OECD Inventory of Support Measures for Fossil Fuels 2024

November 2024



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Policy Trends up to 2023



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Key messages

- The fiscal cost of government support for fossil fuels fell by around one third in 2023 to USD 1.1 trillion, down from USD 1.6 trillion in 2022, reflecting in large part a decline in energy supply costs from record highs in 2022. This decline lowered the reference price, and thus the estimated value of fossil fuels sold below this reference price. Yet, with many measures to support production and consumption of fossil fuels still in place or increasing, the fiscal cost of support to fossil fuels remains elevated relative to its historical average.
- Most (90%) of the fiscal cost of support related to the consumption of fossil fuels. The fiscal cost of support for residential users increased by 29% to record highs, reaching USD 189.3 billion in 2023 (from USD 146.4 billion in 2022), while for manufacturing and other industries it increased by 14% to USD 103.8 billion in 2023 (from USD 90.9 billion in 2022). Most of this support lacked systematic targeting towards those in greatest need, raising both equity and efficiency concerns.
- Economic incentives to decarbonise from fuel taxes, carbon taxes, emissions trading systems (ETSs) and price-reducing support mechanisms – summarised in the net Effective Carbon Rate (Net ECR) declined compared to 2021. While carbon taxes and ETS prices saw modest increases, the increase in support measures through direct budgetary transfers for fossil fuels and low fuel excise rates led to a decrease in the average Net ECR to EUR 14.0/tCO_2e in 2023 from EUR 17.9/tCO_2e in 2021.
- In 2023, as in 2021, the share of GHG emissions covered by a positive Net ECR remained unchanged was 42%; 27% of GHG emissions are covered by explicit carbon prices (carbon taxes or ETSs).
- The high fiscal cost of government support for fossil fuels and low Net ECR highlight the challenges of staying on track with net zero commitments in the face of economic and geopolitical pressures.
- Reforms should focus on better targeting those most in need and phasing out inefficient support for fossil fuels as soon as possible to enable the release of much-needed resources for the net zero transition and help accelerate innovation for energy efficiency.
- Given the high costs of inaction, governments should reaffirm and implement their SDG commitment to phase out and reform inefficient support to fossil fuels to align fiscal policy with climate goals.

1 The fiscal cost of government support for fossil fuels and incentives for decarbonisation

Addressing support to fossil fuels has been recognised as a global priority

The importance of tracking and reporting government support for fossil fuels has been recognised by the international community. The Glasgow Climate Pact adopted at the United Nations Framework Convention on Climate Change (UNFCCC) COP26 in 2021 included a call, subsequently reiterated at COP27 and COP28, to "phase out inefficient fossil fuel subsidies". G7 countries have also committed to phase-out inefficient fossil fuel subsidies by 2025[1], while the UN includes action on support to fossil fuels (using the OECD methodology, see below) in Sustainable Development Goal (SGD) 12 and target 12.c.1.

While support to fossil fuels can reduce the burden of high energy bills on households and firms, fossil fuel support can have a sizeable fiscal cost, increase carbon emissions and air pollution, undermine incentives for the net zero transition and thus longer-term growth. Moreover, as currently designed, they tend to disproportionately benefit higher-income households.

Support can be understood in terms of the fiscal cost of support measures…

Since 2013, in its *Inventory of Support Measures for Fossil Fuels* (hereafter the Inventory), the OECD has been collecting information on policies that likely encourage the production and use of fossil fuels through direct transfers and tax expenditures. The primary objective of the Inventory is to enhance transparency by casting a wide net and identifying public policies which may result in more production and consumption of fossil fuels than would have been the case absent government intervention. It therefore sheds light on government practices that may need to be reformed in the context of the net zero transition. Data on individual support measures for fossil fuels is collected from official government sources (e.g. budget reports, see Section 5).

Information documented in the Inventory includes the fiscal costs of the covered support measures, capturing the preferential treatment accorded to fossil fuels in terms of the cost of direct budgetary transfers to consumers and producers of fossil fuels, and the revenue forgone incurred by applying lower tax rates on fossil fuels. In addition, the International Energy Agency (IEA) measures price support to fossil fuels estimated from the volume of such fuels sold below market prices, thereby promoting fossil fuel consumption. The aggregate fiscal costs obtained by combining the OECD and the IEA data therefore includes the fiscal cost of support for fossil fuels through three support mechanisms: direct transfers, tax expenditures, and price support. The fiscal costs of support measures for fossil fuels thus shows how government support to fossil fuels impacts a country's fiscal position on both the revenue and expenditure sides, highlighting the fiscal resources that could be deployed to meet other policy objectives (Sections 2 and 5).

Government spending and revenue foregone are a measure of the fiscal costs of support policies which likely influence the incentives to decarbonize. Policies could, for instance, decrease end-user fossil fuel prices, thereby potentially increasing both their use and associated carbon emissions and air pollution. Moreover, fiscal costs are relevant from a budgetary perspective in terms of quantifying the fiscal cost of measures that provide favourable treatment to fossil fuels, and so can provide useful information for international efforts to address these underlying support measures (such as at the World Trade Organisation[2]).

And in terms of wider decarbonisation incentives as measured by the Net Effective Carbon Rate

The strength of incentives to decarbonise is in part captured by the OECD Net Effective Carbon Rates (hereafter, Net ECR). The indicator measures carbon pricing broadly including carbon pricing reducing support measures (OECD, 2021[1]). The Net ECR combines the fiscal costs of support measures recorded in the Inventory with the OECD Carbon Pricing and Energy Taxation (CPET) database to estimate the effective marginal carbon rates net of direct budgetary transfers that lower pre-tax prices for fossil fuels. That is, the Net ECR is a measure of the strengths of the decarbonisation incentives implemented through multiple carbon pricing policies: direct budgetary transfers for fossil fuels, fuel excise taxes, carbon taxes and ETS permit prices (Sections 3 and 5).

Together these provide a more comprehensive view of policies and incentives related to fossil fuels

These two metrics – the fiscal cost of support and Net ECR – provide two complementary perspectives on the impact of support for fossil fuels. First, a budgetary perspective, providing information about the fiscal cost of measures that appear to accord preferential treatment to fossil fuels. This can be useful in informing efforts to negotiate the reduction of such measures. Second, the Net ECR provides an economic perspective, measuring the strength of the incentives to decarbonise from carbon pricing policies and direct budgetary transfers for fossil fuels. This is useful for an assessment of the extent to which carbon pricing efforts support the net zero transition. This report summarises the main results stemming from the latest updates of these two datasets, thereby presenting a more comprehensive picture of the nature and magnitude of support to fossil fuels (Box 1).

Box 1. Two metrics to measure the impact of support for fossil fuels

This report is based on two complementary metrics to analyse the impact of support to fossil fuels. Each of them has some advantages and caveats that need to be noted:

Section 2 draws upon the 2024 update of the *OECD Inventory of support measures for fossil fuels* covering 48 countries.

- Aggregate numbers from the Inventory presented in the second section of this report all represent the fiscal cost of support measures for fossil fuels. They provide information about how government support to fossil fuels impacts a country's fiscal position on both the revenue and expenditure side, shedding light on government measures that may need to be reformed and which could free substantial fiscal resources that could be deployed to meet other policy objectives. However, the fiscal cost should not be interpreted as an indicator of the extent to which the considered policies are favourable or unfavourable to climate change mitigation.

- The Inventory reports tax expenditures as estimates of revenue that is foregone due to a particular feature of the tax system that reduces or postpones tax payments (relative to a jurisdiction's own benchmark tax system) to the benefit of fossil fuel producers or users. Hence, (i) tax expenditure estimates can increase over time either because of greater concessions (relative to the benchmark tax system) or because of an increase in the benchmark itself; and (ii) cross-country comparisons of tax expenditures can be misleading due to country-specific benchmark tax systems.
- Individual support measures for fossil fuels are included in the Inventory without reference to their economic or environmental effects. No judgment is therefore made as to whether specific measures are inefficient or ought to be reformed. Moreover, while data collected in the OECD Inventory aim to be comprehensive, the Inventory is not exhaustive. In particular, the OECD Inventory contains more information for countries that provide greater transparency in their budget documentation. This does not necessarily imply that these countries provide higher levels of support than others but may reflect their greater transparency regarding the support they provide.

