4 Effective carbon tax rates from 2021 to 2023: Latest trends from the road transport sector in OECD and G20 countries

The rise in energy prices in the wake of the Covid-19 pandemic recovery in 2021, exacerbated by Russia's war of aggression against Ukraine in 2022[1] has prompted governments worldwide to provide relief to households and businesses. However, the support measures have raised several concerns, including issues of fairness, fiscal costs, effectiveness in staving off inflation and alignment with climate mitigation objectives. Concerns regarding fairness have arisen as higher income households were more likely to benefit from these measures (see, e.g., Ari et al. (2022[1])). Furthermore, the incidence of some support measures has also been cause for concern, since tax reductions generally benefit producers more than consumers when fuel supply is inelastic (see, e.g., OECD (2022[2]), Van Dender and Raj (2022[3])). Another important concern relates to the impact of support measures on price signals. Given the increasing urgency of climate change mitigation, lowering energy prices and in turn carbon prices signals undermines incentives to fulfil net-zero objectives.

The OECD Energy Support Measures Tracker[2] is a dataset taking stock of all government interventions to support energy users since February 2021. The vintage of the database used in this report has a cut-off date of 30 January 2023 and covers 41 countries, including all OECD countries except for Hungary, Iceland and Switzerland and three of the remaining G20 economies (Brazil, India and South Africa). At the time of writing, this database is the most comprehensive source of data on energy support measures in OECD economies (see Hemmerlé et al. (2023[4])).

Most energy support measures can be classified as price or income support measures and may be targeted or broad-based; in the road transport sector, government support mostly consisted in energy price support measures that were not targeted. According to the OECD Energy Support Measures Tracker, out of more than 110 individual measures identified since February 2021, 72% were energy price support measures; 82% were not targeted.[3] When they were targeted, most were targeted towards firms in the services sector.

This chapter focuses on fuel excise and carbon tax measures in the road transport sector. The focus is on this sector, because fuel excise and carbon taxes (effective carbon taxes when taken together) in this sector are the most prevalent carbon pricing instruments as compared with other sectors (see e.g., OECD (2019[5]), Amores et al. (2022[6]) and Figure 2.4). Hence any change thereof has an important impact on carbon prices. In line with the ECR methodology, rates were gathered for 1 April (or the closest available date) of 2021, 2022 and 2023 for 45 OECD and G20 countries.[4] They were gathered for cases where the fuel accounted for more than 5% of carbon dioxide (CO_2) emissions in the road transport sector, which implies that the analysis mainly concerns diesel and gasoline.

VAT reductions[5] and price reductions (e.g. price caps) are not accounted for, and neither are fuel excise or carbon tax cuts which took place between two of the abovementioned dates on a temporary basis.[6] This includes for instance, the temporary price cap on diesel and gasoline prices introduced by the Hungarian government between November 2021 and July 2022 or VAT tax cuts introduced in Luxembourg. The scope of the analysis is thus consistent with the policy instruments included in the effective carbon rates methodology. Both the OECD Tax Policy Reforms yearly report (OECD, 2023[7]) and the OECD analysis of the OECD Energy Support Measures Tracker (Hemmerlé et al., 2023[4]) provide more detail about the measures that are not accounted for in this analysis.

Most of the analysis in this chapter is done in constant 2021 prices as opposed to current prices.[7] The analysis (see Table 4.1), however, starts by discussing countries according to the direction of change of tax rates on the different types of fuels expressed in *current* terms. There is an interest in considering such figures, as fuel excise and carbon tax rates are typically not indexed on inflation.[8] In a world with low inflation rates, tracking change in current prices did not have much of an impact on the change in the price signal provided by fuel excise and carbon taxes in a set country. Considering these tax rates in current terms hence enables to consider which carbon pricing policies countries *actively* implemented (in most cases). In the current context, with global inflation at 4.7% in 2021 and 8.8% in 2022 (IMF, 2022[8]; IMF, 2023[9]) (and a forecast to 5.9% for G20 countries in 2023 (OECD, 2023[10])), even though policy might not have evolved yet to include considerations such as inflation, taxes expressed in *constant* terms matter more for behavioural purposes, in particular for the effective price signal provided for decarbonisation incentives. Hence, a major part of the analysis, which presents taxes per tonne of CO_2 (as opposed to units of fuels), is done in constant 2021 prices.

