

Interpreting figures in country notes

The supplementary country notes for *Effective Carbon Rates 2023* (OECD, 2023^[1]) provide detail on price levels faced by GHG emissions, by country. The proportion of CO₂ emissions from energy use subject to different effective carbon rates (ECR) in each of the countries is presented in Figure 3. The country notes also show coverage as well as the level and components of average ECRs¹ in each of the six economic sectors (road transport, off-road transport, industry, agriculture and fishing, buildings, and electricity) which together account for all CO₂ emissions from energy use in Figure 2 as well as in the seventh category, “other GHG emissions” (methane, nitrous oxide, fluorinated gases and CO₂ from industrial processes), in Figure 1.

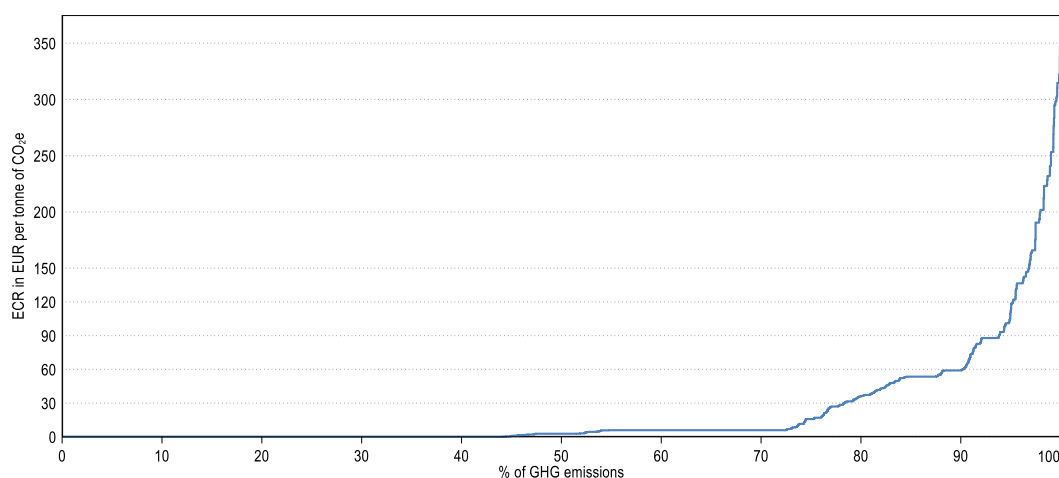
To facilitate the interpretation of the three figures shown in each of the individual country notes, this document presents and explains the three figures for the group of 72 countries as a whole. It begins with an interpretation of Figure 3, followed by one of Figure 2 and ending with Figure 1.

Distribution of Effective Carbon Rates (Figure 3)

This Figure presents the full distribution of Effective Carbon Rate (ECR) levels on CO₂ emissions from energy use across the 72 economies. More precisely, it sorts CO₂ emissions from energy use according to the ECR at which they are priced, starting at zero. The horizontal axis shows the proportion of CO₂ emissions while the vertical axis shows the ECR in EUR per tonne of CO₂. Figure 3 allows the share (in percentage) of CO₂ emissions from energy use priced at or below any given ECR to be identified. For example, around 44% of emissions from energy use in the 72 economies are unpriced, i.e. the blue line in Figure 3 starts to exceed 0 at an x of about 44%. In addition, where the blue line crosses the dashed grey line corresponding to an ECR of EUR 30 per tonne CO₂ in Figure 3, the horizontal axis indicates that around 78% of carbon emissions from energy use across the 72 countries are priced below an effective carbon rate of EUR 30. Similarly, around 90% of these emissions are priced below an effective carbon rate of EUR 60 per tonne of CO₂.

Figure 3. Distribution of ECRs on CO₂ emissions from energy use in 2021

Restricting to CO₂ emissions from energy use, 72 countries



¹ Not to be confused with EACRs (Effective Average Carbon Rates, which account for free allocation and hence provide information of average versus marginal carbon price signals).

Levels and coverage of effective carbon rates across sectors (Figure 2)

The levels and coverage of effective carbon rates vary widely across different sectors of the economy. This is illustrated in Figure 2, which presents the average ECRs and CO₂ emissions from energy use for the six sectors of the economy which are responsible for these emissions (road transport, off-road transport, industry, agriculture and fishing, buildings, and electricity). The horizontal axis of Figure 2 shows total CO₂ emissions from energy use for each sector across the 72 countries in thousand tonnes of CO₂. The width of each sector along the horizontal axis therefore represents the total carbon emissions from energy use from each sector. The vertical axis shows different levels of ECRs. Within each of the six sectors, the width of the shaded rectangles shows the amount of CO₂ emissions from energy use in that sector subject to each type of price instrument. The height of each shaded rectangle represents the average ECR level from the corresponding instrument conditional on instrument applicability (i.e. zeros are excluded). This Figure allows the components of the average ECR in each sector to be identified. Carbon taxes and fuel excise taxes are shown in light blue, while Emissions Trading System (ETS) are shown in green. A tonne of CO₂ emissions can be priced in different ways: only via taxes (corresponding to a light blue rectangle), only via a tradable emissions permit price (corresponding to a green rectangle), or via taxes and tradable permits (corresponding to a light blue rectangle, with a green rectangle on top). Emissions that are not priced are shown with no light blue or dark blue rectangle.

