden's NOx tax is not a pure externality tax, which would require all emitters to be taxed at the marginal social cost of a unit of emission regardless of the abatement opportunities available to them. It is instead an example of a pragmatic way of achieving a desired reduction of total emissions in an economically efficient way (IEEP, 2021).

The NOx tax in Sweden was evaluated as rather successful with firms adapting quickly to this economic policy instrument. Surprising was that emissions were even reduced before the tax was introduced due to incentive effects. Although the positive environmental impact was the greatest briefly after the tax was introduced, the emissions of nitrogen oxides per unit of output still decreased afterwards (but a decreasing rate) (Ecotec, 2001).

Resource rent taxes on Norwegian hydropower generation and petroleum

The production of renewable energy such as hydropower and wind energy can lead to profits than exceed normal returns to capital. This is especially the case in times of high energy prices such as in 2022. These resource rents are the result of the exclusive use or ownership of a natural resource.

In Norway, there is a resource rent tax on petroleum and hydropower. The general corporate tax rate is equal to 22%. For petroleum, there is an extra tax of 56% and for hydropower the rent tax is 37%. This means that the total tax rate for these activities is respectively 78% and 59%.

The resource rent tax on hydropower is an accrued tax, which means that the investment costs are depreciated over the lifetime of the project (Borkenhagen, 2021). The resource rent is calculated on the net profit, that is after other taxes paid by the company (corporate income taxes and property taxes) and after correcting for an uplift (i.e. normal return on investment). More specifically, the resource rent is equal to:

Resource rent = spot market price * actual production
– [operating expenses + licence fees + property tax + depreciation + uplift]

The resource rent tax scheme is designed as a neutral tax. This means that the resource rent does not distort the investment incentives of the companies. Whether a project is investable or not, is not affected by the rent tax. However, this also implies that the resource rent tax can be negative in times of very low electricity prices. In this case, the government needs to compensate the companies and the resource rent tax becomes a subsidy.

In addition, power plants rated above 10 MVA pay a natural resource tax of NOK 0.013 per kWh (13 NOK/MWh or 1.24 EUR/MWh), to the municipalities and counties. This natural resource tax is deductible, krone by krone, against the assessed tax on general income.[136]

6.2.3 *Priority areas for reform*

(Increased) taxes on fertilizers and pesticides

Based on the Swedish application of a fertiliser tax and comparable results in Austria (Sjöberg, 2005), the introduction of such a tax in Belgium seems opportune. Indeed, through its clear impact on the consumption prices, such a tax would contribute to reducing the use of environmentally harmful products. Moreover, the recent IEEP report shows that a fertiliser levy tends to affect higher income households more than lower income quintiles. This is in contrast with indirect tax on domestic biomass fuel and coal, a wastewater pollution tax, a tax on intensive agriculture, and a water consumption tax, which tend to affect lower income households more than higher income households (IEEP, 2021). The quantitative survey in our study also shows that 45% of the experts are strongly in favour and another 23% are rather in favour of such a fertiliser tax. However, the impact on household income would depend on the specific instrument design. Moreover, competitive disadvantages for the farmers concerned must be taken into account. Since a new tax may be difficult to digest for the agricultural sector given the precarious situation of many farmers,

[136] https://energifaktanorge.no/en/regulation-of-the-energy-sector/skattlegging-av-kraftsektoren/#:~:text=The%20rate%20of%20the%20economic,to%20society%20as%20a%20whole.

one option is to adjust the VAT rate on fertilisers. Currently, the following reduced VAT rates apply to the following products:

- 6% on products clearly intended for use as fertilizers and which are not mixed with products recognised as pesticides for agricultural use;

- 12% on products that are clearly to be used as fertilizers and that are mixed with products recognized as pesticides for agricultural use (FOD Financiën, 2022).

Since such reduced rates are not justified, it seems appropriate to us to increase them to the standard rate of 21%. In that way, the existing legal, administrative and compliance framework can be used.

The consumption of the (most important) nitrogen based (inorganic) fertilizer in Belgium is around 150.000 tonnes The current (2022) price level of nitrogen fertilizer is higher than €700 / tonne due to the conflict in Ukraine. However prices before 2021 were around €200-400 tonne. If we use an average price of €500 tonne and go out from an increase in the VAT rate from 12% to 21%, the total extra revenue would amount to €6.7 Million. This shows that the potential impact on revenue is limited.

By analogy with a(n) increased tax on **fertilisers, one could also consider a pesticide tax**. Several EU countries have introduced a similar tax (Denmark, Sweden, France).

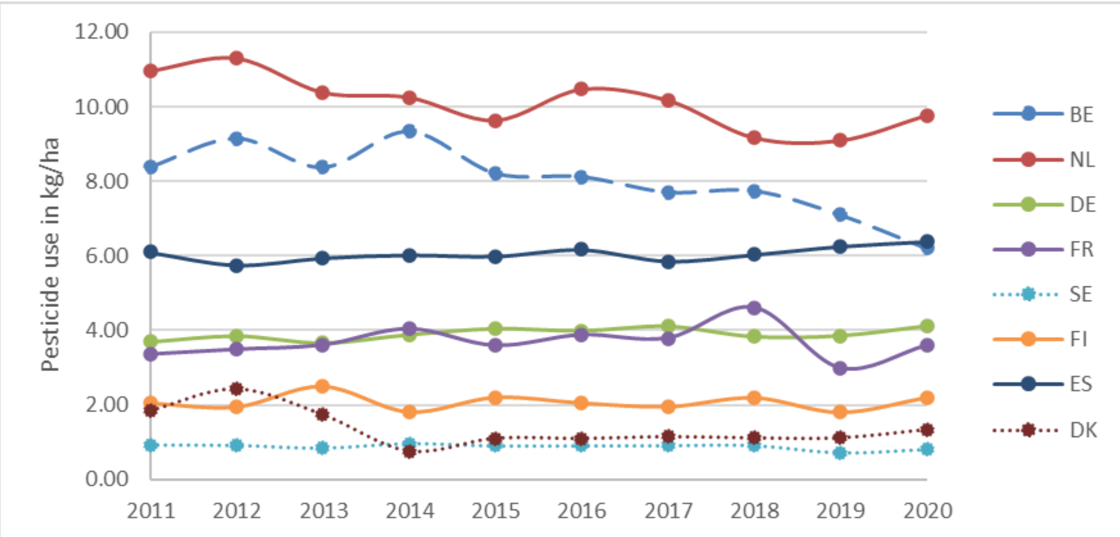

Figure 6.2: Use of pesticides (in kg / ha) in Belgium vs other countries (DK & SE indicated), source: Own calculations based on Eurostat

Pesticide sales in Belgium (2019) are 6126 tonnes in Denmark this is equal to 2660 tonnes (Eurostat data, 2021). Compared to the amount of arable land, Belgium has an intensive use of pesticide (Figure 6.2)

The tax level of Denmark is comparably the highest level (5 – 10 times higher per equivalent volume as Sweden). The revenue in 2015 (Bocker & Finger, 2016) was equal to €80 Million and . For Sweden it was around €7-8 Million. France has a scheme with rates between those of Sweden and Denmark, with an estimated revenue of €60 Million in 2012/2013. It must be noted (Figure 6.2) that pesticide use (measured in kg) has halved in Denmark after 2012. A pesticide tax of 10€/kg (comparable to Denmark) would therefore lead to €61 Million assuming that pesticide use does not decrease. In practice we expect the potential revenue of such a tax to be between €10 and €80 Million depending on the design and rates. Moreover, in order to introduce such a pesticide tax, there is first a need to develop the risk indicators for pesticides so that clear quantitative targets can be set on the basis of a policy plan.

Instead of introducing a new tax on pesticides, one can also look at possible adjustments to the VAT rate given that the current VAT rate on pesticides is only 12%. An alternative measure could therefore be to raise this VAT rate to the standard rate of 21%. At a price of €50-€100 / kg of pesticide the tax level may be comparable to Denmark. It would however be much more crude.

In fiscal measure sheet F.1 in the annex we give an overview of the measure with some key facts.. An important advantage of a VAT increase is that it is relatively easy to implement as the existing legal, administrative and compliance framework can be used. Since the appropriateness of a reduced VAT rate for such environmentally harmful products is questionable, an increase in the VAT rate to the standard rate seems appropriate. On the other hand, a change in VAT is only felt by private individuals. Agricultural companies would not feel this relative price change, which would significantly reduce its impact compared to a product tax on pesticides. It may also be counter-productive if comparably harmless pesticides are priced at higher levels than more damaging pesticides.

Tax on meat consumption

Taking into account that the supply chain of meat entails higher greenhouse gas emissions than plant-based foods (because energy is lost at every trophic level), a (higher) tax on meat consumption could be justified in the light of this research. In addition, meat production is a significant source of nitrogen, phosphorus and other pollutant emissions, and impacts biodiversity-especially by converting land to pasture and arable forage crops. Although several countries such as Denmark, Sweden and Germany are considering a meat tax, there are no (known) implemented practices yet that can serve as a reference for the possible impact of an introduction in Belgium (Charlton, 2019).

A study by CE Delft (2018) called 'the real price of meat' found that meat is substantially under-priced compared to its actual super market cost at consumer. The reason are climate, environmental damages, biodiversity loss, subsidies and disease. External benefits of meat production are relatively low in comparison. In total pork should be 53% more expensive, beef 40% more expensive and chicken 26% more expensive to compensate for external cost of production.

Table 6.1: The real price of meat, source: CE Delft (2018)

	Varkensvlees	Rund totaal*	Kip totaal**
Prijs in supermarkt	€ 7,75	€ 12,17	€ 7,00
Klimaatschade	€ 1,06	€ 1,29	€ 0,62
Milieuschade	€ 2,81	€ 2,73	€ 1,10
Landgebruik (biodiversiteit)	€ 0,09	€ 0,12	€ 0,05
Subsidies	€ 0,02	€ 0,42	€ 0,01
Dierziekten	€ 0,10	€ 0,53	€ 0,03
Externe baten	€ 0,00	-€ 0,20	€ 0,00
Echte prijs	€ 11,83	€ 17,06	€ 8,80
Additionele kosten als percentage supermarktprijs	53%	40%	26%

* Aandeel in consumptie berekend als : afgedankte melkkoeien 75%, kalfsvlees 8%; vleeskoeien 17%.[25]

** Aandeel in consumptie geschat als: vleeskippen 80%; leghennen 20%.

Another recent study into the possible impact of introducing a meat tax in the Netherlands (Broeks et al, 2020) shows that a 15% or 30% price increase at the consumer level (through a VAT increase) would lead to a 8.6% to 16% reduction of meat consumption for all impact categories over 30 years compared to the reference scenario. More generally, a price increase for meat through a tax could lead to a net societal benefit for the Netherlands of about €3.1-7.4 billion in case of a 15% tax or about €4.1-12.3 billion when the price is increased by 30% over a period of 30 years. However, the study warns that, when such price policies are only implemented in one country, important trade effects would occur. Therefore, the authors stress that EU (or even international) agreements are needed to prevent carbon leakage. Nevertheless, the study shows that a meat tax, in addition to having a clear positive impact on the environment, also contributes to positive net total welfare benefits (which also includes the health impact) (Broeks et al., 2020).

Meat consumption in Belgium in 2019 amounted to 75 kg per capita and 82 kg per capita in 2020. The Covid-19 crisis temporarily increased meat consumption after years of stabilisation and decline. We think numbers of 2019 are more representative however as they are more in line with long term trends (Figure 6.3).

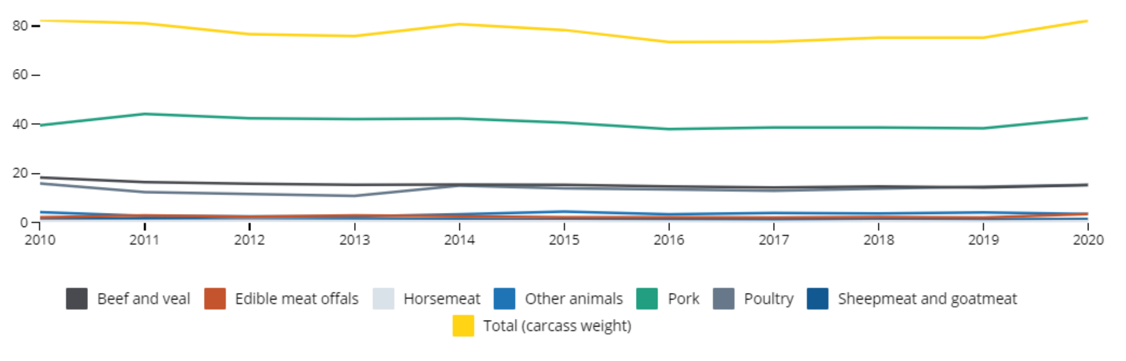

Figure 6.3: Meat consumption in Belgium per capita and per type of meat, source: Statbel 2022

Using results from previously mentioned studies and applying them to Belgium, we find that (Table 6.2) the average price of meat in Belgium would be around €8.6 /kg. The true price of meat including all environmental, external cost and subsidies would amount to €12.35/kg. This is a difference of €3.8/kg.

Table 6.2 :Calculation of average price of meat in Belgium per capita based on Statbel & CE Delft (2018)

	Consumption (kg/capita)	Price (EUR)	Real price[137]	Total consumption EUR/capita
Pork	38.33	7.75	11.83	297.1
Beef	14.61	12.17	17.06	177.8
Poultry	14.3	7	8.80	100.1
Other animals	7.95	8.97	12.56	71.3
Total	**75.19**	**8.60**	**12.35**	**646.3**

Because the VAT on food (and therefore also on meat) is only 6% in Belgium (FOD Financiën, 2022), one could opt, as in the Dutch study, to increase the VAT on meat to 21%. As private citizens are the largest consumers of meat, the VAT instrument is rather suitable for creating behaviour change, more than – for example – pesticides, since the largest consumers there are companies, who are not directly impacted by changes in VAT.

The budgetary impact can be calculated following CE Delft (2018) & Brooks et al (2020). We find that with average prices and consumption levels of Statbel (2020) and a price elasticity of -0.6 (used in Brooks et al) consumption will reduce by 8.5%. For a more limited increase to 12% meat consumption will reduce with 3.4%.

Table 6.3: Consumer impact of meat tax (VAT increase to 21%)

	VAT to 12%	VAT to 21%		Tax revenue (M€)	
Price excl. VAT	8.11	8.11		Population (Million)	11.56
Old price	8.11	8.60		Old consumption (kTonnes)	869
New price	8.60	9.81		Old revenue (M€)	423
Price increase	9.09	14.1%		New revenue (M€) 12%	817
Elasticity	-0.6	-0.6		New revenue (M€) 21%	1356
Impact%	-3.4	-8.45%		**Additional revenue** (M€) **12 % -21%**	**394 – 933**
Consumption after	72.64	68.83			

On the basis of Table 6.3 we conclude that increasing the VAT on meat to 21% would lead to an **additional €394 to €933 Million in revenues**. In addition, this would save society an external cost of €3.8 per kg meat not consumed (see Table 6.2). This is **€277 Million**[138] in external damages avoided for a 21% increase in VAT and €110 Million for a 12% increase in VAT . This does not take into account possible health benefits due to lower meat consumption.

Again, using the VAT instrument has the advantage that it is an already existing instrument, which may increase its acceptability, as compared to the introduction of a new tax. The quantitative survey conducted among the experts in our study also shows that 72% are relatively large to very large supporters of a (higher) tax on meat. An important reason for this is that it places the responsibility on the entire population and does not specifically target farmers. In this way, it can also have an important sensitising effect.

[137] Real price is defined as the actual price of meat including all external costs and subsidies to production

[138]Old consumption * % reduction in meat consumption*unpriced externality or (869*0.0845)*3.8 for 21% increase in VAT.

Tax on rents made by electricity producers

In Belgium, there is a rent tax on depreciated nuclear power plants. The rent tax is designed as a lump sum rate which is determined by the federal government on annual basis. The amount charged by the government is based on advice from the energy regulator (CREG) that calculates the profits realized from the nuclear power plants.

The nuclear rent is calculated in the following way (CREG, 2021)

For nuclear plants that have had their lifetime extended (Act of 31/01/2003 Art.4/2)

- For Doel 1 &2 the annual fee is set at €20 million per year
- For Tihange 1: 0.7*(Sales – (Cost + Net remuneration -Transfer previous year)

For Tihange 1 the fee has never been positive since 2015. Given the ability to transfer negative margins from previous years it is probable that even in the high price environment of 2021 and 2022 the total fee will not become positive. It is unlikely that a new tax can be implemented on these power stations (CREG, 2021).

For nuclear plants for which the lifetime was not extended (Doel 3&4, Tihange 2&3)

The annual fee is calculated using a "cap & floor" system: Firstly, a minimum annual amount is set for three years. If a 38% profitability margin is higher than this minimum amount, a profitability margins is applied. The profitability margin is calculated as the difference between the revenue and total variable and fixed costs.

Revenue is calculated based on Section 3 of the Appendix to the Act of 25 December 2016 amending the Act of 11 April 2003, which takes into account the one-, two- and three-year futures prices and the day ahead prices.

According to the CREG (2021) there is a **possibility to review the 38% rate on the profitability margin**.

For the period 2021 to 2023 the resource rent tax is determined at €72 million per year. This is significantly lower than in previous years. In 2018, the collected rent tax was € 170.4 million, while in 2012 the government collected an all-time high of € 549 million in rent taxes from the energy producers (De Tijd, 2021).The payment of this tax was however heavily disputed by Electrabel, after which a settlement was made in 2015. [139]

Morbée et al (2015) study the taxation of nuclear rents with a theoretical model. They find that there is a significant difference between the optimal short term, medium term and long term tax on nuclear rents. If the government can implement an unanticipated tax on (windfall) profits it can capture almost 1/3 of the rents without significantly reducing long-term investments. The optimal short term tax the propose (€12.5 / MWh) is at the same level as in 2012 (€11/MWh). The opposite is true for new investments. If the amount of potential long term investors is only one, it would be optimal to subsidize the operator. In the medium run the optimal tax (€6.2 MWh) is much lower, but still positive.

[139] Nuclear Power in Belgium | Belgian Nuclear Energy - World Nuclear Association (world-nuclear.org)

Topic	Scenario	Tax EUR/MWh	Comment
Taxation of a monopolist with a capacity constraint by a government that can commit*	**Short run:** Optimal unanticipated tax	12.5**	31% of rent captured
	Long run: Optimal tax on new investments, with one nuclear firm	-7.8	Subsidy to avoid withholding
	Medium run: Optimal tax on lifetime extension of old nuclear power plants, negotiated with incumbent only	6.2	18% of rent captured
Auctioning	Auctioning of lifetime extension licenses with 3 players	24.5	72% of rent captured
	Perfect competition for lifetime extension licenses	33.9	Complete rent capture by government
	Perfect competition for nuclear licenses for new investments	6.1	Complete rent capture by government

* If the government cannot credibly commit, or there is more than 50% chance of an ex-post short-run tax, then there is no more investment in new nuclear capacity.

** If this tax is made permanent and applied to new investments as well, there would be 1/3 less investment than without the tax.

Figure 6.4: Summary of scenarios from Morbée, Himpens and Proost (2015)

A tax on windfall profits has an impact on the shareholders of the electricity producers, but the negative impact on society is limited. According to Schwerhoff et al. (2020), rent taxation is one of the most efficient taxes because it is non distortive. In addition, taxes on rents are in general well received by the general public. The revenues they generate can be used by the government to compensate households and firms for the impact of exceptionally high energy prices. An alternative to the (nuclear) rent tax is using auctioning instruments (Morbée et al, 2015). According to the authors these may perform better if there are enough possible candidates.

If a rent tax is used, it should be designed as a **neutral tax**, such that it does not distort investment decision of the producers. Alternatively, the tax can be implemented during periods of extraordinary high electricity prices caused by market shocks. In the wake of the current energy crisis, Bulgaria, Italy, Romania and Spain have implemented a rent tax on energy producers (Sgaravatti et al., 2022). Other types of electricity production are currently not subject to a rent tax. However, electricity produced by renewable sources such as wind benefits from high electricity prices without being affected by the rises in fossil fuel and coal prices. It must be noted however that many of these producers are currently under power purchase agreements with fixed price contracts. In this case much of the rent will be appropriated by the buyer. Another important note is that the support for offshore wind in Belgium has been made dependent on their profitability. As such high energy prices will reduce public subsidies to windmills offsetting at least a part of the additional revenues (CREG

2021). Ongoing experience with a levy on renewable producers in Spain show that a similar tax could work against the objective of increasing renewable energy production [140]

What is the potential revenue of a profit tax on electricity producers? Electricity production in Belgium in 2021 was 96.34 TWh. About half (49.7%) or 47.9 TWh was produced by nuclear power plants. Applying tax rates suggested by Morbée et al we find the at theoretical revenue for their 'optimal' short term (€12.5 /MWh) and medium term tax (€6.2 / MWh) is respectively €598 Million and €297 Million. The effective nuclear tax in 2021 was close to €1.5 / MWh.

Table 6.4:Potential revenue of a reform in the rent on energy producers, Own calculations based on Febeg (2022)[141]

	Electricity production 2021 in TWh	Current rent in EUR/MWh	Potential reform A EUR/MWh	Potential reform B EUR/MWh	Old revenue	New revenue A	New revenue B
Nuclear	47.9	1.5	6.2	10	72	297	479
Wind	11.8	0	1.5	10		18	118
Solar	5.6	0	1.5	10		8	56
Hydro	1.3	0	1.5	10		2	13
Thermal	29.5	0	0	0		0	0
Other	0.4	0	0	0		0	0
Total	**96.3**				72	325	665

We could (Table 6.4) consider a conservative reform (A) that increases the nuclear rent to €6.2/ MWh. In addition we may consider a relatively low tax on renewables and hydropower at the current level of nuclear energy (€1.5 /MWh) which is comparable to the level of a similar tax in Norway (see above). Applying a lower tax on renewables is justified as the LCOE of nuclear power is significantly lower than wind or solar power (IEA, 2020). The proposed reform would increase the revenue from €72 to €325 Million. The impact of the extension to renewables is relatively limited (about €28 Million). The impact naturally depends on the rate applied. For comparison a uniform tax (B) of €10 /MWh would lead to €665 Million with €186 paid by renewable energy producers. Alternatives with different rates should be studied in more detail.

We propose to review the nuclear rent tax and study extending the existing resource rent tax on nuclear power to other electricity producers including wind, hydropower, large solar and biomass plants. In particular the federal government could review the current 38% rate on profitability for nuclear plants whose lifetime was not extended. For other electricity producers with high fixed cost and low variable cost (wind, solar energy, hydropower) it should be studied if additional measures are necessary. .

6.2.4 Other potential measures

The case experts agree that tax incentives for **biobased products** can be an appealing option. The advantages include the promotion of the circularity of the economy, using local raw materials, which favours local production (and thus independence). According to the experts, the federal government

[140] Spain taxes renewables, nuclear power producers (balkangreenenergynews.com)
[141] Statistieken elektriciteit | FEBEG Federatie van de Belgische Elektriciteits- en Gasbedrijven

should certainly promote the production of bio-based products. One expert refers to the Netherlands, where companies can deduct the use of such products from their corporate taxes.

When it comes to the question of tax incentives for **hydrogen-based processes**, there is no unanimity among the case-experts. While a certain case expert considers hydrogen-based processes as one of the big priorities for a more sustainable industry, other experts consider the focus on hydrogen premature. According to them, it is not the '*silver bullet*' as it is sometimes presented and it is often not efficient to generate. Hydrogen-based processes should therefore be limited toto industries where there is no alternative. For many other industries, however, other energy sources are more appropriate.

In addition to aa meat tax that only indirectly affects livestock, a direct **tax on livestock** cancan also be considered. However, on the basis of the interviews, the experts prefer the indirect tax on meat consumption. The fact that the support for a tax on meat consumption is greater than for a tax on livestock is because the latter strongly targets farmers. Several experts feel that such a measure would target the sector too hard and prefer to encourage farmers to intervene in the production process (through technology subsidies.)..).

Although, based on the Swedish case, a **NOx tax** in itself seems to be an effective measure, we do not consider it as one of the priority measures to be taken at the federal level. The main reason for this is that the regions have the competence to introduce far-reaching measures. This is shown, among others, by the recent Flemish Nitrogen Agreement that includes the required reduction of 60% NOx emissions at sector level by 2030 at the latest for pig and poultry farms in all non-low ammonia emissions stables. Moreover, the dairy and beef cattle industry must achieve a 15% reduction at sector level compared to the 2015 baseline. The Flemish Agreement furthermore leads to the forced closing of 40 of the most polluting agricultural companies by 2025. They will receive compensation. Some 120 other "dark orange" companies will have the option to stop voluntarily by 2026 (Vlaamse Regering, 2022).

6.3 Case 2: Transport

6.3.1 Introduction

Reducing CO_2 emissions in the transport sector is crucial, because the sector is responsible for more than a third of Belgian non-ETS emissions. The emissions from the transport sector are still rising. To achieve a reduction, it is not only necessary to discourage carbon-intensive fuels and encourage a shift to cleaner alternatives, but it is also important to change overall demand. This is especially the case for passenger transport where a modal shift is needed from cars to public transport, bicycle, and walking and air travel should be discouraged. Currently, several tax exemptions and reductions are in place for carbon-intensive fuels for some transportation modes (e.g. rail, maritime and IWW). A first measure would be to phase out these exemptions and align the taxes to the emissions (see also Section 2). Specifically for the Belgian context, the system of company cars has led to an increase of car use and is a priority measure to be addressed.

We asked experts in our interviews to assess a number of existing exemptions and reductions in taxes related to the transport sector. Figure 10.2 gives an overview of the experts' opinions. Support for the tax reductions and exemptions on certain transport activities is very low among the experts interviewed. Especially with regard to the lack of taxation (both excise duties and VAT) of aviation, the experts are (almost) unanimous that reform is needed. While the majority pleads for an immediate removal of the preferential tax treatment, some other experts advocate a gradual phasing-out. Furthermore, it is noteworthy that the preferential tax treatment for electric company cars is also enjoying little support.

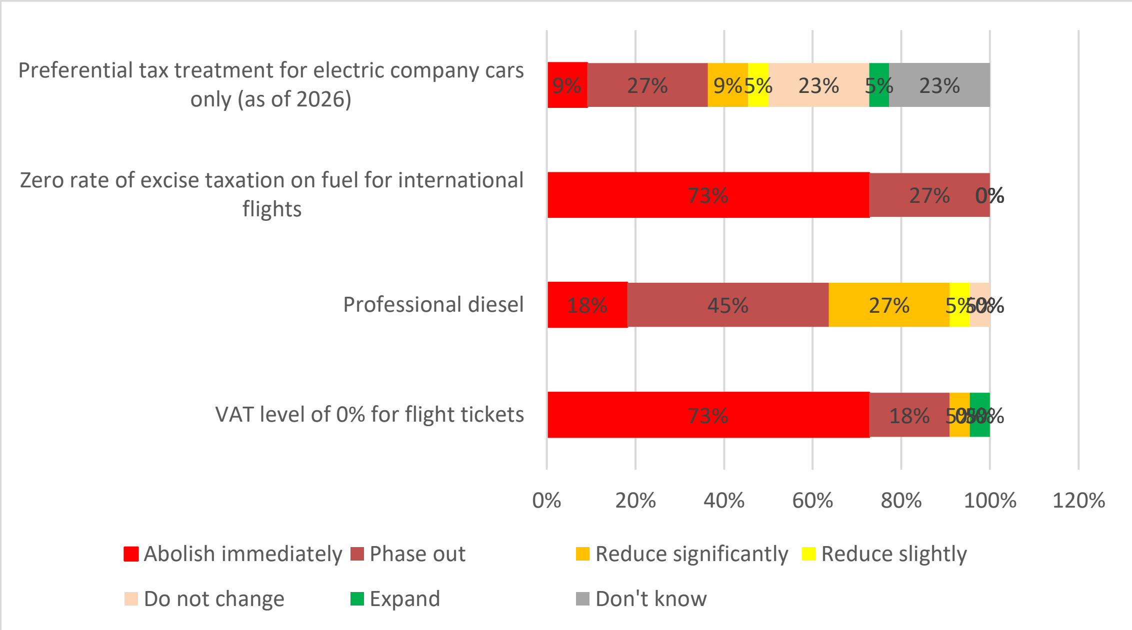

Figure 6.5: Expert opinions on transport reforms

The purpose of this chapter is to concentrate on priority measures to be taken in the transport sector. We focus on two key areas: taxes on aviation, and measures to stimulate a modal shift from passenger cars to more sustainable transport modes.

Company cars, most often accompanied by a fuel card, are very widespread in Belgium. The number of company cars has been steadily increasing year by year. Although the exact number of company cars in Belgium is not easy to determine, Acerta reports that in 2021, 22,3% of the employees in the private sector benefited from a company car. For comparison, in 2016 the share of employees with a company car was only 17,7%.[142]

Company cars provide the opportunity to drive very cheap (and often even free) kilometres, which is a perverse incentive leading to car overuse, more emissions and congestion. On average, company cars drive 26 513 km/year or 9 196 km more than privately-owned cars. Only 1.3% of company car users use public transport while this is 14% among people who don't have a company car (Castaigne (2008)). Moreover, the availability of a company car gives the employee an incentive to accept a job further away from home, which again increases transport demand and congestion.

As company cars tend to be bigger and heavier than the average passenger car, they also have a higher material and carbon footprint in the production phase (including extraction).

As of 2023, the tax deductibility of company cars using fossil fuels will be reduced gradually, reaching zero in 2026. As of 2026, tax deductibility will only apply for cars with zero CO_2 -emissions. This

[142] https://www.acerta.be/nl/blog/werkgevers/salariswagen-blijft-belangrijk-voor-werknemers

intervention by the federal government is expected to boost the electrification of the company car segment. Because company cars are typically replaced after four years and subsequently sold on the passenger car market, the electrification of the company car segment may create a significant second hand EV market.

6.3.2 *Lessons learned from other countries*

Excise taxes on diesel for professional use

In many countries, companies are entitled to a reimbursement of diesel used for the transport of goods by trucks exceeding 7.5 tonnes, or for passenger transport with buses category M2 or M3. Apart from Belgium, a rebate of excise duties on diesel applies also in France, Italy, Hungary, Slovenia and Spain. In France, € 0.1570/litre professional diesel can be reimbursed in 2022. In Italy, the reimbursement of excise duties on professional diesel is currently equal to € 0.2142/litre.[143]

Table 6.5 shows the applicable excise duties on diesel for professional and private use in Belgium compared to its neighbouring countries in 2020. Although Belgium charges among the highest excise duties on private-use diesel, the rates for commercial diesel are much lower than the applicable rates in our peer countries.

