ENVIRONMENT AT A GLANCE INDICATORS

Climate change

Context

Issues at stake

Emissions of greenhouse gases (GHGs) from human activities disturb the radiative energy balance of the earth-atmosphere system. They exacerbate the natural greenhouse effect, leading to temperature changes and other disruption of the earth's climate. Land use changes and forestry also play a role by altering the amount of greenhouse gases captured or released by carbon sinks. Carbon dioxide (CO2) from the combustion of fossil fuels and deforestation is a major contributor to greenhouse gases. CO2 makes up the largest share of greenhouse gases and is a key factor in countries' ability to mitigate climate change. National emissions are also affected by changes in global demand and supply patterns with increasing trade flows and the displacement of carbon-intensive production abroad. Reductions in domestic emissions can thus be partially or wholly offset elsewhere in the world.

Climate change is of global concern for its effects on green growth and sustainable development. It threatens ecosystems and biodiversity, affects water resources, human settlements and the frequency and scale of extreme weather events, with significant consequences for food production, human well-being, socio-economic activities and economic output.

Policy challenges

The main challenges are to mitigate GHG emissions and stabilise GHG concentrations in the atmosphere at a level that would limit dangerous interference with the climate system, and to adapt to and manage risks from climate change.

- This implies implementing national and international low-carbon strategies and further decoupling GHG emissions from economic growth. It also implies increasing the share of renewable energy sources in the supply mix, and reducing energy intensity by adopting energy-efficient production processes and increasing the energy efficiency of consumer goods and services.
- With increasing trade flows, interdependent global value chains and the relocation of carbon-intensive production abroad, reductions in domestic emissions can be partially or wholly offset elsewhere in the world. Domestic mitigation efforts must thus be placed in a global context and must build on a good understanding of carbon flows associated with international trade and final domestic demand.
- Ensuring a proper mix of market-based instruments, for example by promoting carbon pricing, environmentally-related taxation and removing government subsidies and other support for fossil fuels, plays an important role in this transition.
- Beyond these steps, governments must align policies across a diverse range of non-climate areas including transport, housing, construction, spatial planning, agriculture and development cooperation. And they must consider synergies between emissions reduction, adaptation strategies and broader well-being objectives such as reduced air pollution and improved health.

Measuring progress and performance

Environmental performance can be assessed against domestic objectives and international goals and commitments. Tackling climate change and underlying drivers is part of the 2030 Agenda for Sustainable Development (New York, September 2015) under Goal 13: "*Take urgent action to combat climate change and*

its impacts"; Goal 12: "*Ensure sustainable consumption and production patterns"*; Goal 9: "*Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation"* and Goal 7: "*Ensure access to affordable, reliable, sustainable and modern energy for all".*

The main international agreement is the United Nations Framework Convention on Climate Change (1992) which is the basis of:

- The Kyoto Protocol (1997) that sets internationally binding and differentiated emission reduction targets for six GHGs for 2008-12. It has been ratified by 177 parties, including all but two OECD countries, and has been in force since 2005. 37 industrialised countries and the European Union committed to reduce GHG emissions by an average of 5% below 1990 levels. The "Doha Amendment to the Kyoto Protocol" (2012), includes new commitments for the period 2013-20 and a revised list of GHGs. Parties committed to reduce GHG emissions by an average of at least 18% below 1990 levels over 2013-20. The amendment is not yet in force.
- The Paris Agreement (2015) that strengthens the global response to the threat of climate change. The objective is to keep the average global temperature rise this century well below 2 degrees Celsius and as close as possible to 1.5 degrees Celsius above pre-industrial levels. Parties have expressed their commitments to 2025 or 2030 through nationally determined contributions (NDCs), including a regular report on their emissions and implementation efforts.

This is supported by the commitment in September 2009, of the Leaders of the Group of Twenty (G20) economies to "*phase out and rationalize over the medium term inefficient fossil fuel subsidies while providing targeted support for the poorest*." To follow up on this commitment, G20 members have since engaged in a voluntary process of periodically reporting on their fossil-fuel subsidies.

Indicator groups

The indicators presented here include the following:

Emissions and drivers
○ Greenhouse gas emissions: levels, intensities, by source, by sector • Complemented with data on annual surface temperature change by country and region
○ CO2 emissions from energy use • Production-based emissions: levels, intensities, productivity, share of transport • Demand-based emissions (emissions embodied in international trade and domestic final demand - footprints): intensities, productivity, by sector
○ Energy use: energy supply and mix, intensities, share of renewables
Policy measures and instruments
○ Taxes relevant for climate change: revenue raised and tax base structure
○ Fossil-fuel support: fossil-fuel subsidies and other support measures.
○ Official development assistance for climate: mitigation, adaptation

They can be read in conjunction with other indicators on the driving forces and impacts of climate change, which are presented under other Environment at a Glance themes:

Drivers	Theme
Materials use	Circular economy
Land use and land cover	Biodiversity

Impacts	Theme
Water stress	Freshwater
Threatened species	Biodiversity
Population exposure to fine particulates	Air quality

Greenhouse gas emissions

Key messages

- After a drop of 7% in 2020, due to the COVID-19 pandemic and the associated reduction in human activities, GHG emissions in OECD countries rebounded by nearly 5% in 2021.
- In most OECD countries however, emissions have been declining since 2010 partly due to the economic slowdown following the 2008 financial crisis, but also to strengthened climate policies.
- The rate of progress in reducing emissions varies significantly across individual OECD countries. Progress overall is insufficient.

Main trends and recent developments

Despite some progress achieved in decoupling GHG emissions from GDP growth, emissions are still growing in some countries. Historically, OECD countries emitted the bulk of global GHGs, but the share of BRIICS countries in global emissions has been increasing to over 40% since 2010. CO2 determines the overall trend. Together with CH4 and N2O, it accounts for about 98% of GHG emissions (IEA, 2019).