Section 3 draws upon the 2024 update of the net Effective Carbon Rates estimates (net ECR) covering 79 countries.

- Net ECR estimates aim to measure the extent to which countries price their GHG emissions via fuel excise taxes, carbon taxes, ETS permit prices, net pre-tax support to fossil fuels. They provide information about how direct government support for fossil fuels (as negative carbon prices), alongside with explicit carbon pricing instruments and specific taxes on energy use, impacts a country's economic position in terms of efforts to price carbon emissions.

Section 5 provides further details, including country coverage, of both approaches.

Notes

[1] See G7 Climate, Energy and Environment Ministers' Communiqué: https://www.meti.go.jp/press/2023/04/20230417004/20230417004-1.pdf.

[2] See, for example, https://www.wto.org/english/tratop_e/envir_e/fossil_fuel_e.htm.

2 Key trends in the fiscal cost of support measures for fossil fuels

The fiscal cost of government support for fossil fuels decreased significantly in 2023 as energy supply costs fell

New OECD and IEA data show that the fiscal cost of global support for fossil fuels dropped by almost one third to USD 1 102.1 billion in 2023, down from USD 1 612.6 billion in 2022. Energy supply costs, used as a benchmark reference price, fell from record highs in 2022 in many parts of the world, thereby decreasing the estimated value of fossil fuels sold below this reference price (IEA, 2024[2]). That said, with many measures supporting production and consumption of fossil fuels still in place, the fiscal cost of support measures for fossil fuels remains elevated compared relative to the historical average (Figure 2.1).

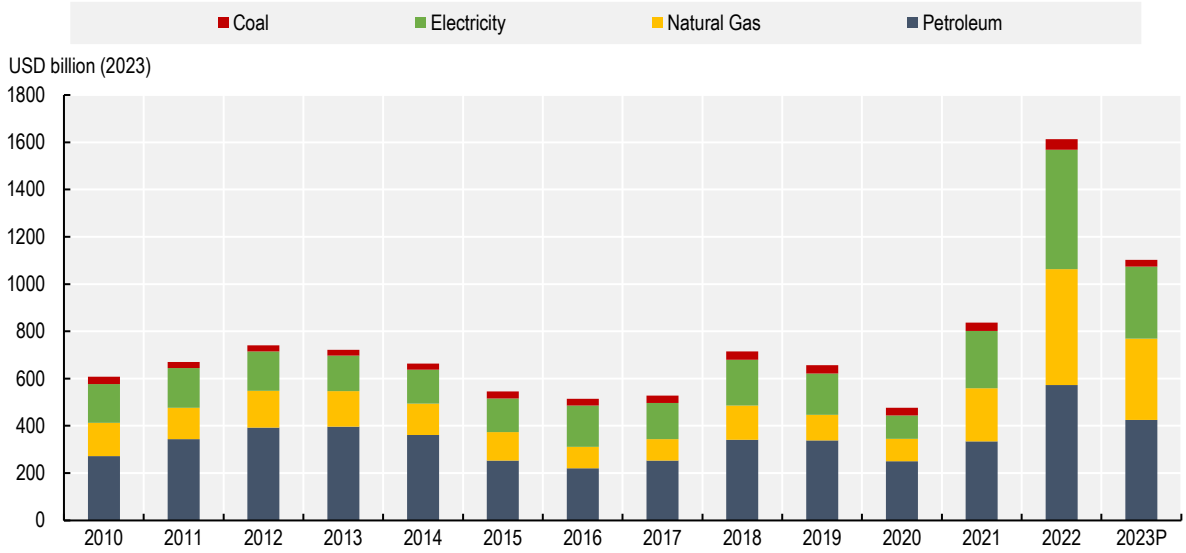
The OECD Inventory estimates that direct transfers and tax expenditures associated with support measures for fossil fuels amounted to USD 514.1 billion in 2023. In addition, the IEA calculates that fossil fuels sold below market prices amounted to USD 616.4 billion. Decreases were significant across electricity, coal, petroleum, and natural gas (Figure 2.1).

The 2023 IEA estimates of the under-pricing of fossil fuels (USD 616.4 billion) are about half of the comparable figure for 2022 (USD 1 178 billion). Benchmark prices (based on energy supply costs) eased, particularly for natural gas, thereby decreasing the difference between the subsidised end-user prices and the benchmark prices (IEA, 2024[2]). That said, the Inventory reports a slight increase in the fiscal cost of support measures for fossil fuels compared with 2022 level (USD 514.1 billion vs USD 503.7 billion), highlighting that governments continued to support fossil fuel production and consumption through specific support measures.

The fiscal cost of direct budgetary transfers amounted to USD 269.8 billion in 2023, making them for the first time more costly than tax expenditure measures (which fell from USD 260.4 billion in 2022 to USD 244.3 billion, Figure 2.2). Most of this fiscal cost of direct budgetary transfers is due to the implementation of several lump sum transfers, support providing compensation for increased energy bills and regulated or capped energy prices to offset exceptionally high energy prices since 2022.

Figure 2.1. The fiscal cost of support for fossil fuels dropped by almost one-third in 2023

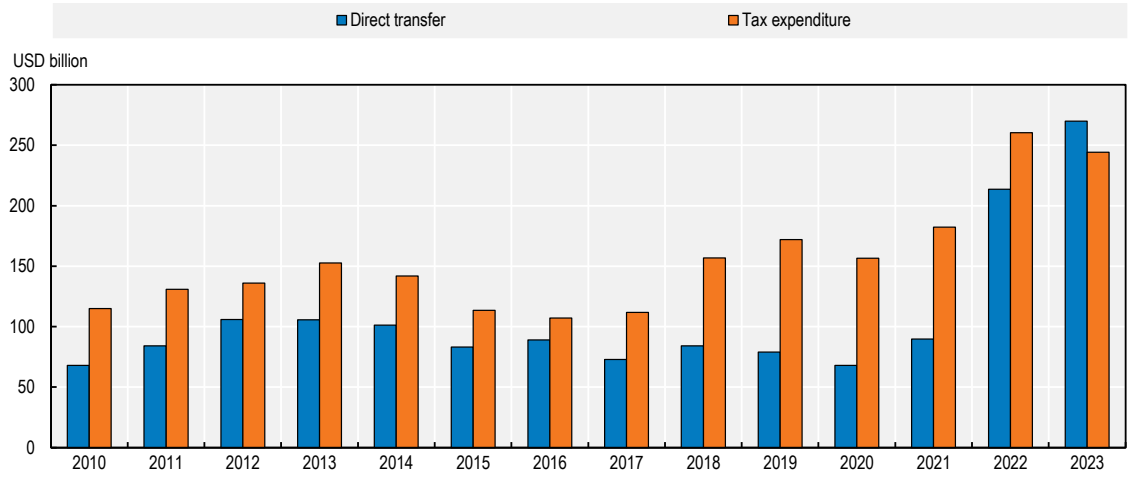
OECD-IEA combined estimate of the fiscal cost of support measures for fossil fuels (82 economies), by fuels (in USD billion, 2023)