Over 2021 to 2023, in the 45 OECD and G20 countries studied here, tax rates in the road transport sector (for diesel, gasoline, as well as LPG and natural gas in some cases) expressed in current local currency units (LCU) decreased in 15 countries, stagnated in 19 countries and increased in 20 countries. Out of the 19 countries which implemented fuel tax rate increases, seven have provisions for increasing fuel excise rates with inflation (see footnote 8). Between 2022 and 2023, there were no decreases in rates in countries which increased rates in current LCU between 2021 and 2023 – though there may have been between 2021 and 2022. In countries with no change in rates, these stayed constant throughout the period, except in Italy, where the fuel excise rate for diesel was lowered by 40% from 2021 to 2022 before getting back to its 2021 level in 2023. For countries with fuel excise rate decreases over the 2021 to 2023 period, most decreases took place between 2021 and 2022. As a reminder, temporary tax cuts that took place within the span of a year as well as price reductions (price caps), though frequent, are not accounted for here.

Carbon taxes expressed in current LCU were either stable or increased in most countries which had one in 2021, except in Slovenia, which cancelled its carbon tax in 2023. In the thirteen other countries with carbon taxes even when the fuel excise tax decreased, carbon taxes did not. This is the case for Ireland, Mexico, Norway and Sweden. Political economy constraints linked to the increase of carbon taxation might be part of the rationale behind the decoupling of these changes. Carbon taxation being a direct carbon pricing instrument as opposed to a fuel excise tax, which is first and foremost an energy tax[9], may also help explain this observation: while governments might have decreased fuel excise taxes to help households and businesses cope with the current energy crisis, their aim may not have been to mute carbon price signals.

In the sample analysed in this chapter, tax cuts took place predominantly in Europe and Central Asia – where the energy crisis was possibly the most directly exacerbated by the war in Ukraine. Amongst the 45 OECD and G20 countries, 12 out of the 28 countries in Europe and Central Asia, two out of seven of the countries in East and South Asia and Pacific and one out of six countries from Latin America and the Caribbean implemented at least one fuel excise tax cut between 2021 and 2023.

Increases or decreases in fuel excise and carbon tax rates expressed in current LCU did not particularly apply more to diesel or gasoline. There were two more increases in fuel excise rates on gasoline than on

diesel and two more decreases in rates on diesel than on gasoline. In terms of rate per tonne of CO_2, the "diesel discount" (Harding, 2014[11]; OECD, 2019[5]) became more pronounced in about a third of countries, remained the same in another third and improved in the remaining third.

Table 4.1. Tax rate changes in current LCU in the road transport sector between 2021 and 2023

44 OECD and G20 countries

Countries are indicated in bold when tax rate changes did not go in the same direction for all fuels