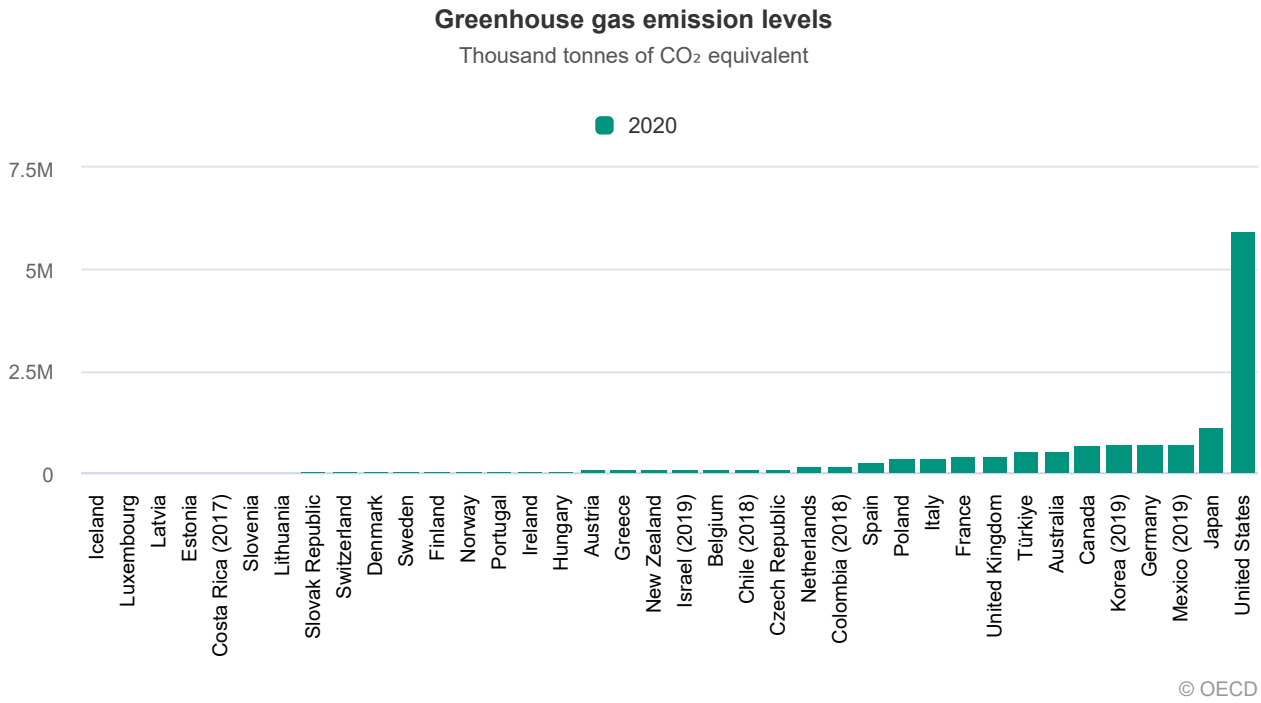
Emissions of OECD countries peaked in 2007, have been gradually falling until 2016 (by 9%), and remained stable over 2017-19. Emissions dropped by 7% in 2020 due to the COVID-19 pandemic and the associated reduction in human activities, but rebounded in 2021 (IEA, 2021). Before the COVID-19 pandemic, emissions have been declining in most OECD countries, partly due to a slowdown in economic activity following the 2008 economic crisis, but also to strengthened climate policies and changing patterns of energy consumption. Emission intensities per unit of GDP and per capita decreased since 2005 in almost all OECD countries, revealing a strong overall decoupling from economic growth. Under the Kyoto Protocol, most OECD countries met their emission reduction commitments for the first (2008-12) and second (2013-2020) period.

Overall progress is however insufficient. Climate change is increasingly impacting people's lives, national economies, biodiversity and ecosystems, including the ocean.

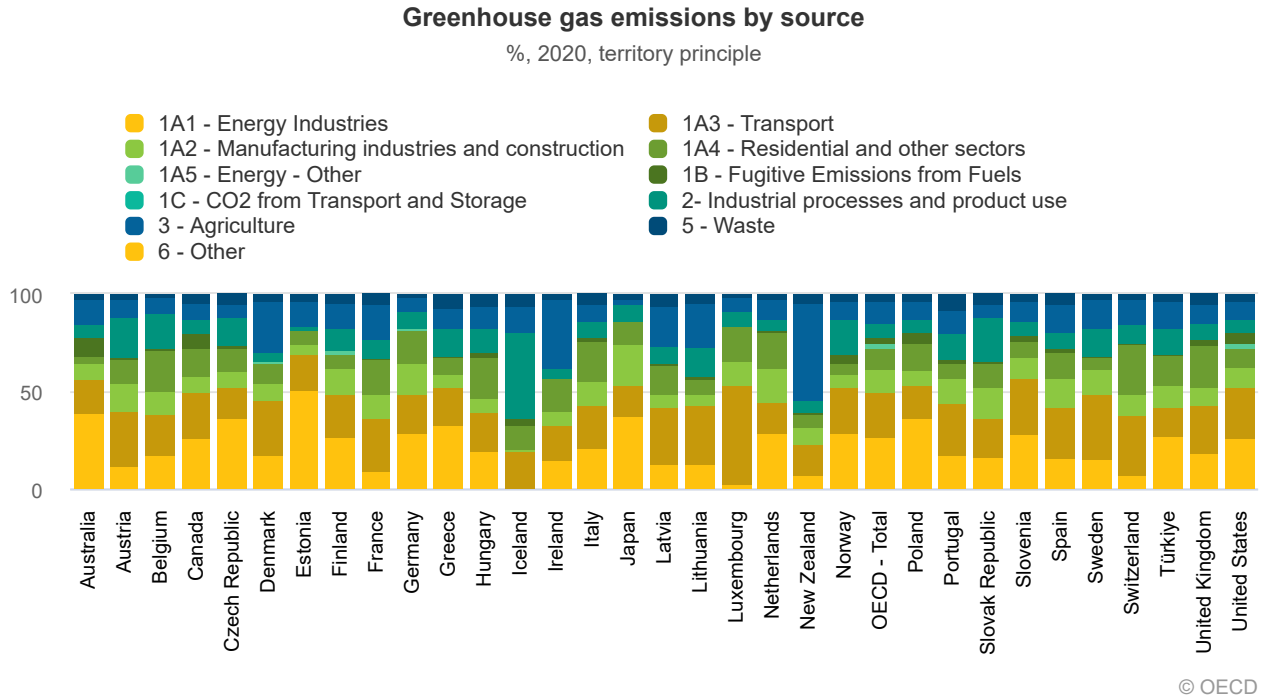
On average, energy industries generate 28% of GHG emissions in OECD countries, followed by transport (23%), manufacturing industries (12%), agriculture (10%), industrial processes (7%) and waste (3%). While the share of emissions from energy industries have slightly decreased since 2005, those from transport and agriculture increased. In some countries such as Lithuania, Luxembourg, Sweden and Switzerland, emissions from transport account for more than 30% of total emissions, while in New Zealand and Ireland, agriculture is the first GHG emitter (above 30%).