Table 6.5 Overview of excise taxes in Belgium vs neighbouring countries

Land	Accijnzen op gasolie gebruikt als motorbrandstof voor professioneel gebruik /1.000 liter	Accijnzen op gasolie gebruikt als motorbrandstof voor privégebruik / 1.000 liter
België	352,54	600,16
Nederland	511,60	511,60
Duitsland	470,40	470,40
Frankrijk(*)	451,90	626,40
Groothertogdom Luxemburg	355,00	355,00

(*) Bedragen op 1 januari 2021 voor de regio Île-de-France (de bedragen verschillen naargelang van de regio). Het gewogen forfaitaire bedrag van de gedeeltelijke terugbetaling van de binnenlandse taks op het verbruik van energieproducten beloopt 174,50 euro/ 1.000 liter.

Bron: Rekenhof, op basis van de gegevens van het Comité national routier français in "Droits d'accises et mécanismes de remboursements partiels sur le gazole en Europe", 2 maart 2020

Source: Rekenhof, 2022

As a result of the rebate, the price of commercial diesel in Belgium is below the EU average. This implies that a large number of international transports refuel in Belgium and apply for a reimbursement. Hammer et al. (2020) investigate Slovak carriers involved in international road transport and find that 31% of these carriers have their excise duties refunded in Belgium.

143 https://www.tln.nl/accijns-en-btw/

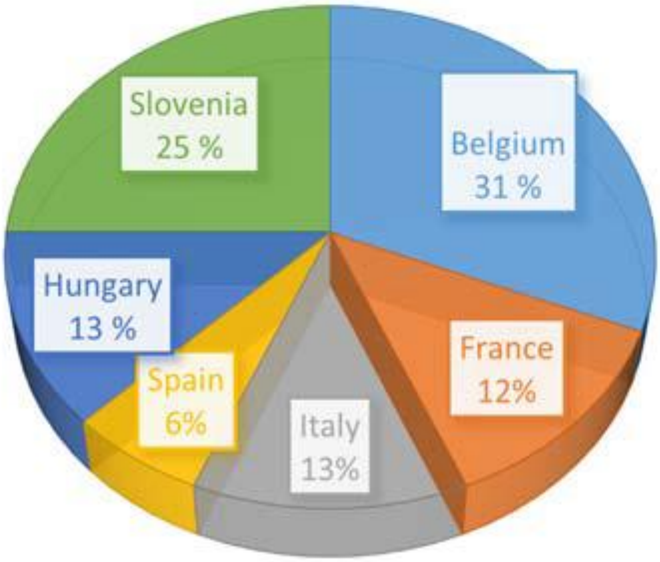

Figure 6.6 Refund location by Slovak international transport carriers

Source : Hammer et al. (2021)

Hammer et al. (2021) also investigate how much money is being reimbursed annual to the international transport firms under investigation. They find that the highest amounts are reimbursed by Belgium, on average € 75 000 per year, which corresponds to a diesel volume of € 276,750 litres per year. This is several times higher than what is reimbursed by other countries offering a reimbursement on diesel excise duties (Figure 6.7)

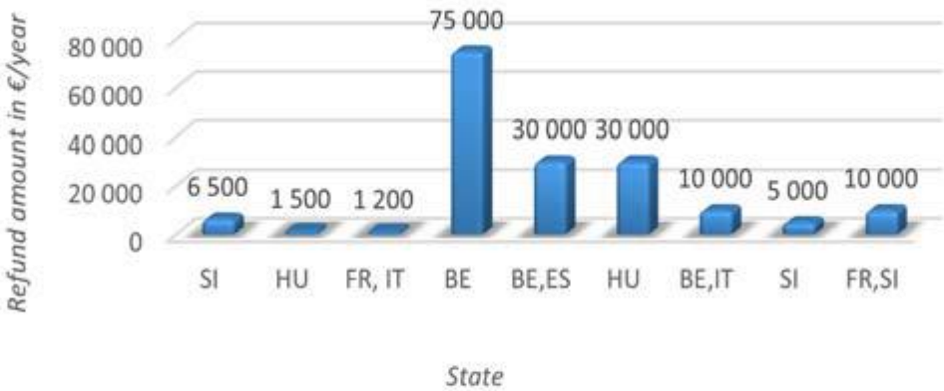

Figure 6.7 Yearly refund to the average transport company in the Slovak Republic

Source: Hammer et al (2021)

Airplane ticket tax – several countries

Airplane ticket taxes (also called embarkment tax or departure tax) have been introduced in many Member States, including Austria, France, Germany, the Netherlands, and Sweden, as well as in the U.K (European Commission, 2019b). Their introduction is relevant because aviation still benefits from substantial environmentally harmful subsidies. Typically, these taxes are levied on 'each origin-destination passenger departing from an airport in the country where the tax is applied, with the airline being responsible for collecting the tax and paying it to the government' (Transport & Environment, 2018). The embarkment tax does generally not apply to transit or transfer passengers.

An overview of applicable embarkment taxes in selected countries is provided in Table 6.6.

While the tax in question used to pursue mainly budgetary objectives, it now has the following goals:[144]

1. to support connectivity;
2. to align with environmental objectives, particularly commitment to net zero emissions by 2050;
3. to ensure that the aviation sector makes a fair contribution to public finances.

Table 6.6 Embarkment tax in selected countries

Country	Rate	Source
Austria	€ 12 flat rate domestic flights have slightly lower rates € 30 flat rate for flight < 350 km	https://www.bmf.gv.at/themen/steuern/steuern-von-a-bis-z/flugabgabe/flugabg-en-konsolidiert-201029.htm
Belgium	€ 10 flat rate for flight <= 500 km € 2 flights > 500 km and intra EEA € 4 long-haul flight	https://www.test-aankoop.be/familie-prive/reizen/nieuws/vliegtaks-april-2022
Germany	€ 13.03 domestic and EU countries € 33.01 long-haul up to 6000km € 59.43 long-haul > 6000 km	https://www.austrian.com/us/en/legal/taxes-and-fees-us
France	€ 7.29 - € 24.93 domestic and intra EU € 15.88 - €71.44 extra EU € 1.38/tonne for goods	https://www.ecologie.gouv.fr/taxes-aeronautiques#scroll-nav__3
Netherlands	€ 7.845 flat rate	https://www.rijksoverheid.nl/onderwerpen/milieubelastingen/vliegbelasting
Sweden	€ 6 intra Europe € 25 N America, Near East, N Africa € 40 rest of the World	https://www.fccaviation.com/regulation/sweden/swedish-aviation-taks
UK	€ 13 flights < 2000 miles, seat pitch < 1.02m € 84 flights > 2000 miles, seat pitch < 1.02m € 180 flights > 2000 miles, seat pitch > 1.02m € 541 planes < 19 passengers	https://www.gov.uk/guidance/rates-and-allowances-for-air-passenger-duty

Neiva et al. (2021) assess the environmental and socio-economic impact of a potential reform of the tax regime of the aviation sector in the EU. The purpose of the studied reform is to address the

[144] Aviation tax reform consultation https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/971943/Aviation_Tax_Reform_Consultation.pdf

problem of the lack of internalisation of climate-related externalities. The study investigates the impact and effectiveness of the following policy options:

- a fuel tax on intra-EEA aviation,
- an airplane ticket tax,
- a combination of the two types of taxes.

The airline ticket tax has several advantages over a fuel tax in aviation. First, the ticket tax is **relatively easy to implement** and the administrative burden is minimal. Overall, the administrative costs to implement a ticket tax are considered lower than the costs for implementing a fuel tax. Neiva et al. (2021) report that the yearly administrative costs to implement a ticket tax would range from € 465 000 to € 1 million per member state.

Second, the ticket tax is **very effective to reduce demand and thus emissions**. A ticket tax can be applied to intra-EEA and extra-EEA flights. This means that the potential impact on demand is larger than a fuel tax, because the latter can only be applied to intra-EEA flights. Neiva et al (2021) show that thanks to this enhanced demand reducing effect, the ticket tax leads to a greater reduction in CO_2-emissions and a in higher revenues from taxation than the fuel tax.

Krenek and Schratzenstaller (2016) investigate the environmental effectiveness of different potential aviation taxes in the EU area. They find that a (carbon-based) fuel tax per litre of fuel is most effective to reduce emissions. The second most effective measure is the carbon-based ticket tax, charged to passengers. A non-carbon based seat tax or flight tax charged on the airline is found to be not effective with respect to environmental impact. The authors show that a carbon-based flight ticket tax based on each flight's specific carbon intensity is much more effective than a uniform lump-sum tax. An individual carbon-based ticket tax accounts for the aircraft's fuel efficiency and its average load factor.

An important point of attention is that the ticket tax **should be high enough** to have a significant impact on airline travel demand. In a study on the willingness to pay (WTP) for the Air Passenger Duty (APD) in the U.K., Seetaram et al (2018) find that the WTP for short haul trips is lower than the current APD rates. In contrast, the WTP for long haul trips is much lower than the APD. This means that the APD does not impact outbound short-haul travel significantly, while it does decrease U.K. outbound travel for longer-haul trips. Therefore, for longer trips, the authors conclude that APD is an effective tool to constrain air travel and (indirectly) reduce aviation emissions. For short-haul trips, the tax should be raised.

A disadvantage of a ticket tax is that it only **affects fuel consumption and emissions indirectly**. The ticket tax does no exert incentives to reduce fuel use or to maximise the aircraft load. The ticket tax is a pure demand-based measure and it does not provide incentives to increase fuel efficiency. Nevertheless, it is the most implementable measure, because a fuel tax on kerosine is unlikely for two reasons. First, a fuel tax raises many legal issues. Second, a fuel tax, even when its applied EU-wide, raises the problem of possible tax avoidance through bunkering and tanking in low-tax countries (Krenek & Schratzenstaller, 2016).

Tax incentives for cycling

There is significant potential for a modal shift from passenger cars to bicycles in Belgium. The latest edition of the research on mobility behaviour in Flanders demonstrates that more than half of all trips are shorter than 5 kms (OVG 5.1, 2020). With the introduction of the e-bike, the potential number of trips that can be replaced by a two-wheeler has even increased. According to the literature, the average distance covered by e-bike is 9,6 km, compared to 6,3 km for a conventional bike (Gravett and Mundaca, 2021).

Several studies show that tax incentives for cycling such as a tax credit for commuting by bicycle or a purchase premium are effective instruments to stimulate cycling. Gravett and Mundaca (2021) show that investments in incentives for cyclists have large benefits in terms of improved air quality, lower greenhouse gas emissions, and health benefits. The authors evaluate the economic costs and benefits of a large set of potential interventions. They find that net economic benefits can be maximised by a policy mix that entails bike-sharing, cycle parking, training and education, low traffic neighbourhoods, e-bike grants, a workplace parking levy and increased use of a cycle-to-work scheme.

Gradin (2019) assesses the socio-economic value of a cycle-to-work scheme in Jönköping, a Swedish municipality. The scheme implies that all municipality employees are offered leased bicycles or e-bikes, which are paid for through a salary sacrificing arrangement. She finds that the benefit-to-cost ratio of the scheme ranges between 4.1 and 7.2, which means that the benefits are several times higher than the costs.

Financial incentives to promote active travel induce a modal shift from passenger cars to bicycles. In an impact assessment of a purchase incentive for e-bikes in Germany, Kämper et al. (2016) show that 45% of the new e-bike mileage replace passenger car mileages. Similar results are found in a study for North Brabant, the Netherlands, which shows that 50% of new e-bike trips substitute car trips (de Kruijf et al., 2018).

Belgium is a frontrunner with respect to the commuting tax credit for cyclists. The tax credit is determined at € 0.25 per kilometre in 2022 (compared to € 0.24 in 2021), which is higher than what is offered in most other countries. For example, in the Netherlands, the tax credit is € 0.19 per km. Only in Germany, the tax credit is higher than in Belgium, notably € 0.30 per km.

6.3.3 Priority areas for reform

The transport sector is one of the main contributors to greenhouse gases in Belgium. Therefore, it is a key area for reform. Because the emissions from the transport sector are mainly direct emissions which are fuel-related, the most pressing reforms are related to the fuel taxes that are discussed in Chapter 2. However, our results show that the proposed tax reform (a carbon tax and the application of excise duties in line with the proposed ETD revision) are not sufficient to achieve the emission targets set by the Fit-for-55 package. Therefore, we investigate additional potential measures that can be taken in the transport sector.

Based on the literature review and input from the expert interviews, we identify five priority areas for reform:

- phase out the subsidy for commercial diesel,

- introduce an excise tax on LPG and CNG,
- phase out the preferential tax treatment for company cars and associated fuel cards,
- increase the embarkment tax in aviation,
- institutionalize the bicycle commuting allowance.

Each of these additional measures are discussed and motivated in turn.

Phase out discount for commercial diesel

As of 2004, professional diesel users can get reimbursed for the special excise on diesel for the amount above € 0.35254 litre (non-indexed). The eligible for the rebate are the taxi sector, the transport of goods with vehicles exceeding 7.5 tonnes and the transport of disabled persons.

In 2014, the Belgian government decided to increase excise duties on diesel at each diesel price reduction in order to make the rate charged on diesel and gasoline prices equal. Excise duties got also indexed at that time. As a consequence, the rebate for professional diesel got more important in terms of budgetary costs. It increased from a few ten thousands euro in the years 2000 to nearly € 981 million in 2019 (FOD Financiën, 2021).

Figure 6.8 shows the evolution of excise duties on professional diesel in Belgium.

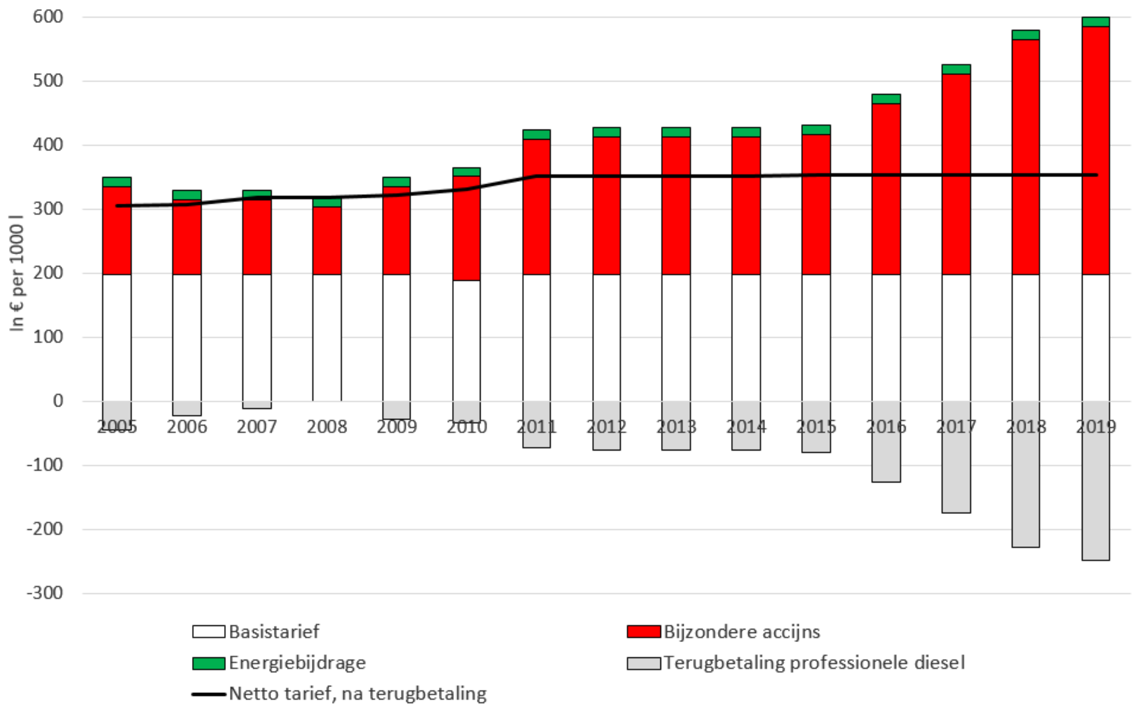

Figure 6.8 Excise duties on diesel for professional use in Belgium

Source: FOD Financiën

Currently, the reimbursement rate for professional diesel is determined at € 0.2270/litre. In response to the reduction of the excise duties of € 0.1446/l on March 19 2022, the recoverable excise duty is equal to the difference between the original rate and the reduction, notably € 0.0824/l. The reduction of the excise duty is implemented according a "cliquet-system", such that the rebate will gradually increase to its original level of € 0.2270/l when energy prices decrease.

The rebate on professional diesel will decrease year by year. More specifically the amount that can be recovered in the future is the following:[145]

- as of January 1, 2023: € 0.2051/l
- as of January 1, 2024: € 0.2041/l
- as of January 1, 2025: € 0.2031/l
- as of January 1, 2026: € 0.2021/l

We argue that **a further reduction and even a phasing out of the excise duty rebate on professional diesel** can be defended based on the following arguments:

- The subsidy remains important, gives a wrong price signal, causes an overconsumption of diesel and extra CO_2 emissions (see calculations below).
- Compared to the price levels in our neighbouring countries, the excise taxes in Belgium are still below the EU average. In 2020, Belgian levels were even below Luxemburg levels (Table 6.5).
- Belgian and foreign companies can benefit from the reimbursement. A majority of reimbursement is done to foreign transport companies (77 836 against 66 891 Belgian transport companies in 2020). Hammer et al (2021) show that foreign transport firms obtain the highest reimbursements in Belgium. As a consequence, there is no competitive advantage in the reimbursement (Rekenhof, 2022).
- The measure is sensitive to fraud although measures are underway to limit that risk (Rekenhof, 2022).

If the fiscal authority decides that a complete phasing out of the reimbursement is not feasible or undesirable, we propose **as a second best option to adjust the level of professional diesel excise tax at least to the level applied in France** (at the latest on 1-01-2023). This corresponds to a level of € 0.452/litre, and an excise tax reduction of approximately € 0.150/litre. With the current policy, professional diesel excise tax will be at nearly € 0.4000/litre on January 1, 2023. The proposed revision of the ETD requires a minimum excise tax level of € 0.4085/litre. By 2026, the reimbursement of excise taxes should be reduced to zero in coordination with neighbouring countries.

Budgetary impact

Below we estimate the budgetary impact of a phasing out of the rebate on excise duties for professional diesel. We consider two potential policy implementations:

- Situation A: Full suppression of professional diesel
- Situation B: Partial suppression of professional diesel (set the excise duty equal to the level applied in France)

[145] https://www.segers-teuwen.be/accijnsterugvraag-professionele-diesel-update-maart-2022

The assumptions of our calculations are based on Delhaye, Van Herle, Van Zeebroeck (2019), who perform a similar exercise. The running costs for diesel trucks are based on MIRA (Delhaye et al, 2017). The truck mileages are from the publication on transport activity by the Federal Planning Bureau (FPB, 2022). All calculations are based on 2019 values for excise duties and traffic volume.

Table 6.7: Overview of assumptions made concerning trucks (2019 values)

Type truck	Diesel use l/100 km	Discount (1000 l)	Discount € (100 km)	Total cost with discount	Volume (bil. Vkm)	Total cost without discount	%change	Diesel volume
Heavy truck >7.5t and <12t t	15.5	-247.62	-3.84	125.0	1.3	128.8	3.1%	200 777
Heavy truck > 12t	30.2	-247.62	-7.47	121.6	7.5	129.1	6.1%	2 264 010
Total				122.1	8.8	129.1	5.7%	2 464 787

Source: FPB (2022), MIRA (2017)

Using the estimates from our own previous studies and the FPB, we can match a total of 2,464,787 litres of diesel use to trucks driving in Belgium and which are eligible for refund. However, the total refund for professional diesel (including foreign companies) is equal to a volume of 2,960,402 l of diesel, representing an overall discount of 733 million euros in 2019. While taxis and buses are also eligible for refund under the professional diesel, we find that that this share is probably rather modest. This means that we can label a significant amount of the professional diesel as 'opportunistic' or 'fuel tax tourism'. These are fuel sales for which discounts are claimed that have little link with the Belgian economy. The total for 2020 is even higher, representing a discount of 981 million euros for a volume of 3,961,297 l. We will therefore assume that the volume above 2,464,787 l can be labelled as fuel tax tourism. This is in line with the estimates from the Rekenhof (2022) in the light of the large increase of foreign vs domestic claims for professional diesel discount.

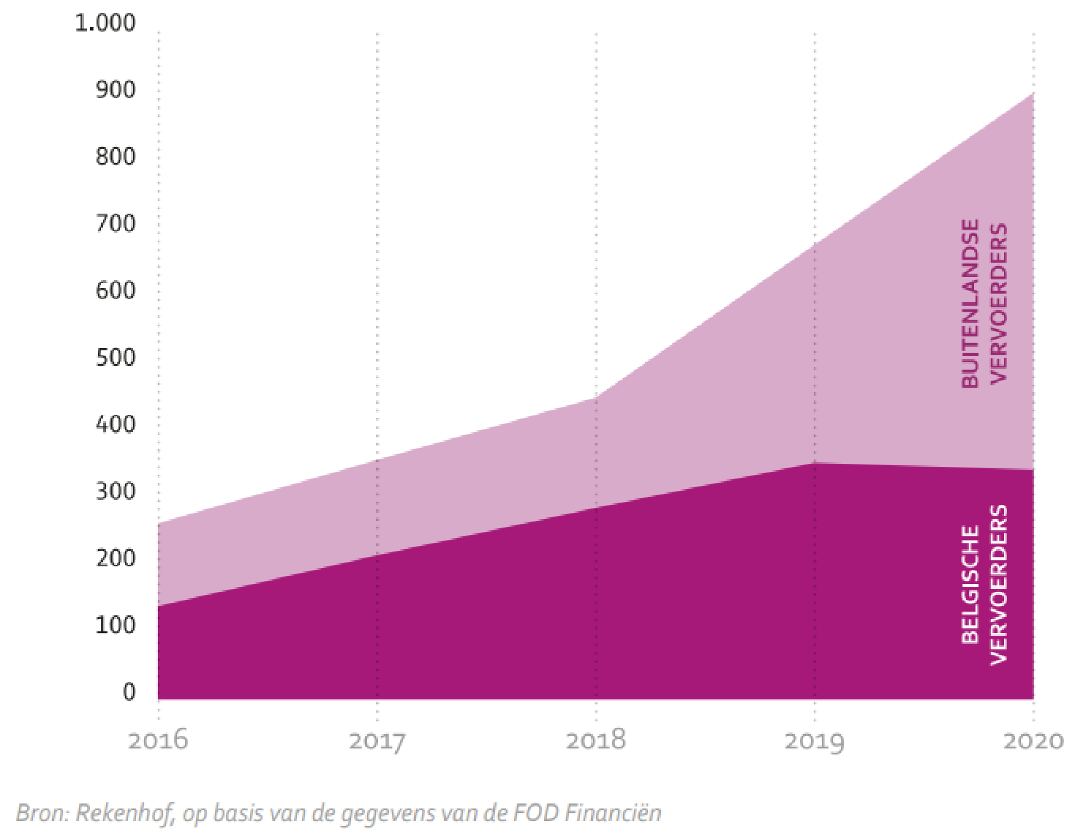

Figure 6.9: Foreign vs domestic claims for professional diesel discount (in Million euros)

Source: Rekenhof (2022)

Our main assumption is that excise tax revenues for domestic trucks as well as foreign truck companies with a strong link (a.k.a origin and destination in Belgium) is relatively low. However, the opportunistic part of the revenue is very elastic. This means that price changes will lead to a large impact.

In situation A (full suppression) we assume that all fuel tax tourism will immediately cease, leading to a large drop in volumes sold & discounts claimed. In situation B we assume that tax tourism will halve, as this would still allow a relatively large discount compared to other countries (especially the Netherlands). Details of the calculation can be found in the table below (Table 6.8)

We find that compared to the 2019 case, **a net gain of 366 million € is possible in case A. In the partial reform of case B, the potential revenue is more limited and equal to 151 million €**.

Table 6.8: Calculation of potential revenue after reform A (full suppression), source: own calculations

Excise tax commercial diesel @ 600.16 euro / 1000 l	DOMESTIC		FOREIGN LINKED TO BELGIUM		FOREIGN FUEL TAX TOURISM	TOTAL
2019 case	Truck 3.5-12 ton	Truck +12 ton	Truck 3.5-12 ton	Truck +12 ton		
Elasticity	0.5	0.5	1.2	1.2	Very high	

Impact on price transport	3.08%	6.14%	3.08%	6.14%		
Initial vkm diesel	0.74	4.30	0.55	3.20		8.80
Initial volume diesel (1000 l)	115 080	1 297 664	85 698	966 346	495 615	2 960 402
Change in volume	1.54%	3.07%	3.69%	7.37%	100%	
Volume after change	0.73	4.17	0.53	2.97	0	8.40
Volume diesel after (1000 l)	113 310	1 257 825	82 535	895 144		2 348 815
Net Excise tax revenue before (M€)	41	457	30	341	175	1 044
Net excise tax revenue after (M€)	68	755	50	537	0	1 410
Difference excise tax	**27**	**297**	**19**	**197**	**-175**	**366**

Table 6.9: Calculation of potential revenue after reform B (equalization with France), source: own calculations

Excise tax commercial diesel @ 452 euro / 1000 l	DOMESTIC		FOREIGN LINKED TO BELGIUM		FOREIGN FUEL TAX TOURISM	TOTAL
2019 case	Truck 3.5-12 ton	Truck +12 ton	Truck 3.5-12 ton	Truck +12 ton		
Elasticity	0.5	0.5	1.2	1.2		
Impact on price transport	1.84%	3.67%	1.84%	3.67%		
Initial vkm diesel	0.74	4.30	0.55	3.20		8.80
Initial volume diesel (1000 l)	115 080	1 297 664	85 698	966 346	495 615	2 960 402
Change in volume	0.92%	1.84%	2.21%	4.41%	50%	
Volume after change	0.73	4.22	0.54	3.06		
Volume diesel after (1000 l)	114 021	1 273 827	83 805	923 743	247 807	2 643 204
Net Excise tax revenue before (M€)	41	457	30	341	175	1 044
Net excise tax revenue after (M€)	52	576	38	418	112	1 195
Difference excise tax	**11**	**118**	**8**	**77**	**-63**	**151**

Introduce an excise tax on LPG and CNG fuels

For CNG cars Belgium imposes no excise duties. Until 2021 the only federal taxes imposed are the federal energy contribution (Federale bijdrage) which amounted to 1.61 €/MWh or 0.021 €/kg and (CREG, 2019) the VAT (21%). In 2022 the federal charge on electricity and natural gas was converted to an excise tax. The change was however minimal[146]. The minimal tax rate under the current version

[146] For businesses, the energy tax rate was increased from 0.54 €/MWh on natural gas to a degressive rate depending on consumption ranging from 1.2 €/MWh to 0.69 €/MWh

of the Energy Taxation Directive (2003) states that natural gas should be taxed at a minimal rate of 2.6 €/GJ. Belgium imposes a zero rate on CNG referring to article 15 (1).

LPG / Autogas for transport is currently not subject to excise duties, although there is an 'excise replacement tax' on LPG ownership on the regional level that varies between €89.16 and €208.20 per year. The tax on LPG ownership was initially imposed by the Federal government to compensate for removing excise duties on LPG in 1983. The reason was that other Benelux countries did not have an excise duty on LPG, while Belgium imposed such a tax. To reduce border traffic and normalize rates across the Benelux, the excise duty was replaced by an ownership tax. With the regionalisation of the ownership taxes, the regions gained competences to impose both normal ownership taxes as the special 'excise replacement tax'. Regional governments do receive the revenues from the 'excise replacement tax' just as other taxes on ownership. Since this was a juridical dark matter, regions have neither indexed nor changed this tax, leaving it at a rate which was originally set by the Federal government with relatively little changes.

Table 6.10: Equivalent excise tax on LPG in € /GJ based on excise replacement ownership tax and estimated fuel use and yearly mileage

Engine	Excise replacement tax	Yearly kilometers	Fuel use (l/100 km)	Implicit tax € /l	Energy MJ/l	Theoretical excise tax € /GJ	Theoretical excise tax € /ton LPG
<7pk	89.16	15000	7	0.08	24.84	3.42	154.5
8-13pk	148.86	15000	8	0.12	24.84	4.99	225.7
>13pk	208.2	15000	10	0.14	24.84	5.59	252.6

In the table above we calculate the theoretical excise duty that would be imposed by the current level of the 'excise replacement tax' on LPG. This is a difficult exercise as ownership taxes have a completely different modality as excise duties on fuels. We find that the excise replacement tax imposed by the federal government, but imposed on the regional level would amount to between 3.42 and 5.59 € /GJ. This is below minimum rates suggested in the revision of the Energy Taxation Directive for 2023 and later.

We suggest implementing an excise tax on CNG and LPG cars that have only a limited environmental benefit compared to other cars and may reduce market shares for electric vehicles. Applying minimum rates for LPG and CNG according the revision of the ETD[147] in 2023 would lead to an excise tax equal to 339.14 €/1000 kg for LPG and 316.92 €/1000 kg for CNG. In terms of calorific value this is still below the minimal rate for other fuels. The revised ETD suggests to bring the rates in line with the minimal rate on other fuels by 2033.

Table 6.11: Impact of introducing revised ETD rates on revenue, source: Own calculations based on FPS data

	Unit	GJ/unit	Volume 2019 (units)	Volume 2019 (GJ)	ETD 2023 €/GJ	ETD 2033 €/GJ	ETD 2023 revenue (Meuro) incl. VAT	ETD revenue 2033 (Meur) incl VAT
LPG	1000 kg	47.3	49 854	2 358 116	7.17	10.75	20.5	30.7
CNG	1000 kg	40.68	5 375	218 649	7.17	10.75	1.9	2.8

[147] Non indexed minimum rate of 7.17 €/GJ in 2023 and 10.75 €/GJ in 2030.

A 'raw' estimate of the possible impact of this reform on the revenue can be given on the basis of volumes sold in 2019. We find that in the absence of behavioural impact, this reform leads to a maximum additional revenue of 20.5 million euro with the proposed revised rate of 2023 and 30.7 million euro with the (non-indexed) rate for 2033. For CNG the impact is considerably lower and is respectively 1.9 and 2.8 million euros. This includes a VAT rate of 21% applicable on these motor fuels. In reality the impact on revenue may be lower, especially for the longer term (towards 2033).

The environmental impact of introducing excise taxes on LPG and CNG cars is negligible in terms of total emissions. Applying common emission factors on volumes stated above[148] we find that overall emissions of these vehicles amount to respectively 0.16Mt and 0.01Mt.

Phase out exemption on gasoil for inland waterway transport

Inland Waterway Transport (IWT) is currently exempt from taxes on fuels. If the revision of the Energy Taxation Directive would become applicable this exemption would no longer be allowed. The minimum rate for gasoil as a motor fuel is equal to 10.75 €/GJ. However the revision of the ETD does state that fuels for maritime transport, inland waterway transport, agriculture, fishing and stationary motors can be taxed at the much lower minimum rate of 0.9 €/GJ.