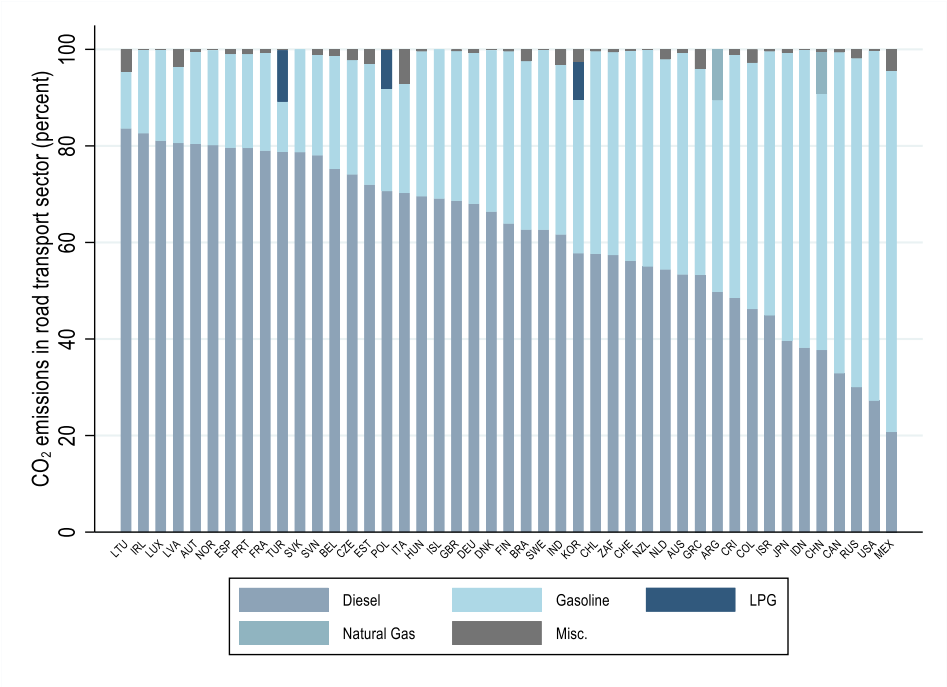
		Tax rate decrease	Tax rate stagnation	Tax rate increase
Fuel excise	Diesel	**Czechia**, **France** (buses and coaches), India, Ireland, Korea, **Mexico**, Netherlands, Norway, Portugal, Slovenia, Sweden, Switzerland, United Kingdom (13)	Austria, Brazil, Canada*, China, Germany, Estonia, Greece, **Italy**, Japan, Lithuania, **Luxembourg**, Latvia, Slovak Republic, Spain, Türkiye, United States (16)	Argentina, Australia, Belgium, Chile, Colombia, Costa Rica, Denmark, **Finland**, **France** (propellant, heavy good vehicles), Hungary, Indonesia, Iceland, Israel, New Zealand, Poland, South Africa (17)
	Gasoline	Hungary, India, Ireland, Israel, Korea, Netherlands, Norway, Portugal, Slovenia, Sweden, Switzerland, United Kingdom (12)	Austria, Brazil, Canada, China, **Czechia**, Germany, Estonia, **Finland**, Greece, Japan, Lithuania, Latvia, Slovak Republic, Spain, Türkiye, United States (16)	Argentina, Australia, Belgium (unleaded gasoline), Chile, Colombia, Costa Rica, Denmark, **France**, Indonesia, Iceland, **Italy**, **Luxembourg**, **Mexico**, New Zealand, Poland, South Africa (17)
	LPG	Korea	Lithuania, Türkiye	Poland
	Natural gas			Argentina
Carbon tax	Diesel	Slovenia	Finland, France, Japan, **Portugal** (non-commercial, road)	Argentina, Colombia, Denmark, Ireland, Iceland, Luxembourg, Mexico, Norway, **Portugal** (commercial, road), Sweden, South Africa
	Gasoline	Slovenia	Finland, France, Japan, **Portugal**	Argentina, Colombia, Denmark, Ireland, Iceland, Luxembourg, Mexico, Norway, Sweden, South Africa

Note: The rates considered for the purpose of this table are those that apply to fuels which account for more than 5% of a country's road transport CO_2 emissions as of 1 April 2021. Hence, not all fuel excise and carbon taxes are considered here. Carbon taxes which apply to natural gas or LPG in the road transport sector do exist (in Canada, Denmark, Finland, France, Ireland, Japan, Luxembourg, Mexico, Norway, Portugal, Slovenia, Sweden, South Africa), but not in countries where these fuels account for more than 5% of their road transport CO_2 emissions. Moreover, the rates considered in this table are the rates that apply at the federal level: state- or province-specific rates for the Canada, Mexico or the United States.

* Note that carbon taxes in provinces and territories that either have their own schemes (e.g. British Columbia, New Brunswick) or are subject to the federal carbon pricing system (such as Alberta, Manitoba) that includes the regulatory charge on fossil fuels, did increase from CAD 40 in 2021, to CAD 50 in 2022 and CAD 65 per tonne of CO_2 in 2023 in most cases.

Tax rate decreases did not necessarily take place on the CO_2 bases that were relatively higher in a country, nor did they necessarily increase on bases that were lower (see Table 4.1 and Figure 4.1). Czechia decreased their fuel excise rate on the fuel with the most important share of emissions in the country's road transport sector (above 70%), diesel, while Luxembourg and Italy increased their fuel excise rates on gasoline, which represents less than 20% of these countries' road transport sector CO_2 emissions. Current rates increased or remained stable for road transport sector use of fuels such as LPG and natural gas, which are less important in this sector.

Figure 4.1. Share of fuels in CO_2 emissions in the road transport sector



Note: The category Misc. groups fuels that each make up less than 5% of the country's road transport sector CO_2 emissions.