Individual OECD countries' rates of progress vary significantly, whether emissions are considered in absolute numbers, per capita amounts or per unit of GDP. This partly reflects different national circumstances, such as composition and rate of economic growth, socio-demographic developments, energy supply and consumption patterns, energy prices, and the extent to which the countries have taken steps to reduce emissions from various sources and to price carbon.

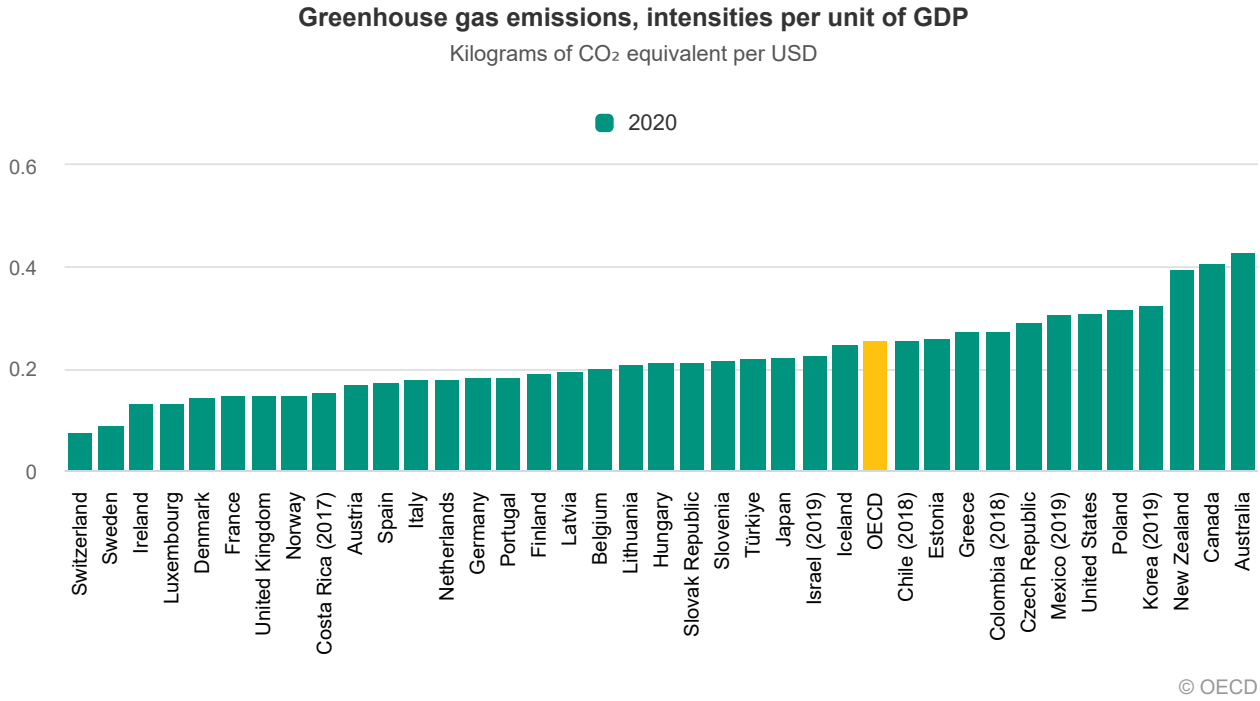
Indicators



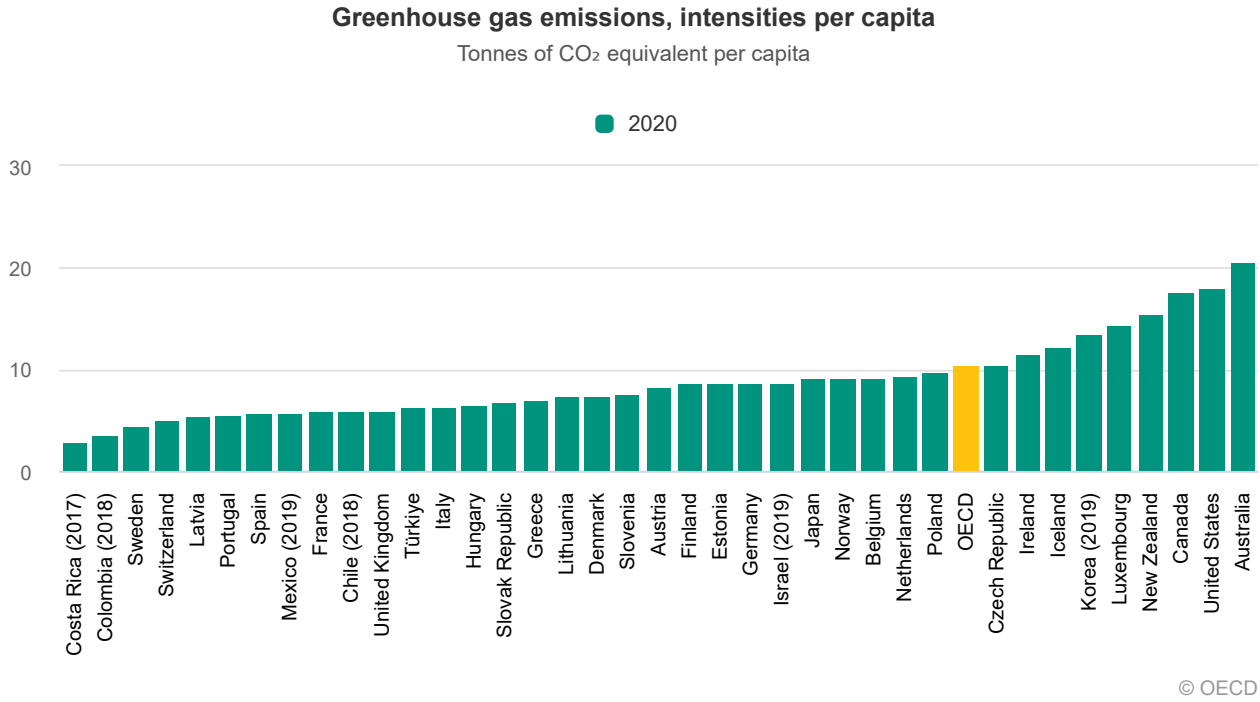
Source: OECD, "Air and climate: Greenhouse gas emissions by source", *OECD Environment Statistics* (database), https://doi.org/10.1787/data-00594-en.



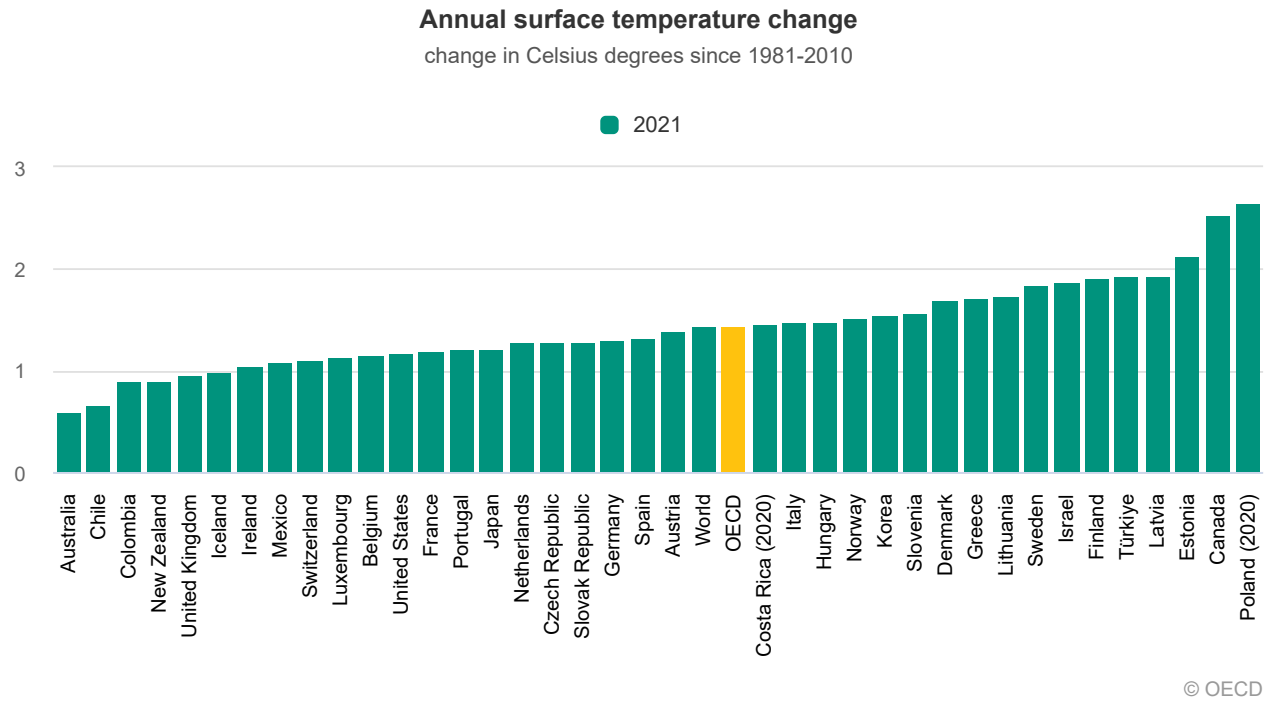
Source: OECD, "Air and climate: Greenhouse gas emissions by source", *OECD Environment Statistics* (database), https://doi.org/10.1787/data-00594-en.



Source: OECD, "Air and climate: Greenhouse gas emissions by source", *OECD Environment Statistics* (database), https://doi.org/10.1787/data-00594-en.



Source: OECD, "Air and climate: Greenhouse gas emissions by source", *OECD Environment Statistics* (database), https://doi.org/10.1787/data-00594-en.



Source: Maes, M. J. A., et al. (2022), 'Monitoring exposure to climate-related hazards: Indicator methodology and key results', https://doi.org/10.1787/da074cb6-en.

Comparability and interpretation

Data on GHG emissions display a good level of comparability. Reductions in national emissions may also be the result of offshoring domestic production (and the associated emissions). Evidence of decoupling based on domestic emissions per unit of GDP or per capita, therefore, may reveal only part of the story.