The lower rate minimum rate is motivated as inland waterway transport has a low external cost. Therefore it should not be subject to a large tax increase, which would be contrary to objectives of modal shift.

Table 6.12: Impact of phasing out exemptions for inland waterway transport, source: Own calculations based on FPS data

	Unit	GJ/unit	Volume 2019 (units)	Volume 2019 (GJ)	ETD rate heating €/GJ	ETD rate motor fuels€/GJ	ETD (Meuro)	ETD revenue Motor fuel rate (Meur)
Gasoil IWT	1000 l	36.348	240 280	8 733 779	0.9	10.75	7.9	93.9

Introducing minimum rates on gasoil for inland waterways at the current proposed minimum rate (non-indexed 0.9 €/GJ) would lead to a volume based tax of 32.71 €/1000 l. We also calculate the potential revenue of taxing gasoil for IWT at the same rate as the equivalent motor fuel. This is equal to 390.74 €/1000 l. We find that in the first case the impact on revenue and cost would be limited to €7.9 Million. In the second case it is equal to €93.9 Million, without taking into account behavioural impact. The study on fossil fuel subsidies for Belgium (FPS, 2021) estimates that the subsidy on gasoil for inland waterways amounts to 133 M€ when compared to the current rate for motor fuel.

We note that the inland waterway transport sector has divulged a joint statement drawn by the EBU, ISO and IWT platform to reverse the current position of the EC on removing exemptions for inland waterways and limit the reform to sea going vessels. [149]

Tax company cars and fuel cards as "normal" advantages in kind

The new regulation on the fiscal treatment of company cars implies that the company car segment will electrify very quickly. This will have an important impact on CO_2 emission reduction of the

[148] 0.067 tonnes of CO_2 per GJ for LPG and 0.056 tonnes of CO_2 per GJ for CNG
[149] IWT-position-on-Energy-Taxation-Directive_2022_02_18.pdf (ebu-uenf.org)

company car segment. However, the literature and expert advice points to the need for a phasing out of the preferential treatment of company cars, even if they are fully electric. The arguments for this recommendation are the following:

- other societal and environmental problems like excess energy consumption, non-exhaust emissions, congestion, and an unfair and regressive tax regime remain.
- as there is no longer a differentiation between company cars with a fuel card and without a fuel card, there is no incentive at all to reduce energy consumption. Therefore, more mileages will be driven, which leads to higher electricity consumption and indirect emissions.
- the measure only benefits the high and middle income classes. In the highest income decile, 48% owns a company car, while in the 30% lowest income households, only 1.5% owns a company car (FOD Financiën, 2021).
- because all new cars sold in Europe need to be zero-emission by 2035 (Fit-for-55), it does not make sense to subsidise the sale of these cars beyond this period.
- the tax benefits for company cars and fuel cars represent a large budgetary expense. Table 6.13 shows the budgetary cost for the government resulting from the preferential tax treatment for company cars and fuel cards. The costs increase yearly. In 2019, the total budgetary expenses (revenue forgone) amounted up to € 2,3 billion.

Table 6.13 Budgetary cost for company cars and fuel cards (in million €)

	2015	2016	2017	2018	2019
Company car	1 541	1 670	1 781	1 821	1 874
Fuel card	384	327	412	472	481
Total	**1 926**	**1 997**	**2 194**	**2 293**	**2 355**

Source: FOD Financiën (2021)

The new regulation on company cars, in which the preferential tax treatment is only applicable to zero-emission cars, will have a budgetary impact as well. The deductibility of zero-emission company cars will decrease from 100% in 2026 to 67,5% in 2031. This will potentially reduce the growth in company car numbers and will logically lower the budgetary costs for the government.

We propose to treat **tax company cars and fuel cards as "normal" advantages in kind**. This contributes to a more transparent and fairer system and reduces the harmful societal impacts. Without behavioural change, this would mean that approximately 2.2 Billion EUR extra of tax income would be generated.

Budgetary impact

Phasing out of the preferential treatment of company cars and fuel cars can lead to a budgetary saving of about € 2,3 billion. However, this statement should be interpreted with caution. As indicated above, the new regulation with respect to zero-emission company cars can have a budgetary impact as well. Further research has to demonstrate whether and to what extent the new regulation has a budgetary impact.

Different options are available concerning the recycling of these extra tax revenues. A first option would be to redistribute the tax revenues to the beneficiaries of company cars by lowering the taxable income. A second option is to use the tax revenues to reduce the social security contributions for the higher wages. A third option is to redistribute the tax revenues reflecting the solidarity principle. This means that the tax revenues are mainly redistributed to the lower and middle wages and to a lesser extent to the higher wages.

Environmental impact

The environmental impact of the phasing out of the preferential treatment of company cars can be split up in an impact on direct CO_2 emissions and an impact on indirect CO_2 emissions and other pollutants.

With respect to direct CO_2 emissions, phasing out company cars might have a small negative effect. This is because the current regulation requires all company cars to be zero-emission by 2026. If electric company cars are no longer tax deductible, the transition to a fully electric fleet might be slower and direct CO_2 emissions will be lower. However, this impact may be small. The tax advantage for company cars results in a larger car fleet. The current regulation may result in an even shorter lifetime of fossil fuel company cars. Currently, these cars are replaced after four years, on average. When company cars are depreciated, they are not taken out of the market, but they re-enter the second hand market (in Belgium or abroad). Hence, the beneficial tax treatment for company cars leads to a larger total car fleet.

In Table 6.14 below we calculate the impact of the proposed policy measure on indirect CO_2 emissions. This impact is evaluated in 2040, because at that time we can evaluate the Fit-for-55 measure that stipulates that all new cars need to be zero-emission by 2035. As company cars are typically replaced after four years, the full fleet should be electric by 2040, with or without the preferential tax treatment.

The results in Table 6.14 rely on the following assumptions:

- In 2017, the number of company cars in Belgium is estimated at 541 700 cars (FOD Financiën, 2021). Over the period 2011-2017 the number of company cars has increased by 4% per year on average (FOD Financiën, 2021). We apply this annual growth rate up to 2025. As of 2026, we assume a zero growth because the impact of the new regulation with respect to zero-emission cars is still unknown. This means that by 2040, we estimate the number of company cars at about 712 000.
- With the phasing out of company cars, only 90% of the former company cars are replaced by another car. This is our own assumption based on the fact that a good that gets a significant price increase will be bought less.
- Company cars drive on average 27 000 km/year while non company cars 17 000 km/year (Castaigne (2009) and Vandenbroucke, (2019)).

- In 2035, only zero emission cars will be allowed to register in Europe as proposed by the Fit for 55 packages of the Green Deal. The proposal has been adopted in the environment committee of the European Parliament on 12 May 2022.[150]
- The emission factor for PM2.5 is from Timmers et al, (2016)
- The emission factor for power generation is the emission factor of the marginal electric power generating company as the one used for the PAMs analysis for the FPS Health (ICEDD, 2021). This assumption can be criticked as battery electric vehicles can be charged at least partly at the moment of choice. At that moment, power can probably be generated at a lower emission rate.
- The emission factor for fossil fuel cars (143 g/km in 2030) is the same as the one used for the PAMs analysis for the FPS Health (ICEDD, 2021).
- The energy consumption of electric cars, not company cars, is 10% lower than that of electric company cars. We assume these cars are smaller and lighter and use therefore less energy. 2016 statistics show average weight of company cars is 10% higher and power is 20% higher for company cars.

Table 6.14 Environmental impact by 2040 phasing out company cars

	current measure	alternative measure
	company cars 100% electric	company cars phased out
n° of company cars or replacement cars	712 000	640 800
share of company cars replaced with phasing out of company cars		90%
share of electric cars in the segment	100%	100%
share of fossil fuel cars in the segment		0%
km driven per car	27 000	17 000
energy consumption kwh/100km	17	17
km driven electric (million)	19 224	10 894
km driven fossil fuel (million)fou	0	0
energy consumption from cars MWh	327	185
Particulate matter (PM 2.5) emission (ton)	144	82
CO_2 emissions in g/kwh (power generation)	350	350
power generation CO2 (g/km)	59.5	59.5
direct CO_2 emissions (kton)	0	0
CO_2 emissions from power generation (indirect emissions, compensated by ETS)	**1 144**	**648**

[150]https://www.euractiv.com/section/transport/news/lawmakers-back-eu-wide-ban-on-new-fossil-fuel-cars-from-2035-despite-strong-lobbying/

Based on a few hypotheses from literature, we observe that from 2040 on, each year the company car regime is continued, 142 MWh extra energy is consumed and 62 ton of additional fine dust is emitted.

The CO_2 emissions should be the same in both scenarios due to the Emission Trading System (ETS), although extra power generation will be necessary. Extra power generation emissions in the scenario that maintains the company car regime will be compensated in other sectors. The consequences of these compensations are likely to be felt more by people without a company car than by people with a company car.

The scenarios do not take into account the fact that company cars are heavier and larger than the average car (1376 kg for a non-company car, 1490 for a company car, (Vandenbroucke, 2019)). The negative environmental impact of particulate matter (PM2.5) will therefore be larger in the scenario that keeps the company car regime intact.

Align embarkment tax (short-term) and apply VAT (mid-term) on airline tickets

Since April 2022, Belgium applies an embarkment tax on airline tickets. Following rates apply:

- € 10 per ticket for short-haul flights (<= 500 km)
- € 2 per ticket for intra-EEA flights > 500 km
- € 4 per ticket for other flights

A comparison of these rates with the ticket taxes charged by other countries (Table 6.6) shows that the ticket tax in Belgium is low. Research shows that a ticket tax should be high enough to have a demand effect. If the ticket tax is below passengers' willingness-to-pay (WTP), there is no behavioural change and subsequently no environmental impact resulting from this measure. In a study for the U.K., Seetaram et al (2018) find the WTP for a ticket tax on short-haul flights to be below the U.K.'s rate of € 13 per ticket. This is also below the Belgian rate. No comparable study on the WTP for flight tickets exists in Belgium, but given that the respective study is already several years old, we may assume that the current Belgian ticket tax is below the WTP of airline travellers. Therefore, at its current level, it will have minimal environmental impact.

We propose to increase the airline ticket tax as follows:

- € 20 per ticket for short-haul flights
- € 8 per ticket for intra EEA flights
- € 30 per ticket for extra EEA flights

This increase aligns the Belgian embarkment tax with the rates applied in other countries. Alignment with other Member States is the second best option. Preferably, airline ticket taxes are implemented EU-wide.

Budgetary impact

To estimate the budgetary impact of the increased ticket tax, we need to determine the demand effect of the increased tax rate. We use the price elasticities for passenger flights determined by IATA (2007), which are considered by the literature as the most adequate and precise. IATA (2007) estimates the price elasticity for intra-Europe flights to -0.84, for Europe-North America flights equal to -0.72 and for Europe-Asia flights to -0.54. We need to distinguish intra-EEA and extra-EEA. Hence, we determine the extra-EEA price elasticity as the average of Europe-North America and Europe-Asia.

Numbers on departing passengers (excluding transit and transfer) are obtained from the three largest airports in Belgium for passenger transport, notably Brussels Airport, Brussels South Charleroi Airport and Oostende Airport. Passenger numbers are for the year 2018.

The average ticket price for intra and extra EU flights is taken from EC (2021), which reports average ticket prices in 2015. We convert the prices to the year 2021 based on the harmonized index of consumer prices in Belgium.

Table 6.15 shows the demand impact of the proposed increased embarkment tax. Although the price increase on extra-EEA flights is proportionally larger than the price increase for intra-EEA tickets, we find that the demand impact is comparable as a result of the lower price elasticity for extra-EEA flights. Demand for airline tickets drops with 4,3% for intra-EEA flights and with 4,9% for extra-EEA flights.

Table 6.15 Demand impact of an increased embarkment tax in Belgium

	price elasticity	ticket price no tax	ticket price current tax	ticket price increased tax	% price change	% demand change
intra-EEA	-0.84	150.6	156.6	164.6	5,1%	-4,3%
extra-EEA	-0.63	327.0	331.0	357.0	7,9%	-4,9%

The budgetary impact of the increased embarkment tax is calculated in Table 6.16. The total number of departing passengers drops from 11.3 million per year to 10.8 million per year. Nevertheless, the budgetary impact is overly positive because the tax increase is much larger than the decrease in the number of passengers. We estimate that the increased embarkment tax results in additional tax revenues of approximately € 109.4 million per year.

Table 6.16 Budgetary impact increased embarkment tax in Belgium

	Departing passengers current tax regime	Departing passengers increased tax regime	Budgetary impact
intra-EEA	9 869 065	9 445 682	€ 73 025 163
extra-EEA	1 486 534	1 412 967	€ 36 442 865
Total	**11 355 599**	**10 858 649**	**€ 109 468 028**

Environmental impact

Based on the estimated impact on demand in Table 6.16 we can estimate the environmental impact of the suggested increase in the embarkment tax. The result is shown in Table 6.17.

According to BEIS (2021), the average direct climate change (CO_2 , CH_4 and N_2O) and indirect climate change (non-CO_2 emissions e.g. water vapour, contrails, Nox) of short haul flight are higher than those for long haul flights.[151] The average emission impact of domestic and short haul flights is equal to 0.254 kg/CO2 eq per passenger per km, while long haul flights emit on average 0.195 kg/CO2 eq per passenger per km.

There is no universal definition of short versus long-haul flights. Wilkerson et al. (2010) determine the average distance covered by a short-haul flight at 783 km and 4938 km for a long-haul flight.

When we multiply the decrease in the number of passengers in Table 6.16 with the emissions per passenger per km and the average flight length, we find that the increase in the embarkment tax leads to **a yearly reduction in emissions equal to 155 072 tonnes CO_2 equivalent**.

In 2019, the total emissions of the international aviation sector in Belgium was equal to 5.2 million tonnes. Therefore, **the increased embarkment tax decreases the emissions by the aviation sector in Belgium by 3%**.

Table 6.17 Environmental impact of increase in embarkment tax

	Direct emissions (kg/CO_2e)	Indirect emissions (kg/CO_2e)	Average flight length (km)	Impact direct emissions (tonnes)	Impact indirect emissions (tonnes)	Total impact (tonnes)
Short haul	0.133	0.121	783	-44 106	-40 127	-84 233
Long haul	0.102	0.093	4938	-37 054	-33 785	-70 839

Source: BEIS (2021), Wilkerson et al. (2010)

Additional measures in aviation: VAT on airline tickets

An increase in the embarkment tax can be implemented relatively easily and on the short term. In the mid-term it should be considered to levy a (preferably EU-wide) VAT on airline tickets. This raises a legal challenge, because current EU VAT regulation doesn't allow for a VAT on international air travel.

However, the EU VAT regulation with respect to international air travel might be revised depending on the outcome of an impact assessment evaluating this measure that is currently commissioned by the EU (FOD Financiën, 2021).

Upon such a revision, we advise to align the VAT on air travel for passengers with that of international rail passenger transport. That is, a VAT tariff of 6% on the sale of airline tickets could be implemented. A study be CE Delft shows that this measure would reduce CO_2 emissions in aviation by 6% and generate revenues ranging from € 200 to € 400 million (European Commission, 2019b).

Additional measures in aviation: Excise tax on kerosene

Kerosene for aviation is currently not subject to excise taxation. Applying a tax on kerosene is legally possible, but is difficult or near impossible for Belgium to implement unilaterally. If Belgium applies a tax without EU coordination it is probable that air carriers will optimise their fulling outside Belgium, leading to very little to no additional revenues for the federal government.

[151] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021

The volume of kerosene for aviation sold in 2019 is estimated at slightly above 2 billion litres. If the entire volume becomes subject to an excise tax, this may lead to a considerable impact on federal revenues. Applying the minimum rate suggested in the revision of the ETD would make this volume subject to a rate of 10.75 €/GJ or 379.26 €/1000 l.

CE Delft (2019a) estimates that introducing a kerosene tax of 330 €/1000l on aviation would lead to an additional 450 M€ in fiscal revenue for Belgium. Additionally it would reduce emissions with about 17%. It would also reduce jobs and indirect value added created by about the same number.

Table 6.18: Impact of introducing revised ETD rates on revenue, source: Own calculations based on FPS data

	Unit	GJ/unit	Volume 2019 (units)	Volume 2019 (GJ)	ETD 2023 €/GJ	ETD 2033 €/GJ	ETD 2023 revenue (Meuro)	ETD revenue 2033 (Meur)
Kerosene aviation	1000 l	35.28	2 013 864	71 049 136	0	10.75	0.0	763.8

Pure application of the tax on kerosene on the basis of volumes of 2019, without taking into account behavioural impacts would lead to an increase in revenue of 763.68 Million euro. This is clearly an overestimation as the tax would only be applicable on intra EU journeys. It is very hard to estimate the impact of the tax, especially since (in case the revision of the ETD would pass the EU policy process) the excise rate on kerosene will only be applicable by 2033. We expect that about half of the volume is due to intra EU journeys. This amounts to 381 Million euros. This would be similar to the CE Delft (2019a) estimate. We expect the CE Delft (2019a) estimate to be largely valid for this tax reform and consider it as an upper limit of the possible fiscal revenue and impact.

Institutionalize the bicycle commuting tax credit

Currently, the bicycle commuting allowance is not mandatory in Belgium. Employers can choose whether they offer such an allowance, except when it is established in the CAO (e.g. health care sector). A study by SD Worx shows that about one fourth of the employers offer a bicycle allowance to their employees.[152] This means that the tax credit is still far from institutionalized.

All (case) experts are strongly in favour of the "Avoid Shift Improve" principle, which lists the best mobility principles in order of importance with regard to using the car. "Avoid" is therefore the most preferable principle and represents the avoidance of using the car by, for example, using the bicycle. "Shift" refers to switching to another transport source such as public transport and "Improve" means to improve or optimise the car (e.g. by using an electric car instead of a petrol or diesel car). The Avoid principle fits well with the philosophy of reducing the total consumption of the car rather than focusing too much on changing the fleet. Consequently, the experts are strongly in favour of (tax) incentives to increase bicycle use.

The experts believe that the federal government should consider the bicycle tax credit as one of the spearheads of the (sustainable) mobility policy. Some experts refer to the anomaly that the (tax deductibility of the) car allowance is currently higher than the bicycle allowance and thus rewards the use of the car for commuting more than the use of the bicycle.

[152] https://www.sdworx.be/nl-be/pers/2022/2022-03-28-belg-trapt-in-2021-een-vijfde-minder-kilometers-naar-het-werk

In addition to increased tax deductibility, the case experts also argue for administrative simplification in obtaining the bicycle allowance and a broader obligation to all sectors.

6.3.4 Other potential measures

Introduce tax incentives for car sharing

In order to reduce the car fleet instead of focusing on a shift to electric cars, one expert suggests to put more effort into tax incentives for car sharing. Although the other case experts are in favour of the principle of making car sharing more attractive, they do not think the focus should be on the tax aspect. Using shared cars is already financially much more attractive than having your own car because you save a lot of costs (taxes, insurance, etc.). According to the other experts, the focus should mainly be on increasing the supply and reducing the administrative burden that often comes with it.

Another reason not to push too hard on tax breaks for car sharing is that it is often only attractive to a relatively limited group of people. For example, while it is an efficient and effective system in an urban context where many families live in close proximity, this is less the case for families living in more rural areas. Moreover, it will not have a major impact on commuting as many people will need a car at the same time.

6.4 Case 3: Circular Economy

6.4.1 Introduction

The climate challenge is often reduced to an energy problem. Consuming less energy and making energy generation greener (e.g. solar and wind energy) are then the solutions. However, an important part of the high energy demand is largely hidden in the way we extract, produce and consume materials. Looking at the climate problem as a materials problem opens up perspectives for providing new directions for solutions.

The Federal Action Plan for a Circular Economy (2021-2024) contains 25 proposals for measures that fall under federal competence in areas such as product standards, consumer protection, public procurement, employment and taxation. All the proposed measures aim to stimulate the marketing of more circular products and services, encourage more circularity in production and consumption patterns, and introduce the incentives and tools needed to make the transition from a linear to a circular economy (FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu, 2021)

Since measures to promote the circular economy can concern both regional and federal policies, good coordination is necessary. Therefore, the Federal Action Plan is primarily intended to complement the actions undertaken by the regions in the area of the circular economy (Federale Regering, 2021).

While the Federal Action Plan mainly focuses on broader initiatives (such as information campaigns) and regulatory instruments (such as mandatory certification systems and the banning of certain products), we will focus on some concrete fiscal measures to promote the circular economy.

6.4.2 Lessons learned from other countries

The Spanish tax on non-reusable plastic packaging

In reaction to the adoption by the EU of the 'Plastic own resource', several countries havehave considered the adoption of a plasticsplastics tax. EU 'Plastic own resource' has been in place since 1 January 2021. It consists of a national contribution that is based on the amount of non-recycled plastic packaging waste. It is expected to encourage Member States to reduce packaging waste and stimulate Europe's transition towards a circular economy. At the same time, it leaves Member States the possibility to define the most suitable policies to reduce plastic packaging waste pollution in line with the principle of subsidiarity (European Commission, 2021).

To finance the national contribution, Spain has made a bill of law to levy a tax on all non-reusable plastic packaging.

The main design features of Spain plastic tax under proposal are the following.

- The taxable event is the manufacture, import or intra-EU acquisition of non-reusable plastic packaging where the product is intended to be used in the Spanish territory;
- Reusable packaging, to which the tax does not apply is defined as "*any packaging that has been conceived, designed and marketed for multiple circuits or rotations throughout its life cycle, being refilled or used for the same purpose for which it was conceived*". This definition is borrowed from Directive 94/62/EC (last amended by Directive (EU) 2018/852) which identifies the manufacturers of products and those making intra-EU acquisitions or imports into Spain as the taxpayers;;
- The rate is set at a level of EUR 0.45 per kilogram. It is reduced where recycled plastic is used during the manufacturing process.

The Spanish tax on non-reusable plastic packaging will enter into force on 1 January 2023. It is expected to raise approximately €724 million annually. The impact of the tax will be greatest on industrial and consumer products businesses, as it is applicable on the manufacturing, importation and intra-community acquisition of non-reusable plastic packaging for its final use within the Spanish market and covers both the transactions of (empty) packaging materials themselves and packaged products (Kühlers, 2022). According to Ernst & Young, there is however a lack of clarity regarding what kind of recycling allows for the taxable base reduction (EY, 2021).

The UK tax on plastic packaging

In the UK, a tax on plastic packaging came into force on 1 April 2022. Unlike the Spanish measure, which applies only to non-reusable plastic packaging, the UK tax is levied on plastic packaging manufactured in, or imported into the UK, that does not contain at least 30% recycled plastic. Consequently, it will not apply to any plastic packaging which contains at least 30% recycled plastic, or any packaging which is not predominantly plastic by weight. The tax rate will amount to £200 (corresponding to €234) per metric tonne if certain thresholds are met.

As the tax has only been introduced very recently, no evaluations are available yet. However, the British government expects that the macro-economic impact to be very limited. The government expects that the tax will provide a clear economic incentive for companies to use recycled plastic material in plastic packaging, which will increase the demand for this material and produce more recycled and collected plastic waste, which will not end up in landfills or incinerators. Moreover, the impact on consumers is also estimated to be low, even if companies pass on the higher costs. This is mainly because plastic packaging usually makes up a very small amount of the total cost of goods (HM Revenue & Customs, 2021). Nevertheless, there have recently been protests by a number of large food companies in the UK because they think the tax is too strict. They mainly complained about the lack of exemptions for materials that come into contact with food and cannot be recycled. As a result, these businesses had no choice but to pay the tax – leading to increased costs, which might be passed on to the consumer (Agyemang, 2022).

6.4.3 Priority areas for reform

Reform of beverage container tax

With the beverage container tax, Belgium has had an important tool since 2004 to encourage the use of reusable packaging or packaging-free alternatives. Although the beverage container tax is a good instrument in itself, a thorough reform is to be recommended. A first logical adjustment would be to adjust the rates of the tax to inflation. Because the rates have not been indexed since 2004, there is a tax reduction of 27% in real terms, which is growing every year. If the tax rate would be indexed to bring it the same level of 2004, actual tax revenue would be around €478 Million compared to €349 Million today. Reforms should go beyond indexation however, as the current tax is not optimally differentiated and could give wrong incentives. Other recommended adjustments include more differentiation in the design of the tax by distinguishing between recycled and virgin materials. Since the beverage container tax focuses on a specific segment of packaging, it seems appropriate to look at a possible extension to other types of packaging (cf. next section). This and other proposed reforms of the beverage container tax are discussed in more detail in Sheet F2.

Introduce a plastic packaging tax with a differentiation based on the recyclability

With the European Commission's second circular economy action plan (2020) and the recent adoption of the Plastic Own Resource (2021), EU Member States are being given a concrete incentive to reduce packaging waste. With the adoption of the Plastic Own Resource, member states will in fact pay a national contribution based on non-recycled plastic packaging waste (European Commission, 2021). This measure has already incited several member states such as the United Kingdom and Spain (cf. previous section), and Italy (EY, 2021) to introduce a tax on plastic packaging or start the preparations to introduce it.

Although Belgium already has a tax on a specific segment of (plastic) packaging with the beverage container tax, it seems appropriate to us to also introduce a more general plastic packaging tax. The planned introduction of a new national levy based on non-recycled plastic packaging waste meets this need (Supreme Finance Council, 2022). The expert interviews also show that all the experts have indicated that they are in favour of such a general tax on plastic packaging: 55% of the experts are strongly in favour, while the other 45% say they are rather in favour. Compared to the other newly proposed taxes in the quantitative survey, the plastic packaging levy is the only tax for which all the experts express their support. However, it is important to differentiate such a plastic packaging levy on the basis of recyclability with a distinction toto be made on the basis of plastic packaging made from virgin materials on the one hand or from recycled plastic on the other. One of the great advantages of the packaging levy is that it responds to the highest priority part of the Lansink's Ladder, which symbolises the desired hierarchy for waste disposal. This is because the most important step is to avoid creating waste, for example by selling a product unpackaged or by taking a shopping bag to the supermarket instead of using a plastic bag. A packaging levy encourages such actions (Milieuservice, 2022).

Although all the experts are in favour of a plastic packaging tax, they do point to the danger that it is levied at one specific 'point' in the chain (and that there are many different points in the value chain). The efficiency of such a tax is therefore largely dependent on its tax base. As such, it adds complexity on long supply chains since every invoice in the supply chain should identify the amount of plastics in order to enable refunds or payments (EY, 2021). Therefore, several experts recommend to consider reforming the VAT system because it has an impact throughout the value chain. Interesting in this respect is the proposed reform of the VAT to a Damage and Value Added Tax (DAVAT) which incorporates (environmental) damage of a product or activity into the system. One of the biggest advantages, according to the experts who proposed the idea, is that such a system would pass through the entire value chain, so that both producers and consumers would be affected. So it has an impact on the whole chain (Traversa & Timmermans, 2021). However, since a reform of the VAT system to DAVAT requires an adaptation of the EU Directive and the federal government consequently cannot reform it, it will not be discussed further here. However, given the high potential of such a DaVAT reform, we will treat it in more detail in Annex D4.

Modify the system of investment deductions to stimulate the longer use of (electronic) equipment in companies

Electronic equipment in companies, such as computers and smartphones for employees, are often depreciated after only a few years after which it is no longer used, while the products themselves often still function perfectly. If there are technical problems with a device, many companies buy new material instead of repairing it. Such rapid *'scrapping' of perfectly functioning equipment* is therefore at odds with a sustainable and circular vision of business and should not be encouraged at all. The problem, however, is that the system of depreciation is fiscally beneficial for companies, since they can be spread out as costs over several years, which means that less corporate taxes need to be paid. The experts therefore propose to tackle the '*depreciation culture'* that encourages waste. There should be an incentive to use the (electronic) material longer and, in case of technical defects, to focus more on repairing the material instead of immediately buying new material. Such a change would therefore have a positive impact on the (local) repair economy and would greatly reduce the need to import electronic equipment. However, there is less clarity on the exact details of how to stimulate the longer use of (electronic) equipment in companies. According to a number of experts, a tax incentive could be given in the last year of depreciation to encourage continued use of the equipment. Other experts opt for a gradually higher tax benefit the longer certain electronic devices are used. One way of doing this would be to look at adaptations/additions to the investment deduction system that aims to encourage SMEs to make productive investments. The investment deduction reduces the amount of tax to be paid. The tax deduction is determined as a percentage of the investment (FOD Financiën, 2015).

6.4.4 *Other potential measures*

Provide more fiscal support to repair and recycling economy by introducing VAT reduction or reductions in labour charges

The case experts agree that the federal government should provide **more (fiscal) support to the repair and recycling economy**. Indeed, it is a win-win situation with both environmental and social benefits, which are strongly represented in this sector. Measures that promote the repair and recycling economy also have a positive impact on (local) employment. Besides taxes on beverage containers or plastic packaging (cf. previous section), several general and case experts propose to adjust VAT as an appropriate instrument to promote the production and use of recyclable products. Some experts are thinking of a VAT reduction for specific products with a high recyclability rate or that can be completely reused. However, in order to stimulate the recovery economy, some experts argue that **reductions in labour charges within that specific sector could have** an even greater positive impact compared to adjustments in VAT.

6.5 Case 4: Financial sector

6.5.1 Introduction

To achieve the ambitions set in (international) climate agreements and sustainable development plans, investments in technical and economic innovation are indispensable. Without financial support, specific incentives or assistance, these investments will occur insufficiently. This is because green investment projects are generally riskier (because of volatility in energy prices, long horizons and high upfront costs) than traditional investments. At the same time, the return on these projects is often uncertain. In many cases, the risk-return profile of green investments is not competitive with traditional projects because externalities (like pollution) caused by traditional projects are not priced.

In Belgium, taxation of the financial sector and financial products are not tailored to mobilise capital for sustainable activities, nor are investments in polluting activities discouraged. With € 346 billion assets under management in 2020, financial institutions in Belgium have an important potential role to play in financing green projects. The challenge is to identify the incentives needed to support such a transition towards greener finance.

Financial institutions in Belgium are currently taxed on different grounds. On top of general taxes and charges such as corporate income taxes and non-deductible VAT for individual end users, the financial sector is subject to several sector-specific levies. There are charges in place to safeguard financial stability such as the contribution to the Guarantee Fund for financial services and the contribution to the Resolution Fund.

For investors, four types of taxes may apply: a financial transaction tax, withholding taxes on investment income, capital gain taxes (only on specific products) and a capital tax on security accounts. Investors pay a financial transaction tax on stock-exchange and carry-over transactions. Withholding taxes are charged on dividends (stocks) and interests (bonds, savings accounts and deposits). The rate varies depending on the type of financial product and sometimes a tax-exempt amount is in place. On fixed income funds and mutual funds that invest at least 10% of the asset's value in bonds, a capital gains tax is charged. In 2021, the Belgian government introduced a capital tax on securities accounts with a value exceeding €1 million.