1) The OECD-IEA combined estimate covers 82 countries, resulting from merging IEA price-gap estimates and OECD Inventory estimates of the fiscal cost of support measures for fossil fuels. Countries included in the calculations are: Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belgium, Bolivia, Brazil, Brunei Darussalam, Canada, Chile, People's Republic of China (hereafter 'China'), Colombia, Costa Rica, Croatia, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Gabon, Georgia, Germany, Ghana, Greece, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Islamic Republic of Iran, Israel, Italy, Japan, Kazakhstan, Korea, Kuwait, Latvia, Libya, Lithuania, Luxembourg, Malaysia, Mexico, Moldova, Netherlands, New Zealand, Nigeria, Norway, Oman, Pakistan, Poland, Portugal, Qatar, Russian Federation, Saudi Arabia, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Chinese Taipei, Thailand, Trinidad and Tobago, Türkiye, Turkmenistan, Ukraine, United Arab Emirates, United Kingdom, United States, Uzbekistan, Venezuela, Viet Nam.
2) Fiscal cost of support for the fuel "Electricity" is derived from measures providing support for electricity generation or consumption (e.g. through regulated electricity tariffs for end-users). Estimates only include the fossil fuel share in electricity generation (i.e. excluding renewables and other non-fossil fuel sources). Measures supporting electricity generation technology based on a specific fossil fuel (used as an input) are categorised under this fuel (i.e. petroleum, coal, or natural gas).
3) Fiscal cost of support measures for fossil fuels included in the Inventory are based on information reported by countries through official documentation (e.g. budget reports). Support measures for which such information is not available are excluded from the aggregate amount reported in this report. In addition, support measures in certain countries may not have been exhaustively identified.
4) The Inventory reports tax expenditures as estimates of revenue that is foregone due to a particular feature of the tax system that reduces or postpones tax payments (relative to a jurisdiction's benchmark tax system) to the benefit of fossil fuels' producers or users. Hence, (i) tax expenditures estimates can increase over time either because of greater concessions (relative to the benchmark tax system) or because of an increase in the benchmark itself; (ii) cross-country comparisons of tax expenditures can be misleading due to country-specific benchmark tax systems.
5) Individual support measures for fossil fuels are included in the Inventory without reference to their economic or environmental effects. No judgment is therefore made as to whether such measures are inefficient or ought to be reformed.
6) Data are expressed in constant 2023 US dollars. Data for 2023 are on a preliminary basis.
Sources: OECD Inventory of support measures for fossil fuels and IEA Fossil Fuel Subsidies Database.

Figure 2.2. The fiscal cost of direct budget transfers was larger than tax expenditures in 2023

Fiscal cost of support measures for fossil fuels in OECD & partner countries (48 countries), by support mechanism (in USD billion)



1) Countries included in the calculations are: Argentina, Armenia, Australia, Austria, Azerbaijan, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Moldova, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States.
2) Fiscal cost of support measures for fossil fuels included in the Inventory are based on information reported by countries through official documentation (e.g. budget reports). Support measures for which such information is not available are excluded from the aggregate amount reported in this report. In addition, support measures in certain countries may not have been exhaustively identified.
3) The Inventory reports tax expenditures as estimates of revenue that is foregone due to a particular feature of the tax system that reduces or postpones tax payments (relative to a jurisdiction's benchmark tax system) to the benefit of fossil fuels' producers or users. Hence, (i) tax expenditures estimates can increase over time either because of greater concessions (relative to the benchmark tax system) or because of an increase in the benchmark itself; (ii) cross-country comparisons of tax expenditures can be misleading due to country-specific benchmark tax systems.
4) Individual support measures for fossil fuels are included in the Inventory without reference to their economic or environmental effects. No judgment is therefore made as to whether such measures are inefficient or ought to be reformed.
5) Data are expressed in nominal US dollars. Data for 2023 are on a preliminary basis.
Source: OECD Inventory of support measures for fossil fuels.

The fiscal cost of support for coal fell from record highs, while support for natural gas has becomes relatively more important

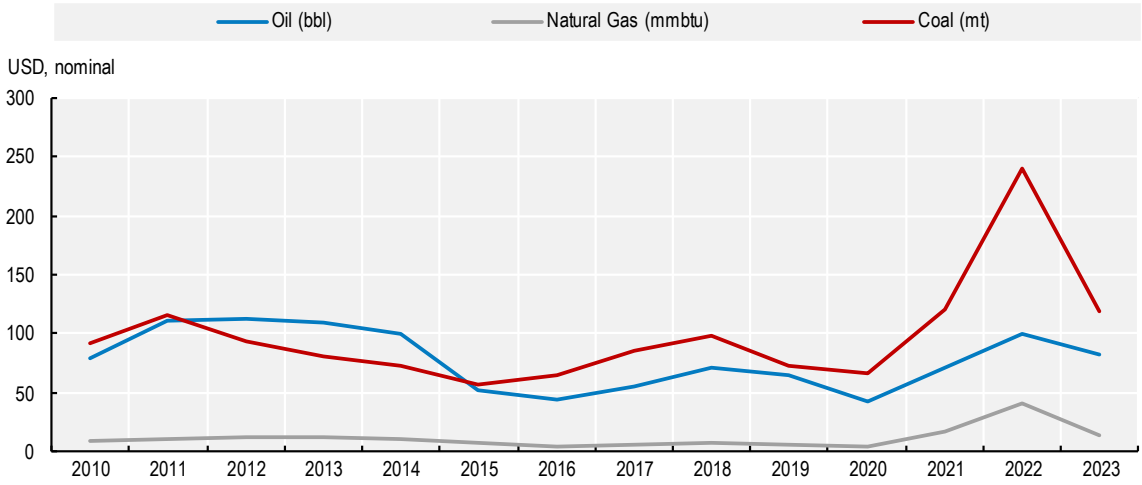
Over the last ten years, the fiscal cost of support measures for coal – the most emission-intensive fuel – has shown significant fluctuations (Figure 2.1). Between 2014 and 2018, this type of support increased from USD 25.7 billion to USD 35.9 billion. This reflected the efforts of various governments to sustain coal use amid concerns about energy security and debates about the need to maintain conventional energy sources. While volatile over 2018 to 2021, the fiscal cost of coal support measures saw a significant increase from 2020, peaking at USD 43.5 billion in 2022, the highest level recorded in the decade. This surge resulted from transitional measures adopted by many governments to ease the financial burden on vulnerable households, to counteract the impact of high oil and gas prices.

However, 2023 saw a significant reduction in the fiscal cost of coal support measures to USD 27.7 billion, a 36% decrease from the previous year. This decline was largely due to the end of the transitional measures implemented from 2022. Nevertheless, this shift could also reflect the start of a realignment of policies with international climate commitments, with increased efforts to reduce support for the most emission-intensive fuel.

While the fiscal cost of support to coal has seen a dramatic decrease, natural gas greatly increased its share in the total fiscal cost of support for fossil fuels. This growth trend for natural gas began as far back as 2018 yet grew rapidly in the past three years to from 20% of total fiscal support in 2020, to 31% in 2023. This represents a more than doubling in the last five years, from USD 145 billion in 2018 to USD 343 billion in 2023.

Considered to be the cleanest type of fossil fuel in terms of CO_2 emissions, natural gas has often been promoted as an effective transitional fuel while renewable alternatives become available at scale. While this may explain the broader trend of increasing fiscal cost of support for natural gas, it does not fully account for the recent jump in the fiscal cost of support, especially during and after the energy crisis. Rather, this recent fluctuation may be better explained by the interruption of piped natural gas to Europe from the Russian Federation resulting in a peak in global natural gas prices in 2022 (Figure 2.3; (IEA, 2024[3]; World Bank, 2024[4]).