For further details, see the metadata in the source databases listed under *Sources* below.

CO2 emissions from energy use

Key messages

- Global CO2 emissions declined by 5.8% in 2020 due to the COVID-19 pandemic and the associated reduction in human activities, but rebounded by 4.8% in 2021.
- OECD countries emit about one third of global CO2 emissions from energy use, compared to more than half in 1990.
- A more nuanced picture emerges when emissions are considered from the perspective of final demand. The carbon footprint of OECD countries is generally higher than emissions from domestic production.

Main trends and recent developments

CO2 from the combustion of fossil fuels and biomass accounts for about 90% of total CO2 emissions and two third of total GHG emissions, therefore determining overall GHG emissions trend. Global energy-related CO2 emissions picked-up and reached a record high in 2018-19. Emissions declined by 5.8% in 2020 due to the COVID-19 pandemic and associated reduction in activities, but rebounded by 4.8% in 2021. Despite the decline in 2020, global energy-related CO2 emissions remained at 31.5 Gt, a level exceeding the range of 25-30 Gt of CO2e per year, considered to be in line with containing temperature rises below 1.5°C (IPCC (IPCC, 2018). Emissions are still growing in many countries, mainly due to increases in the transport and the energy sectors.

Since 2000, OECD energy-related CO2 emissions have decreased while the economy continued to grow. This is due to structural changes in industry and energy supply, improvements in energy efficiency in production processes and structural changes in global value chains. Most countries have achieved only a relative decoupling between emissions and economic growth, although some managed to reduce emission levels in absolute terms. While decreasing in OECD America and OECD Europe, energy-related CO2 emissions continue to grow in the OECD Asia-Oceania region. This is due to energy supply and consumption patterns and trends, often combined with relatively low energy prices.

Since 1990, energy-related CO2 emissions have grown more slowly in OECD countries as a group than they have worldwide. Today, OECD countries emit about one third of global CO2 emissions from energy use, compared to more than half in 1990.

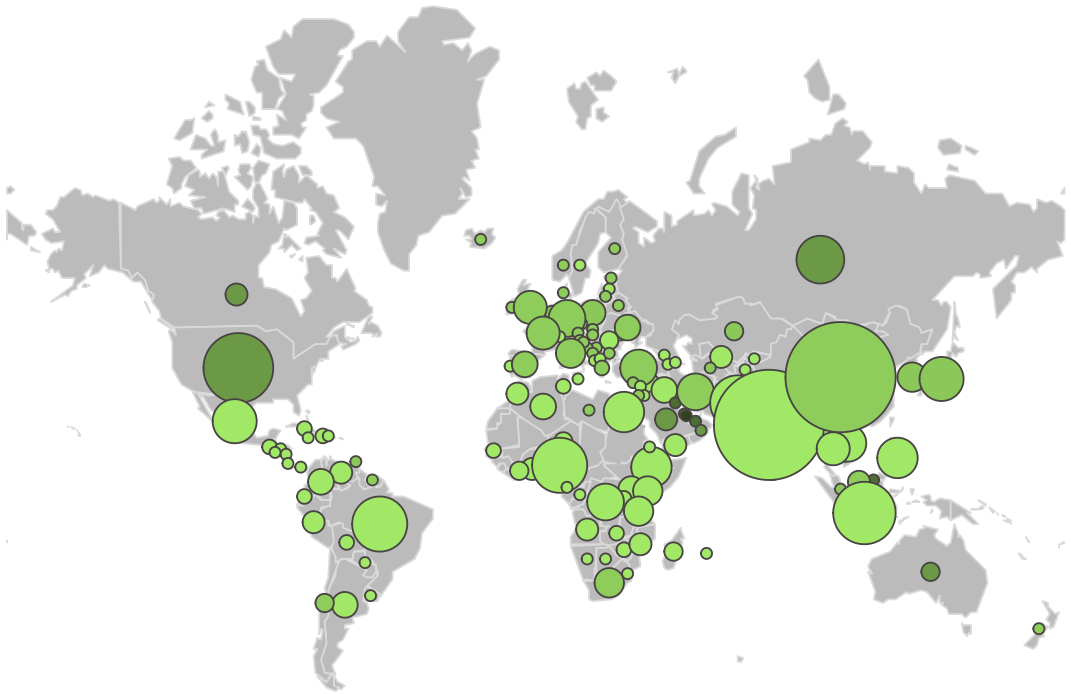
On a per-capita basis, OECD countries still emit far more CO2 than most other world regions, with 8.3 tonnes of CO2 emitted per capita on average in OECD countries in 2019, compared to 4.4 tonnes in the rest of the world. Individual OECD countries' rates of progress vary significantly, regardless of whether they are considered in absolute numbers, per capita amounts or per unit of GDP.

A more nuanced picture emerges when emissions are considered from the perspective of final demand. The carbon footprint of OECD countries, that accounts for all carbon emitted anywhere in the world to satisfy domestic final demand is generally higher than emissions from domestic production. This is because OECD countries have increasingly outsourced the production of consumer goods to other countries.