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Rates per unit of fuel may be converted into rates per tonne of CO_2. The tax base of fuel excise and carbon taxes in the road transport sector of the 45 OECD and G20 countries analysed in this chapter is expressed in litres of fuel for liquid fuels such as diesel, gasoline and LPG and cubic metres for gaseous fuels such as natural gas. Using a unit of fuel's carbon content, these taxes can then be expressed in tonne per CO_2 (see Table 4.2). Depending on a fuel's carbon content, the same price per litre of fuel may translate into different prices per tonne of CO_2. For instance, given the carbon content of one litre of LPG is lower than that of diesel, the same tax rate per litre on these two fuels translates into a higher tax per tonne of CO_2 for LPG.

Table 4.2. From tax rates per common commercial units to tax rates per tonne of CO_2

Fuel	Rate per common commercial unit	Equivalent rate in EUR per tonne of CO_2
Diesel	10 eurocent/L	37.5
Gasoline	10 eurocent/L	43.7
LPG	10 eurocent/L	63.2
Natural gas	10 eurocent/m^3	58.5

Note: OECD calculations based on IEA (IEA, 2023[12]), *World Energy Statistics and Balances*. The values shown are based on average carbon content of these energy categories across the 44 countries covered in the 2018 *Taxing Energy Use* edition. Actual carbon emissions associated with combusting the respective fuel may vary depending on local fuel characteristics.
Source: Adapted from Table 3.1 of OECD (2019[5]).

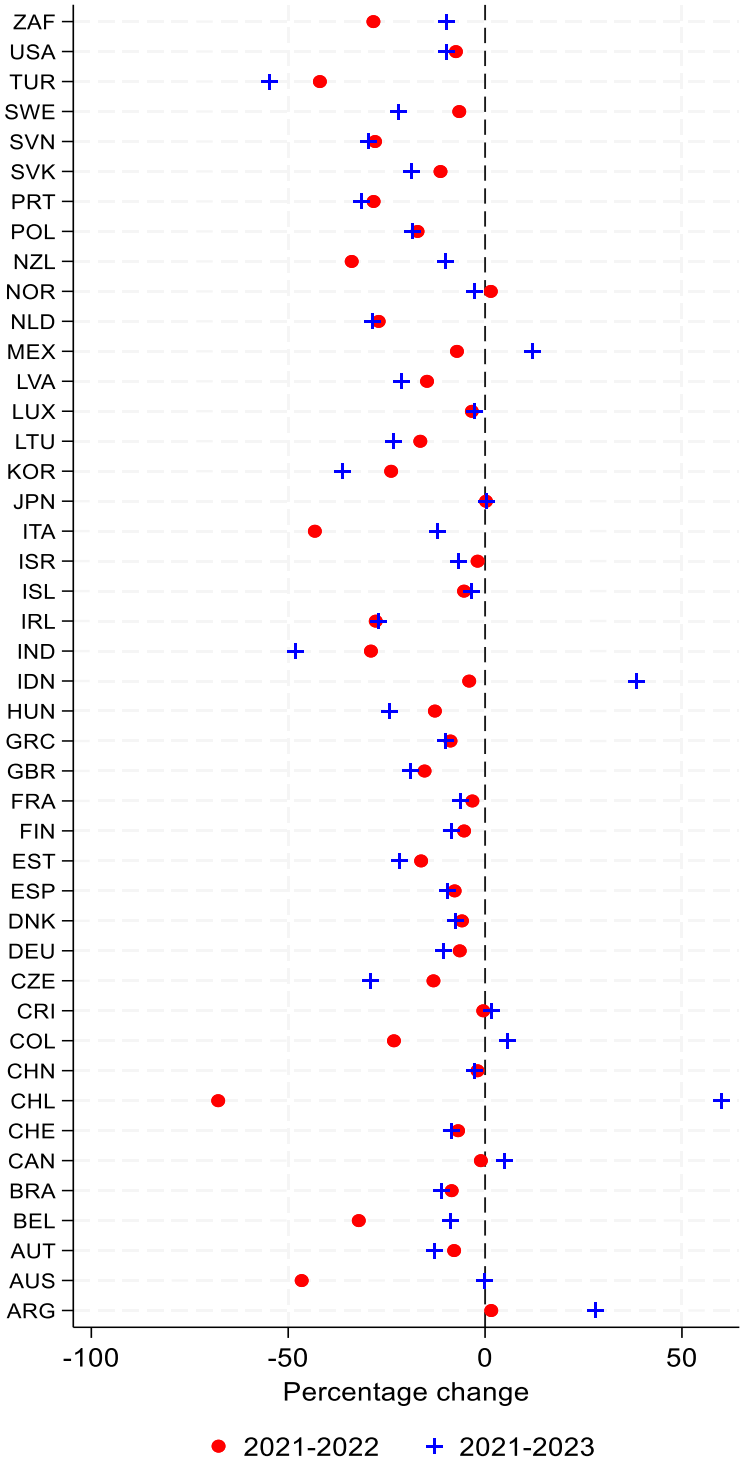
The remainder of the chapter considers rates expressed per tonne of CO_2 in constant 2021 prices and when considering the resulting effective carbon tax rates, most countries have seen a decrease in these