Figure 2.3. Fossil fuel prices went down in 2023



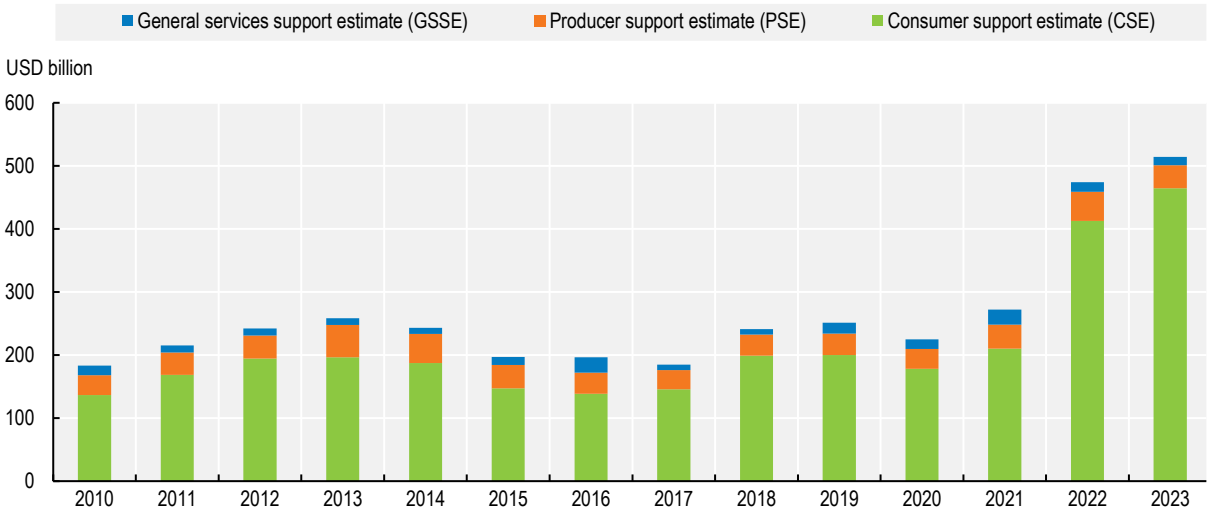
Note: Natural gas prices are based on the TTF benchmark price. Oil prices are based on the Brent Crude benchmark. Coal Prices are based on the South African benchmark.
Source: World Bank Commodity Price Data.

Support for consumption by households and firms accounts for most of the fiscal cost of support for fossil fuels, but remains largely untargeted

While energy supply costs eased since their peak in 2022 (IEA, 2024[2]), the fiscal cost of support to fossil fuel consumption has remained high and even grew slightly from USD 412 billion in 2022 to USD 464 billion in 2023. The Consumer Support Estimate (CSE) reached its highest ever share of the total fiscal cost of support to fossil fuels, accounting for just over 90% of the fiscal cost of support, up from 87% in 2022 (Figure 2.4). At the same time, support to producers estimate (PSE) and general support estimate (GSSE) both decreased by 21% (from USD 46.1 billion to USD 36.5 billion) and 16% (from USD 15.3 billion to USD 12.9 billion) in 2023, respectively.

Figure 2.4. Support to consumption represents the vast majority of the fiscal cost of support to fossil fuels

Fiscal cost of support measures for fossil fuels in OECD and partner countries (48 countries), by type of support (in USD billion)

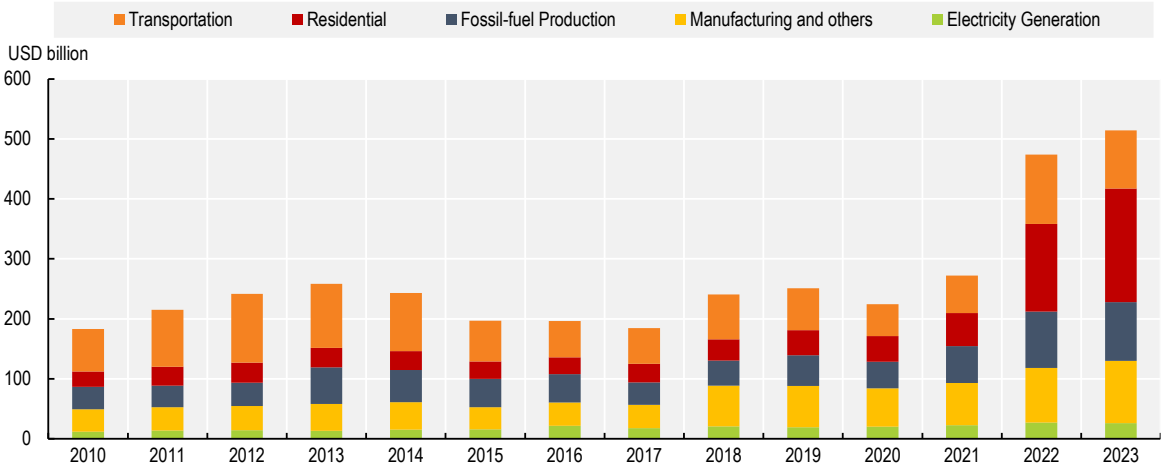


1) Producer Support Estimate (PSE) includes measures that support the activities of exploration and extraction, bulk transportation and storage, and refining and processing of fossil fuels. Consumer Support Estimate (CSE) includes measures that support the use of fossil fuels in power and heat generation, industrial processes, and activities outside of the energy sector, and all other final uses of fossil fuels, whether in the transport sector, the residential sector, or primary industries outside of the energy sector (e.g. agriculture and forestry). General Services Support Estimate (GSSE) includes measures benefitting producers or consumers collectively, as are measures that do not increase current production or consumption of fossil fuels but may do so in the future. Examples of GSSE measures would include public support for industry-specific infrastructure development such as public support for the construction of coal or natural-gas terminals.
2) Countries included in the calculations are: Argentina, Armenia, Australia, Austria, Azerbaijan, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Moldova, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States.
3) Fiscal cost of support measures for fossil fuels included in the Inventory are based on information reported by countries through official documentation (e.g. budget reports). Support measures for which such information is not available are excluded from the aggregate amount reported in this report. In addition, support measures in certain countries may not have been exhaustively identified.
4) The Inventory reports tax expenditures as estimates of revenue that is foregone due to a particular feature of the tax system that reduces or postpones tax payments (relative to a jurisdiction's benchmark tax system) to the benefit of fossil fuels' producers or users. Hence, (i) tax expenditures estimates can increase over time either because of greater concessions (relative to the benchmark tax system) or because of an increase in the benchmark itself; (ii) cross-country comparisons of tax expenditures can be misleading due to country-specific benchmark tax systems.
5) Individual support measures for fossil fuels are included in the Inventory without reference to their economic or environmental effects. No judgment is therefore made as to whether such measures are inefficient or ought to be reformed.
6) Data are expressed in nominal US dollars. Data for 2023 are on a preliminary basis.
Source: OECD Inventory of support measures for fossil fuels.

The residential sector benefitted the most from the increased support for consumption, with its fiscal cost reaching a record USD 189 billion, a 29% increase from 2022 (Figure 2.5). Residential support has also become by far the largest share of total fiscal cost of sector support at 37%. The fiscal cost of support to manufacturers and industry also experienced an important 14% increase in 2023, reaching a record high of USD 103 billion. The growth of the fiscal cost of support in these two sectors was matched by a relative decline in the fiscal cost of support for transportation and electricity generation. The transportation sector's share of the fiscal cost of support fell to a record low of 18.8%, declining from USD 115.5 billion in 2022 to USD 96.8 billion in 2023. Similarly, the share of the fiscal cost of support for electricity generation fell to a low of 5.1%, declining from USD 27.4 billion in 2022 to USD 26.2 billion in 2023.