Table 6.19Taxation Taxation of financial products in Belgium (simplified view)

	Equity	Bonds	Funds – ACC	Funds – DIS	Savings*
Withholding tax	✓	✓		✓	✓
Financial transaction tax	✓	✓	✓	✓	
Capital gains tax			✓		
Tax on securities account > € 1m	✓	✓	✓	✓	

* A withholding tax on interest from savings accounts applies for interest income above € 980 in 2022.

For savings in pension funds and long-term savings (third pillar of the Belgian pension scheme), a specific tax scheme applies. Savings in pension funds are taxed at 8% when the beneficiary reaches the age of 60 years. There is an annual tax credit for savings in pension funds. In 2022, savings up to € 990 enjoy a tax credit of 30%, while savings up to € 1270 are entitled to a tax credit of 25%.

The main challenge in greening the fiscal scheme in the financial sector is to discourage investments in "brown" activities and/or redirect capital towards green projects. A way to do this is by charging differential withholding or capital taxes based on the environmental and social governance (ESG) score of an investment. However, this process is cumbersome, complex and requires a uniform ESG scoring mechanism. Up to today, there is no such universal scoring mechanism in place. Alternatively, targeted green investment products can be promoted with dedicated tax incentives and actions to increase their visibility.

Until 2012, the federal government allowed a tax credit for interests paid on green loans. This measure was cancelled as part of a budget cut. The tax credit on green loans was not overly positive evaluated by experts. During the interviews, experts mentioned the risk of greenwashing and the problem of self-labelling, which make it difficult to guarantee that a project is truly green. At present, there are no dedicated "green" fiscal incentives for climate-friendly investments by private investors.

6.5.2 Lessons learned from other countries

Green Projects Scheme – the Netherlands

The Netherlands provide a tax incentive scheme for green investments by private investors, dubbed "the Green Projects scheme". Private investments in selected green funds and savings deposited at recognized green banks are exempted from capital gains tax. In 2022, green investments are exempted up to € 61,215 per person. In addition, there is an additional income tax credit of 0.7% on these green investments.

Under the Green Projects scheme, private investors or savers are offered a green savings account or a green investment fund. The bank is required to invest the money in green projects that should comply with criteria set by the government with respect to sustainability. Because of the tax benefit, the investors/savers are willing to accept a below average return. This means that the green projects are financed at low interest costs, which increases the number of projects that are undertaken.

Table 6.20 Social-economic costs and benefits Green Projects Scheme 2010-2017, in million €

Source: Thijssen et al. (2019)

	2010 – 2017 yearly average in million euro
Social costs (opportunity loss)	**€ 29**
Environmental benefits	**€ 345**
CO_2	207
Nox	54
Particulate matter (PM)	80
1,4-Dichlorobenzene	4
Environmental benefits, QCA corrected	**€ 262 - € 303**
Budgetary costs (loss of tax income)	**€ 94**

Thijssen et al (2019) conducted a social cost benefit analysis to evaluate the Green Projects scheme of the Dutch government over the period 2010 to 2017. They find that the socio-economic value of the scheme is significantly positive: the social costs (defined as the opportunity costs of investing in projects with a higher return) are equal to € 30 million per year on average. The social benefits (environmental benefits) are estimated between € 262 and € 303 million per year. The budgetary costs for the government (missed tax income and implementation costs) are equal to € 98 million per year. This means that the monetized environmental benefits of the Green Projects scheme are almost three times larger than the budgetary costs. An overview is provided in Table 6.19.

With respect to the effectiveness of the Green Projects scheme, Thijssen et al. (2019) report that between 12% and 24% of the green projects are identified as "free riders". These are projects that would also be funded without the scheme. This means that at least three quarters of the executed green projects would not have been undertaken without the financial incentive provided by the government.

Environmental-friendly bonds – the U.S., Nordic countries, Asian countries

Over the past decade, the market for environmental-friendly bonds has seen an impressive growth. However, there are significant differences between countries with respect to their involvement in this market.

In the United States, the federal Energy Policy Act of 2005 launched Clean Energy Renewable Bonds (CREBs). CREBs were tax credit bonds to finance renewable energy projects. CREBs could be issued by electric cooperatives, government entities and certain lenders. The investor buying the CREB received a tax credit on the bond's interest. Hence, investors were willing to accept lower interests than on conventional bonds, leading to a lower borrowing cost for the issuer. In 2009, the programme was extended by the introduction of New Clean Renewable Energy Bonds. The initiative was stopped under the Trump administration in January 2018.

Green bonds are bonds for which the proceeds are used to invest in an environmentally friendly project. Most green bonds are certified by an external party who guarantees the green bond status and monitors the use of the proceeds by the issuer. The green bond market is still young and unstructured, which makes it sometimes difficult for issuers and investors to find their way towards these products.

The figure below shows the green bond issues by country in 2021. In absolute numbers, the U.S., China and Germany are market leaders in the green bond market. This is shown by the blue bars in Figure 6.10. In contrast, scaled by size (measured by the country's GDP), the orange line shows that Norway and Sweden are most active in green bond issuance, followed by Hong Kong, the Netherlands and Singapore.

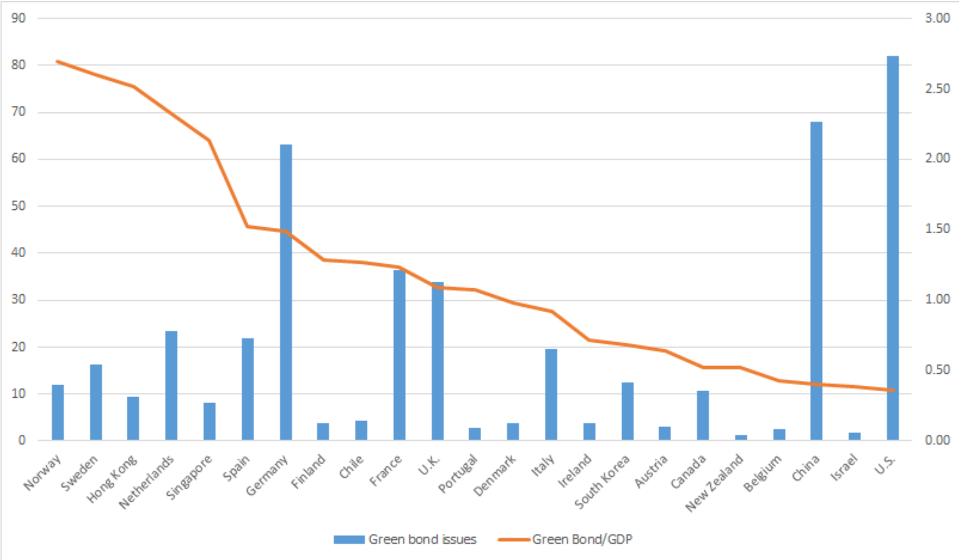

Figure 6.10 Green bond issuance activity 2021 (in billion €)

Source: Climate Bond Initiative and World Bank

The dominance of Norway and Sweden in the green bond market has been confirmed by the literature. Torvanger et al. (2021) determine the success factors for the green bond market based on an analysis of the cases in Norway and Sweden. They find that especially Sweden stands out by providing a strong institutional framework for the green bond market. The role of the government is considered important. The Swedish government has consistently sent strong signals to the financial markets with respect to their commitment to sustainability. The clear and transparent communication about strengthened sustainability requirements over time helps to reduce uncertainty and incentivises businesses to engage in climate friendly investments.

Several countries that rank high in green bond issuance activity have stimulated the green bond market with specific tax incentives. The Monetary Authority of Singapore encourages the issuance of green bonds through the Sustainable Bond Grant Scheme. Singapore reimburses the external review expenses up to SGD 0.1 million (€ 68 500) for green bonds that companies issue in Singapore and that are listed on the Singapore stock exchange with a minimum issue size of SGD 200 million (€ 137 million) and with a minimum tenure of 3 years.[153]

Similar to Singapore, Hong Kong has launched the Green and Sustainable Finance Grant Scheme (GSF Grant Scheme) in 2021.[154] The GSF grant allows green bond issuers and borrowers of green loans to have the issuance costs and external review expenses reimbursed by the government. With respected to issuance costs, 50% of expenses can be reimbursed, up to an amount of HK$ 2.5 million

[153] https://www.mas.gov.sg/schemes-and-initiatives/sustainable-bond-grant-scheme
[154] https://www.hkma.gov.hk/media/eng/doc/key-information/press-release/2021/20210504e4a1.pdf

(€ 305 500). External review costs are fully reimbursed up to an amount of HK$ 800 000 (€ 97 760) per bond or loan.

The impact of green bonds on the society are substantial. KfW Development Bank (2015) estimates the environmental impact of green bonds issued in Germany. The study finds that per € 1 million invested in green bonds:

- greenhouse gas emissions are reduced by 800 tonnes per year,
- nine jobs are created or secured for one year in manufacturing and construction,
- € 68,000 is saved as a result of less energy imports or fewer fossil fuels burned.

In the same line, Flammer (2020) shows that the environmental performance of companies that issued green bonds improves significantly. More specifically, the green projects financed by green bonds resulted into a CO_2-emission reduction of 27.7% for the issuing companies.

Sustainable investment as default for pension funds – the U.K.

In the United Kingdom, new requirements are set for pension funds in the Occupational Pension Schemes by the Climate Change Governance and Reporting Regulation 2021 (HM Treasury, 2020). The requirements are aligned with the reporting recommendations set by the Taskforce of Climate-related Financial Disclosures (TCFD), which become mandatory for large U.K. companies and financial institutions as of April, 2022.[155]

More specifically, the regulation implies a **mandatory practice** for pension funds to incorporate climate-related risk in investment strategies. Also, the regulation imposes stringent and transparent reporting on climate related risks in the investment portfolios. As a result, asset managers in pension schemes will maximally reduce the climate risk in their portfolios. They are used as frontrunners to finance green technology and the green energy transition.

The U.K. regulations are ground-breaking because they do not only impose asset managers what to disclose about their investments, but they also prescribe specific actions to be taken first. There are four areas in which actions are to be taken:

- Governance: asset managers must establish and maintain continuous oversight of the climate-related risks and opportunities of their investments.
- Strategy: there should be a clear assessment of the impact of climate-related risks and opportunities on the scheme's investment strategy in the short, medium and long term.
- Risk management: climate-related risk management should be integrated in the overall risk management of the pension scheme.
- Metrics and targets: there should be annual reporting on specific climate-related metrics and the investment scheme should have a (non-binding) target based on at least one of these metrics.

[155] https://www.gov.uk/government/news/uk-to-enshrine-mandatory-climate-disclosures-for-largest-companies-in-law

6.5.3 *Priority areas for reform*

It is generally accepted in the literature that taxing undesirable activities is more effective and less distortive than providing subsidies or tax credits. Therefore, a theoretical optimal tax measure would increase taxes (for example withholding taxes or capital gains taxes) on investments in polluting companies. Practically, raising these taxes on savings and investments can have negative side-effects. The general withholding tax rate in Belgium is set at 30%, which is one of the highest in Europe. Raising this rate even further may induce capital flight and scare off investors. Alternatively, one could think of another withholding tax rate based on the ESG score of the financial product. However, such measure would be complex to implement and involves a significant administrative burden.

Based on a synthesis of the literature, an analysis of the current tax scheme on financial products in Belgium and input from expert interviews, we propose two priority areas for reform. The first proposal is to stimulate investments in green projects by providing temporary tax incentives for green financial securities. The second measure is to reform the tax credit for pension savings based on the environmental friendliness of the pension fund.

Each of these priorities are briefly discussed below.

Stimulate investments in (innovative) green projects through the promotion of green bonds (or other green financial securities)

The experience in the Netherlands learns that tax incentives to finance green projects leads to positive societal effects, that exceed budgetary costs. Still, the Dutch Green Projects scheme requires significant administration because the government needs to define what qualifies as a green project and is responsible for the monitoring.

The main idea of the Green Project scheme is to lower the financing costs of green investments by providing a tax credit to the investor. A similar effect as the Green Projects scheme can be achieved by making existing green financial products more financially attractive. An example of such a green financial product is a green bond.

The European Commission has developed the European Green Bond Standard (EUGBS) to support the issuance of green bonds and support the growth of the green bond market (European Commission, 2019c and 2020). The EUGBS guarantees that green bond projects are issued in accordance with the EU taxonomy. It determines reporting and reviewing requirements to ensure full transparency on the use of the proceeds. By formalizing the criteria for qualifying as a green bond, the EUGBS helps to minimise the risk of greenwashing.

There is currently no specific fiscal framework for green bonds in Belgium. However, research has shown that tax incentives for green bonds have a strong impact on green bond issuance of corporations (Azhgaliyeva & Kapsalyamova, 2021). Similarly, Agliardi & Agliardi (2019) show that tax incentives can play a key role in scaling-up the green bond market and raising awareness of climate-friendly investments.

The government can stimulate green bond issuance using different fiscal measures (Climate Bond Initiative, 2016):

- Tax-credit: the bond issuer does not pay interest on tax-credit bonds. Instead, investors in these bonds receive a tax credit.
- Tax-exempted interest income: investors do not pay withholding taxes on the interest received on the bonds. Therefore, these bonds can be issued at lower interests.
- Direct subsidy: bond issuers receive an interest subsidy from the government such that their borrowing costs are lower than for a conventional bond issue.
- Reimbursement of issue costs: the government reimburses costs associated with the green bond issue such as reporting costs, or the costs of an external reviewer.

An important remark is that **a tax incentive for green financial products should only be temporary**. The purpose of this measure is to increase the visibility and attractiveness of green financial products. The literature shows that a tax incentive can play a key role to support and accelerate the growth of this market segment. Evidence from the green bond market in Sweden shows that once the market is more established and backed by a strong institutional framework, fiscal incentives are no longer required for the market to develop further (Torvanger et al, 2021). Agliardi & Agliardi (2019) argue that tax incentives for green bonds are efficient in the earliest stage, when investors need to get familiar with the new financial instrument and issuers need to build up a credit history. Therefore, we recommend the tax incentive to be **limited in time** or to be exclusive for **first time issuers**.

The budgetary cost of each measure depends on the magnitude of the measure and the size of the green bond market in Belgium. In the Netherlands, the average yearly cost of the Green Project scheme was equal to 2.6% of the amount invested in green projects under the scheme (Thijssen et al, 2019). In 2021, green bonds were issued in Belgium for a total amount of € 2.5 bn (excluding sovereign green bond issues). A 2.6% budgetary cost would amount to € 65 million. This is a very crude estimate and should be treated with caution. Further research is needed to determine the total cost more precisely.

Based on the size of the current green bond market in Belgium, we can estimate the budgetary impact of a withholding tax exemption on the interests received on green bonds. Today, the withholding tax on interest income is equal to 30%. At a current issuance activity for green bonds of €2.5 bn per year and an average coupon of 0.75%, the tax credit would result in € 5,625,000 revenue forgone per year. Obviously, as the green bond market grows and interest rates evolve, the revenue forgone would increase proportionally.

Alternatively, the government can reimburse the issuance and/or the external review costs associated with green bonds. In order to obtain green bond certification (like the EU GBS), the green bond needs to be externally reviewed and monitored. This creates additional costs for the issuer, which may be discouraging. The government can reimburse these costs up to a specific amount (e.g. € 75,000). However, a drawback of this incentive is that it might drive up the costs of external reviews for smaller bond issues.

The case experts that were interviewed raised some concerns about the current form of green bonds. The practice of self-labelling is a serious issue because it can lead to greenwashing. This undermines the credibility of the green bond market. Therefore, initiatives such as the EUGBS are valuable and should be used to further develop the green bond market.

Case experts are not in favour of a reintroduction of the tax credit on green loans, which was in place until 2012. The reasons for this are twofold. First, there is the issue of greenwashing. The tax credit on green loans was applicable to the private sector, where monitoring and control is minimal. This may lead to unjustified green labels. Second, the tax credit on green loans is predominantly used by households in middle and upper income class. Lower income households are not able to benefit from this measure.

A (temporary) tax incentive for corporate and sovereign green bonds is expected to have a much bigger impact than a tax incentive on green loans. First, the tax incentive can be made conditional upon green certification of the bond (such as compliance with the EU Green Bond Standard). Although it is still a young market, the market for green bonds can be monitored more closely than the market for green loans. Second, the size and potential of this market is larger than the market for green loans.

ESG-based tax credit for pension fund savings

The federal government provides an incentive for pension savings through a tax credit of 30% or 25%, depending on the savings amount. Currently there a no specific requirements about the environmental friendliness of the investments made by pension funds. This is a missed opportunity. Being an important shareholder, long term asset managers such as pension funds and insurance companies can stimulate companies to lower their carbon footprint and to operate in a more sustainable way. Differently put, these asset managers can serve as leverage to accelerate the transition to a greener economy (Schoenmaker, 2017).

To implement a green reform of the pension savings tax credit, the government can **make the tax credit conditional upon the environment performance of the pension fund**. This can be done in several ways. First, the government can specify the investable assets of pension funds. This would not necessarily mean that the pool of investable assets is reduced (which would be undesirable). Instead, the pool of investable assets can be redefined such that it only covers sustainable and environmentally friendly assets.

A second way to implement a green pension savings tax credit is to assign a sustainability score (ESG score) to each pension fund (based on its underlying assets). The tax credit is conditional upon achieving a predefined sustainability score. A concern raised during the expert interviews is that there is currently no unified monitoring and ESG scoring system to develop such an ESG-based tax credit. A second concern is that it would be hard to identify the ESG score of a pension fund.

The concerns raised by the experts are partly dealt with by the recently adopted Sustainable Finance Disclosure Regulation (SFDR) by the European Commission. The SFDR imposes pension funds (and other investment companies) to disclose ESG information about the fund, both at entity level and at product level. The SFDR should increase transparency about the ESG score of each fund and it helps to prevent greenwashing. Hence, the SFDR can be used as leverage to develop a green tax credit for pension savings.

To determine what is a green investment and what not, **the EU Taxonomy should be used**.[156] The EU Taxonomy is a transparent tool that classifies economic activities according to the EU's climate and environmental objectives. The SFDR requirements are linked with the EU Taxonomy by including 'environmentally sustainable economic activities' as defined by the Taxonomy Regulation in the definition of 'sustainable investments' in the SFDR.

This measure would not lead to an additional budgetary burden for the government. At the same time, it will incentivise pension fund managers to invest in green assets. The administrative burden should also be minimal provided that the requirements for the tax credit are aligned with the disclosure requirements set in the SFDR.

6.5.4 Other potential measures

Support collective financing mechanisms

The case experts believe that the government can play an important steering role with regard to **supporting collective financing mechanisms** (cf. (cf. case buildings). The experts therefore advocate **increasing the tax deductibility** of such mechanisms. This way, dormant savings can be activated via *'social crowdfunding'* and the setting up of *'cooperatives for environmental projects'*. However, some experts point out that it is mainly households with a relatively high income that will be interested in such collective financing projects, which will give them an extra advantage in case of tax deductibility. In other words, it may bring about certain Matthew effects.

156 https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en#compass

6.6 Case 5: Buildings

6.6.1 Introduction

The overview of the share of greenhouse gases emitted per sector shows that, based on the figures for the year 2020, emissions directly related to buildings account for 19% of total emissions due to residential heating and tertiary heating:

- Although emissions for the residential heating part decreased by 6.042 kilotonnes of CO_2 equivalent over the period 1990-2020, it still represents 13.8% of total greenhouse gas emissions. The increase in the price of energy and the improved energy efficiency of buildings have probably contributed to this decrease in consumption;
- In the tertiary sector, fuel consumption has increased by 36% since 1990. One reason is the 35% increase in the number of employees between 1993 and 2017. At the same time, electricity consumption also increased by 183 % (between 1990 and 2017) (FPS Public Health, Food Chain Safety and Environment, 2022).

Given the relatively large share of greenhouse gas emissions that can be linked to the buildings sector, it is obvious that measures related to the taxation of fossil fuels and other energy products, such as the introduction of a carbon tax, can also be considered as fiscal measures with a direct impact on the buildings case. Given that these more general measures, which can be directly linked to the taxation of fossil fuels, are already discussed in detail in the first part of this study (starting from chapter 5), this section will focus on *other* possible measures that the federal government can take with regard to the case of buildings.

An important note here is that the federal government's room for manoeuvre is relatively limited since the regions are competent for land-related matters. Concretely, the regions are responsible for financial support for housing, real estate taxation, social housing, the promotion of rational energy use, building permits and many other matters with a direct or indirect impact on housing and buildings. In particular, the transfer of real estate taxation from the federal government to the regions as a result of the 6de state reform has ensured that the options available to the federal government are relatively limited (Flemish Government, 2022). Despite the above limitations, this section will propose several fiscal measures that the federal government can take to stimulate a more sustainable policy related to the case of buildings.

6.6.2 Lessons learned from other countries

Heat grids for buildings in the Netherlands

In the Netherlands, the university TU Delft and the technological institute Deltares joined forces with several companies to install a smart thermal grid for buildings on the university campus in 2016. TU Delft's heating network is connected to 23 buildings. The current heat sources available are CHP (combined heat power) installations and gas boilers. The research results show that the use of gas boilers can be reduced by 20% without having to make any large-scale modifications to buildings. This saving will be primarily achieved by setting the temperature of the heating network as low as possible and dynamically based on weather forecasts. The simulations show that with some minor adjustments it is possible to achieve primary energy savings of 10 to 15%. Moreover, substantial energy saving is already possible with relatively little effort (Pothof, 2022).

This Dutch case shows that adaptations of an existing thermal network can already lead to significant environmental benefits. When thermal networks are implemented in places where they are not yet present, the sustainability benefits will therefore be even greater.

Heat grid practices in the UK

The UK's Clean Growth Stratego projects that heat networks will need to provide 17-24% of the UK's heat by 2050 in order to meet UK carbon reduction targets cost effectively. Various applications of heat grids have already been implemented. Some interesting examples are:

- The Lee Valley Heat Network is based upon a combination of waste-to-energy sources and gas-fired combined heat and power to supply residential and commercial consumers. To fund the project, Enfield Council is borrowing £6 million from the European Investment Bank (EIB) and £6 million from the London Energy Efficiency Fund (LEEF). Consequently, it is an example of a public sector led project sponsor;
- Cheshire East Council has entered into a 30 year joint venture agreement with Engie to deliver heat networks. The joint venture partners will have 50:50 voting rights and 50:50 investment contribution to any future projects. This is an example of a public-private Joint Venture;
- The Royal Albert Docks thermal grid is based on a combination of boilers, chillers, a combined heat and power system and storage technologies funded through a combination of equity and debt from the private developer Advanced Business Park. This is an example of a private sector led project sponsor (Grant Thornton, 2018).

Taxation of gasoil for heating

In its review of fossil fuel subsidies in Belgium (2021), the federal ministry of Finance notes that the current rates of gasoline equal to 17.95 €/GJ (see *Table 3.1*) could be used as a reference rate for energy taxation. Applying this principle consistently would imply drastic changes. For example it would imply that the current low rate for gasoil used for heating (17.26 €/1000l) would increase to 652.45 €/1000 l as it is essentially the same fossil fuel as diesel. This change may be too drastic for now, however we should also note that among EU countries, Belgium has extremely low rates for gasoil for heating (see figure below) and that many countries tax gasoil at comparable rates as motor fuels, among those the Netherlands.

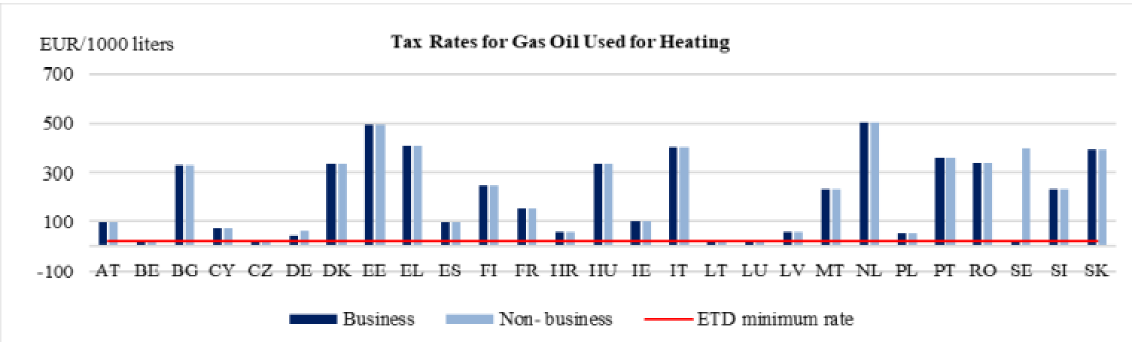

Figure 6.11: Comparison of rates on gasoil with current minimum rate of ETD, source: EC (2021d) p.111

6.6.3 *Priority areas for reform*

Reform of excise taxes on heating fuels consistent with carbon pricing

In our view, the switch from heating based on fossil fuels towards more environmentally friendly technologies is a first crucial priority area for reform with regard to the buildings case. As already mentioned in the introduction, the measures discussed in the first part of this study largely focus on this first priority (section 3.2.3 and the analysis in sections 2 and 5).

If the federal government would not consider a carbon tax on fossil fuels for all non-ETS sectors, it could consider a more limited reform focused principally on heating fuels. For this we can refer to section 5.4.1 of the report.

For more detail, we refer to Sheet F.6 that elaborates on the decarbonisation of building heating.

Speed up renovation of housing stock by modifying EPC

According to the case experts, a second important priority in relation to the case of the buildings is to speed up the renovation wave for Belgian houses. During the interviews, various proposals were made that could contribute to this. Some interesting proposals that were made by the case experts include using a modified EPC as a tax bonus-malus system and introducing stronger fiscal incentives for renovations. However, as these are mainly aimed at adjustments to regional policies, we have opted to include them in the annex (D1 & D2).

Encouraging use of heat pumps and heat networks

According to the case experts, there is currently a dominant focus on stimulating heat pumps in Belgian policy. Although heat pumps for individual households are very important in the transition to more sustainable energy (cf. Annex D3), the experts also point to alternative (underexposed) instruments. An increased use of the great potential of heat networks in densely populated areas was often mentioned as one the main priorities.

The case studies in the previous section show that several EU countries are already relying on heat networks in densely populated areas. The great potential of heat networks is also recognised by the EU, which is supporting the Heat Roadmap Europe project financially. Heat Roadmap Europe is a series of studies since 2012 that builds evidence supporting the decarbonization of the heating and cooling sector in Europe and developed roadmaps for redesigning this sector by collecting the waste heat from both industry and electricity production and using smart district heating grids (Heat Roadmap Europe, 2022).

While the promotion of heat pumps (for individual households) is primarily a regional competence, the federal government can play an important supporting role in the further rollout of heat networks in Belgium. According to Bertelsen et al. (2021), (national) policy makers should provide proper governance and regulatory frameworks, and set the direction for the implementation of the entire energy system and the role of district energy in decarbonisation and sustainable development. With regard to the financing of such large-scale projects, the authors state that the national policy makers can play an important role in facilitating the involvement of the private sector and innovative practices such as partnerships with energy service companies or crowdfunding. Reference is made to the example in the Île-de-France Region where €1 million to finance the geothermal district heating project GeoMarne was gathered through crowdfunding (Bertelsen et al., 2021).

According to the case experts, the greatest obstacle to the rollout of such collective facilities is their large scale and the associated high cost. Therefore, in addition to providing more legal certainty, the experts argue for tax incentives for collective financing mechanisms. Such forms of collective financing can ensure that certain larger innovative sustainable projects can be financed because not one party runs the entire risk. When it comes to energy projects in large rental projects (such as flat blocks), it can also partly solve the split incentive dilemma. If certain energy-saving investments can be made in this way, both the owner and the tenant will benefit: The owner does not have to (fully) pay for the financing, while the tenants reap the benefits of the energy-efficient investment.

The fiscal promotion of such innovative financing practices can ensure that such projects can be rolled out more quickly. What form these tax incentives should take is a matter for further research . Providing tax deductions for participation in such crowdfunding projects already is an avenue to explore (cf. Case 4 – Financial sector)

6.7 Summary table of priority areas for reform

To summarize this chapter, Table 6.21 provides an overview of the priority measures in each of the selected key areas.

Table 6.21 Overview of the priority measures in selected key areas

Key area	Priority measure	Type
Industry & Agriculture (case 1)	Increased taxes on fertilizer and pesticides	Indirect tax (VAT)
	Meat tax	Indirect tax (VAT)
	Tax on rents made by electricity producers	Direct tax (economic rents)
Transport (case 2)	Phase out reimbursement of excise duty on commercial diesel	Indirect tax (excise duty)
	Excise tax on LPG and CNG	Indirect tax (excise duty)
	Increased airplane ticket tax	Indirect tax (flat rate)
	Phase out company cars and fuel cars	Abolishment of direct tax credit
	Institutionalise bicycle commuting allowance	Direct tax credit
Circular economy (case 3)	Reform of beverage container tax	Reform of existing indirect tax
	Introduce a plastic packaging tax with differentiation based on recyclability	Introduce a new indirect tax
	Modify the investment deductions to counter rapid depreciation of equipment	Modify existing investment deduction regulations
Financial sector (case 4)	Temporary tax incentive for green bonds	Direct tax credit or subsidy
	Green tax credit for pension funds and long term savings	Reform of existing direct tax credit
Buildings (case 5)	Fiscal stimulation of collective financing mechanisms	Introduce tax deductions

7 Conclusions

The purpose of this study is to analyse potential avenues for reforming the federal tax system in order to make it more environmentally-friendly. We distinguish two dimensions for reform: the taxation of energy products through carbon taxation and increased excise duties as part of a climate tax shift on the one hand, and measures for greening the federal tax system in certain key areas on the other hand. We integrate our research in the broader context of the European Union (EU). At this level, we refer to the revision of the EU's Energy Taxation Directive (ETD) and the extension of the Emissions Trading System (ETS). Reaching the ambitious emission reduction objective of fit for 55[157] as well as the burden sharing agreement laid out in EU Climate law[158] requires strong incentives for households and firms to reduce their consumption of fossil fuels.

We find that the current excise taxes on energy are generally well below the benchmark set by environmental taxation, except for electricity which is taxed above its (external) environmental cost. Taxes on carbon content are largely absent in current heating fuels. Excise tax rates on LPG, kerosene, coals, gasoil and heavy fuel oil would need to increase substantially by 2030 to be consistent with recent estimates on the social cost of carbon emissions. Although natural gas has a relatively low environmental cost compared to other fossil fuels, there is a substantial margin to increase taxes in the light of environmental taxation. As with heating, the rate for industrial applications is much lower. However, some of the industrial sectors are covered by the European Emission Trading System (ETS). It is therefore possible that these emissions will still be subject to some form of taxation, albeit indirectly.

Motor fuels are taxed at higher rates which makes it more in line with environmental taxation. However, the excise tax is currently the only environmental tax on transport that is variable with vehicle usage[159]. While excise taxes on motor fuels are much higher than on fuels for heating and industry, they are still below the marginal external cost of transport. Given the relatively slow progress of the transport sector with respect to emission reduction[160] we conclude that there is a margin for additional fiscal measures.