rates (see Figure 4.2). Given that rates expressed per tonne of CO_2 give a sense of the carbon price signal in the road transport sector, comparing them across years is best done by considering constant terms, i.e., accounting for inflation. When expressed in constant 2021 LCU per tonne of CO_2, effective carbon tax rates have decreased in 37 out of 45 countries' road transport sectors from 2021 to 2023. Part of this decrease is due to active policy choices of lowering current fuel excise rates on diesel and gasoline in certain countries (Table 4.1) and part of it is due to inflation combined either with government inaction in reforming fuel excise rates or with an increase in rates that did not match inflation. This contributes to explaining the discrepancy between Figure 4.2 and Table 4.1.[10]

Effective carbon tax rates expressed in constant 2021 LCUs increased in 16 countries between 2022 and 2023 as compared to three countries between 2021 and 2022. This resulted in an increase in effective carbon tax rates for eight countries between 2021 and 2023 (Figure 4.2). In Japan, effective carbon tax rates increased very slightly. Indeed, in Japan, tax rates did not vary (Table 4.1) over the whole period, and it is the only country in the sample which has not undergone inflation over 2021 to 2023. Argentina, Chile and Colombia are the only three countries which had provisions for indexing fuel excise or carbon taxes on inflation that also experienced an increase in effective carbon tax rates between 2021 and 2023. While federal fuel excise taxes remained constant in current prices in Canada, carbon taxes in provinces and territories that either have their own schemes or are subject to the federal carbon pricing system, increased, in most cases, by more than 50% in current prices, which translated into an increase in constant prices as well. Given that gasoline holds a more important share of emissions in the Mexican road transport sector, the increase in fuel excise rates on gasoline along with the increase in its carbon tax rates more than compensated the decrease in fuel excise rates on diesel. This resulted in an increase in Mexico's effective carbon tax rates between 2021 and 2023. Finally, Indonesia's fuel excise rates increased enough in current terms to translate into an increase in constant 2021 LCUs. Belgium, Ireland, Italy and Luxembourg are the only EU countries for which rates started increasing again from 2022 onwards.

Figure 4.2. Evolution of effective carbon tax rates in the road transport sector since 2021

Percentage changes between 2021 and 2022 as well as between 2021 and 2023, in constant 2021 LCU



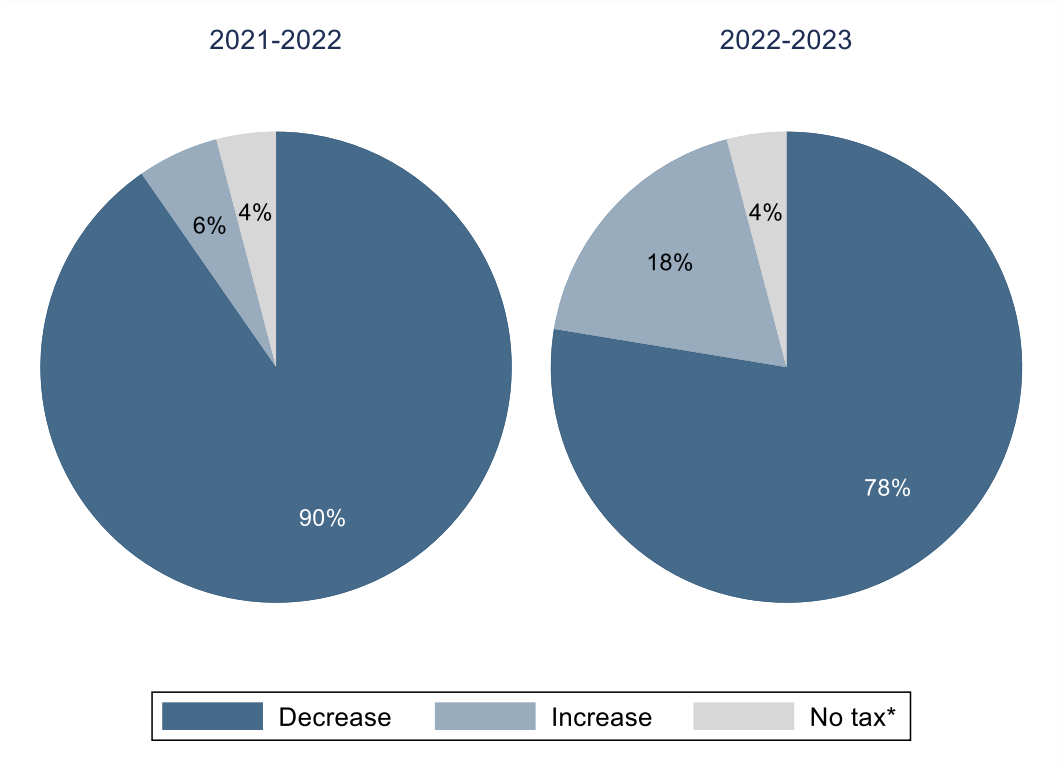
Note: State and province-specific tax rates for Canada, Mexico and the United States are included in the calculations. It is assumed that fuel excise state-level tax rates followed the same trend as federal-level tax rates in the United States and Canada (i.e. did not change in current terms), as well as in Mexico for state-level carbon tax rates.