Indicators

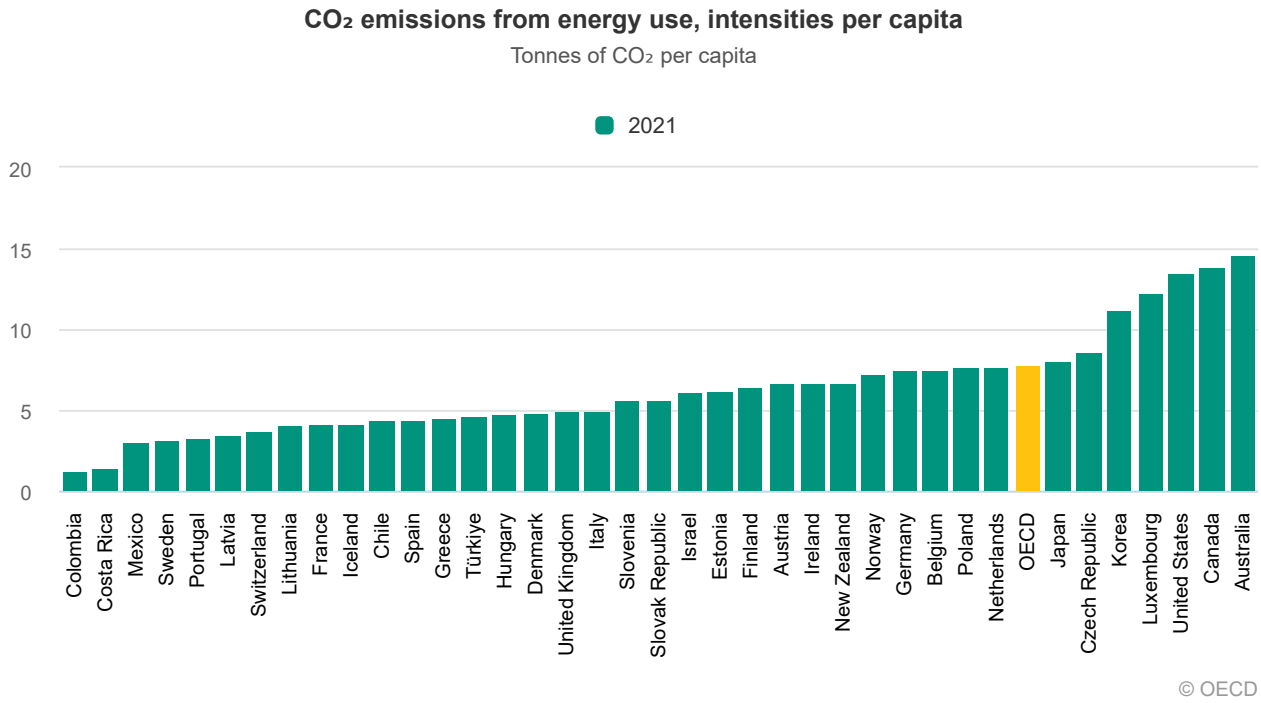
Overview map all countries

Figure 0.7 CO2 emissions from energy use, intensities per capita

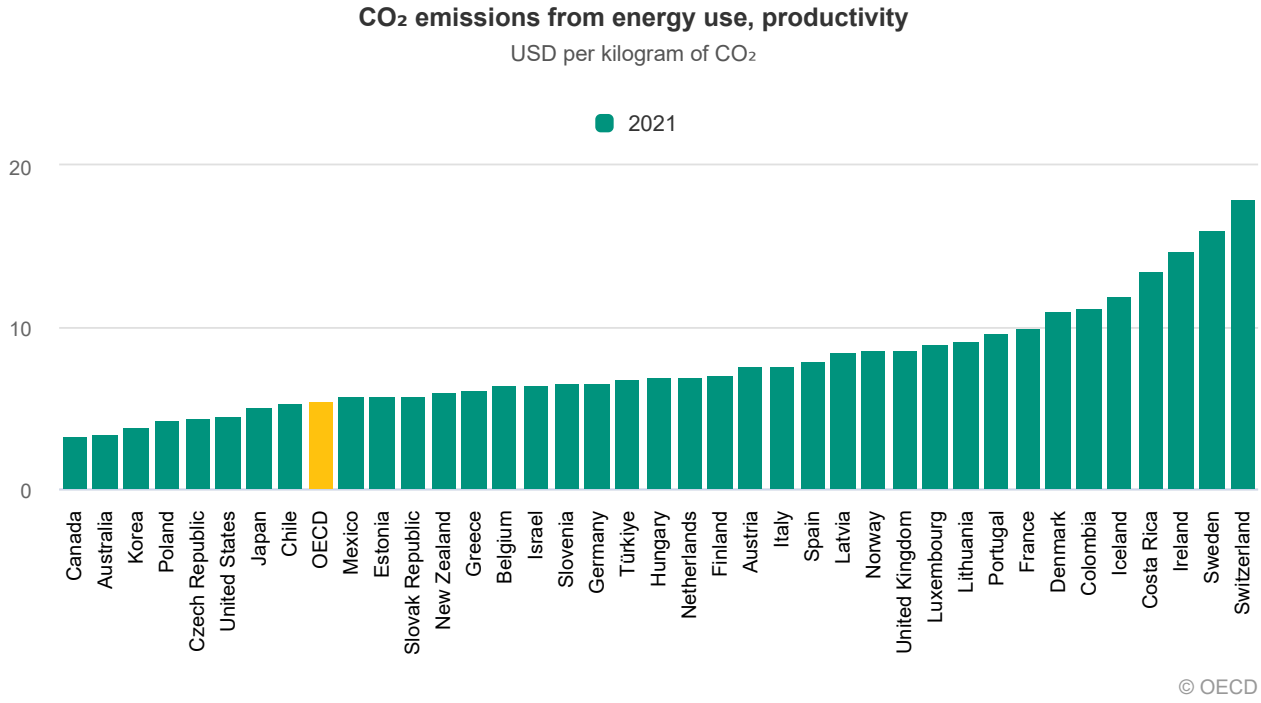


Source: OECD, "Green growth indicators", *OECD Environment Statistics* (database), https://doi.org/10.1787/data-00665-en, based on IEA data.