Figure 2.5. Support for residential use and manufacturing now represents the largest shares of the overall fiscal cost of support

Fiscal cost of support measures for fossil fuel in OECD and partner countries (48 countries), by sector (in USD billion)



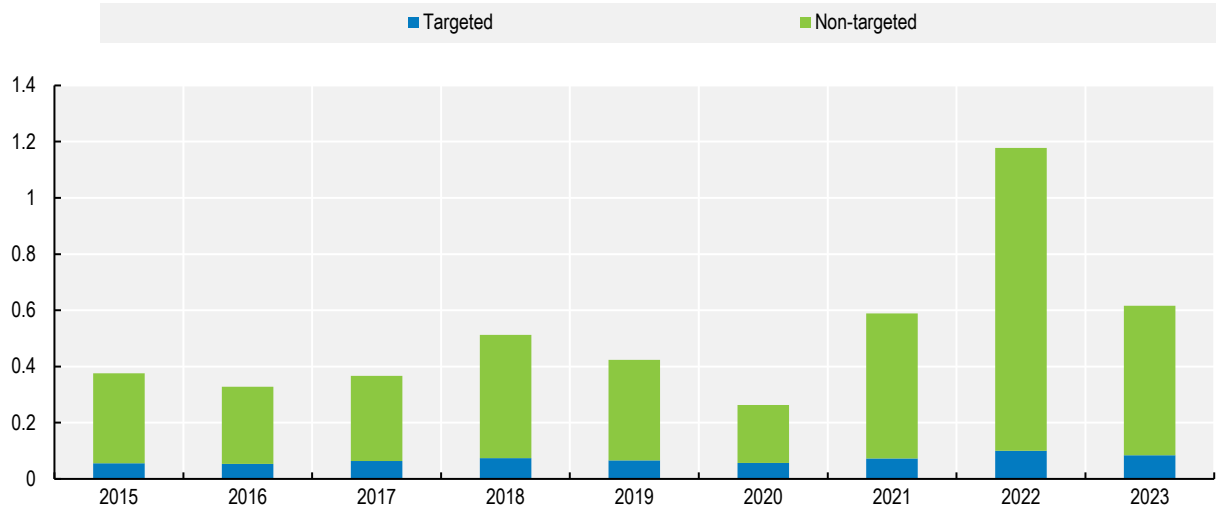
1) Production sector includes measures that support the production, exploration, trade, storage, and transportation of fossil fuels. The transportation sector includes measures that support the final uses of fossil fuels in the transport sector, including domestic aviation, domestic navigation, road, and rail. Residential sector includes measures that support the final use of fossil fuels (including electricity) in the residential sector (i.e. consumption by households). The electricity generation sector includes measures that support fossil fuel-based electricity and heat generation (both main and auto producers). Manufacturing and others include measures that support the use of fossil fuels in the energy transformation sector other than electricity and heat generation, industrial and manufacturing sector, commercial and public services, agriculture, forestry, and fisheries.
2) Countries included in the calculations are: Argentina, Armenia, Australia, Austria, Azerbaijan, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Moldova, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States.
3) Fiscal cost of support measures for fossil fuels included in the Inventory are based on information reported by countries through official documentation (e.g. budget reports). Support measures for which such information is not available are excluded from the aggregate amount reported in this report. In addition, support measures in certain countries may not have been exhaustively identified.
4) The Inventory reports tax expenditures as estimates of revenue that is foregone due to a particular feature of the tax system that reduces or postpones tax payments (relative to a jurisdiction's benchmark tax system) to the benefit of fossil fuels' producers or users. Hence, (i) tax expenditures estimates can increase over time either because of greater concessions (relative to the benchmark tax system) or because of an increase in the benchmark itself; (ii) cross-country comparisons of tax expenditures can be misleading due to country-specific benchmark tax systems.
5) Individual support measures for fossil fuels are included in the Inventory without reference to their economic or environmental effects. No judgment is therefore made as to whether such measures are inefficient or ought to be reformed.
6) Data are expressed in nominal US dollars. Data for 2023 are on a preliminary basis.
Source: OECD Inventory of support measures for fossil fuels.

Households have been significantly impacted by the energy crisis. Energy poverty has been rising, with millions of individuals now reported to be facing heightened difficulties in meeting essential energy needs such as heating their homes during winter, notably across Europe (European Commission[5]). Indeed, the average pre-tax electricity price for households in the European Union increased by 6.55% in 2023 over 2022 and now stands at 61.73% higher than 2021 levels (Eurostat[6]). The most vulnerable populations, generally low-income households and the elderly, are disproportionately affected due to their limited capacity to absorb these rising costs (OECD, 2022[7]). Moreover, the sharp rise in energy bills has also impacted their capacity to allocate resources to other essential needs, such as food and education. Again, low- and middle-income households are particularly vulnerable, as they devote a larger portion of their income to energy costs (OECD, 2022[7]).

Support to consumption, if well-targeted, can thus play a key role in alleviating the burden on households in times of pressure from rising energy costs. However, measures to support fossil fuel consumption were still largely poorly targeted in 2023 (85% of fossil fuels sold below market prices were untargeted, Figure 2.6). While defining and identifying the right target to support may be challenging (OECD, 2023[8]; Hemmerlé et al., 2023[9]), poorly targeted measures raise concerns related to efficiency, equity, and the environment. First, the fiscal cost of poorly targeted support measures is higher than necessary as a broader range of recipients beyond just lower income households benefit from them, raising efficiency concerns. Second, these measures often disproportionately favour wealthier households, which typically consume more energy – e.g. through larger vehicles, more spacious homes potentially equipped with air conditioning and more electrical appliances (Wooders, 2024[10]), raising equity concerns. Finally, untargeted measures distort price signals, thereby contributing to the higher continued consumption of fossil fuels.

Figure 2.6. The vast majority of fossil fuel consumption support measures by value are still untargeted

Fossil fuels sold below market prices in 49 countries (in USD billion, 2023)



1. Targeted support measures are defined as benefitting a specific category of households, firms, or energy users. Targeted support includes agriculture and household (LPG and kerosene fuels only) sectoral support.
2. Countries included in the IEA Fossil Fuel Subsidies estimates are: Algeria, Angola, Argentina, Austria, Azerbaijan, Bahrain, Bangladesh, Bolivia, Brunei Darussalam, China, Colombia, Croatia, Ecuador, Egypt, El Salvador, France, Gabon, Ghana, Hungary, India, Indonesia, Iraq, Islamic Republic of Iran, Kazakhstan, Korea, Kuwait, Libya, Malaysia, Mexico, Nigeria, Oman, Pakistan, Poland, Qatar, Russian Federation, Saudi Arabia, Slovakia, South Africa, Sri Lanka, Chinese Taipei, Thailand, Trinidad and Tobago, Turkmenistan, Ukraine, United Arab Emirates, United Kingdom, Uzbekistan, Venezuela, Viet Nam.
Source: IEA (2024[2]).

Likewise, poorly targeted support measures provided to businesses raise concerns related to competition, market efficiency, and the environment. Support to firms can embed price distortions by decreasing energy input prices which firms could pass onto their output prices. This can therefore have indirect effects on wider markets. Government support to firms can also imply more significant climate implications as it may support emission-intensive production processes, especially when supporting energy-intensive sectors (Garsous, Smith and Bourny, 2023[11]). While challenging to implement, governments should aim to target support to companies facing liquidity and solvency problems due to energy price shocks but which would otherwise be viable (OECD, 2022[12]). This strategy would mitigate against the risk of supporting inefficient firms, which can impede competition, hinder domestic productivity growth, and distort international markets (OECD, 2020[13]). In general, government support to firms should be time limited, transparent, proportionate, and non-discriminatory (i.e. applying objective and transparent criteria for determining firms' eligibility) (OECD, 2020[13]; 2021[14]).