Beyond 2030 we expect a quick increase in the social cost of carbon that reflects the ambition to reach net zero emissions by 2050. This means that the gap between the excise tax and the environmental cost energy use will likely increase even further in the absence of other policies.

In light of this, we establish a two-part scenario.

The first part of the scenario of reform integrates the revision of the ETD, as if it was adopted. The revised ETD aims to reform excise duties on energy products as of January 2023, to base these taxes

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157 Referring to the objective of reducing GHG emissions with-55% in 2030 compared to 1990 levels.

158 Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013, *OJ L 156, 19.6.2018, p. 26–42:* Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), *OJ L 243, 9.7.2021, p. 1–17*

159 VAT on fuels as well as the VAT on the excise tax itself are not considered to be forms of environmental taxation (Eurostat 2013). Other taxes (ownership, registration, insurance) are not directly related to actual vehicle kilometers driven.

160 [Transport emissions (europa.eu)]

on the environmental performance of energy production and on their energy (or 'calorific') content. It also aims to remove most of the fossil fuels subsidies it allows.

The second element of our scenario of reform is a tax levied on the CO_2content of fossil fuels in non ETS sectors with revenue recycling. This is also known as a budget-neutral climate tax shift. We assess the environmental and socio-economic impact of an introduction of a carbon tax on transport and heating fuel of respectively €20/tonne in the short run (2023) and € 70/tonne CO_2 in the medium run (2030). The carbon tax should be part of a **broader policy mix**. Our results show that a price on transport and heating fuel of €70/tCO_2 in 2030 alone will not be sufficient achieve the needed emission reduction. This finding is in line with the literature. The climate tax shift will need to be complemented with existing or new GHG mitigation measures both at the federal and at other levels (i.e. European and regional level).

Our research is conducted on the basis of three types of analysis. First, we assess the impact of a climate tax shift at the **macroeconomic level**. For the macroeconomic analysis, we use the European Model for the Assessment of Income Distribution and Inequality Effects of Economic Policies (EDIP), which is a Computable General Equilibrium (CGE) model. We use EDIP to calculate the impact of different levels of carbon taxes on total CO_2-emissions from transport and buildings by 2030. The model also allows to estimate total fiscal revenues and assess the impact of different tax redistribution alternatives. In the macroeconomic analysis, we also consider the impact of a carbon tax of €100/tonne CO_2.[161]

The macroeconomic analysis shows that a climate tax shift and the implementation of the revised ETD excise duties on heating fuels, is a valuable option to increase the pace of the energy transition. **Applying revised minimum ETD rates and carbon prices in the transport and buildings sector** equal to 20 €/tonne CO_2 in 2023, raising to 70 €/tonne by 2030 will **lead to emission reductions between 3% and 12.5%**.

The **expected revenue of the tax reform is around € 1.1 billion for a 20 €/tonne CO_2 tax in 2023 and € 2 billion in 2030**. This is in line with estimates of the National Debate on Carbon Pricing in Belgium. We find that this revenue could be used to reduce the fiscal pressure on labour by around 2%. In a sensitivity analysis, we also compute the tax revenues from a € 100 €/tonne CO_2 carbon price in 2030. This **higher carbon price would result in fiscal revenues equal to € 2.7 billion**.

We use the model to assess different budget-neutral revenue recycling options. The reference option is a lump sum redistribution of tax revenues on a per capita basis. In addition we compare three options that use the revenue to implement a linear cut in labour taxes of 1%, 2% and 3%. A last option is to reduce VAT on electricity on a permanent basis.

Using alternative recycling options leads to economic benefits. Compared to a scenario where each household would receive a fixed amount of revenue from carbon taxation (lump-sum distribution), a linear cut in labour taxes would increase GDP with 0.04%, real disposable income with 0.10% and reduce unemployment with 0.66%. In absolute value at current levels of GDP and

[161] The consideration of a € 100/t CO_2 carbon tax is motivated based on a recent publication by the EU that computes the current shadow price for carbon at approximately €100/t. This price is expected to rise to € 800/t by 2050 (EIB Group Climate Bank Roadmap 2021-2025). IEEP (2021) also uses a price of 100 €/tonne CO_2 for the external cost of carbon up to 2030.

unemployment, this represents about €200 Million in GDP and 3000 FTE. The impact is roughly proportional to the size of the tax cut. Therefore a 3% cut has a roughly threefold impact. For a cut in VAT rates on electricity GDP would increase with 0.06%, real disposable income with 0.03% and unemployment with -0.34% compared to the lump sum scenario. This represents around €300 Million in GDP and 1500 FTE.

There is a **trade-off between efficiency and equity in the choice of the revenue recycling option** between lower labour taxes (better for GDP but higher income inequality) or a lump transfer (better to reduce inequality but higher economic costs). We find that is possible to combine a cut of up to 2% in social security contributions on labour with a proposed 70 €/tonne carbon tax in budget neutral tax-shift. While this would lead to increased economic productivity, it comes at the cost of a reduction in equity of the scheme. For the reduction in VAT on electricity to 6%, we refer mainly to the microsimulation results, that indicate that a reduction in VAT leads to a more unequal distribution than lump sum.

Second, we run **microeconomic simulations** to assess the impact of carbon tax shifts in 2023 and in 2030 on household budgets. Our analysis focuses on the distributional effects of these taxes on households, identifies the characteristics of the "winners" and "losers", and compares different revenue recycling options based on their potential to compensate the most affected and/or most precarious households. Our computations are based on the 2018 Household Budget Survey (HBS) for which more than 6,000 households representative of the Belgian population reported their monthly spending.

Belgian households spent an average of €72/month on heating fuels (excluding electricity) and €84/month on transport fuels in 2018 (HBS). The proposed tax reform in 2023 would add respectively €8 (+11%) and €4 (+4.7%) to these expenditures**.** If the fiscal revenues collected on households are redistributed equally among them, which constitutes the reference scenario, households whose taxes increase by more than €12 per month are net losers, while the others are net winners.

On average, households in the first four deciles (lowest 40% incomes) gain as they are less affected by higher taxes on transport fuels. Indeed, data reveals that (i) heating fuel expenditures are relatively constant across income deciles (ii) the poorest households have fewer cars, use them less and/or have vehicles that consume less fuel. Deciles 5 to 10 are net losers, and the average effect becomes more negative as one moves up the deciles. The average impact is, however, rather small: it goes from a gain of €3 per month in the second decile to a loss of €2 in the 10th decile.

There is **considerable heterogeneity between the energy consumption of households** within deciles. Some use their car intensively while others do not have one, housing differs in terms of surface to be heated or insulation, etc. As a result, the effect of the reform varies greatly between households within each decile. We **find that the additional taxes paid on average by the households that are heavily impacted are +/- €20 higher than for those that are slightly impacted**, in each decile. As a result, the share of households that suffer from a net loss higher than 1% of their income is highest in the first decile and this rate decreases with deciles.

Before the reform, 30% of the households in the first decile are in energy poverty (*i.e.*, spend more than 14% of their income on energy used at home). This proportion decreases with deciles to reach

13% in the 5th decile. The **reform for 2023 reduces energy poverty at the population level from 10.6% to 10.2%, with a reduction by 1.5 percentage points in the first two deciles**.

We analyse how different categories of households are affected by the reform when we consider other dimensions than income. Our two findings are the following. First, the **households that heat mainly with heating oil are heavily impacted**: they lose an average of €9.9 per month, only 14% of them gain and 6.5% among them lose more than 1% of their total income. Second, **the type of lodging matters. Households living in a flat gain on average €4 per month while those living in a house lose**, since houses are on average bigger and less energy efficient. Flats are also a more common type of housing in cities. Hence, expenditure on transport fuels is typically lower for people living in flats. These results are confirmed by our econometric analysis.

We simulate **alternative revenue recycling** options and compare their impact on households in energy poverty, on households in the first three deciles and on the entire population. We find that the number of households benefiting from the carbon tax shift is higher when the revenue collected is targeted towards poorer households than when it is redistributed lump sum. This is true (i) among the households in the three first deciles, (ii) among the households in energy poverty and (iii) in the entire population.

Finally, we project our analysis in 2030 to study the impact of higher carbon taxation combined with reduced energy use. We consider a carbon price of €70 per ton of CO_2 emissions in 2030 and a reduction in CO_2 emissions of -43% for transportation and -49% for residential sectors to be achieved between 2018 and 2030, in order to reach the Fit-for-55 objectives.[162]These fuel consumption reductions are assumed to be the same proportionally for all households. We find that a household would contribute €21/month on average. In each decile, the third of households that are most affected by the reform lose more than €10/month on average, while those who benefit the most gain about €15/month.

Third, to determine priority measures for a green taxation reform in other areas than energy, we use the **Delphi method**, supported by **a synthesis of the literature** and **evaluation of country cases**. The Delphi method is a qualitative research approach in which a panel of experts is interviewed in two rounds. Expert opinions are subsequently aggregated and analysed. This is complemented by a comparative analysis of selected examples of environmental taxes in other countries.

On this basis we propose a number of priority measures for each of the 5 key areas.

Industry & Agriculture

We recommend that taxes on fertilizer and pesticides are increased. Pesticide sales in Belgium (2019) are 6126 tonnes (Eurostat data, 2021). A pesticide tax of 10€/kg (comparable to Denmark) would therefore lead to around €61 Million before behavioural change. While the Danish pesticide tax seems to be a promising measure for Belgium, more preparatory studies would be needed to identify and quantify the best tax base and the most efficient tax design.

[162] These targets are in line with projections from the Climate.Be platform that shared their results during the "Fit For 55" conference held on the 8/10/2021. The presentation can be found on the following link: https://climat.be/doc/fitfor55-bog-1-non-ets-sectors.pdf

A simpler measure would be to remove the preferential VAT rates for both fertilizer (currently 6% of 12%) and pesticides (12%). While this reform would have the advantage of its administrative feasibility, its environmental effectiveness would be significantly limited by the fact that an increase in VAT rate only has an impact on individuals, and not on companies. In addition it may discourage more environmentally beneficial pesticides (or fertilizers) if their price is higher as more damaging alternatives.

As an additional priority measure in agriculture we suggest increasing the VAT on meat consumption to either 12% or 21% compared to the current 6%. Recent studies for the Netherlands (CE Delft 2018; Broeks et al, 2020) suggest that the current price of meat is substantially lower than its actual environmental cost. Extrapolating these studies to Belgium we find annual potential revenues from €394 to €933 Million (with a respective increase in VAT to 12% or 21%) and external benefits of €108 up to €272 Million due to lower environmental damages. In addition there are significant long term health benefits to consumers that may compensate for losses in consumer surplus (Broeks et al, 2020).

Finally we suggest a reform of the current tax on nuclear rent and study a possible extension of the tax to other sectors (wind, solar, biomass, hydrogen) with high fixed cost and low variable cost of production. Since 2012 the revenue of the tax on rents of nuclear power producers in Belgium has declined from €550 Million (€11 / MWh) to €72 Million (€1.5 / MWh) in 2021. Even at a relatively low levels of taxation suggested in earlier reviews (6.2 €/MWh in Morbée et al, 2015) the annual revenue of the nuclear tax could be increased substantially

Transport

As a priority reform, Belgium could phase out or reduce two important fossil fuel subsidies. The first is the reimbursement for commercial diesel, which is significantly higher than in neighbouring countries (€981 million payments in 2019), and more than half of the payments go to foreign countries. While the behavioural impact of the measure would partially crowd out the budgetary impact, we still recommend to consider a full but gradual phase-out of this subsidy. We consider two options. Either fully phasing out the subsidy with an estimated impact of €366 million in new revenues compared to 2019. Or a partial phasing out of the subsidy to the level of France (reducing reimbursement to €150 per 1000 l) which would bring in €151 Million in additional revenues. We also note that if the revision of the Energy Taxation Directive will be approved at EU level, fully phasing out the reimbursement will be legally required.

The second recommendation is the phase out the preferential tax treatment of company cars and associated fuel cards, which is more generous than in comparable countries as well (estimated budgetary cost of €2.3 billion in 2019). The third recommendation is to institutionalise the tax-free bicycle commuting allowance by making it mandatory in all sectors.

Fourth, to partially internalize the external costs of aviation, the existing embarkment tax could be increased from € 10 per ticket to € 20 per ticket (short-haul), from € 2 per ticket to € 8 per ticket for EU flights and from € 4 to € 30 per ticket for non-EU flights. This would align the tax with the rates of Belgium’s neighbouring countries. The expected (additional) budgetary impact of this measure is €109 Million.

In the mid and long term, additional measures could be taken in aviation such as a VAT on airline tickets (6%, in line with rail passenger transport), and the introduction of excise duties on kerosine. These measures have large potential budgetary impacts if implemented. Introduction of a VAT on plane tickets would generate revenues between €200 & €400 Million by 2030. An excise tax on kerosene at the minimum rates required in the revision of the Energy Taxation Directive would lead to an additional revenue of up to €400 Million by 2030.

We also recommend phasing out introducing excise taxes on LPG and CNG at rates proposed in the revision of the Energy Taxation Directive. The budgetary impact would be small with revenues on CNG of €3-5 Million and LPG €16-22 Million.

A measure that can be considered, but should be assessed critically to avoid reverse modal shift from inland waterways to road transport is the reform of current exemptions on excise taxes for Inland Waterway transport. The revision of the ETD requires setting a low (€0.9/GJ) tax on diesel for inland waterways. We look specifically to two options. A) introducing a minimum tax at the rate set by the revised ETD B) introducing an excise tax at the minimum rate for motor fuels (10.75 €/GJ). We find that in option A) the potential revenue is equal to €7 Million, for option B) the potential revenue is €93.9.

Circular Economy

The study recommends to reform the existing beverage container tax in the following ways:

- An immediate compensation for the real tax rate reduction (27% since 2004) by an automatic annual indexation. If the tax rate reduction is compensated, this would lead to an additional €130 Million in revenues.
- Ensuring more differentiation in the tax design (e.g. between recycled and virgin material)
- Studying the pros and cons of other economic instruments (such as deposit return systems) which could replace or supplement the beverage container tax

Next, the study recommends to study the introduction of a more general plastic packaging tax[163] with differentiated tax rates based on the recyclability (virgin vs. re-used).

Finally, we recommend to modify the tax regime of investment deductions to stimulate the longer use of (electronic) equipment in companies.

Finance

In the financial sector, a temporary tax incentive for green bonds to support the growth of the green bond market, and increase investments in green projects and green innovation could be introduced. Ideally, this tax incentive would take the form of a temporary exemption on the withholding taxes on the bond's interest income. Alternatively, a reimbursement of the issuance costs or the costs for an external review could be considered. The incentive should be conditional upon certification of the bond (e.g. EU Green Bond Standard) to mitigate the risk for greenwashing.

[163] The EU has introduced a new levy on non-recycled plastic packaging waste from 1 January 2021. This is financed through Member State contributions. For Belgium, the revenues of this annual levy are expected to be around 153.4 million €.

Furthermore, a green tax credit for pension savings could be implemented. The tax credit can be made conditional on the ESG[164] investment strategy of the fund (aligned with the Sustainable Finance Disclosure Regulation).

Buildings

In the sector of the built environment, the federal government's room for manoeuvre is relatively limited. However, tax credits (or other fiscal incentives) for collective financing mechanisms for heat grids could be considered.

[164] Environmental, Social, and Governance

8 Mapping of potential tax reform measures

Category	Potential reform or measure	Impact on revenues in M€	Environmental impact	Economic impact	Social impact	Feasiblity & complexity	Source / section in report
Excise tax	Apply rates from revised ETD on heating fuels	183 M€ (excl. VAT) 220 M€ (incl. VAT)	-0.3% CO_2 (EDIP)	Very low	Limited increase in heating cost	High feasibility Low complexity	Section 2 and section 5
	Suppress tax exemption on professional diesel (bring back reimbursement to 0 €)	366 M€ (Own calculation) Reduced administrative cost	Reduction in NOx 0.2%-0.3% reduction in overall CO_2 emissions	-5% vehicle kilometers by freight	Increased equity	High feasibility Tension with logistic sector Low complexity Commercial diesel discount not allowed by revision ETD in 2023	Own calculations IEA (2022) Section 6.3.3
	Suppress tax exemption on professional diesel (bring back reimbursement to 150 € / 1000 l)	151 M€ (Own calculation) Some reduction administrative cost	Reduction in NOx 0.1%-0.15% reduction in overall CO_2 emissions	-2.5 to 3% reduction in vehicle kilometers freight	Increased equity	High feasibility due to gradual phase out Low complexity	
	Replace ownership tax on LPG with excise tax	11 M€ - 16 M€ (revised ETD rate 2023 & 2033) 27 M€ (aligned to gasoline rate in €/GJ)	Limited Shift to other fuels	Low	High for limited group of LPG owners	Agreement necessary with regions	Own calculations on the basis of 2019 volumes Section 6.3.3

	Introduce CNG tax	1 M€ - 3 M€ (revised ETD rates 2023 & 2033) 5M€ (aligned to gasoline rate in €/GJ)	Limited Shift to other fuels (mainly gasoline)	Low	High for limited group of CNG owners	High feasibility Low complexity	Own calculations on the basis of 2019 volumes Section 6.3.3
	Introduce kerosene tax on aviation	381 M€ by 2030	Reduce CO_2 emissions of flying by 17%	Increase cost of flying Modal shift to rail and other modes	Relatively limited	Legal barriers Best in EU wide agreement (revised ETD)	CE Delft (2019a) FPS (2021) IEA (2022) Section 6.3.3 Fiche F.4
	Remove tax exemption for Inland Waterway transport	7.9 M€ (ETD proposal @0.9€/GJ) 93.9 M€ (minimum rate of 10.75 €/GJ) 133 M€ (FPS (2021))	Limited	Increase in cost of IWW freight Possible shift to rail or road	High impact for a relatively small amount of carriers	No legal barriers, but possible resistance by carriers	IEA (2022) FPS (2021) Section 6.3.3
Carbon pricing	Introduce a carbon tax on top of existing excise duties equal to 20 €/tonne in 2023 and progressively increasing to 70 €/tonne or 100 €/tonne in 2030	**Households** 600 M€ (20 €/tonne tax) 1.3 billion € (70 €/tonne tax) **Firms & services (non-ETS)** 248 M€ (20 €/tonne tax) 625 € (70 €/tonne tax)	**CO_2 reduction (€ 20/ton tax)** 3.2 % overall 4.8% buildings 2.6% transport **CO_2 reduction (€ 70/ton tax)** 10 % overall 8.9% buildings 12.48% transport		Decrease in equity of revenues are redistributed lump sum to households Increase in inequity of revenues are used for reducing labour taxes Higher prices for imported commodities	Increased social tension on energy prices without tax recycling instruments Carbon taxation is a federal competence	Section 2 and section 5

VAT	Reduce VAT on electricity from 21% to 6%	1 to 1.7 Billion € Impact on revenues rises with increased electrification	Limited	0.06% increase in GDP and 0.03% increase in household income Reduction in unemployment of -0.34% (EDIP results)	Increase in inequality as electricity use is much higher for rich households		Section 2 and section 5
	Increase VAT on coal from 12% to 21%	Limited as only a very minor part of households use coal for heating	Reduction in CO_2 and local pollutants	Very low	potential regressive impacts	High feasibility Low complexity	Section 6.6.2 and 6.6.3
	Increase VAT on firewood from 6% to 21%	Limited as much firewood is obtained informally	Possible reduction in CO_2 Shift to informally obtained firewood	Very low	potential regressive impacts	High feasibility Low complexity	Section 6.6.2 and 6.6.3
	Reduce VAT on renovations to 6%	Limited as many renovations are already at 6% VAT rate. More research necessary	Accelerate rate of renovation			Need proactive communication	Section 6.6.2 and 6.6.3
	Reduce VAT on repair and reuse to 6%	Limited	Less use of materials/ less waste			High feasibility Some already in place (bicycle, shoes, leatherware and clothing)	Section 6.6.2 and 6.6.3
	Increase VAT on meat to 12% or 21%	€394 Million for a a reform to 12% €933 Million in additional fiscal revenues with a 21% increase in VAT	small reduction of CO2 and nitrogen emissions €110 Million in avoided external cost for VAT 12% €277 Million in avoided external cost for VAT 21%	Reduction in demand for meat (productivity loss)	Benefits to health and biodiversity Decreased demand for agricultural land Health benefits Higher prices for meat (regressive)	High feasibility Low complexity	Section 6.2.3 CE Delft (2018) Broeks et al (2020)
	Increase VAT on pesticides and fertilizers to 21%	For fertilizers: limited impact	(small) reduction of chemical pollution	Small risk of buying abroad	None	High feasibility	Section 6.2.3

		For pesticides: potentially similar as pesticide tax depending on price level of pesticide. Between €10 and €60 Million.				Existing legal, administrative and compliance framework can be used	
	Introduce VAT on flight tickets equal to 6% or 21%	200-400 M€	Reduction in Co2 emissions of 6%	Risk of loss in competitivity	Slight increase in equity Challenging for family gathering	Current EU regulations do not allow for VAT on air tickets but discussions are ongoing	Section 6.3.3
Tax reform	Suppress favourable tax treatments for company car	Current lost tax revenues estimated at 2.4 Billion €	Reduced car use	Reduces congestion. Revenues recycled will have positive impact on other sector	Increased equity and revenues available for other measures to ensure ecological transition	Potential opposition of lobby groups and company car users.	Section 6.3.3
	Increase embarkment tax	109 M€	Reduction in Co2 emissions of 4%	Risk of loss in competitivity	Slight increase in equity Challenging for family gathering	Sector opposition Opposition from population	Section 6.3.3
New Taxes	Introduce frequent flyer tax	Similar to embarkment tax	Higher reduction than embarkment tax		More equitable than embarkation tax	High Administrative complexity (see e.g. UK)	CE Delft, 2019a Section 6.3.3
	Introduce pesticide tax	Revenue pesticide tax Denmark (highest relative tax) €80 Million in 2015. For Sweden €7-8 Million (lower tax rates). Extrapolation to Belgium: between €10 and €80 Million. Around €61	Reduction of chemical pollution. From other countries experience (Denmark) this could be small.	no important side effects	none	Denmark has introduced a similar tax at levels of €10/kg and higher depending on the type of pesticide	Section 6.2.3 Bocker & Finger (2016)

		Million with average rate of €10/kg at current rate of sales.				Sweden and France also have similar taxes.	
	Introduce plastic packaging tax	The annual levy by Belgium is expected to be around €153.4 Million to the EU budget.	Incentive for reducing single-use virgin-material plastic packaging	no important side effects	none	High feasibility: already planned to be introduced in 2023, retroactively from 2021 European Union has instated a levy of €0.80/kg on Member states.	Section 6.4.3 EY (2021)
Tax Reform	Introduce tax on rents made by electricity producer	Rent declining from 550 M€ in 2012 to 137 M€ in 2019 and 72 M€ in 2021. Proposed reforms leading to €325 and €665 Million respectively.	Tax should be designed in a neutral way, to avoid distorting investments.	Significant impact on investors but limited for society if only excessive profits taxed	Minor	Tax on nuclear rent already exists.	Section 6.2.3
	Decrease administrative burden for shared vehicle use	No major impact	No major impact	No side effects		Legal barriers	Section 6.3.4
	Institutionalize bicycle tax credit	Limited	Modal shift from car to bicycle	Limited	Health benefits	High feasibility	Section 6.3.3
	Reform of beverage container tax to differentiate based on recycled material / colouring / weight	130 M**€** (real tax rate reduction compensation)	Reduction of waste	No important negative side effects. Encourages innovation		requires collaboration agreement between the three region	Section 6.4.3
	Extend depreciation period of electrical equipment for 3 to 5 years	Not known	Increase lifetime of electrical appliances	Limited	May increase purchase cost		Section 6.4.3
	Introduce (temporary) tax incentive on green bonds	Not known	Stimulate investment in climate mitigation and adaptation projects	Increase investment in 'green' companies.	Reliance on certification procedure	Certification required for green bonds	Section 6.5.3

				Positive impact on GDP through investments.			
	Reform incentives on pension savings and other collective savings according to ESG score or other durability measure	Tax incentives for pensions savings amount to 550 M€ in 2019 Impact of reform can be limited as total tax incentive does not need to change. Only the funds that are eligible	Stimulate investment in energy transition and companies that score high on Environment Social Governance (ESG) Reduced investment in fossil fuel subsidies	May reduce overall investment and push away investors	Increased reliance and dominance of firms that produce durability scores (like ESG) Limited to households and firms with sufficient savings	Increase complexity and administrative cost	Section 6.5.3

A Appendix: Literature review carbon pricing

Carbon pricing is being increasingly adopted around the world as it is seen as an essential tool to combat climate change. The design, however, differs in form (emission trading schemes, carbon taxes), coverage and rates. As the precise characteristics of carbon pricing determines its effectiveness it is important to have a look at existing schemes. For this reason, we first conduct a comparison of carbon pricing across some EU countries and British Columbia (Section A.1). This exercise is then complemented with the expert opinions on the matter expressed during interviews (Section A.2).

A.1 Comparison of carbon pricing schemes in other EU countries and Canada

This section conducts a brief comparison of carbon pricing across some EU countries. It also refers to British Columbia as a best practise example. A similar exercise has been made at the occasion of the National Debate on Carbon Pricing. However, it needs to be updated for two main reasons.

First, the design of some of these existing schemes has been modified. This concerns British Columbia, France and Sweden. Experience from British Columbia and Sweden is relevant because they are generally presented as 'success stories' in carbon taxation. France, on the contrary, has faced remarkable difficulties with its carbon tax. It is also a neighbouring country.

Second, there are new examples which are useful to study, in particular Austria, Germany, Luxembourg and the Netherlands. The central point to pick up here is that their experience suggests a change towards a more hybrid approach, combining elements of a carbon tax and of an ETS. This is particularly important as the Fit for 55 Package, how to integrate carbon taxes in the broader EU carbon pricing landscape set has become a burning issue.

For each of these countries, the carbon pricing schemes under analysis will be compared in terms of year of implementation, form, interaction with existing energy taxes, coverage, rates and revenues collected. By contrast, the way these countries have addressed the possible distributional impacts resulting from the adoption of such a tax is tackled in section 0. These finding are summarised below.

Table 8.1: Overview of carbon pricing design, source: own calculations and literature review

	year	Form	Interaction energy tax	Coverage% total emissions	Rate (US$/tCO2e)	Revenues/year in 2021 in million US$[165]
Austria	Pending	ETS (hybrid)	separate	40%	30	-
British Columbia	2008	Tax		78%	32.76	1.230
Germany	2021	ETS (hybrid)	Separate	40%	25[166]	-
France	2014	Tax	integrated	35%	54.01	8.329
Luxembourg	2021	Tax	Separate	65%	24.22	164*
Netherlands	2021	Tax (hybrid)	Separate	30%*	36.33	-

[165] Excel table about revenues https://www.i4ce.org/download/donnees-2021-comptes-mondiaux-du-carbone/
[166] Fixed price of allowances; question, then market price when sold ?

Sweden	1991	Tax	integrated	40%	142,23	2.266

*Dashboard says 12%
** expected

A.1.1 Austria

A proposal of carbon pricing scheme is currently pending in Austria.[167] This measure is part of an 'eco-social tax reform', encompassed in the broader climate strategy to achieve net zero emissions by 2040. The carbon tax proposed would not replace existing energy taxes but complements them.

The scheme in question takes the form of an ETS. Nevertheless, allowances will have a fixed price during a transitional period between 2022 (€30) and 2025 (€55). It is designed upstream, applying to fuel supplier.

The German system has served as an inspiration for the design of this scheme.[168] In addition, the current proposal under the Fit for 55 Package (infra) to extend the ETS to the transport and heating sectors has played a crucial role on the form chosen.

The scope of this scheme includes CO_2 emissions outside the EU-ETS, principally the building and transport sectors. These represent 40% of GHG emissions in Austria. It covers an exhaustive list of energy products, including petrol, diesel, heating oil, coal, natural gas. It does not include electricity, as power generators are generally caught by the EU ETS.

A.1.2 British Columbia

The British Columbia carbon tax (official name: B.C.'s Revenue Neutral Carbon Tax) has been in force since 2008. Together with Scandinavian countries, it is generally cited as one of the most successful examples in carbon taxation.

In contrast with most schemes, British Columbia carbon tax was adopted at the provincial level.[169]

This tax has a broad scope. It covers almost all sectors, although it contains exemptions in favour of the industry, aviation, transport, and agriculture sectors. It applies to GHG emissions all fossil fuels, as opposed to emissions from industrial processes, as well as to combusting waste (tyres). It is planned to broaden this coverage to fugitive emissions and emissions from the burning of certain forestry residues.

The carbon tax rate follows an increasing price trajectory. It has started at a level of CAN$10/t$CO_2$ (about US$/ t$CO_2$) and reached CAN$40/ tCO_2 (US$32/ t$CO_2$) in 2021.

Note that a complementary scheme applies to large industrial installations, which takes the form of a 'baseline-and-credit system'. However, this scheme is currently not operational.

Box The pan-Canadian carbon pricing scheme

In 2018, the Canadian Federation passed the federal Greenhouse Gas Pollution Pricing Act. This act includes a pan-Canadian approach to carbon pricing, which acts as a backstop system. That is, it provides minimum

[167] https://www.ris.bka.gv.at/Dokumente/Begut/BEGUT_COO_2026_100_2_1908302/BEGUT_COO_2026_100_2_1908302.html
[168] Dans blog
[169] There seems to be Link with rates other provinces – same rate (or already national initiatitve

rules that apply insofar provinces do not have a carbon pricing scheme in place or where this scheme is not sufficiently stringent.

This act was challenged by several provinces including Alberta, Manitoba, Ontario and Saskatchewan. It was upheld by the Supreme Court of Canada in a ruling of March 25, 2021.[170]

This system has two components: a tax-like component on fuels, and a baseline-and-credit ETS for emissions-intensive and trade-exposed industrial facilities (so-called the Output-Based Pricing System (OBPS).

The fuel charge applies to the main fossil fuel as well as to combustible waste (e.g., tires). This charge is administered by the Canada Revenue Agency (CRA). It contains a number of possible reliefs e.g. in favour of agriculture or aviation.