StatLink https://stat.link/s9q8ml

Despite higher inflation in 2022 than in 2021, most tax rate decreases in the road transport sector took place between 2021 and 2022 – in 2023, rates are already starting to recover (Figure 4.3). A larger share of CO_2 emissions in the 45 countries' road transport sectors underwent a decrease in carbon prices resulting from taxes from 2021 to 2022 than from 2022 to 2023. As observed in current units already, more active policy reforms took place from 2021 to 2022 to decrease rates than from 2022 to 2023. Moreover, even though effective carbon tax rates decreased in most countries between 2021 and 2023, Figure 4.2 shows that even in constant 2021 prices, some increases in carbon rates took place between 2022 and 2023. Even though tax rates in constant 2021 EUR decreased in 2022 and 2023, the median remained stable (about EUR 63.5/tCO_2 in 2021 and 2023, about EUR 62/tCO_2 in 2022) (Figure 4.4). However, the highest rates decreased: while 29% of CO_2 emissions were subject to rates of EUR 120/tCO_2 or higher in 2021, only 21% are subject to such rates in 2023. This is consistent with most decreases taking place in the EU, where fuel excise taxes were highest in 2021.

Figure 4.3. Share of CO_2 emissions from energy use in the road transport sector which underwent a decrease or an increase in taxes