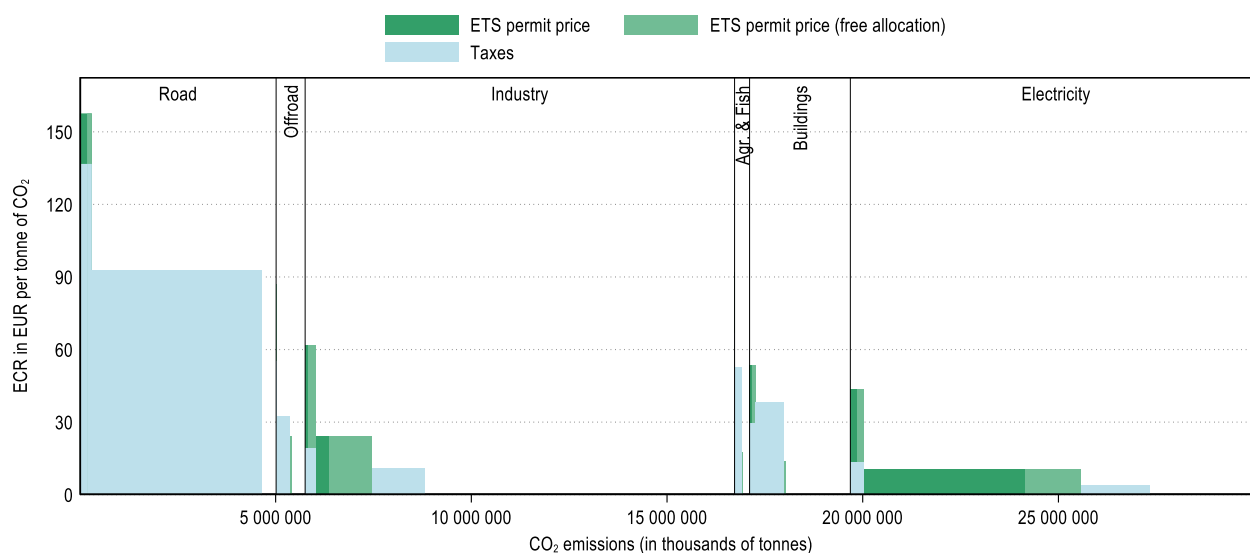
Figure 2 illustrates the wide variation in the composition of average ECRs in the different sectors of the economy across the 72 countries. Around ninety-three percent of carbon emissions from road transport are priced. Around eighty-seven percent of road emissions are priced by taxes alone at an average rate of EUR 93 per tonne of CO₂. About six percent of road emissions are subject to taxes and an ETS at an overall average ECR of EUR 158 per tonne CO₂. Carbon emissions from off-road transport and from agriculture and fishing – two relatively small sectors in terms of CO₂ emissions accounting for less than 4% of carbon emissions from energy use when taken together – are mainly priced via taxes, but ECR coverage is significantly lower than in the road sector (see the width of the light blue bars), and they are also priced at lower average rates (see the height of the light blue bars). ETSs cover a small proportion of emissions in each of these sectors, as shown by the thin green bars in these two sectors. Emissions from industry account for more than a third of carbon emissions from energy use across the 72 countries. About seventy-two percent of industrial emissions are unpriced. Of the remainder, the instrument mix is relatively diverse: Around 12% of emissions are subject to taxes only (the light blue bar), around 13% of emissions are priced via an ETS only (the green bar), and around 2.5% of emissions are priced via both taxes and ETS (the green and light blue bar combined). The overlap between ETS and taxes is thus relatively small in the industry sector, implying that the two pricing instruments often cover different emissions, increasing the total amount of emissions covered by a price in that sector. This small overlap can also be observed for carbon emissions from energy used in electricity generation, which also account for a bit more than a third of carbon emissions from energy use in the 72 countries. While in this sector about twenty-seven percent of carbon emissions are unpriced, around 3% of emissions are subject to both a tax and an ETS and face an average combined price from these instruments of almost EUR 44 per tonne CO₂ (i.e. the light blue and green bars). Taxes alone (the light blue bar) apply to around 17% of CO₂ emissions from energy use in the electricity sector at an average rate of EUR 4 per tonne of CO₂. A much larger proportion of emissions (around 53%) are priced at about EUR 10 per tonne of CO₂ on average through an ETS (the green bar). As in the industry sector, the taxes and permit prices often cover different emissions. The price signal from (fuel excise and carbon) taxes dominates the ECR on carbon emissions from the buildings sector, as it covers a relatively large proportion of the base (around 28%). Because different fuels used in one sector may be taxed at very different rates, the average carbon rates presented in Figure 2 may hide significant differences within sectors. For example, a majority of countries tax CO₂ emissions from gasoline used in the road transport sector at higher rates than those from diesel. Similarly, emissions from coal use

are often taxed at rates significantly lower than those applied to emissions from oil products or natural gas. The database relating to the *Pricing Greenhouse Gas Emissions* reports provides more detail on the exact distribution of tax rates that underlies the average tax rates shown in Figure 2 (<https://stats.oecd.org/Index.aspx?DataSetCode=ECRS>).