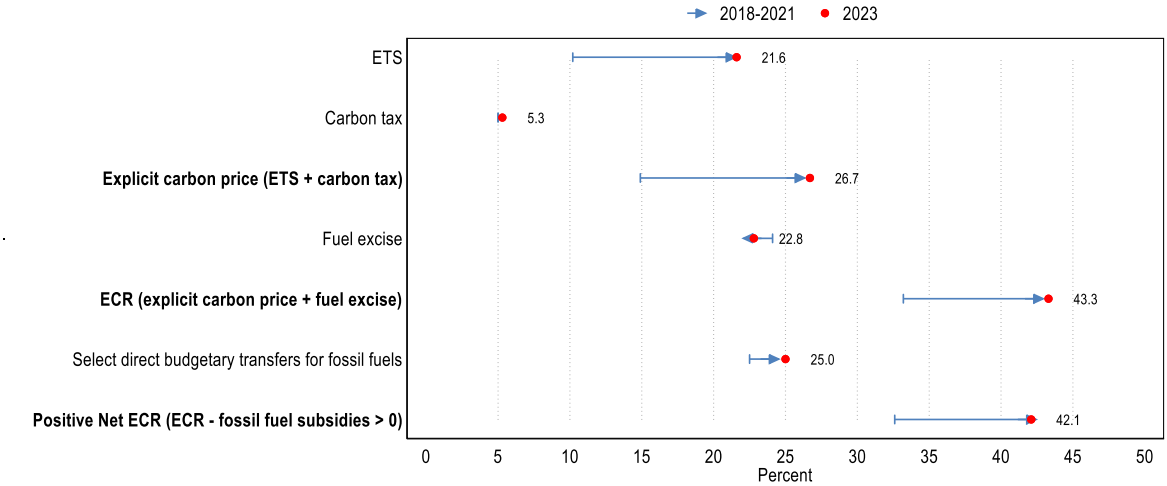
3 Key trends in Net Effective Carbon Rates

Progress in the coverage of emissions subject to a positive effective carbon rate has been limited

Approximately 42% of GHG emissions were subject to a positive Net ECR in 2023, with coverage not changing significantly from 2021 to 2023 (Figure 3.1) (OECD, 2024[15]). In 2023, about 27% of GHG emissions were covered by explicit carbon prices – be in the form of an ETS, a carbon tax, or both – while 23% of GHG emissions was covered by fuel excise taxes, an implicit form of carbon pricing. Coverage by explicit pricing instruments therefore exceeds that of implicit pricing instruments. Amongst explicit instruments, coverage through ETSs was much larger than through carbon taxes, reflecting the higher number of countries with this instrument in place (40 countries had an ETS in place, compared to 27 countries with a carbon tax), and the preference for ETSs as an explicit carbon price continued to grow.

Figure 3.1. Emissions coverage of carbon pricing instruments has seen minimal changes

Share of GHG emissions subject to a positive price in 79 economies by carbon pricing instrument, in %

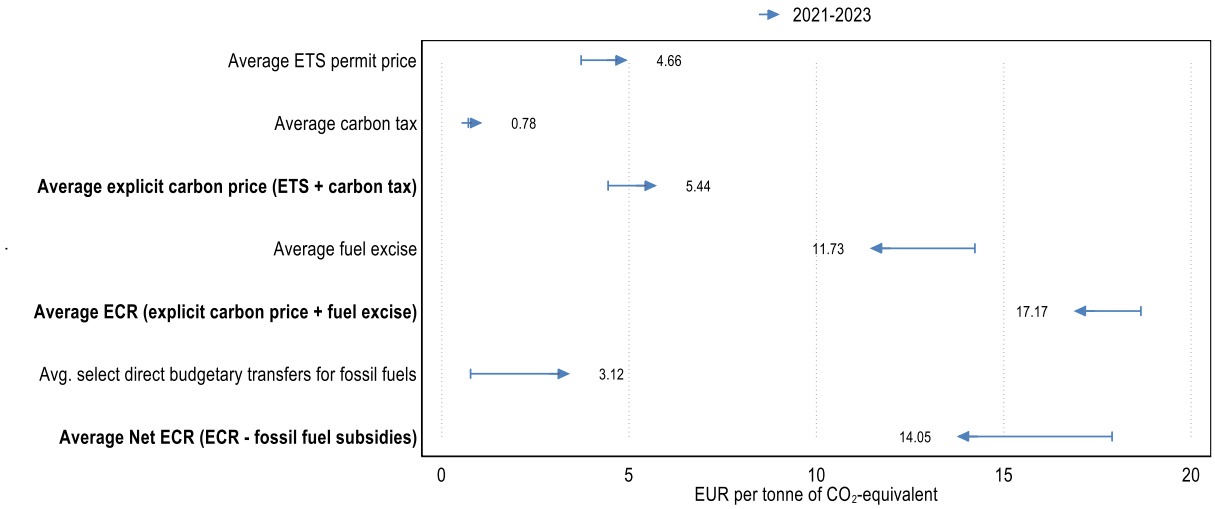


Note: ETS coverage estimates are based on the (OECD, 2023[16]), with adjustments to account for recent coverage changes. Select direct budgetary transfers for fossil fuels estimates are based on the OECD's *Inventory of Support Measures for Fossil Fuels*, where available, and original research for the other countries (OECD, 2023[17]). Due to data limitations, select direct budgetary transfers estimates for 2023 are based on data for 2022. GHG emissions are the sum of fossil-fuel related CO_2 emissions, calculated based on energy use data for 2021 from the IEA (2023[18]) and other GHGs from (Climate Watch, 2024[19]). All 79 countries are covered for 2023, with varying country composition according to the coverage of previous editions in other years. Percentages are rounded to the first decimal place.
Source: OECD (2024[15]).

The largest change in the emission coverage by instrument from 2021 to 2023 was the expansion of direct budgetary transfers for fossil fuels, selected from the Inventory for countries covered in both databases (Section 2),[1] which increased by 1 percentage point from 24% in 2021 to 25% in 2023. Such measures counteract the emissions coverage by positive price signals from carbon taxes, ETSs and fuel excise taxes. The emissions coverage of ETSs increased by 0.7 percentage points and the coverage of carbon taxes increased by 0.3 percentage points, while coverage of emissions from fuel excise taxes remained almost identical from 2021 to 2023. These developments were mostly driven by only very modest expansions of, or no change to, coverage of explicit carbon instruments across most countries (Figure 3.2). This primarily reflects the increase in the average ETS permit price, which rose to EUR 4.66/tCO_2e in 2023. In comparison, the average carbon tax rate remains much lower, at EUR 0.78/tCO_2e, having changed little since 2021.

Figure 3.2. The decline in Net ECR is driven by fuel excise taxes and direct support for fossil fuels

Net Effective Carbon Rates in 79 economies by carbon pricing instrument, in EUR/tCO2e



Note: Effective carbon rates are averaged across all GHG emissions of the 79 countries, including those emissions that are not covered by any carbon pricing instrument. Due to data limitations, select direct budgetary transfers for fossil fuels estimates for 2023 are based on data for 2022. All 79 countries are covered for 2023 with varying country composition according to the coverage of previous editions in other years. All rates are expressed in real 2023 EUR using the latest available OECD exchange rate and inflation data; changes can thus be affected by inflation and exchange rate fluctuations. Prices are rounded to the nearest eurocent.
Source: OECD (2024[15]).

As in previous years, implicit carbon prices in the form of fuel excise taxes represented the strongest price signal at EUR 11.73/tCO_2e, despite decreasing by EUR 2.5/tCO_2e from 2021 (EUR 14.23/tCO_2e). Given that only 48 countries out of the 79 countries covered had explicit forms of carbon pricing (carbon tax or ETS or both) in place and for many, at low rates, fuel excise taxes represented the strongest carbon price signal in many countries. Low- or middle-income countries were notably less likely to have explicit carbon pricing instruments and relied more on fuel excise taxes. The reduction in fuel excise taxes and the increase in direct budgetary transfers for fossil fuels, led to an average decrease in Net ECRs of EUR 3.12/tCO_2e. Together, these changes reflect countries' responses to rising fuel prices, which are also evident in the decline in coverage of emissions with a positive Net ECR from 2021 to 2023.

Note

[1] Select direct budgetary transfers are direct budgetary transfers to fossil fuel suppliers or end-users that are expected to reduce domestic fossil fuel prices before taxes. Tax expenditures are already part of the ECR component. See Section 5 for more information on the methodology of the OECD Net Effective Carbon Rates.

4 Policy implications: Support measures should be better targeted and temporary

While the decrease in energy supply costs drove down the fiscal cost of support for fossil fuel in 2023, the OECD Inventory shows that governments continued many measures supporting the consumption and production of fossil fuels. As a result, the fiscal cost of support measures for fossil fuels remains elevated relative to its historical average. Moreover, direct budgetary transfers for fossil fuels and low fossil fuel excise rates weakened the economic incentives to decarbonise measured by Net ECR compared with 2021 levels.