The rates of the fuel charge are set at a level of \$20/tCO_2 as of April 1, 2019, rising by \$10/tCO_2 per tonne annually to \$50 per tonne as of April 1, 2022

From 2023, it is planned that in 2023 the carbon price should be set at a level of CAN\$65/tCO_2 and follows an increasing trajectory of \$15 per year to reach \$170 per tonne CO_2 in 2030. These amounts are converted in caps of emissions where the carbon pricing scheme takes the form of an ETS.[171]

A.1.3 France

There is a carbon tax in France since 2014 (Finance law for 2014).[172] The French carbon tax (also known as 'Contribution énergie climat') is not a separate tax. It takes the form of an additional component to prevailing system of excise duties ('taxes intérieures de consommation'), namely:

- Domestic consumption tax on natural gas (so-called 'TICGN')
- Domestic consumption tax on coal (so-called 'TICC')
- Domestic consumption tax on energy products (so-called 'TICPE')

As an additional component to existing energy taxes, the price signal of the CO_2 tax is diluted. These taxes, in effect, contain a wide range of derogations (tax reductions or exemptions). In particular installations covered by the EU ETS are exempt from the tax, as well as certain industrial processes (non-combustion usage), shipping, aviation, public transport and freight transport which are (partly) exempt from the carbon tax.

This system can be explained by the willingness to apply a differentiated treatment across energy products and uses. In its attempt of 2009, the French parliament had designed the tax as a separate tax. It encompassed a wide range of derogations (e.g. in favour of ETS installations, agricultural work). The Constitutional council annulled the act introducing the tax for breaching the principle of equal treatment.[173]

[170] See see stacey; chalifour
[171] https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information/federal-benchmark-2023-2030.html
[172] In particular article 32.
[173] decision

The CO_2 rate was originally set at a level of €7/tCO_2. Then, it was increased to €14.50/tCO_2 in 2015, €22/tCO_2 in 2016 and €30.5/tCO_2 in 2017.[174] This price trajectory was however frozen, following the 'Yellow Jacket' strikes, at a level of EUR 44.6/tCO_2 for 2019 and has remained at that level since then.[175]

A.1.4 Germany

Since January 1, 2021, a national ETS is in place in Germany in the building and transport sectors.[176] Similar with the Austrian proposal, this scheme is applied upstream on fuel suppliers. It was adopted by the Fuel Emissions Trading Act of 2019. This approach contrast with most other EU Member States which have rather preferred the adoption of a carbon tax.

The cap has been determined on the basis of Germany's mitigation targets in non-EU ETS, i.e. those covered by the EU Effort Sharing Regulation.

This scheme covers most fossil fuels, including petrol, diesel, heating oil, liquefied gas, natural gas. It also applies to biomass when it does not meet the sustainability criteria. By contrast, coal will only be covered from 2023.

This scheme partially overlaps with the EU-ETS. Therefore, two possibilities are provided for to prevent double pricing. First, fuel suppliers can reduce the obligations they have to surrender when they sell fossil fuels to companies that are covered by the EU-ETS. Second, companies covered both by the EU-ETS and by the German ETS can apply for compensation.

The German ETS will be gradually phased in, with a set price on emission allowances between 2021 and 2025. The price trajectory planned is €25/tCO_2 (US$29/t$CO_2$) to reach €55/t$CO_2$ (US$65/t$CO_2$) in 2025. The year 2026 will be transitionary, as allowance will be auctioned but in a price corridor, ranging between €55-65/tCO_2 (US$65-76/t$CO_2$). From 2027 onwards, allowances price will in principle be set by the market.

A.1.5 Luxembourg

Luxembourg carbon tax is one of the recent examples of carbon pricing in the EU. It was implemented by the law of 19 December 2020 and has been in force since January, 1st, 2021,

The carbon tax applies to fossil fuels used for transportation and heating. It takes the form of a separate tax which is additional to existing excise duties. Because of this design, the rates of the CO2 tax do not fall into the unified tax rates under the Convention of 29 May 1972 in Luxembourg between the Netherlands, Belgium and Luxembourg on the unification of excise duties.

The tax rates have been differentiated between three categories of energy products. They were set originally at a level €31.56 (US$ 37.07)/tCO_2 for petrol, €34.16 (US$40.12)/t$CO_2$ for diesel and €20 (US$23.49)/t$CO_2$ for the other energy products. The tax rates were established by making an average of CO2 tax levels in neighbouring countries (France 44, Belgium 0 and Germany announced 20). These rates have been increased since then (25 euros in 2021 and 30 euros in 2022).

[174] Loi sur la Transition Energétique

[175] La loi de finances pour 2018 a porté ce taux à 40,6 € en 2018 et 86,2 € en 2022, dernière année du quinquennat. See See PROJET DE LOI DE FINANCES 2019 : TAXE CARBONE, L'HEURE DE VERITÉ Christian de PERTHUIS 1 et Anouk FAURE 2

[176] Fuel Emissions Trading Act

The difference in the tax rates is rather remarkable given that each tCO2 has the same impact on society. The rationale underpinning such differentiation is that there was already a climate contribution levied on diesel and petrol (which did not depend on CO2) the revenues of which were earmarked to a dedicated climate fund. For those products, the CO2 tax integrated these rates.

ETS installations are exempt from the tax but their number is marginal. On the contrary, there are no specific rules in place for heavy duty vehicles.

A.1.6 The Netherlands

The Netherlands introduced in 2020 (Industry CO_2 Tax Act of 16 December 2020), which is in force since January,1, 2021. It takes the form of a separate tax that applies on top of the EU-ETS. Thus, the tax partially husbands the scope of the EU-ETS: it applies to industrial emissions covered by the EU-ETS. It also covers waste incineration plants and nitrous oxide plants which are currently not participant to the EU-ETS.

The Dutch carbon tax is only due for 'avoidable emission', that is where installations' emissions exceed their baseline based on EU ETS benchmarks and a national reduction factor needed to reach the emission target. On the contrary, emissions that do not reach this baseline are not priced. In this case, installations receive 'dispensation rights', which they can bank for another year or exchange with other facilities.

The rate is set at a level of 30€/tCO_2, subject to indexation. It follows an annual increasing trajectory of 10.56 €, to reach 125 € by 2030. Where the installation is covered by the EU-ETS, the payable amount corresponds to the difference between allowance price ETS under the ETS and the rate in question (*e.g.* if the allowance rate in 2030 is 100 euros, the rate of the carbon tax will be 25 euros).

A.1.7 Sweden

Sweden is often hailed as a 'success story' in carbon taxation. Sweden's CO_2 tax was introduced in 1991, being one of the first movers with other Scandinavian countries. To introduce this scheme, Sweden modified the base of prevailing energy taxes towards two components: CO_2 emissions and calorific content.[177]

The rate was originally set at a level of SEK 250 (27 €) per tonne of CO_2 emission. Simultaneously, the calorific content rates were reduced by 50 percent. The CO_2 rates has followed an increasing trajectory, to reach SEK 1 200 (EUR 114) in 2021.[178]

This system has differentiated between firms and individuals, the former benefitting from more advantageous rates until 2018. It is worth noting that the CO2 rate was originally the same for firms and individuals, but Sweden subsequently retrenched, after contestation by industries.[179]

From 2011 industries covered by the EU-ETS have been exempted from the CO_2 tax and have been subject to a lower energy tax. Furthermore, certain industries and transport mode (i.e. train, shipping, aviation), as well as forestry and agriculture are partially exempt from the tax.

[177] andersen
[178] Website sweden…
[179] Mikael Skou Andersen (2019) The politics of carbon taxation: how varieties of policy style matter, Environmental Politics, 28:6, 1084-1104, DOI: 10.1080/09644016.2019.1625134, p. 1085.

In addition, a fuel used in cogeneration facilities covered by the EU-ETS was mostly exempted until recently. This rule was changed in 2019 as part of a package of measures aimed at attaining net zero emissions by 2045.

A.2 Comparison of revenue recycling options in other EU countries and British Columbia

There are palpable differences as to how the countries under study address the distributional impacts resulting from carbon pricing. For instance, British Columbia has paid much attention to revenue transparency and redistribution. Other countries such as the Netherlands do not address this issue.

These differences may result from political preferences or cultural divergences, but they can also be tied to the design of the scheme in question. In particular, the coverage of the scheme, the carbon price level and whether carbon pricing is added on the top of existing taxes or part of a broader reform does not result in the same distributional impacts.

A.2.1 Austria (proposal)

The introduction of a carbon pricing scheme in Austria was part of a broader eco-social tax reform. This reform encompasses a variety of compensatory and GHG mitigation measures.

To begin with, the carbon pricing scheme itself includes compensatory measures for businesses. Notably, there is a lump-sum reimbursement for additional costs induced by the scheme, which depends on the type of usage. In the same vein, there is a partial refund in favour of companies at risk of carbon leakage, in particular energy intensive industries, as well as to avoid hardship cases (e.g. in transport).

In order to mitigate the consequences of the carbon pricing for households, the reform contains a *'regional climate bonus'* (starting from 1 July 2022). The amount of the bonus will vary from €100, €133, €167 to €200, depending on the degree of remoteness and isolation of the place of residence and the availability of public transport. The need for travel is thus taken into account.

In complement, *personal income tax* is reformed (both for workers and self-employed persons). The rates vary according to the tax bracket, as shown in Table 8.2 below. In total, the tax reduction is expected to amount to 3.9 billion euros.

Table 8.2: Personal income tax brackets

	Tax reduction in %	Tax reduction in euros/year	Start date
1st income bracket	From 25% to 20%	11,000-18,000	Already in 2020
2nd income bracket	From 35% to 30%	18,000-31,000	as of 1 July 2022
3rd income bracket	From 42% to 40%	31,000-60,000	as of 1 July 2023

On top of that, the *'family bonus'*, that is an annual tax allowance for families, will also be increased from €1,500 to €2,000. The additional amount per child, another tax reduction for low-income families, is increased from 250 euros to 450 euros.

As regards businesses, the reform plans to gradually reduce the *corporate income tax* from 25% to 23% by 2024. This is expected to result in an overall tax cut of 700 million euros per year. Further, the *allowance on profit* (up to 30,000 euros) is increased from 13 to 15% of profits (excepted relief of 50 million euros). Furthermore, an existing reduction in *social security* contributions is increased from 400 to 650 euros. This measure specifically targets low wage earners. There are also *investment relief measures*, namely a bonus for ecological investments (350 million euros). Finally, *employee profit-sharing* is exempted up to 3,000 euros per employee.

As of 2020, self-generated electricity from photovoltaic panels that is not released into the grid is exempt from tax for self-generated energy that is not fed into the grid. Then, as of 1 July 2022, the clean electricity tax will be abolished to all forms of renewable electricity (including hydro, wind and biogas). This corresponds to a relief volume of EUR 50 million.

A.2.2 British Columbia

British Columbia (BC) originally conceived its carbon tax as revenue neutral, in the sense that the carbon tax revenue is recycled back into the economy. However, this is no longer the case.

Revenues from the carbon tax are used in three ways:

- The *Climate Action Tax Credit*, which returns revenues to low- and middle-income taxpayers.
- The *Climate Action Revenue Incentive Program* (CARIP), which returns revenue paid by local governments that have signed the BC Climate Action Charter back to those governments. The objective is to support their operations and encourage investment in climate action.
- The *CleanBC Program for Industry*, which is composed of the CleanBC Industrial Incentive Program (CIIP), for large facilities and the CleanBC Industry Fund.

It is also worth noting that when the tax was first introduced, all resident received $100 dividend, to reduce public opposition to the tax.

A remarkable element of the scheme is the *transparency* requirements in terms of revenues collected and use. In particular, revenues and revenue use from the carbon tax are publicly reported in an 'Accountability Report'.[180] In addition, BC Ministry of Finance is under duty to prepare annually a three-year plan for recycling carbon tax revenues through tax reductions. The plan is presented to the legislative assembly for review and approval.

[180] For 2021 see https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/2021_climate_change_accountability_report.pdf

Table 8.3: Use of carbon tax revenues in British Columbia

Clean Investments

Climate Action Initiatives	Sum of Actuals 2020/21	Forecast 2021/22
OPERATING INVESTMENTS		
Cleaner Buildings and Communities	83.34	117.68
Cleaner Industry	104.64	119.93
Cleaner Transportation	86.00	84.22
Climate Action Tax Credit[7]	303.39	312.00
Other Clean Spending[8]	82.97	131.31
Stronger BC Climate Action Spending[9]	186.58	0.00
Transit Projects[10]	126.86	149.76
TOTAL	**973.77**	**914.90**
CAPITAL INVESTMENTS		
Cleaner Government and Public Sector	44.39	58.25
Cleaner Buildings and Communities	4.38	13.70
Cleaner Transportation	3.24	7.00
Transit Projects[10]	305.43	472.56
TOTAL	**357.43**	**551.51**
GRAND TOTAL	**1331.20**	**1466.41**

Note: Amounts in each year are not cumulative and totals may not add due to rounding. Amounts are not audited. The list may not capture all climate-related spending by government and this presentation may expand in subsequent reports.

Budget 2021 confirmed government's commitment of over $2.2 billion over five years in cumulative spending on CleanBC initiatives since 2019/20. The table above also includes climate spending outside of CleanBC programming, which increases overall spending per fiscal year.

The rates increases of the British Columbia carbon tax have been frozen several times. Notably, the scheduled annual increase for the year 2020 was deferred as a COVID-19 relief measure). In addition, as an additional response to COVID, the BC climate action tax credit was increased and expanded in July 2020, to provide income support for British Columbia residents.

A.2.3 France

France has adopted, in parallel to the carbon tax, several support measures. These measures were financed by the revenues from the carbon tax, thus through revenues recycling.

A share of the revenues collected is earmarked in the "energy transition" fund. This fund aims to finance calls for tenders for renewable electricity, biomethane and demand management.

On the other side, there is a wealth of compensatory measures, the main ones being:

VAT reduction for energy works by households

the energy voucher since 2018, replacing the previous social energy tariffs (see Box 2);[181]

[181] About the social tariffs and why they were replaced: https://www.actu-environnement.com/ae/news/audit-ademe-tarifs-sociaux-energie-cheque-energie-martin-simplication-dispositif-19107.php4

- energy transition subsidy MaPrimeRenov, which the energy transition tax credit and the aids from the[182]Anah) "Habiter Mieux Agilité[183];
- support for the purchase of clean vehicles: car bonus and the conversion premium

These measures have changed dramatically over time. In particular, the tax credit for competitiveness and employment (known as CICE) was transformed into a long-term reduction of social contributions. This change is notable as the CICE amounted to 3 billion euros, compared to 1 billion euros for the reduced VAT rates for energy works.[184]

As regards households, these schemes have mainly covered higher heating expenses resulting from the carbon tax and not higher transport expenses. This gap has been raised amid of the Yellow Jackets strikes.[185]

Box 2. From the social energy tariffs to the energy voucher in France

The energy voucher has replaced since social tariffs for electricity and gas on 1 January 2018. This replacement was justified by the willingness to ensure fairness and simplicity. Social tariffs were automatically granted to entitled households by energy suppliers.[186] The households eligible for social tariffs were identified by the health insurance organisations (OAM), as well as by fiscal administration.

There were different categories of tariffs, to take into account the situation of households which did not have an individual energy supply contract (e.g. social or retirement residence).

In addition, these tariffs were divided into two parts: electricity and gas. In total, it was estimated that in 2015, 3 million households benefited from social electricity tariffs and 1.2 million from social gas tariffs.[187]

Social tariffs had the following main pitfalls:[188]

- First, households using heating gasoil were not included;
- Second, the take-up rate for the population targeted by the social tariffs was too low;
- Third, the system in place was complex in terms of administrability and calculation of the amounts granted;
- Overall, it missed its target (only 1/3 of households in energy poverty benefitted from such tariffs[189]

The energy voucher has a broader coverage than: it compensates expenses in energy consumption, including electricity, gas and heating gasoil, as well as certain energy renovation expenses. The amount that is ultimately granted depends on the household's income and the composition of the household. It is limited to 277 euros/ household.

In 2021, 5.8 million households were entitled to the 2021 energy voucher. Given the exceptional rise in energy prices, the Government has allocated an additional €100 energy voucher to these households.[190] The total cost was estimated at €850 million for 2019 (compared with €539.7m in 2018).[191]

[183] http://www.senat.fr/rap/l21-163-311-1/l21-163-311-114.html

[184] Point climat n°56 – La Contribution Climat Energie en France : fonctionnement, revenus et exonérations – **I4CE** | **3**

[185] C'était une des critiques – retrouver https://www.lepoint.fr/economie/il-y-a-une-incomprehension-des-citoyens-sur-la-fiscalite-ecologique-16-11-2018-2271905_28.php

[186] Conseil des prélèvements obligatoires, La fiscalité environnementale au défi de l'urgence climatique - septembre 2019 , https://www.ccomptes.fr/fr/institutions-associees/conseil-des-prelevements-obligatoires-cpo p 94

[187] Douenne 2018, LES EFFETS REDISTRIBUTIFS DE LA FISCALITÉ CARBONE EN FRANCE , les notes de l'IPP

[188] For a detailed analysis see https://ademe.typepad.fr/files/rapport_audit_tarifs_sociaux_energie_juillet2013.pdf

[189] https://revenudexistence.org/doc/rencontres/RencontreAIRE2017-12-13.pdf ; see also see https://www.actu-environnement.com/ae/news/audit-ademe-tarifs-sociaux-energie-cheque-energie-martin-simplication-dispositif-19107.php4 ;

[190] https://chequeenergie.gouv.fr/

[191] Conseil des prélèvements obligatoires, La fiscalité environnementale au défi de l'urgence climatique - septembre 2019 , https://www.ccomptes.fr/fr/institutions-associees/conseil-des-prelevements-obligatoires-cpo p 94

Households receive the energy voucher automatically, upon the condition of fulfilling their tax declaration.

An important criticism against the energy voucher is that it does not entail a mobility dimension. Therefore, several authors have suggested to expend its scope to cover also mobility expenses.[192]

A.2.4 Germany

A compensation mechanism has been introduced to address the risks of carbon leakage. The amount of the compensation between 65%-95% of an entity's costs under the ETS and is differentiated among (sub)sector.

Revenues will be used for a variety of measures, in particular to support decarbonization, to lower electricity rates for consumers and to deduct transport costs from income taxes for commuters.

Of particular relevance are the following discussions (subject to possible changes) :

- A levy paid to finance renewable energy sources (EG-Surcharge). It was reduced by a half in 2021 and shall be completely abolished this or next year.[193]
- In the new coalition deal, the new government agreed on a climate transfer ("Klimageld") that should be paid to compensate higher energy prices, especially for lower income households.
- The coalition deal also contains an agreement that revenue from the national ETS will be used to finance the national Energy- and Climate Fund. These revenues will – among others – be used to finance the losses from the abolition of the EEG-surcharge.

A.2.5 Luxemburg

A share of the revenues from this tax is earmarked to the 'climate and energy' fund.[194]

Revenues are redistributed through social compensation and green investments. Social compensation measures take the form of a cost-of-living allowance. This allowance is granted by the Ministry of Family to national residents and pre-existed the adoption of the CO2 tax. Residents receive a cheque that can be spent freely; as soon as there is an increase in the cost of living. There is also a tax credit in place from which border residents can benefit too.

A.2.6 Netherlands

The Netherlands has not provided for specific compensation for taxpayers.

Amid of the COVID pandemic, the 'Dutch cabinet decided to limit the carbon tax's impact in the first years by issuing 20% more dispensation permits. It is expected that no tax is therefore due until 2025.'[195]

8.1.1 Sweden

The adoption of the carbon tax was part of a broader environmental tax reform. It was accompanied by a reduction of income taxes on capital and labour (tax shift). In addition, different tax shelters were eliminated, and the base of the value added tax (VAT) was broadened.

[192] https://www.chaireeconomieduclimat.org/wp-content/uploads/2018/11/2018-04-POLICY-BRIEF-2.pdf perthuis; also douenne;
[193] https://www.bmwi.de/Redaktion/EN/Pressemitteilungen/2022/20220111-habeck-presents-germanys-current-climate-action-status-need-to-triple-the-rate-of-emission-reductions.html

[194] https://www.bcl.lu/fr/publications/bulletins_bcl/Bulletin-BCL-2021_3/226746_BCL_BULLETIN_3_2021_analyse-4.pdf
[195] https://carbonmarketwatch.org/2020/12/21/what-can-we-learn-from-the-dutch-national-carbon-tax/

Subsequently, as the carbon tax rate rapidly increased (between 2001 and 2006), employers' social contributions were reduced, and the most vulnerable households benefited from income tax exemptions.

A particularity of this reform is that it has been conceived as a long-term process, covering three decades of carbon tax increases and corresponding income tax or VAT decreases.

A.3 Expert opinion on carbon price design

The importance of the characteristics of a carbon tax can hardly be overestimated on the basis of the expert interviews. Although almost all experts support the general principle of taxing carbon (equivalents), the exact design of such a tax determines its effectiveness. According to many experts, it is therefore important to look at the design of a carbon tax in countries that have already introduced such a tax. In what follows, we limit ourselves to a number of general points of interest regarding the functionalities of a carbon tax based on the interviews.

A.3.1 Pricing

The determination of the carbon tax rate is not an isolated issue and is of course closely linked to the level of excise duties and the EU ETS system (section 2.3.3). In what follows, therefore, the discussion on pricing is rather general, based on ideological convictions.

With regard to the carbon **price level**, the opinions of the interviewed experts differ. Some experts are of the opinion that the rate should be high enough from the introduction onwards, because of the '*shock effect*' and the higher chance of a change in behaviour. Moreover, a drastic and rapid intervention is needed if the climate objectives are to be achieved.

Other experts advocate a more pragmatic approach with a relatively low fee in the beginning. According to the latter group, the focus should be on developing the instrument and bringing the concept within the mindset of citizens and companies. This is best done as cautiously as possible with a low rate in the beginning. Once the tax has been in place for long enough and is '*commonplace*', the rate can be gradually increased.

In addition to differing opinions on the level of the carbon tax, there were also differing approaches as to whether it would be best for the tax to have a **uniform rate** across all (business) sectors, or whether, on the other hand, a varying rate based on the business activity would be more appropriate. The majority of experts advocate simplicity and clarity, and therefore want to limit exceptions as much as possible. They often refer to the many categories and exceptions in other taxes and excise duties, resulting in the tax often missing its target. Consequently, one must also '*dare to demolish sacred cows by being straightforward*' and stick to an uniform pricing.

Other experts take a different view, referring in particular to the specific modalities of the transport sector. For that sector the excise duties are already very high, resulting in the fact that a relatively high implicit carbon tax already applies. In addition, the price elasticity is also limited ('*Belgians are devoted to their cars*') so that a higher tax will most likely not have a major impact on behaviour. In addition to the particular situation of the transport sector, a number of experts also argue for exceptions for industries where one wants to keep costs low. Other experts advocate that a '*selective carbon tax on specific sectors could be more powerful than a general carbon tax on all sectors*'.

A.3.2 Timing

With regard to the timing of the introduction of a carbon tax, many experts refer to the ambitious climate objectives in 2030 (section 2.3.4). Consequently, many experts argue for an immediate introduction of a carbon tax without waiting for an extension of the ETS (in 2026) since meeting the targets would then certainly not succeed. Therefore, it is necessary to anticipate now. On the other hand, experts also refer to the importance of a certain predictability ('*a clear trajectory*') and the need for a transition period for certain sectors (such as shipping). However, since action has to be taken rapidly in order to achieve the EU 2030 climate targets, some experts think that foreseeing (long) transition periods might be more difficult given the time pressure.

A.3.3 Part of a policy mix

Although most experts are convinced of the usefulness and necessity of introducing a carbon tax, they stress that it is certainly not a silver bullet. From a broader perspective, some experts mention that taxation is only one instrument. Rather, regulatory measures (such as obligations and bans) remain enormously important for steering society and the economy in the direction of greater greening because of their direct impact. With fiscal measures, the '*polluter often continues to pay*' while regulatory measures (depending on the measure) can be much more coercive. Many experts therefore believe that fiscal policy (including a carbon tax) should primarily serve to support non-fiscal policy. However, the exclusive use of regulation is certainly not ideal either, according to the experts. Fiscal policy (including the carbon tax) remains indispensable for gaining support: by putting the market to work, consumers and producers will in fact achieve part of the transition themselves. The importance of the need for higher environment-related taxes also appears from the quantitative survey. If the experts who did not answer the question are left out of consideration, no less than 95% of the experts believe that the current level of environment-related taxes is rather too low (55%) or much too low (40%). Only one expert answered that the current level is adequate and none of the experts considered the environmental taxes (rather or much) too high (cf. Figure 1 in Section 0)

An important general remark is that, when taxing certain types of emissions, one should be wary of focusing too narrowly on CO2 (equivalents). Other greenhouse gases (such as methane) and other types of pollution (such as air pollution and the prevalence of traffic jams) must not be forgotten. In other words, too much focus on a carbon tax can lead to **problem shifting**, which can cause a lot of collateral damage.

Furthermore, in addition to the carbon tax, **other taxes and fiscal incentives** (such as technology subsidies) will be needed to green the federal tax system sufficiently. These other tax instruments are discussed in detail in Section 5.

A.3.4 Budget neutrality

During the interviews, the experts were also asked whether the carbon tax would be introduced on a budget-neutral basis, meaning that the revenues would be fully channelled back into the economy and society. Almost all experts were in favour of this principle. An important argument for this is that the introduction of a carbon tax will likely have important regressive effects in certain sectors for which compensation must be provided. Another argument is of a more pragmatic nature, stating that budget neutrality is necessary "*to sell the reform*". Furthermore, experts expect that a large part of the revenues will have to serve to (financially) support certain energy-intensive industries in the transition. The consumer organisations Test-Aankoop – Test Achats also states that introducing a carbon price should effectively be a budget-neutral operation, with the revenue from such a contribution being intelligently and fairly redistributed, e.g. through a reduction in the burden on labour and support measures for the most vulnerable consumers. Consequently, the principle of budget neutrality is crucial to the consumer organisation because it is a sine qua non for a broad social support base for climate tax shifts.

Some experts even want to go beyond a budget-neutral reform and argue that the reform may even be '*budget-negative in the beginning*' (i.e. it may cost more than it yields). A first reason for this is that the investments will pay off in the future. In addition, it may be necessary to show the population that there are major benefits to be gained from the reform, which may increase support for it.

B Appendix: CGE modelling

B.1 CGE and the Social accounting matrix

The EDIP model was originally developed in 2007 within the REFIT EU project by Transport and Mobility Leuven (TML), but was regularly updated. The European Model for the Assessment of Income Distribution and Inequality Effects of Economic Policies (EDIP) is constructed using the Computable General Equilibrium (CGE) framework, which takes as a basis the notion of the Walrasian equilibrium. Walrasian equilibrium is one of the foundations of the modern micro economiceconomic theory. CGE models are a class of economic models that use actual economic data to estimate how an economy might react to changes in policy, technology or other external factors. A model consists of (a) equations describing model variables and (b) a database (usually very detailed) consistent with the model equations which is called the social accounting matrix. The behaviour of representative agents in the economy is modelled using micro-economic theory. The representative agents are: households, firms, government and investment agents.

Households are assumed to maximize a nested Constant Elasticity of Substitution (CES) utility function consisting of aggregate commodities from 68 production sectors (indexed with *i)*. Transport and energy are modelled in greater detail than in other CGE models, distinguishing private and public transport by distance class, mode (rail, bus, air) and distinguishing energy use for transport and heating separately. The model distinguishes 5 types of households (indexed *th*) according to income class (income quintiles), with different endowments in terms of skill level (low, middle and high – indexed with *ed*) and capital. Households have fixed saving rates by income class. The consumption budget of each household type (B_{th}) is the sum of the wage income, capital income and government transfers (T_{th}) minus income taxes (TY_{th}). Unemployment benefits are calculated using a replacement rate $(PL_{u,ed})$ proportional to the market wage. The wage income is equal to the endowment of labour $(L_{th,ed})$ of each household by education/skill type corrected by the specific unemployment rate by skill type (u_{ed}) and wage net from taxes (PL_{ed}). Capital income is equal to the capital endowment of each household by sector $(K_{i,th})$ and the return to capital net from taxes (RK_i).

$$B_{th} = \left(\sum\nolimits_{ed}(1 - u_{ed}) \cdot L_{th,ed}.PL_{ed} + \sum_{i} K_{i,th} \cdot RK_i\right) - TY_{th} + T_{th} + \sum\nolimits_{ed} u_{ed} PL_{u,ed} \quad (1)$$

Firms are maximizing profits under a similar nested CES function as households, using production factors (capital, labour, energy) and other inputs from industries. This last part is modelled with fixed input-output (Leontief) factors. Firms aggregate in economic sectors that produce at average cost (zero-profit condition). We treat Belgium as a small-open economy using the Armington assumption of substitution between locally produced and foreign goods. Transport use by firms is more detailed than the average model as firms use transport services and can produce their own transport.

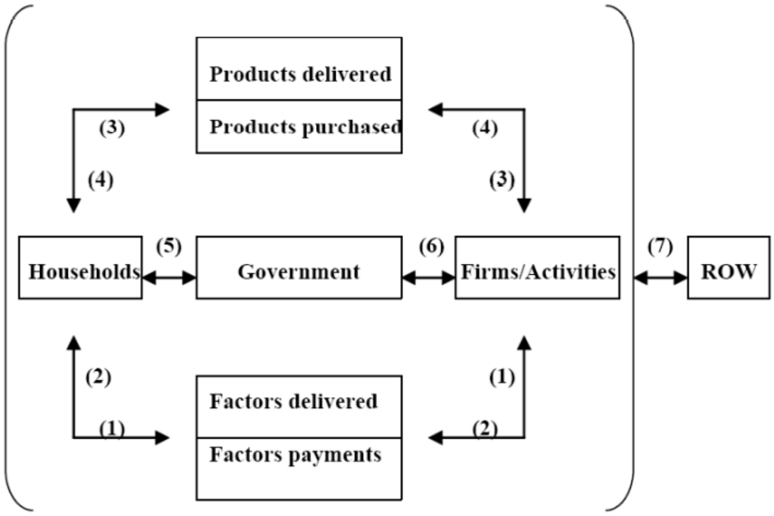
Investment is determined in a dynamic way, by calculating the next period capital stock for each sector and assigning this to specific investment goods and services. Total investment depends on the size of the replacement stock and the basic rate of return for each sector. The model can generate a 'one-shot' equilibrium by assuming that the rate of return in each sector is stable and hence returns to the same value.

Government is modelled as another representative agent, collecting taxes and redistributing (or financing) tax surpluses (deficits). The government has its own expenditures, which are oriented towards providing public services (education, administration, culture, defence) and infrastructure provision (construction, building materials). A broad and accurate tax system is in place, distinguishing social contributions on labour, tax on capital and labour income, VAT, sales taxes and subsidies, production taxes and subsidies.

The model has a number of built-in equilibria for government behaviour, where the budget is automatically balanced either by increasing/decreasing expenditures, savings or taxes (lump sum and labour) or any combination of these mechanisms in fixed proportions. In this study we use the set-up where transfers to households are flexible.

The principal **data of the model** is based on the social accounting matrices (SAM), which are an extension of the official supply and use-tables and input-output tables supplied by the National Bank of Belgium (NBB) with base year 2018. These have been upscaled to 2019, the base year of the model. The model forms a closed system 'in equilibrium', meaning that production and consumption are balanced and all production factors (capital, labour and energy) are used.