In constant 2021 LCU, 45 OECD and G20 countries

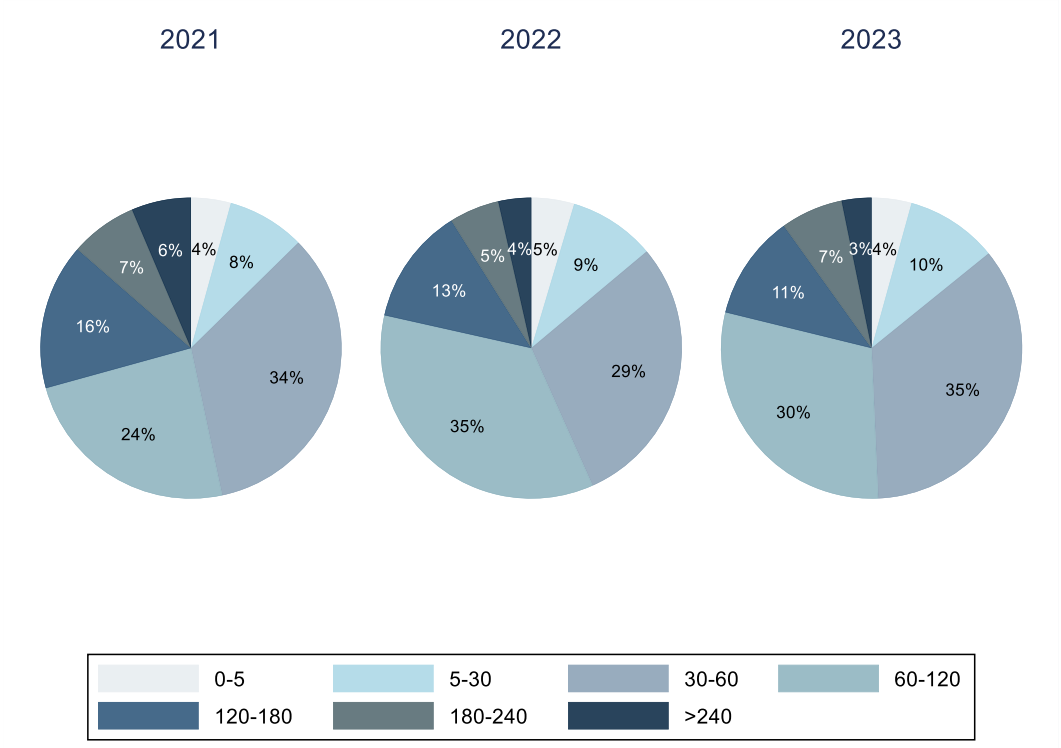


Note: *"No tax" stands for the emissions that did not face any carbon tax rate in 2021, 2022 and 2023. These are the only tax rates that remained the same over the whole period when taken in constant 2021 LCU.

StatLink https://stat.link/tumckd

Figure 4.4. Share of CO_2 emissions in the road transport sector subject to different tax rate levels

In EUR 2021, 45 OECD and G20 countries



Note: Rates were converted into (constant) 2021 EUR using the latest available OECD exchange rate and inflation data.

StatLink https://stat.link/uixbz4

While effective carbon tax rates did decrease in a large majority of OECD and G20 countries between 2021 and 2023, they have already started to recover. However, the reality of a low-inflation economy may be changing and indexing fuel excise and carbon tax rates on inflation may be a way to maintain carbon price signals provided by taxes as well as to raise revenue in line with increasing costs.

The decrease in effective carbon tax rates in the road transport sector between 2021 and 2023 in all EU countries and the increase in permit prices (even in constant 2021 rates, see Chapter 3) for sectors subject to the EU emissions trading system (ETS) has contributed to lessening the gap between ECRs in these different sectors. Indeed, between 2021 and 2023, in OECD and G20 countries covered by an ETS, average ECRs in the road transport sector have decreased by 7.5% (from about EUR 97 to EUR 90 per tonne of CO_2) and have increased by 46% in the electricity sector (from about EUR 9 to EUR 14 per tonne of CO_2) and by 26% in the industry sector (from about EUR 7 to EUR 9 per tonne of CO_2). An EU ETS 2 with auctioned permit prices, may contribute in the future to avoiding the decreases observed in sectors mainly covered by taxes such as the road transport sector. However, the recent plummeting of permit price levels in Korea shows that ETSs do not necessarily constitute a stronghold against economic downturns.

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Notes

[1] Long term trends such as underinvestment in natural gas and clean energy supply are also at play (see IEA (2021[13])).

[2] https://bit.ly/3P2E47B.

[3] Indeed, in times of crisis, broad-base tax reductions are easier to administer – especially when no prior targeting system is in place in the country. This also has the advantage of reaching those that may not be captured by the existing social benefits system. However, this comes at the expense of maintaining a price signal that is commensurate with the supply shortages and that is aligned with a net-zero pathway (see, e.g. Boone and Elgouacem (2021[14]), OECD (2022[2])).

[4] All OECD and G20 countries as of January 2023, excluding Saudi Arabia.

[5] Chapter 1 provides an explanation of instruments covered by the ECR indicator and the rationale for leaving some pricing instruments out of the database.

[6] Indeed, in stable times, while permit prices are volatile within a year, fuel excise and carbon taxes are generally fixed throughout a year. Hence, ECRs generally account for taxes as available on 1 April and average permit prices over the year.

[7] Current prices in a given year in a given currency are expressed in the value of the currency for that year. Hence, when comparing current prices over time, price inflation is not accounted for. Constant prices adjust for price inflation and are expressed against a benchmark year. They may then be used to measure “true variations” in a series of prices.

[8] In 2021, Argentina, Australia, Belgium, Colombia, Chile, Denmark, the Netherlands (suspended in 2022), the United Kingdom and South Africa (suspended in 2022) were the only countries among the countries analysed in this chapter which had provisions for indexing such taxes on inflation.

[9] (That can be translated into a carbon price).

[10] Different tax rate cuts and increases on diesel and gasoline within a same country, along with different carbon contents of these fuels can also contribute to the differences observed.