The high fiscal cost of support and low Net ECR highlight the challenges of meeting net zero commitments amid economic and geopolitical pressures. Reaching net zero emissions requires a much faster deployment of non-fossil technologies (IEA, 2023[20]), and the recent energy crisis has raised concerns about energy security, as fossil fuels have become a less reliable source of energy (OECD, 2022[12]). Reforming support for fossil fuels and phasing out inefficient measures has the potential to free up much-needed resources which could be used for the transition to net-zero emissions, accelerate innovation to improve energy efficiency, and help reduce dependence on fossil fuels thereby reducing households' vulnerabilities to price shocks.

In undertaking reforms, governments can shift away from broad-based household and business support, which tend to benefit users which are not necessarily in greatest need, and redesign policies to be better targeted. Indeed, fossil fuel support measures are often highly inefficient as only a small share of the benefit they bring goes to those consumers or parts of the economy which they are ostensibly designed to help. Reforming and redesigning these measures would limit fiscal costs and re-establish the price signal in relation to fossil fuels for more final consumers, thus providing incentives for energy saving and switching to non-fossil fuels sources (OECD, 2022[12]). Some alternatives to fossil fuel support measures, such as direct payments to households to support their incomes, could be less costly for governments and have fewer associated negative impacts (Wooders, 2024[10]; OECD, 2022[12]).

Developing capabilities to enable energy users to make the transition to clean energy sources would contribute to achieving climate, energy, and social policy goals (OECD, 2022[12]). Achieving this triple policy objective is currently hindered by policies that encourage the continued consumption and production of fossil fuels. Countries should therefore reaffirm and implement commitments made in the SDGs for phasing out and reforming inefficient fossil fuel support, with a view to ensuring that fiscal policy is better aligned with climate objectives.

5 Understanding the different approaches to measure the impact of support for fossil fuels

The fiscal cost of support measures for fossil fuels

The *OECD Inventory of Support Measures for Fossil Fuels* identifies, documents, and estimates government support measures that encourage fossil-fuel production or consumption through direct transfers and tax expenditures. It is based on a bottom-up approach that collects detailed information from official government sources (e.g. budget reports) for individual support measure for fossil fuels. The latest edition of the Inventory includes 1 921 support measures in 51 OECD, G20, and EU Eastern Partnership economies.[1] The fiscal cost of support measures for fossil fuels provides information about how government support to fossil fuels impacts a country's fiscal position on both the revenue and expenditure sides.

The fiscal costs recorded in the Inventory are direct expenditures and foregone revenue reported by countries in their national budget reports, the latter being based on their own benchmark tax system (and therefore their own objective function). Tax expenditures record the extent to which a government does not collect revenue that it would have in the absence of the measure. The fiscal cost of a tax expenditure is therefore measured as the difference between a preferential tax treatment and the national benchmark tax system. In this vein, tax expenditure estimates deliver similar information as estimates of direct budgetary transfers, i.e. the extent to which such government policies reduce government fiscal surpluses or increase fiscal deficits and reduce available funding for other programmes, given each country's national circumstances and preferences (OECD, 2019[21]). Consequently, a change in support due, for instance, to an increase in the benchmark tax rate, recorded as an increase in tax expenditures in the Inventory, would reflect the change in government resources foregone because of the change in the degree of preferential treatment from which the targeted recipients are benefitting (OECD, 2019[21]). The measures included in the Inventory and their fiscal cost therefore shed light on government practices that may support fossil fuel production or consumption and that may need to be reformed, thereby freeing substantial fiscal resources that may be deployed to meet other policy objectives.

In this report, the fiscal costs of support measures from the Inventory are also presented combined with the IEA estimates of fossil fuel support. The IEA estimates the support to fossil fuels that are either consumed directly by the end user or used as an input in the production of electricity. The IEA estimation method uses the price gap approach, in which the average end user price paid by the consumer is compared to a reference price that corresponds to the full cost of supply, adjusted for the costs of transportation and distribution and value-added tax. The price gap is the amount by which an end-user price is below the reference price, the existence of such gap indicating the presence of a support for fossil fuel consumption. A price gap can be created through various government interventions, including price controls or direct budget transfers (such as grants) that result in (end or intermediate) users paying prices below market levels. The joint OECD-IEA estimate is computed by identifying and removing overlapping

support measures – i.e. measures documented in the Inventory that could directly lower domestic energy prices and would therefore be included in the IEA estimates – for each country covered in both databases (OECD, 2018[22]). However, there is limited overlap between the OECD Inventory and the IEA fossil fuel support database because of the differing country coverage of the two datasets, with most OECD countries showing domestic prices higher than the reference prices considered by the IEA.[2]

Table 5.1. Support mechanisms coverage in the fiscal cost approach

Direct budgetary transfers	Payments made by governments, or bodies acting on behalf of governments, to individual recipients. This includes direct spending, e.g. for specific support programs, and government ownership (fully or through equity shares) of energy-related enterprises.
Tax expenditures and other revenue foregone	Tax concessions that are typically provided through lower rates, exemptions, or rebates of consumption taxes on fossil fuels (mainly value-added taxes and excise taxes) or measures to reduce the cost of the extraction of fossil fuels (including accelerated-depreciation allowances for capital expenditure, investment tax credits, deductions for exploration and development expenses, and preferential capital-gains treatment). Tax expenditures can also take less visible forms such as the special treatment of income from state-owned enterprises, tax relief for income earned on industry sinking funds (e.g. for site remediation), tax exempt bonds, the use of foreign tax credits for what may be considered royalty payments, or preferential tax rates on fuels used as inputs in fossil-fuel production. Tax expenditures are often premised on providing government support to activities or entities deemed to be socially beneficial; or on concerns relating to risk and uncertainty, energy security, capital intensity, high upfront costs, and long project timelines.
Induced transfers (or price support or price-gap)	Estimated subsidies due to market regulation and price support for lower end-user price relative to the full cost of supply. This refers to a change in prices received by producers and paid by domestic consumers as a consequence of government interventions, such as through direct price regulation, pricing formulas, border controls or taxes, and domestic purchase or supply mandates. The difference between the end-use price and the reference price (reflecting the full cost of the supply, which would prevail in a competitive market) amounts to the price gap or induced transfer. For countries that import a given product, consumer support estimates derived through the measurement of price-gaps are explicit. That is, they represent net expenditures resulting from the domestic sale of imported energy at lower, regulated prices. In contrast, for countries that export a given product – and therefore do not pay world prices – support estimates are implicit and have no direct budgetary impact. Rather, they represent the opportunity cost of pricing domestic energy below market levels. For countries that produce a portion of their fossil-fuel consumption themselves and import the remainder, the estimates represent a combination of opportunity costs and direct government expenditures.

Economic incentives to decarbonise measured by Net Effective Carbon Rates

The Net ECR estimates provide information about the extent to which governments price GHG emissions via explicit carbon pricing instruments (carbon taxes and ETS prices) and specific taxes on energy use (largely fuel excise taxes) as positive prices, less negative prices emanating from transfers that lower pre-tax fossil fuel prices. The estimation methodology combines the fiscal cost of support measures reported in the Inventory with the OECD's Carbon Pricing and Energy Taxation (CPET) database, building on an approach pioneered in *Taxing Energy Use for Sustainable Development* (OECD, 2021[1]). The CPET database provides a consistent framework for cross-country comparability by systematically integrating all specific taxes on energy use and greenhouse gas (GHG) emissions. It covers carbon taxes, excise taxes on fuels and determines permit prices for emissions subject to emissions trading schemes (OECD, 2019[23]).