A SAM is a square matrix in which each transaction is recorded only once in a cell of its own – it is conventionally agreed that the entries made in rows represent incomes or receipts, whilst the entries made in c corresponding column, i.e. for every income there exists a corresponding expenditure, with their totals being equal. These figures yet other accounts, defined in accordance with the goal of the study and the available information. Thus, the SAM consists of a set of interrelated subsystems that, on the one hand, give an analytical picture of the studied economy in a particular accounting period and, on the other hand, serve as an instrument for assessing the effects of changes on the particular flows represented by it (injections and leakages in the system), which might be the result of po measures. Therefore, the SAM can be seen as a working instrument for quantifying the flows in the economic circuit and for simulating the effects resulting from any changes in such flows. A SAM usually encompasses a somewhat less detailed supply and use table or input-output (IO) table. A clear distinction must be made between the IO table and the SAM. The essence of the IO table is the way industries are interrelated through transactions, while the SAM also presents the transactions and the transfers between the different types of economic agents like households, various categories of companies, government and In a simplified manner, the SAM is the transformation of the circular flow into a matrix of transactions between the various economic agents.



The households supply labor and capital to the firms (1), who organize the production activities. In return they receive payments for the use of their labor and capital factors (2). These payments may take the form of wages, interests or dividends. Furthermore, the households spend their income on products (3), which are delivered by firms/activities (4). The government is involved in transfers to and from households (5) and firms/activities (6). The transfers may refer to taxes on products and on production, subsidies, income taxes, social security contributions, social benefits, etc. The economic relations between the country and the rest of the world (ROW) are given by (7)

These relations may take the form of imports and exports of goods and services, compensation of employees and property income to and from ROW, taxes less for the change in net equity of households on pension funds reserves to and from ROW and capital transfers to and om ROW.

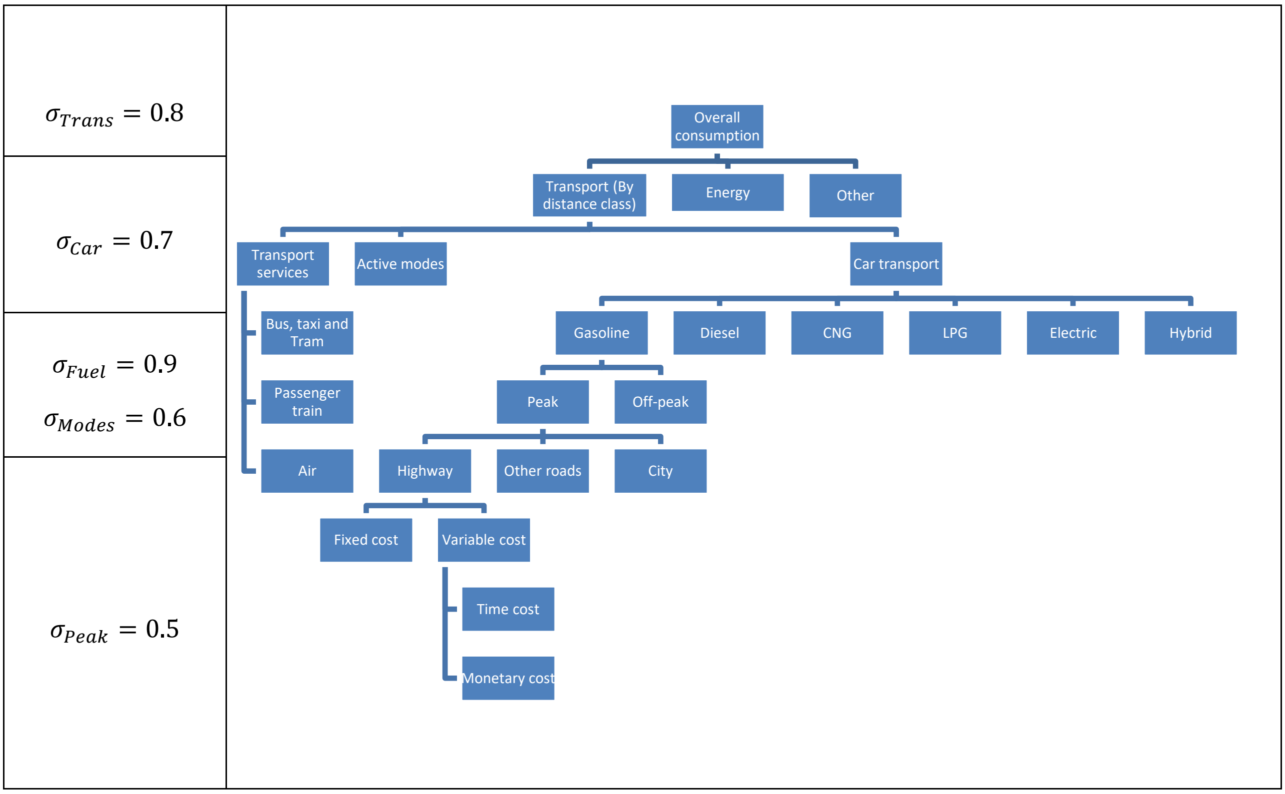


Figure 8.1: Nested CES demand tree for consumers in EDIP (generalized price)

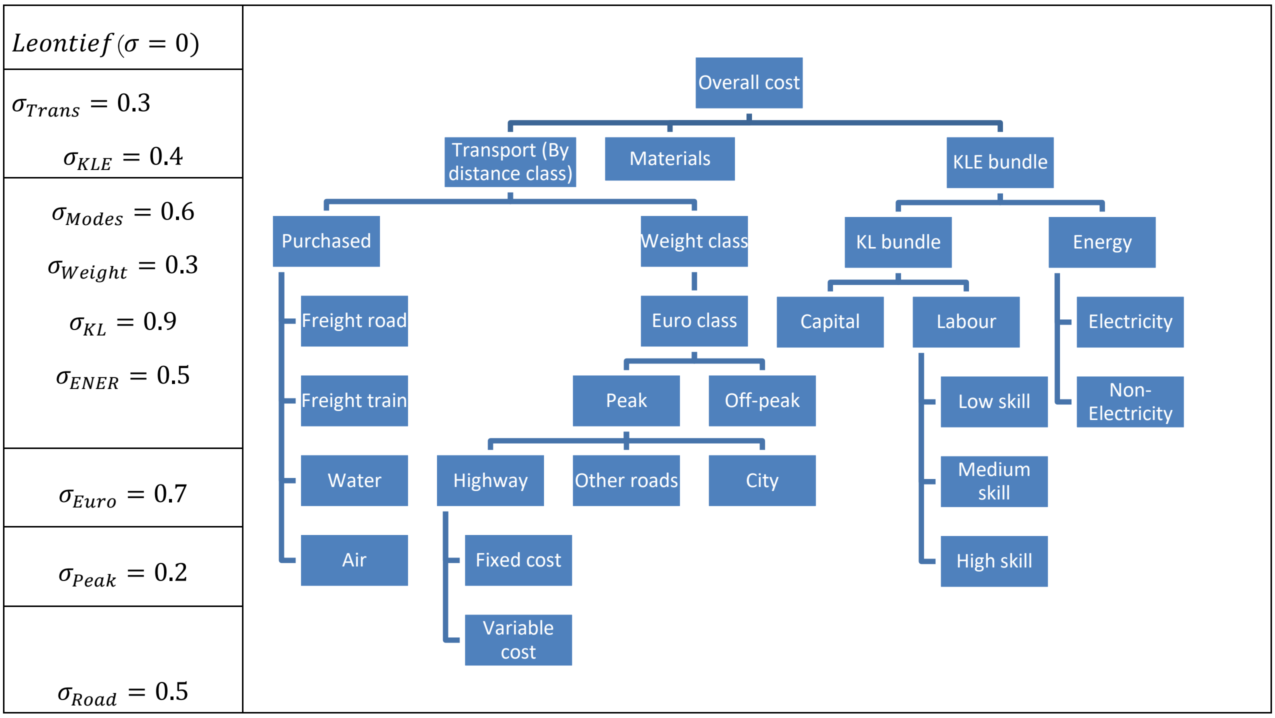


Figure 8.2: Nested CES demand tree for producers in EDIP

In Figure 8.1 and Figure 8.2 above, the nested demand structure of producers and consumers is represented schematically. Transport costs enter either via changes in cost of own produced transport or through changes in the cost of purchased transport services. Specific for EDIP is that all transport costs are accounted for through production of transport margins by the transport and trade sector. This includes the margins for import and export of goods. Used elasticities of substitution (σ) are reported next to each level in the demand tree for both consumers as producers. The base year of EDIP is 2019, the simulation results have a reference year 2023 and 2030. W

The **labour market** in EDIP characterised by market imperfections and equilibrium unemployment. We make use of a simplified wage curve in which household's participation in the labour market depends on the real market wage. We assume that there is a basic link between the price of labour and the unemployment rate otherwise known as the wage curve (Blanchflower and Oswald, 2005). Real net wages are calculated from the net after-tax wage $\mathbf{PL_{ed}}$ and a weighted consumption price index for each skill level ($INDEX_{ed}$). The price index is a weighted index including all goods and services, including the price of transport. The elasticity of the wage curve (ϵ_{ed}^{w}) determines the change in unemployment for changes in the real wage. It was found to be around -0.1 in many countries. This elasticity can be expected to vary according to skill level. We use -0.12 for the lower skilled workers, -0.104 for medium skilled workers, while higher skilled workers perceive elasticities equal to -0.075. The logic behind the different elasticities is related to the tightness of the labour market. The wage elasticity for labour supply is lower for high-skilled than for low-skilled labour (Mastrogiacomo et al, 2013).

$$\epsilon_{ed}^{w}\left(\left(\frac{\frac{\mathrm{PL_{ed}}}{\mathrm{INDEX_{ed}}}}{\frac{\mathrm{PL}_{ed}^{0}}{\mathrm{INDEX_{ed}}}}\right)-1\right)=\left(\frac{\mathrm{u_{ed}}}{\mathrm{u_{ed}^{0}}}-1\right) \tag{3}$$

The main component of **the welfare indicator** used in this study is equivalent variation for each household (EV_i). This is calculated from a specific price index (PEV_i) and the consumer income (Y_i) before and after the policy change (indicated by a zero superscript for the base year). The price index is based on the CES utility function used in the model and is based on specific price indices for transport (p_{tr}), other consumption (p_{oth}) and energy consumption (p_{ener}), matched with cost share parameters ($\gamma_{tr}, \gamma_{oth}, \gamma_{ener}$). Each of these component price indices are calculated in a similar fashion from lower lying nests in the CES function.

$$EV_i = \frac{PEV_i^0}{PEV_i} Y_i - Y_i^0 \tag{4}$$

$$PEV = (\gamma_{tr}^{\sigma_{tr}} p_{tr}^{1-\sigma_{tr}} + \gamma_{oth}^{\sigma_{tr}} p_{oth}^{1-\sigma_{tr}} + \gamma_{ener}^{\sigma_{tr}} p_{ener}^{1-\sigma_{tr}})^{\frac{1}{1-\sigma_{tr}}} \tag{5}$$

Total welfare is calculated as the sum of equivalent variation for each representative household group (income quintiles, indexed by *i*), the consumer valuation of different government expenditures $\Omega_k(CG_k)$ (using CG_k for government expenditures and Ω_k as a weighting function) and external benefits (EB_i) (these include accidents, noise, time benefits for trucks and environmental benefits). External benefits in the model are first calculated in an aggregate way (see above) and then allocated to each representative household. Time benefits for households from reduced congestion are added to the labour endowment of households in EDIP (see equation 1). As such time benefits are a part of the equivalent variation. Other external benefits are proportionally allocated to each representative household as we did not have any detailed information on the relative impact of noise, emissions and or accidents per income quintile.

$$SW = \sum_i EV_i + \sum_k \Omega_k(CG_k) + \sum_i EB_i \qquad (6)$$

Consumer valuation of supplied government expenditures is necessary, since we use changes in government expenditures as the main mechanism to ensure budget balance. Without taking this into account, we would neglect possible benefits from public expenditures, leading to an downward or upward bias on the social welfare indicator in some scenarios. For simplicity we evaluate the supplied government (public) consumption at market prices of the baseline scenario.

C Appendix: Expert interviews

C.1 Purpose of the expert interviews

The expert interviews allow for a deeper look at measures that could be part of a greening of the Belgian federal tax system. By means of in-depth interviews, the experts can shed light on the introduction of a carbon tax shift and other tax measures in Belgium. On the basis of the interviews, the experts can provide the necessary clarification of important priorities and potential points of interest of various tax measures. Moreover, they can give the necessary nuance to certain results of the simulations.

The study work in this task leads to an extensive analysis of possible tax measures, with an overview of their advantages and disadvantages from the own background and discipline of the various general experts and case experts. In addition, we look at a number of additional elements, such as the importance of communication about the tax reform and the corresponding public support.

The content of the expert interviews can roughly be divided into two main parts. A first part focuses mainly on the introduction of a carbon tax shift in Belgium. For this, the interviews with the general experts are especially important. The second part takes a closer look at other ways of making the federal tax system greener. Concretely, five important cases have been identified. These cases are (1) housing, (2) transport, (3) industry & agriculture, (4) circular economy and (5) the financial sector. For this second part, the interviews with the case-experts are particularly interesting (cf. section C.2.1).

C.2 Using the Delphi method

In order to get the most out of the expert interviews, we opted to apply the Delphi method whereby the same experts are questioned twice. In the first interview round, the experts are questioned extensively about the greening of federal taxation on the basis of a semi-structured questionnaire (see section C.4.1). After this first round, the experts' answers are collected and then the researcher structures them, compares them, groups them and collects the points of consensus and dissensus. On the basis of this analysis, a synthesis is made. This synthesis summarises the main findings from the first round and goes into more detail on a number of open points.

During the second interview round, the synthesis based on the first round is used as a guide. The second interview therefore allows to elaborate on what was proposed by other experts in the first round. Amongst other things, it allows new proposals made by a certain expert in the first round to be tested by the other experts in the second round. In this way, it provides a deepening of the results. Based on the insights of the other experts, each expert is asked if he or she wants to make adjustments to the previously given answers. The basic idea underlying the Delphi technique is that the estimates of a structured group of experts are more accurate than those of an unstructured group of experts (Rowe and Wright, 2001).[196]

C.2.1 Determining and contacting the experts

In consultation with the steering group, it was decided to interview 30 experts. With this goal in mind, the researchers draw up a list of potentially interesting experts. In consultation with the members of the steering committee, the experts are chosen from the academic world and the government sector. Suggestions for experts were given by the members of the guidance committee. When drawing up the list of experts, account was taken of a balanced distribution between general experts on the one hand and case experts (approximately 4 to 5 per case) on the other. In addition, a balanced distribution between Dutch-speaking and French-speaking experts was aimed for.

Since it can be expected that not every expert who is invited will be able/willing to participate in the interview, a dynamic longlist of about 60 experts was composed. This way, we can be sure of a sufficiently large list of general experts and experts for the 5 cases to reach a total of 30 confirmed experts. The experts in the longlist are ranked by theme (general and cases) so that we can move up the list based on the number of confirmations.

The experts were invited by e-mail in which the purpose of the research and the reason for the interview were briefly stated. The e-mail asked whether the expert in question was interested in taking part in such an interview. He was asked to confirm via e-mail. Even if the expert did not wish to participate, he was asked to let us know so that we could contact a new expert from the long list.

To the experts who had confirmed, a number of interview dates were proposed via e-mail. If one of the dates was selected, the expert then received an invitation for an (online) meeting (cf. section C.2.2). If an expert indicated that they could not do any of the proposed dates, they were sent a number of new suggestions (via e-mail) until one was possible. In this way, we finally succeeded in recording interviews with 30 experts.

Before the start of the first interview round, each expert received an electronic informed consent form. With this, the experts could give their official consent for the interview after being adequately informed about the purpose of the study, what will be expected of them and what the possible risks and benefits of the study are.

The first interview round was conducted in the period late December '21-January '22. The second round followed in February and early March '22.

C.2.2 onducting and processing of interviews

The table below gives an overview of the interviews conducted on the basis of the expertise for the two interview rounds. During the first interview round, 30 experts participated, 8 general experts and 22 case experts, with a balanced distribution of 4 to 5 experts per case. The vast majority of these experts also participated in the second interview round (90%). Only 3 experts were unable to participate in the second interview. This means that a total of 57 interviews took place with 30 experts. The list of experts can be consulted in annex C.3.

	General	Buildings (Case 1)	Transport (Case 2)	Circular economy (Case 3)	Industry/ Agriculture (Case 4)	Financial sector (Case 5)	TOTAL
Objective	7-10	4-5	4-5	4-5	4-5	4-5	30
Round 1	8	4	5	4	4	5	30
Round 2	8	4	5	4	3	3	27

As the interviews (of both rounds) were planned in a period in which physical consultation had to be avoided as much as possible due to Covid19, it was opted to organise all interviews online (via Microsoft Teams). Moreover, organising online interviews was much easier from a practical point of view, as almost 60 interviews had to be conducted over a period of approximately 2 months. With the consent of the experts involved, all interviews were recorded so that they could be listened to again afterwards (if necessary) when making reports. The recordings were therefore for internal use only for the researcher involved who analysed the interviews.

The (57) reports of both interview rounds were then loaded into NVivo, a qualitative data analysis software package that helps to organise, analyse and find insights. Using NVivo, all reports were coded after which all paragraphs could be brought together with the same code. In this way, maximum benefit could be derived from the interviews. Especially in the context of the current research, where experts were questioned twice in the framework of the Delphi study, being able to structure what was said in all interviews was extremely important. The analyses could then be carried out on the basis of the parts of the text brought together in NVivo.

C.3 List of interviewed experts

	Last name	First name	Affiliation	Main expertise
1	Achten	Wouter	ULB	Circular economy
2	Baret	Philippe	UCL - agriculture	Industry/Agriculture
3	Bollen	Annemie	SERV	Buildings
4	Claeys	Els	FPS Mobility	Transport
5	Colla	Martin	UCL/VUB - Flow	Industry/Agriculture
6	De Borger	Bruno	UAntwerpen	Transport
7	De Callataÿ	Etienne	Université Namur	Financial sector
8	De Sadeleer	Nicolas	USaint Louis	General
9	De Vaal	David	Service de lutte contre la pauvreté, la précarité et l'exclusion sociale	General
10	Demilie	Laurent	SPF Mobilité	Transport
11	Helsen	Lieve	KUL - Energy conversion	Buildings
12	Henry	Alain	Federal Planning Bureau	Transport
13	Hudon	Marek	ULB	Financial sector
14	Macharis	Cathy	VUB	Transport
15	Mossay	Emmanuel	UCL	Circular economy
16	Rabaey	Korneel	UGent	Industry/Agriculture
17	Schoubben	Frederiek	KUL	Financial sector
18	Traversa	Edoardo	UCL	General
19	Valenduc	Christian	FPS Finance	General
20	Van Acker	Karel	KUL	Circular economy
21	Van Liedekerke	Luc	UAntwerpen	Financial sector
22	Van Passel	Steven	UAntwerpen	Industry/Agriculture
23	Van Steenbergen	Alex	Federal Planning Bureau	General
24	Van Steenberghe	Vincent	FPS Health & Environment	General
25	Van 't Klooster	Jens	KUL	Financial sector
26	Vanhille	Josefine	UAntwerpen	General
27	Verbeeck	Griet	UHasselt	Buildings
28	Verbeke	Stijn	UAntwerpen/VITO	Buildings
29	Vermang	Bart	UHasselt	Circular economy
30	Zaccai	Edwin	ULB	General

C.4 Methodology questionnaire interest organisations

C.4.1 Questionnaires

For the first interview round, six different questionnaires were drawn up. One questionnaire was designed for the general experts. A separate questionnaire was also drawn up for each of the 5 cases. These questionnaires were semi-structured. This implies that the questions were prepared in advance, but that it was possible to deviate from the order of questions. It was also possible to ask more questions each time the expert said something interesting or when clarification was required. The fact that the same (main) questions were asked over and over again had the great advantage that the answers from the different experts could be compared. This was particularly interesting in the context of the second interview round.

Although the content of the six different questionnaires was very different, there was a fixed pattern that was followed when interviewing the experts during the first interview round. After a short introduction in which the purpose of the research and the reason for the interview was explained, the carbon tax shift was discussed in more detail. Afterwards, other possible tax instruments for greening the federal tax system were discussed. While the general experts mainly focused on the part about the carbon tax shift, the case experts mainly went into more depth about the other greening instruments. However, we also found it relevant to ask the general experts briefly about the other options and to put a number of questions about the carbon tax shift to the case experts as well.

By analogy with the first interview round, six different questionnaires were used for the second interview round (one for the general experts and five for the different cases). Contrary to the first round where the questions were simply asked verbally, we used 6 personalised PowerPoint presentations for the second interview round. These presentations contained an overview of a number of important conclusions based on the first round, to which the experts could give feedback. In addition, the presentations contained new proposals from the experts during the first interview which could be tested during the second round with the other experts. In addition, a number of graphs of the results of the micro-analysis were included which could be discussed with the experts. The presentations were given to the experts beforehand so that they could prepare for the second interview if they so wished. During the interview, these presentations were then shown so that they could go over them together.

Although the main aim of the expert interviews was to conduct in-depth qualitative research, a short quantitative component was built in at the end of each interview round. Concretely, at the end of each interview, the experts received a word document (via e-mail) with a number of short survey questions which they could return to the experts. The results of this short survey at the end of the first interview round were also presented to the experts for feedback during the second interview. The analyses of the two quantitative surveys at the end of each interview can be found in annexe 0

C.4.2 Determining and contacting interest organisations

In consultation with the members of the Steering Committee, it was decided that, in addition to interviewing the experts (cf. annex C), a number of interest groups would also be interviewed about their views on a carbon tax shift. During a meeting with the steering committee, it was agreed to submit written questions to the employers' organisation (VBO-FEB), the two largest trade unions (ABVV-FGTB & ACVACV-CSC) and the largest consumer organisation (Test-Aankoop -

TestAchatsTestAchats). Concretely, a contact person was sought within each of these 4 organisations (2 Dutch-speakers and 2 French-speakers) and contacted via e-mail.

The e-mail briefly explained the purpose of the study and the reason for asking to fill in the written questionnaire. They were asked if they wanted to cooperate by returning the completed questionnaire to us. The e-mail explicitly stated that returning the questionnaire meant that we could (partially) use the answers in the report.

The questions of the questionnaire can be found in the next section.

Eventually, 3 of the 4 interest organisations responded to the request to complete the questionnaire. Specifically, the employers' organisation VBO-FEB, the trade union ACV-CSC and the consumer organisation Test-Aankoop – Test Achats completed the questionnaire. Their responses to the questions were included in the paragraphs on the expert interviews throughout the report.

C.4.3 The questionnaire

Introduction of a budget-neutral climate tax shift in Belgium:

1. What is your organisation's position on a budget-neutral climate tax shift, introducing a CO_2 tax, the revenues of which are fully returned to the economy and society?
2. What **emphases, elements, modalities** do you think such a tax shift should include (exemptions, tax base)?
3. Do you consider the principle of **budget neutrality** of such a climate tax shift important or would you deviate from it? By this we mean that the revenues of the tax are fully used to reinvest in the economy/society.
4. What do you think would be the best use of the expected **revenues from** the introduction of the CO_2 tax? (*a tariff of € 70 /ton CO_2 can lead to a revenue of € 2.6 billion cf. study 2018*); you may choose to indicate one way of spending or a mix of measures.
5. Do you think that the introduction of a federal climate tax shift is **feasible**? In other words, is there sufficient support for it (politics, industry, population)?

Other fiscal measures:

So far, the focus has mainly been on tax measures that are directly linked to fossil fuels. However, there are many other possible tax measures in other sectors that could contribute to the greening of the Belgian tax system. Some of the trajectories that we are particularly interested in are:

- additional measures to make **buildings** more environmentally friendly;
- measures within the **transport sector** (car traffic, shipping, aviation)
- measures in **industry/agriculture;**
- measures linked to the **circular economy and packaging** (such as the packaging tax reform);
- measures in the **financial sector** ("green" investments)

6. In your opinion, are there important tax measures with a potential for greening in one or more of these sectors? These could be new or higher taxes, lower or higher tax rebates, higher or lower VAT, etc.
   - Which ones and why?
7. Any additional remarks

D Expert proposals

D.1 Need for stronger incentives for renovations (case buildings)

The case experts agree that renovating homes is one of the key elements in achieving the climate objectives. However, according to them, renovating outdated houses is going much too slowly. According to them, the reduced VAT rate for renovating homes is certainly a good measure in itself that has ensured that people have taken the decision to renovate their homes more quickly. However, it is important to note that renovating a house often does not go far enough. It often involves very outdated houses that are *'spruced up',* but still do not meet the energy performance requirements of the near future. The renovations that are done are often not the most efficient investments, so that many of the recently renovated homes will have to be renovated again within 10 years. In the case of very outdated homes, the experts say, it is often better to demolish and rebuild rather than carry out a thorough renovation.

Since, according to the experts, the renovation wave in Belgium is going much too slowly, much stronger instruments are needed in addition to the current VAT reduction for renovations. Most experts of the buildings case therefore rather look at regulatory measures such as a renovation obligation with financial compensations for those households that lack the financial means to perform a deep energy renovation of their dwelling. The recent extension of the Flemish interest-free loan for priority target groups from purely energy renovations to improvements in the quality of housing and the increase in the maximum amount can be supportive in this respect.[197]

In addition to more regulation, however, the focus should also be on better and more proactive communication. An expert refers to the fact that it is generally known that the D-energy label is insufficient in the longer run and that therefore it should be quickly communicated that a better label should be aimed for. This way, people are better prepared and will take action sooner or renovate more drastically.

Given that these proposed measured in addition to a reduced VAT rate are mostly related to regional competences, they will not be discussed in more detail.

D.2 Using a modified EPC as a tax bonus-malus system (case buildings)

In order to use taxation to motivate households to renovate their houses faster or to make the energy performance of a house more important in the decision to buy a house, one expert proposes to use the energy performance certificate (EPC) as a criterion to grant certain tax incentives. Assuming that tax incentives on regional property taxes are the most appropriate, this is a proposal that mainly concerns the regional policy makers. Concretely, the EPC score could be used to grant a tax benefit in case the house falls below a certain score (and possibly even a penalisation if the house has a score above a certain EPC level). The EPC score on which the tax benefit is granted could then be gradually increased in function of the climate objectives in the longer term. This trajectory should be clearly

[197] Vlaamse Overheid (2022), *Renteloos renovatiekrediet* [https://www.vlaanderen.be/renteloos-renovatiekrediet-rentesubsidie-bij-energierenovatie-na-aankoop]

communicated from the start in order to give households the opportunity to make proactive adjustments.

Linking the EPC score to certain tax benefits would also be advantageous to address the **split incentive dilemma** in rental properties where the owner has to make the investment to make a property more sustainable, while the tenant benefits because of the lower energy bill. If there is a tax benefit associated with a lower EPC score, there is therefore also a financial benefit for the owner in the case of energy-efficient investments.

When this proposal was presented to the other case experts in the second interview round, the idea was received with great enthusiasm. However, an important condition for its success is that the EPC score needs to be adjusted. Currently, it is a relative indicator that is calculated per m², whereas the size of the house is also very decisive and should be taken into account. In the proposal to use the EPC as a bonus-malus system, an **adjustment is therefore proposed to the current calculation of the energy performance of a dwelling**. Because the impact of the size of the dwelling and the number of family members is not currently taken into account, it is proposed that this be incorporated into the determination of the energy performance of a dwelling. In this way, we move from determining an energy label that focuses on *efficiency* to one that focuses on *sufficiency*.

Another expert notes that the proposal is currently difficult to realise (administratively), as the EPC score is not known for many dwellings. On the other hand, this proposal could perhaps be an important trigger to have the EPC score for many dwellings determined more quickly.

D.3 Encouraging the use of heat pumps at individual level (case buildings)

At the individual household level, heat pumps remain enormously important for the transition from fossil fuels to electricity. Especially in the case of homes in sparsely populated (rural) regions, their purchase should therefore be encouraged. An important condition is that they are only profitable in well insulated houses. In poorly insulated homes, investments in various forms of insulation must be given priority.

By analogy with the renovation of dwellings (cf. section D.1), the experts believe that the roll-out of heat pumps is too slow and that more should be done by the various authorities. Some argue that households with a heat pump should be encouraged through the housing tax system. Other experts go even further and advocate a gradual obligation for heat pumps.

The experts realise that the purchase of a heat pump is currently still expensive and therefore often unrealistic for low-income households. Additional efforts should therefore be made to make it feasible for low-income households. Proposals are to make the subsidies/premiums for heat pumps more selective (with higher premiums for lower-income households) and/or to provide interest-free loans for certain income groups. With regard to the premium system, the experts find that there are often too many conditions for granting it and that payment often takes too long. Consequently, they argue for direct discounts on the invoice. However, since the premium system is mainly a regional competence, this will not be discussed further.

D.4 Expert opinion on the reform of VAT to DaVAT

A number of experts are proposing a complete revision of VAT and the adoption of the sustainability aspect as a new starting point. In this way, the (environmental) damage of a product or activity is incorporated into the system. In concrete terms, the experts propose to reform VAT into a Damage and Value-Added Tax (or DaVAT). For a detailed explanation of the principle, please refer to Traversa & Timmermans (2021)[198] & Timmermans & Achten (2018)[199] . In what follows, we briefly summarise the basic principle. It is worth noting that the authors suggest a reform at EU level. Therefore, this is not a tax that the federal authority could revise on its own.

DaVAT adapts the current VAT system for goods and services by including a cost based on life cycle analysis. Because this pollution component is a significant one, both producers and consumers will benefit from relying on sustainable products and services. If properly constructed, it can prevent the erosion of the tax base and protect competitiveness while meeting the requirements of social justice and equity. Specifically, DaVAt is composed of three key instruments:

1) Uniform VAT (UVAT): A low uniform base rate similar to the current approach to VAT (e.g. 3%);
2) Global Damage Tax (GDT): Implemented by adding to the UVAT a unit tax, GDT, which is calculated on the basis of the environmental impacts identified through specific or general life cycle analyses.
3) Specific Damage Tax (SDT): In order to take into account environmental, social or ethical concerns that are specific to a country, a different damage tax (SDT) is proposed that goes beyond life cycle analysis.

One of the biggest advantages, according to the experts who proposed the idea, is that such a system would pass through the entire value chain, so that both producers and consumers would be affected. So it has an impact on the whole chain. With many other taxes (such as a materials tax), however, a tax is only levied at one specific point (on a particular material or activity). As a result, the chance of missing out on other polluting activities (problem shifting) is much greater than with a system like DaVAT.