CO2 emissions from energy use

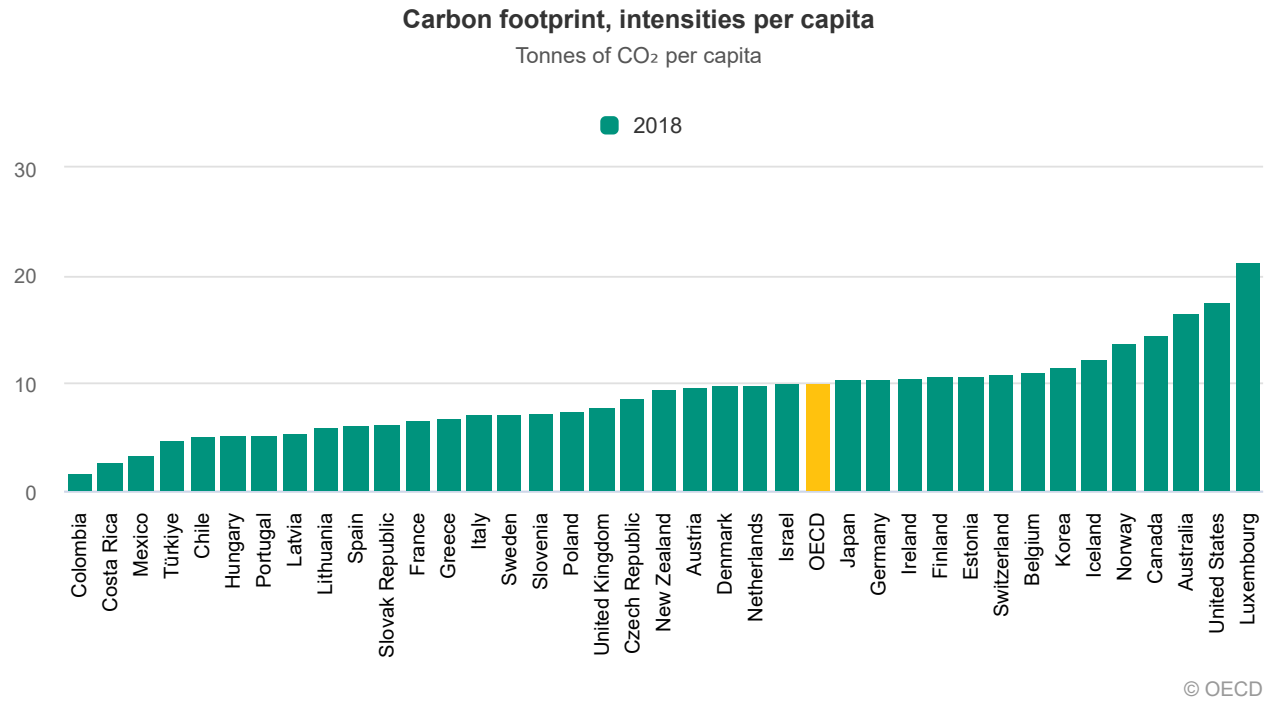


Source: OECD, "Green growth indicators", *OECD Environment Statistics* (database), https://doi.org/10.1787/data-00665-en, based on IEA data.

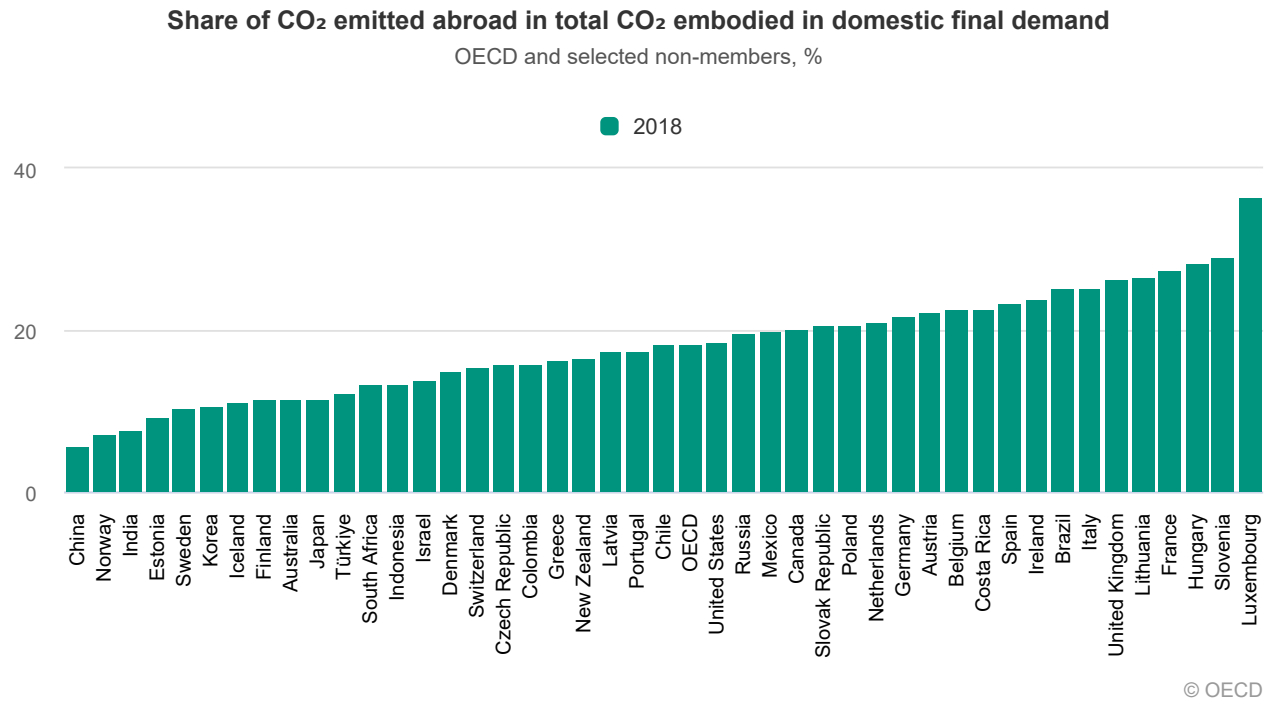


Source: OECD, "Green growth indicators", *OECD Environment Statistics* (database), https://doi.org/10.1787/data-00665-en, based on IEA data.