Direct budgetary transfers to fossil fuel suppliers or end-users are expected to reduce domestic fossil fuel prices before taxes if they increase in proportion to fossil fuel consumption. Typically, budgetary transfers compensate fuel suppliers for providing fossil fuels at regulated below-market prices. Such measures can be considered as negative carbon prices, as in the way fuel excise taxes are expressed as positive carbon prices in the ECR indicator, as a reduction in the unit price of fossil fuels automatically leads to a reduction in the price of CO_2 emissions resulting from their use. Therefore, such support measures are integrated into the effective carbon rates framework to construct effective carbon prices net of pre-tax support measures (the Net ECR) (OECD, 2023[17]). The Net ECR estimates therefore measure the strengths of the economic incentives to decarbonize implemented through multiple policies, including direct support to fossil fuels, fuel excise taxes, carbon taxes and ETS permit prices.

Table 5.2. Policy instruments coverage in the economic incentives approach

Policy instrument	Definition	Examples
ETS	The price of tradable emission permits in mandatory emissions trading and cap-and-trade systems representing the opportunity cost of emitting an extra unit of CO2, regardless of the permit allocation method.	Emissions trading systems are most commonly used for larger emitters from the power and industry sectors and are in operation in, for example, California (United States) and Quebec (Canada), China, and the European Union.
Carbon tax	All taxes for which the rate is explicitly linked to the carbon content of the fuel or where the tax is levied directly on GHG emissions (irrespective of whether the resulting carbon price is uniform across fuels and GHGs.) The term carbon tax is thus equally used for taxes that apply to GHGs other than CO_2.	Most countries administer explicit carbon taxes in the same way as fuel excise taxes. Countries that follow this fuel-based approach do not actually tax CO_2 directly, but rather calculate the corresponding rate in common commercial units, for instance by reference to kilograms for solid fuels, liters for liquid fuels, and cubic meters for gaseous fuels. Fuel-based carbon taxes are often levied as a component of fuel excise taxes. There are a number of countries that tax GHGs directly.
Fuel excise tax	All excise taxes that are levied on fuels and that are not carbon taxes.	Almost all countries tax gasoline and diesel used for road transport. The tax rate is typically specified per litre or gallon of fuel.
Select direct budgetary transfers for fossil fuels	Budgetary transfers that decrease pre-tax prices for domestic fossil fuel use.	There are countries that regulate the price of fossil fuels below supply costs and then compensate fuel suppliers for the resulting losses).

Table 5.3. Country coverage

Country	OECD Inventory of Support Measures for Fossil Fuels	IEA Fossil Fuel Support Estimates	OECD Net Effective Carbon Rates		
			2018	2021	2023
Algeria		Yes			
Angola		Yes			
Argentina	Yes	Yes	Yes	Yes	Yes
Armenia	Yes				
Australia	Yes		Yes	Yes	Yes
Austria	Yes	Yes	Yes	Yes	Yes
Azerbaijan	Yes	Yes			
Bahrain		Yes			
Bangladesh		Yes	Yes	Yes	Yes
Belarus	Yes				
Belgium	Yes		Yes	Yes	Yes
Bolivia		Yes			
Brazil	Yes		Yes	Yes	Yes
Brunei Darussalam		Yes			
Bulgaria					Yes
Burkina Faso			Yes	Yes	Yes
Canada	Yes		Yes	Yes	Yes
Chile	Yes		Yes	Yes	Yes
China	Yes	Yes	Yes	Yes	Yes
Chinese Taipei		Yes			
Colombia	Yes	Yes	Yes	Yes	Yes
Costa Rica	Yes		Yes	Yes	Yes
Côte d'Ivoire			Yes	Yes	Yes
Croatia		Yes			Yes
Cyprus			Yes	Yes	Yes
Czechia	Yes		Yes	Yes	Yes

Country	OECD Inventory of Support Measures for Fossil Fuels	IEA Fossil Fuel Support Estimates	OECD Net Effective Carbon Rates		
			2018	2021	2023
Denmark	Yes		Yes	Yes	Yes
Dominican Republic			Yes	Yes	Yes
Ecuador		Yes	Yes	Yes	Yes
Egypt		Yes	Yes	Yes	Yes
El Salvador		Yes			
Estonia	Yes		Yes	Yes	Yes
Ethiopia			Yes	Yes	Yes
Finland	Yes		Yes	Yes	Yes
France	Yes	Yes	Yes	Yes	Yes
Gabon		Yes			
Georgia	Yes				
Germany	Yes		Yes	Yes	Yes
Ghana		Yes	Yes	Yes	Yes
Greece	Yes		Yes	Yes	Yes
Guatemala			Yes	Yes	Yes
Hungary	Yes	Yes	Yes	Yes	Yes
Iceland	Yes		Yes	Yes	Yes
India	Yes	Yes	Yes	Yes	Yes
Indonesia	Yes	Yes	Yes	Yes	Yes
Iraq		Yes			
Ireland	Yes		Yes	Yes	Yes
Islamic Republic of Iran		Yes			
Israel	Yes		Yes	Yes	Yes
Italy	Yes		Yes	Yes	Yes
Jamaica			Yes	Yes	Yes
Japan	Yes		Yes	Yes	Yes
Kazakhstan		Yes		Yes	Yes
Kenya			Yes	Yes	Yes
Korea	Yes	Yes	Yes	Yes	Yes
Kuwait		Yes			
Kyrgyzstan			Yes	Yes	Yes
Latvia	Yes		Yes	Yes	Yes
Libya		Yes			
Lithuania	Yes		Yes	Yes	Yes
Luxembourg	Yes		Yes	Yes	Yes
Madagascar			Yes	Yes	Yes
Malaysia		Yes	Yes	Yes	Yes
Malta					Yes
Mauritius					Yes
Mexico	Yes	Yes	Yes	Yes	Yes
Moldova	Yes				
Morocco			Yes	Yes	Yes
Netherlands	Yes		Yes	Yes	Yes
New Zealand	Yes		Yes	Yes	Yes
Nigeria		Yes	Yes	Yes	Yes
Norway	Yes		Yes	Yes	Yes
Oman		Yes			
Pakistan		Yes			
Panama			Yes	Yes	Yes
Paraguay			Yes	Yes	Yes

Country	OECD Inventory of Support Measures for Fossil Fuels	IEA Fossil Fuel Support Estimates	OECD Net Effective Carbon Rates		
			2018	2021	2023
Peru			Yes	Yes	Yes
Philippines			Yes	Yes	Yes
Poland	Yes	Yes	Yes	Yes	Yes
Portugal	Yes		Yes	Yes	Yes
Qatar		Yes			
Romania					Yes
Russia	Yes	Yes	Yes	Yes	Yes
Rwanda			Yes	Yes	Yes
Saudi Arabia		Yes			
Singapore					Yes
Slovakia	Yes	Yes	Yes	Yes	Yes
Slovenia	Yes		Yes	Yes	Yes
South Africa	Yes	Yes	Yes	Yes	Yes
Spain	Yes		Yes	Yes	Yes
Sri Lanka		Yes	Yes	Yes	Yes
Sweden	Yes		Yes	Yes	Yes
Switzerland	Yes		Yes	Yes	Yes
Thailand		Yes			
Trinidad and Tobago		Yes			
Türkiye	Yes		Yes	Yes	Yes
Turkmenistan		Yes			
Uganda			Yes	Yes	Yes
Ukraine	Yes	Yes	Yes	Yes	Yes
United Arab Emirates		Yes			
United Kingdom	Yes	Yes	Yes	Yes	Yes
United States	Yes		Yes	Yes	Yes
Uruguay			Yes	Yes	Yes
Uzbekistan		Yes			
Venezuela		Yes			
Viet Nam		Yes			
Zambia					Yes

Notes

[1] Belarus, the Russian Federation, and Ukraine data have not been updated since the 2021 edition of the Inventory. To keep a consistent set of countries over time, these countries are therefore excluded from the aggregates presented in Section 2.

[2] See OECD (2015[24]), (2018[22]), and (2021[14]) for detailed explanations on the *OECD Inventory of Support Measures for Fossil Fuels*.

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