The idea of reforming the current VAT system to DaVAT came up in discussions with some experts during the first interview round. We therefore used the second round of interviews to check what other experts thought of this proposal. In the survey, for example, we asked what the experts thought of the idea (cf. Figure 4 in annex 0). Of the experts who answered the question, more than half (55%) are in favour of the idea. In addition, almost 1 in 4 experts have no opinion (23%). The remaining experts are against the idea (18%) or indicate that they are neutral about the introduction of DaVAT (5%). During the interviews, the supporters of DaVAT indicated that one of the major advantages of DAVAT is that it approaches the environmental aspect in a holistic way by going far beyond an exclusive focus on carbon (equivalents).

An important comment on the DaVAT tax is **the expected complexity**, especially if the idea were to be to provide each product with an adjusted tariff. An expert makes the comparison between

[198] Traversa, E., & Timmermans, B. (2021), Value-Added Tax (VAT) and sustainability in the European Union: A radical proposal design in Intertax 46(11), pp. 871-884.

[199] Timmermans, B., & Achten, W. (2018), From value-added tax to a damage and value-added tax partially based on life cycle assessment: principles and feasibility in International Journal of Life Cycle Assessment 23(11), pp. 2217-2247.

apples bought locally and apples coming from New Zealand. However, it could be an interesting fact for some larger categories. Since, according to many experts, the current tax system is already far too complex, they are wary of the idea of making a relatively simple mechanism (the current VAT) far more complex. Proponents, however, argue that DaVAT will, in time, result in a simpler system because it intervenes in all links of the chain, making many specific taxes (such as a materials tax or a packaging levy) unnecessary.

Another consideration is that the communication must then be done differently: many people do not know how much VAT is included in the total amount when they buy something, or they are not very aware of it. In other words, it should also be clear to people that the DaVAT is low because it is a sustainable product and vice versa. A system similar to the nutrient score for food products could be interesting in that respect.

D.5 Expert opinion on (new) taxes and subsidies

The expert interviews show that, in general, there is a strong preference for (new) taxes over subsidies. The strong preference for taxes is also apparent from the quantitative survey in which the experts were asked to evaluate a number of new taxes (see Figure 10.8 below). Even if the answer option 'no answer' is included, for each proposed new tax there is a large preponderance of supporters and only a relatively limited number of opponents. A tax on plastic packaging and a NOx tax receive particularly high support among the experts who completed the survey. A tax on meat consumption receives more support than a tax on livestock because the latter mainly targets farmers while, according to the experts, consumers also bear an important responsibility.

That the majority of experts are in favour of the proposed taxes is no surprise, since the experts indicated during the interviews that it is often more efficient and desirable to 'tax bad behaviour' rather than 'reward good behaviour' (by the use of subsidies). Many experts therefore prefer to levy new taxes instead of providing more subsidies. The strong support for the introduction of a carbon tax also fits perfectly within this vision (cf. section 4.2).

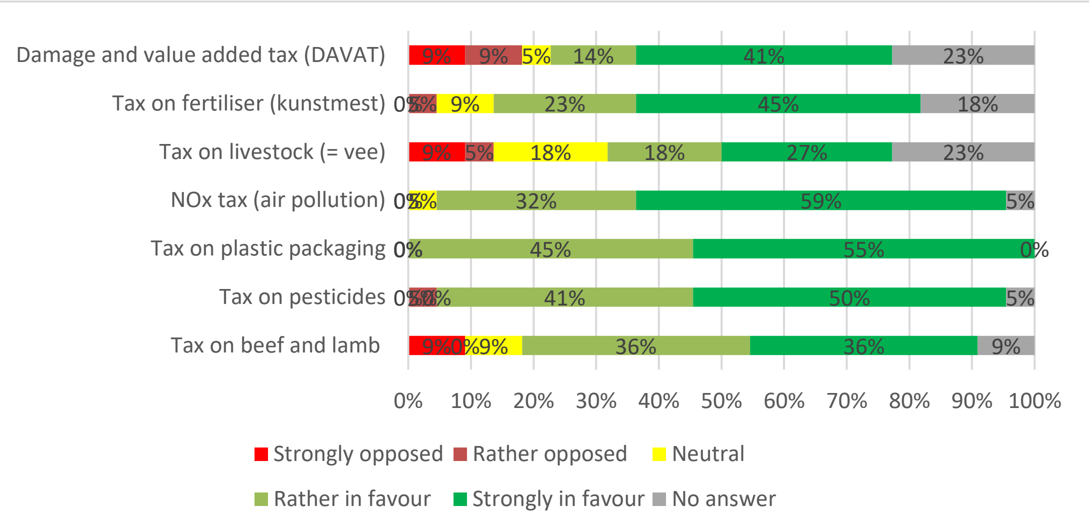


Figure 10.8 Expert opinion on new proposals for taxes

According to the experts, the need for caution in issuing subsidies is mainly due to a number of adverse effects, such as, in addition to the high financial cost, possible lock-in and rebound effects. This does not mean, however, that subsidies cannot be a useful instrument in the greening of the federal tax system. In particular, the use of technology subsidies to replace the current reductions and exemptions from excise duties for energy-intensive companies has met with great approval from the experts. Indeed, it ensures that the competitiveness of the companies remains (largely) unaffected compared to companies in other EU countries (compared to simply abolishing the current reductions and exemptions). Moreover, by using technology subsidies, a financial advantage that increases with the consumption of energy, and is therefore a false incentive, is replaced with a financial advantage that stimulates sustainable investments.

E Overview of legal articles

E.1 Derogations energy taxation directive

Derogations Energy Taxation Directive	Provision
Mandatory Derogations	
output taxation of heat and the taxation of products falling within CN-codes 4401 and 4402;	
Energy used for purposes other purposes than transport and heating fuel	Article 2
Dual use of energy	
Electricity when it accounts for more than 50% of the cost of a product	
Mineralogical processes	
Energy products and electricity used to produce electricity	Article 14 a
Commercial aviation and maritime navigation fuel	Article 14, b & c
Facultative derogations	
Differentiated rates directly linked to product quality;	Article 5
differentiated rates dependant on quantitative consumption levels for electricity and energy products used for heating purposes;	
differentiated rates for the following uses: local public passenger transport (including taxis), waste collection, armed forces and public administration, disabled people, ambulances;	
differentiated rates between business and non-business use, for energy products and electricity referred to in Articles 9 and 10	
differentiate between commercial and non-commercial use of gas oil used as propellant	Article 7, § 2
reduced rate on gas oil used by heavy duty vehicles when road pricing system is adopted	Article 7, § 4
Tax reduction/exemption for taxable products for certain project of environmental friendly technological	Article 15
Tax reduction/exemption for renewable electricity and from combined heat and electricity generation	
Tax reduction/exemption for energy products and electricity used for combined heat and power generation	
Tax reduction/exemption for energy products and electricity used for the carriage of goods and passengers by rail, metro, tram and trolley bus;	
Tax reduction/exemption for energy products uses related to navigation	
electricity, natural gas, coal and solid fuels used by households and/or by organisations recognised as charitable	
natural gas and LPG used as propellants;	
products falling within CN code 2705 used for heating purposes	
Level of taxation down to zero for energy products and electricity used for agricultural, horticultural or piscicultural works, and in forestry.	
Exemption/ reduced tax rate for products produced from biomass, and certain other categories of products	Article 16
Tax reductions in favour of energy intensive businesses	Article 17 § 1, a)
where agreements are concluded with undertakings or associations of undertakings, or where tradable permit schemes or equivalent arrangements are implemented, as far as they lead to the achievement of environmental protection objectives or to improvements in energy efficiency.	Article 17, § 1, b
the Commission, may authorise any Member State to introduce further exemptions or reductions for specific policy considerations.	Article 19

F Fiscal measure sheets

F.1 Pesticide tax

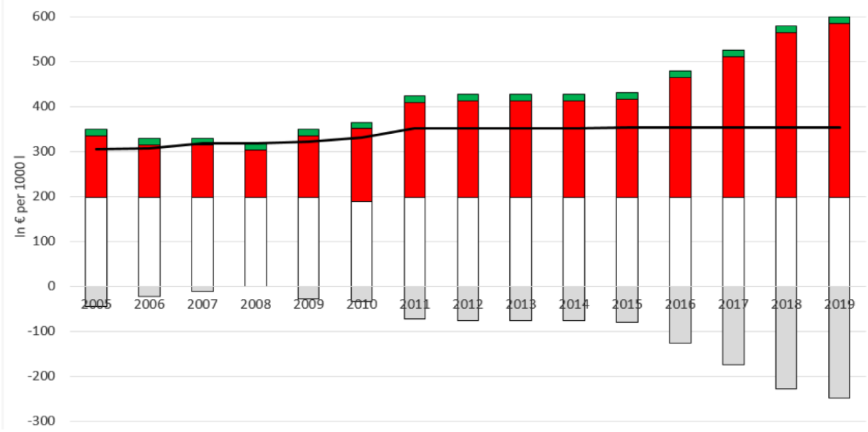
Industry & agriculture: pesticide tax	
Challenge(s)	Reducing the use of pesticides
Current policy	Belgium does currently not have a product tax on pesticides The current VAT rate on pesticides is 12%, which is a preferential treatment compared to the standard tax rate of 21%
Guiding reform principle	Introduce a product sales tax on pesticides (excise type) based on the Danish example: o on all types of pesticides, o taking into account health risks: tax rates based on risk reduction have proven to be more effective than tax rates based on pesticide use: a shift from harmful to less harmful substances can have the same environmental and health impact than a reduction in the use of pesticides (OECD, 2020). However, to make this approach possible, risk indicators for pesticides will need to be developed, ideally as part of a pesticide policy plan which also contains clear quantitative targets; o recycling the revenues back to the farmers, e.g. by reducing land charges or other compensation. Remove the current preferential rate VAT by increasing it up to the standard tax rate of 21%.
Impacts	Environment: reduction of chemical pollution Potential side effect: purchases abroad
Legal issues	Shaping the tax as an excise tax has the benefit that the existing legal, administrative and compliance framework can be used, which allows for an efficient introduction.
Lessons/inspiration from other countries	Danish pesticide tax (since 1972).
comments	Ideally, a pesticide tax will be part of a policy mix and a broader policy plan, containing specific targets and policy instruments, and aimed at an integrated approach. The plan should contain both regulatory and economic instruments, and be backed by technical assistance, and a communication and awareness campaign to support the farmers who are confronted with the stricter pesticide policies. The plan should also be linked to and aligned with related policy fields, such as nitrogen and phosporus policies, biodiversity policy, and water policies. In Belgium, an integrated policy framework will ideally be coordinated between the federal and the regional governments.

F.2 Tax on rents made by electricity producers

Energy industry: Tax on rents made by electricity producers	
Challenge(s)	Sometimes electricity producers can make excessive profits ('rents') due to extreme market conditions (very high electricity prices) or production benefits (e.g. accelerated depreciation rules, or lifetime extension of a nuclear power plant). In such circumstances, government can impose a tax on the rents
Current policy	Currently, only rents due to depreciated nuclear power plants are taxed. The lump sum tax rate is annually decided by the federal government based on CREG calculations. In reality, the real excessive profits are hard to calculate and in the past, the tax was often criticized for being too low. In times of extremely high electricity prices, such as in 2022, other types of electricity production that are not directly affected by the rises in fossil fuel prices, such as offshore and onshore wind, could make excessive profits. These are currently untaxed.
Guiding reform principle	Extension to wind, hydro and large solar and biomass plants Increase the rents tax for nuclear
Impacts	If only the excessive profits are taxed, the impacts are significant for investors, but limited for society. Taxing excessive profits of renewable energy production could curb investor's willingness to invest in it. However, as long as 'normal' market profit are not taxed additionally, it is only the acceleration caused by the exceptional circumstances that is slowed down. Therefore, rent taxation is considered to be the least distorting (Schwerhoff, 2020) and - thus – most efficient of all types of taxes, making it an attractive option for all policy makers. Moreover, taxes on rent are generally well received by the general public, and the revenues they generate can be used by government to increase welfare and wellbeing of the population, e.g. to compensate for the impact of exceptionally high energy prices.
Legal issues	Calculation of the excessive profits is a challenge. A condition for societal support is that this calculation is done on an objective basis, ex post, and (ideally) by a neutral party, such as the CREG. If the tax rate is too high, it will be disputed by the electricity producers; if it is too low, it will be criticised for giving them preferential treatment.
Lessons/inspiration from other countries	In Norway, a tax on resource rents is levied on hydropower plants with generators rated at more than 10 MVA[200]
comments	

[200] Source: https://energifaktanorge.no/en/regulation-of-the-energy-sector/skattlegging-av-kraftsektoren/#:~:text=The%20tax%20rate%20for%20general,exceeding%20normal%20returns%20to%20capital.

F.3 Suppression of rebate on excise duty for commercial diesel

Road transport: Suppression of rebate on excise duty for commercial diesel	
Environmental Challenge(s)	*Non declining GHG emissions of the goods transport sector* • GHG emissions of road transport have been still increasing over the last decades and to the 2040 horizon, no significant decrease is expected.
Current policy instruments	*Reimbursement for professional diesel since 2004* Professional diesel users can get reimbursed for the special excise on diesel for the amount above 352.54 EUR/1000 liter (non-indexed). This was decided in 2004. As in 2014, the Belgian government decided to increase excises on diesel at each diesel price reduction in order to make diesel and gasoline prices equal. Excises got also indexed at that time. As a consequence, the amounts reimbursement for professional diesel got more important. From a few ten thousands euro in the years 2000 to nearly a billion in 2019 (981 million EUR in 2019)  Each +7.5 ton vehicle can get the reimbursement while fuelling in Belgium, as well Belgians as non-Belgians.
	Slight decrease in reimbursement in the following years The reimbursement was 247.6 EUR /1000 litre between July 2018 and 31-12-2021. On 1-01-2022, the amount was reduced to 226.97/1000 litre. It will be further reduced to 205.06 EUR/1000 litre by 1-01-2023 and then gradually to 202.06 on 1-01-2026
	A further decrease in reimbursement makes sense for the following reasons: 1. The subsidy remains important, gives a wrong price signal, causes an overconsumption of diesel and extra CO2 emissions. 2. Compared to the price levels in our neighbouring countries, the excise taxes in Belgium are still below, except for Luxemburg .In 2020 Belgian levels were even below Luxemburg levels.[201] 3. Reimbursement is done for Belgian and non-Belgian truckers. A majority of reimbursement is done for foreign transport companies (77 836 against 66 891 Belgian

[201] https://www.fuelseurope.eu/knowledge/refining-in-europe/economics-of-refining/fuel-price-breakdown/

	transport companies in 2020).As a consequence there is no competitive advantage in the reimbursement. 4. The measure is sensitive to fraud although measures are underway to limit that risk	
Reform options	Suppress excise tax reimbursement	Reduce reimbursement to the average excise tax levels in neighbouring countries
Description	Bring reimbursement back to 0 EUR in 2030	Bring reimbursement back to 150 EUR/1000 litre (reduction of nearly 100 EUR/1000 litre)
Impacts	*Budget* If carriers don't change their behavior, compared to the 2019 situation, the gain will be of 733 million EUR. Compared to 2020 this is even 981 million EUR. However, freight carriers will change their behaviour as Belgium won't offer the cheapest fuel any more. As a consequence, gains will probably be much lower. We estimate that excise tax revenue would go up with about 366 million € (which is about half of the total discounts paid in 2019)	In a more modest reform where the discount is reduced to 150 EURO/1000 l, the expected increase in revenue is estimated to be around 341 Million € without behavioural impact. With behavioural impact the revenue gain is expected to be around 151 million €
	Environment -5% in vehkm. As a consequence, a similar reduction in emissions[202]. However, as trucks will fuel abroad, the gains will less important.	-2.5 to -3% reduction in vehicle kilometers
	Equity More equity in the sense that companies and citizens are treated more equally.	More equity in the sense that companies and citizens are treated more equally.
Legal issues	No legal issues to report. A first step in suppression is already done	
Other effects	Positive (availability of alternatives) It will make the logistic sector more efficient It will make alternatives with lover energy use more attractive It can provide an incentive for relocation of activities in order to reduce transport costs	Negative (obstacles) The sector suffered from COVID (and in early 2022 from increasing fuel prices), it could argue that it is difficult to support another tax. The logistic sector has an important means to put pressure on politicians, to wit blocking the cities and streets

[202] Delhaye, 2019, verschuiving van publieke middelen naar openbaar Vervoer en actieve modi

Recom-mendation	Bring the level of professional diesel excise tax at least to the French level of 452 EUR/1000 litre at the latest on 1-01-2023. This corresponds still to an excise tax reduction of approximately 150 EUR/1000 litre. With the actual policy, professional diesel excise tax will be at nearly 400 EUR/1000 litre at 1-01-2023. The actual draft version of the ETD requires a minimum excise tax level of 408.5 EUR/1000 litre. Reduce the reimbursement of excise taxes by 2026 to zero in coordination with neighbouring countries. Lowered excise tax rates provide a wrong price signal. France and Germany will furthermore increase their tax levels.

F.4 Embarkment tax

***Aviation**: Embarkment tax (short term) VAT (midterm) on air tickets and excise on kerosine (long term)*		
Challenge(s)	*Rising GHG emissions* • CO2 emissions from commercial operators in 2019 increased by 29% compared to 2013[203] • ICAO forecasted by 2050 a tripling of emissions compared to 2015 • 4% of CO2 emissions in EU are from aviation [204] • Non CO2 emissions from aviation contribute at least as much as CO2 emissions to global warming	
	Lacking legal framework: Wide tax exemptions for aviation for VAT and Fuel excise taxes See also below under mid and long term solutions	
Current policy instruments	*European Emission Trading System (ERS)* Covers stationary industrial emission sources AND emissions from intra EU aviation. Total emission allowances are reduced by 2% each year from 2020 on (before reduction of 1.7%/year)	
	Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA - ICAO initiative – voluntary today, obligatory from 2026 on) Obliges air carriers to offset all their emissions above 2020 levels.	
	With current policy instruments following challenges remain: 1. Only CO2 emissions are covered by actual instruments while non CO2 emissions cause 50% of air traffic global warming. 2. Equity; aviation is used by the best off, less flying and/or more expensive flying will therefore contribute (slightly) to more equity 3. Risk of lobbying for softer objectives if objectives are not reached by the sector 4. Due to COVID, low or no impact from CORSIA as reference year is 2019	
Reform options: embarkment tax (short term), VAT on air tickets (medium term), kerosine excise (long term)		
Short term: embarkment tax	Basic (today) option	Alternative option: increase embarkment tax

[203] https://theicct.org/publication/co2-emissions-from-commercial-aviation-2013-2018-and-2019/

[204] https://ec.europa.eu/clima/eu-action/transport-emissions/reducing-emissions-aviation_en

Description	Actual measure 10 EUR/ticket < than 500 km, 2 EUR/ticket for other EU destinations, 4 EUR/ticket for other destinations from 1-04-2022	Double for flights< 500 km, quadruple tax to 8 EUR for EU flights, multiply by 7 or 8 the tax to 30 EUR for non-EU flights
Impacts	*Budget* 30 M EUR revenu/year estimated	109.4 M EUR revenue estimated (to be confirmed by more precise calculation)
	Environment Limited impact, **(below 1%)** taking into account low ticket tax. A 12 EUR tax = -4% passenger demand and CO2 emissions while here average tax lies between a third and a sixth of 12 EUR	Estimate of around 4% reduction in CO2 emissions (to be confirmed by precise calculation)
	Equity Slightly positive	Slightly more positive
Legal issues	No legal issues to report, measure introduced since 1-04-2022	
Mid term: VAT on air tickets	Today, EU VAT regulation doesn't allow for VAT on air tickets. Discussions at EU level are underway to simplify the rule concerning "place of service provision". If discussions evolve positively, VAT could be levied on air tickets. A VAT tariff of 6% would be coherent with international rail passenger transport. It would **reduce CO2 emissions by 6%** and generate revenues of 200 to 400 M EUR.	
Long term: kerosine excise	Excises are not levied on kerosine for international air traffic although there is no legal barrier. The introduction of a kerosine excise similar to the actual minimum level on diesel, 330 EUR/1000 l could generate 450 M EUR based on 2015 figures and **reduce CO2 emissions by 17%**[205]	
Other effects	Positive (availability of alternatives) *Travelling by air is most of the time not a necessity. *Alternatives for business meetings are available (digital meetings). Business can furthermore afford a small ticket tax *Family gathering can remain a challenge. Therefore a lump sum cheque could be provided to people with family abroad.	Negative (obstacles) *Sector suffered from COVID, could argue that it is difficult to support another tax *Competitiveness. Risk is disappearing as neighbouring countries (will) take similar measures. *Population not happy with another tax
Recommendation	Obtaining significant reductions in emissions from aviation is a huge challenge with the actual policy instruments. There is however still a "low hanging fruit measure", **increase the**	

[205] Federal Public Service Finance, 2021, Federal inventory of fossil fuel subsidies

	embarkation tax to the tax level in the neighbouring countries. Belgium applies extremely low embarkation tax tariffs compared to the neighbouring countries as the annexed comparison illustrates. Proposed tariffs are 20 EUR for the < 500km flights, 8 EUR for the intra EU flights and 30 EUR for the extra EU flights. For the latter, concertation with The Netherlands would be appropriate as the Dutch tax for non-EU flights is lower. It remains absolutely necessary to levy VAT on aviation tickets and a kerosine tax as soon this is possible.

F.5 Company cars and fuel cards

Road transport: Remove company cars and fuel cards		
Challenge(s)	**Harmful societal consequences from company cars and fuel cards for free* Company cars and fuel cards provide mobility for free. As a consequence company cars drive on average approximately 9200 km more each year, causing subsequent emissions, congestion, unliveability (Castaigne et al, 2009) **Growing number of company cars with harmful societal consequences in last decade* The FPS Finance estimates the increase in company cars between 2007 and 2017 at 64%. Their number went up from 331 000 to 542 000 **High labour taxes make nearly tax free company cars very attractive for employers and employees* **The system is thoroughly unfair as among the 10% best off, 48% can use a company car, while among the 30% worst off, only 1.5% can use a company car* **The system costs more than 2 billion EUR in lost tax revenue to Belgium*	
Current policy instruments	*From 2026 on, only electric cars will be eligible for the system. Between 1-07-2023 and 1-01-2026, a transitional arrangement will be in place. Belgian **carbon emissions** from road transport will be **reduced** compared to the previous situation as company cars will no longer emit directly CO2. *However, **other environmental and societal challenges** like fine dust (EV's emit the same amount of fine dust as fossil fuel cars), inefficient use of (scarce) energy, reduced liveability in cities, congestion, occupation of open spaces will **remain**. *Also the **social unfairness** of the system remains.	
Reform options: full electric company cars, phase out company cars/fuel card advantage and recycle new tax revenues		
Description	Full electric company cars (today option)	Phase out company cars/fuel cards and recycle 80% of extra tax revenues to reduce high wage tax rate (30%) and increase lowest tax bracket and or the imposition rate on the lowest tax brackets (50%)
Impacts	*Budget* No budgetary impact	20% of company car/fuel card exemptions = extra revenue = 400 Million Euro (other 80% is recycled in other policies)

<table>
<tr><td rowspan="2"></td><td colspan="2"> Environment
CO2 emissions:
1) lower direct CO2 emissions with current policy option than with company car phasing out,
Direct CO2 emissions from company cars are reduced to 0 with the today option of electric company cars. CO2 emissions from power generation could increase, although, as these emissions are integrated in the European ETS, these eventual emissions should be compensated in other ETS sectors.
2) more uncertain impact if indirect CO2 emissions taken into account
Because by 2035, all new cars are assumed to be zero-emission according to the Fit-for-55 action plan, there will be only an impact on the indirect CO2 emissions. These will be lower in a no-company car subsidy scenario because the car fleet will be smaller and there will be less kms driven, hence a lower energy consumption.
3) extra revenue in phasing out scenario can be used for other CO2 reducing measures
Other CO2 reducing measures can be house insulation for example
Fine dust and other environmental and societal challenges: phasing out of company cars superior to current policy option
A scenario with phasing out of company cars reduces the kilometres driven and as a consequence the emissions of fine dust, open spaces occupied by cars, congestion,… </td></tr>
<tr><td> Equity
Company cars and electric cars remain the privilege of the best off. This could make acceptance for ecological transition lower. </td><td>1 billion EUR becomes available for more equity in the tax system which can contribute to a higher societal acceptance for other measures in the ecological transition.</td></tr>
<tr><td>Legal issues</td><td colspan="2">The legal issues are minor compared to the potential opposition by lobby groups and actual company car users. Phasing out the company cars fiscal regime will furthermore simplify the Belgian fiscal system.</td></tr>
<tr><td>Lessons/inspiration from other countries</td><td colspan="2"> *Normally, all increases in indirect emissions should be covered by the ETS system. However, the ETS system could increase electricity prices for consumers. As a consequence, governments could be tempted to intervene in some way or another in the ETS price forming mechanism. For that case, it is relevant to have an idea on the indirect emissions.
*The ETS for the transport and residential sector that is proposed in the European Fit for 55 package could reduce the impact of the current policy as emissions of the whole park will need to decrease. </td></tr>
<tr><td>Other effects</td><td> Positive
Equity and environmental effects as mentioned above </td><td> Negative (obstacles)
Strong opposition of large group of company car owners and car lobby </td></tr>
<tr><td>Recommendation</td><td colspan="2"> Consider the actual policy option as a first step in the complete phasing out of company cars by 2030. The actual policy guarantees a significant share of electric vehicles in the near future.
Accompany the phasing out of company cars by </td></tr>
</table>

	1) disincentives for large fossil fuel vehicles and incentives for smaller and lighter electric vehicles. Advantages of lighter vehicles are multiple and can be found at https://www.lisacar.eu . 2) the introduction of the ETS for the transport and residential sector as proposed in the European Fit for 55 Package Recycle the extra tax revenue in order to guarantee the inclusion in the ecological transition.

F.6 Reform of excise taxes on heating fuels and natural gas

Buildings: Reform excise tax on heating fuel and natural gas	
Challenge(s)	- Decarbonisation of building heating

Current policy	- Excise tax: excise + special excise + energy contribution + 'controleretributie' (quality monitoring fee)
	- Heating fuel: tax rate €ct 1.73/l, revenues (2019): €21.8 mio
	- Natural gas: €1/MWh: revenues (2019): €82 mio
	- No automatic indexation based on inflation. In real terms, this means that
	  o Excise tax rates on heating fuels have decreased by 38% between 1993 and 2021.
	  o Excise tax rates on natural gas have decreased by 30% between 1994 and 2021.

Guiding reform principle	- Reform options:
	  o Increase as part of the climate tax shift (universal carbon tax based on the carbon content)
	  o Increase as part of an energy tax shift: higher taxes on natural gas and heating fuel, lower taxes on electricity
	  o Increase as a separate reform measure, based on benchmark of transport fuel tax rates, external costs, carbon content or other;
	  o Introduce automatic indexation, which means that real tax rates remain stable until changed by a policy decision.

Impacts	- Accelerating the decarbonization of buildings, by improving the business case for the insulation of buildings and the switch to zero or low-carbon solutions, including electricity (heat pumps, riothermia, geothermia, district heating, …)
	- Potential side impacts:
	  o Social impact: to be compensated to avoid a regressive impact
	  o Co-benefits in terms of improved air quality
	  o Unwanted switch to more (carbon-inefficient and highly polluting) wood-based heating should be guarded.

Legal issues	- Compatibility with EU-ETS and with the potential future ETS-BRT should be carefully guarded to avoid double taxation. - Any accompanying carbon border measures (CBA) should be design with much care to avoid compliance issues with international trade rules.
Lessons/inspiration from other countries	- Sweden has a carbon tax since 1991, which is very high for households and small businesses (currently €114/tonne CO_2), but exempts ETS companies.
comments	- In an ideal climate tax shift, taxes on both heating oil and natural gas should increase. In order to create an incentive for an accelerated switch from fossil fuel-based to electricity-based heating (heat pump), taxes on electricity should have a significantly smaller increase, or none at all. - Energy products or sectors covered by other (well-performing) carbon pricing systems, such as ETS, should be exempted from the tax increase, or at least the two systems should be carefully aligned with each other. - An ideal climate tax shift should be part of a comprehensive climate plan, which contains a policy mix of regulatory, economic and socio-cultural (awareness campaigns) policy instruments. The choice should be made based on a thorough study of the impacts and the optimal design of the reform.

F.7 Beverage container tax

<table>
<tr><td colspan="2">Circular economy: reform of the beverage container tax</td></tr>
<tr><td>Challenge(s)</td><td>Realising a shift from consumption of single-use plastic beverage containers towards (1) reusable ones and (2) package-free alternatives</td></tr>
<tr><td>Current policy</td><td>Beverage container tax, introduced in 2004:

Tax considered equivalent to an excise tax
Reusable packaging: 1,41 EUR/hl
Non-reusable packaging: 9,86 EUR/hl
Exemption for milk and milk-based beverages
Tax rates not indexed since 2004, which is similar to a real tax rate reduction of 27%
2019 government revenues: € 349 million
</td></tr>
<tr><td>Guiding reform principle</td><td>Immediate: compensate for the real tax rate reduction since 2004, automatic annual indexation
Potential reforms:

More differentiation in the tax design, e.g.:

between recycled and virgin material, e.g. based on the recycled content of the packaging.
Replace the current volume base (hectorlitre) by a weight-base to better represent material use
Introduce higher tax rates for hard-to-recycle types of material, e.g. coloured PET bottles.
Exemption or reduced rates for packaging covered by a deposit-return system.

Explore extension to other types of single-use food packaging.

The downside is that the tax will then not longer be a type of excise duty, which will require the set-up of a new regulatory and enforcement system, and thus an in-depth study aimed at finding the optimal design, legal barriers, minimizing side-effects, enforcement, etc.
Would allow/require to differentiate between types of material, e.g. cardboard vs. plastic.

Study the pros and cons of other economic instruments, e.g.

White certificates that producers or importers that put packaging on the market need to submit to the government every year based on recycled content. Packaging that is part of reuse systems could be exempt or receive less stringent targets;
Deposit-return systems: interaction with the tax should be studied more in-depth.

</td></tr>
<tr><td>Impacts</td><td>Depending on the reform chosen, different impacts will occur; if well-designed, any of the reforms can lead to an accelerated shift towards more circular packaging, less material use, less use of single-use plastics, and more reuse systems.
Extending the tax to non-beverage types of food packaging will be more complex than staying with the current product scope (excise-type of tax).</td></tr>
<tr><td>Legal issues</td><td>A reform will need to be studied in-depth, including a full legal analysis.</td></tr>
</table>

	Some of the alternative economic instruments suggested above are not federal but regional competence, requiring a collaboration agreement between the three regions.
Lessons/inspiration from other countries	Danish beverage container tax (since 1978): based on (1) type of material, (2) volume, and (3) weight of the packaging. Swedish beverage container tax (since 1973, reformed 1984): famous for its interaction with the existing (mandatory) deposit-return system on cans and plastic bottles.

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