Free allocation affects the average price signal. The share of emissions priced by ETSs and subject to free allocation is shown in a lighter shade of green. The overall free allocation shares vary across sectors, with emissions from road transport receiving about 2% of free allocation and emissions from industry and electricity receiving more than 80% of free allocation. These overall shares, however, hide large heterogeneity across countries, with electricity receiving considerably less free allocation than industry in the EU ETS, for instance.

Figure 2. Average effective carbon rates by sector and component in 2021

Restricting to CO₂ emissions from energy use, 72 countries



Levels and coverage of effective carbon rates across CO₂ vs other GHG emissions (Figure 1)

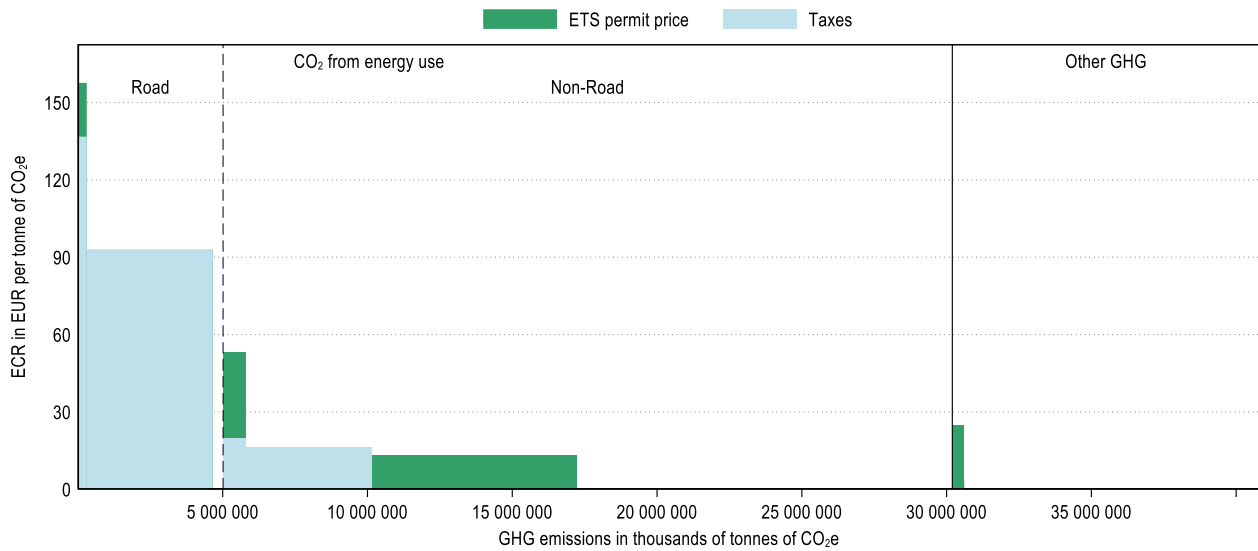
This Figure provides information on coverage of CO₂ emissions from energy use versus other GHG emissions (i.e., methane, nitrous oxide, fluorinated gases and CO₂ from industrial processes), as well as levels and components of average ECR in these categories. Given the larger coverage and higher rates of CO₂ emissions from energy use in the road transport sector, the CO₂ emissions category is split between the road transport sector and the other five above-mentioned sectors. The Figure reads in the same way as Figure 2. In particular, the majority of unpriced emissions originate from non-road CO₂ emissions from energy use and other GHG emissions. These latter emissions, which represent about 26% of GHG emissions over the 72 countries considered are mostly priced through ETSs, which covered almost 4% of other GHG emissions at an average ECR of EUR 25 per tonne of CO₂. Taxes cover less than 0.2% of these emissions.

Given the uncertainties around the measurement of other GHG emissions (see discussion in Chapter 2, section 2.2 of the *Effective Carbon Rates 2023* report, OECD (2023_[11])), coverage and average rates faced

by emissions in this category present uncertainty. They are shown in the individual country notes but are not discussed in the main analysis of the report.

Figure 1. Average effective carbon rates in 2021

CO₂ emissions from energy use and other GHG emissions, 72 countries



All figures in the country notes exclude CO₂ emissions from biofuel combustion. This is discussed in the main text of the report (Chapter 1, section 1.3 of *Effective Carbon Rates 2023* (OECD (2023_[1]))).

Annex A of *Effective Carbon Rates 2023* provides figures including CO₂ emissions from biofuel combustion.

The *Effective Carbon Rates 2023* report, brochure and country notes are available at: <http://oe.cd/ECR2023>.