CO2 emissions from energy use embodied in international trade and domestic final demand



Source: OECD, "Carbon dioxide embodied in international trade", *OECD Structural Analysis Statistics: Input- Output* (database), http://stats.oecd.org/Index.aspx?DataSetCode=IO_GHG_2021.



Source: OECD, "Carbon dioxide embodied in international trade", *OECD Structural Analysis Statistics: Input- Output* (database), http://stats.oecd.org/Index.aspx?DataSetCode=IO_GHG_2021.

Comparability and interpretation

The CO2 emission estimates are affected by the quality of the underlying energy data, but in general the comparability across countries is quite good. The low CO2 emissions productivity of Estonia result from the use of oil shale for electricity generation. Oil shale has a high-carbon emission factor. The high per-capita emissions of Luxembourg result from the lower taxation of road fuels compared to neighbouring countries, which attracts drivers to refuel in the country.

Carbon productivity indicators inform about the relative decoupling between economic activity and carbon emissions into the atmosphere. They provide insight into how much carbon productivity has improved. They also measure how much of the improvement is due to domestic policies and how much to displacement or substitution effects. The demand perspective helps explain production-based trends.

Reductions in national emissions can also be achieved by offshoring domestic production and, thus, the related emissions. Evidence of decoupling based on domestic emissions, therefore, may reveal only part of the story.

For further details see the metadata in the source databases listed under *Sources* below.

Energy use

Key messages

- Total energy supply in OECD in 2021 remained below the ten-year average observed before the pandemic.
- OECD countries continue to rely on fossil fuels for 78% of their energy, while renewables, although increasing, still play a relatively minor role in energy mixes.
- Energy intensity decreased for OECD countries overall, but results to date are insufficient to effectively reduce air and GHG emissions from energy use.

Main trends and recent developments

Although energy demand rebounded following strong restrictions in mobility in 2020 (IEA, 2021), it is still below ten-year long-term average observed before the pandemic in OECD countries in 2021. Total energy supply (TES) per capita also rebounded following the pandemic, but remains below the long-term average observed before 2020.

Global improvements in energy efficiency have been declining since 2015. Energy intensity improvements was 3.5% over the two years period 2019-21 in OECD countries, below the IEA target of an annual global primary energy intensity improvement of 4% in its Net Zero Scenario (IEA, 2022a).

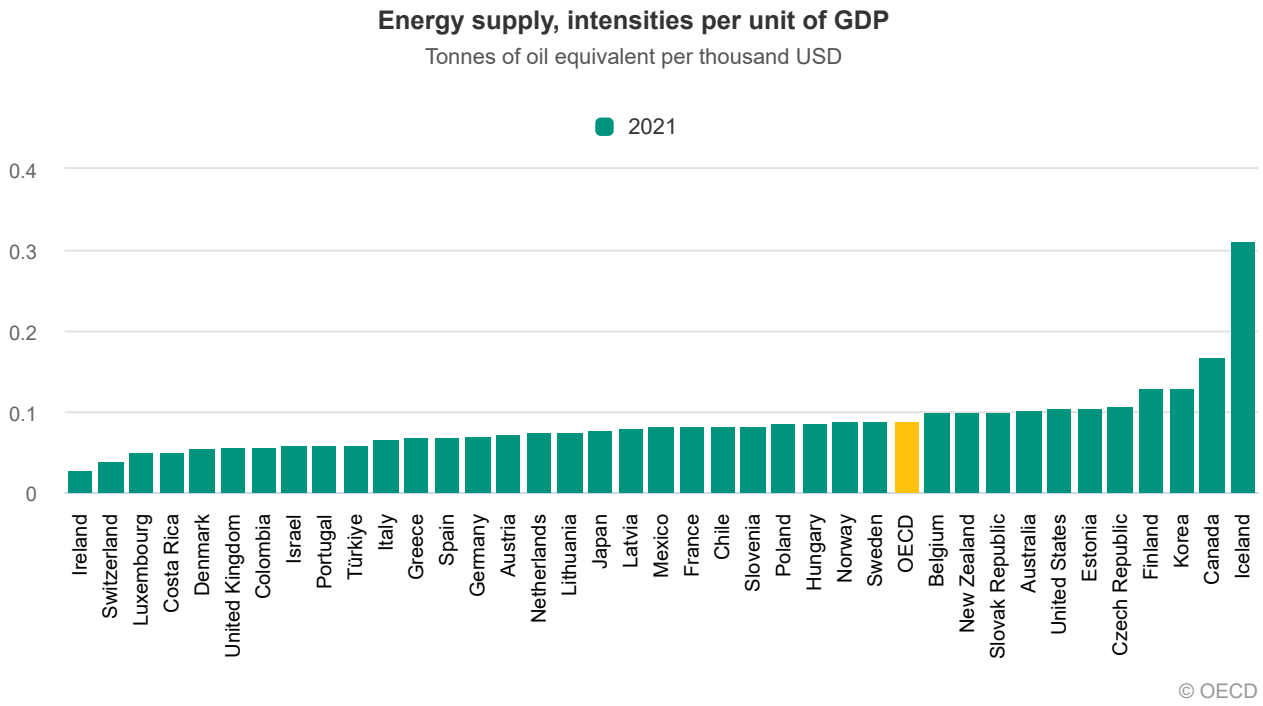
In the 1990s and 2000s, energy intensity per unit of GDP decreased for OECD countries overall as a consequence of structural changes in the economy and energy conservation measures, and, since 2009, as a consequence of the slowdown in economic activity following the economic crisis. In some countries, the decrease was due to the transfer of energy-intensive industries to other countries. Such outsourcing may increase pressures on the global environment if less energy efficient techniques are involved.

Variations in energy intensity among OECD countries are wide. They depend on national economic structure and income, geography, energy policies and prices, and countries' endowment in different types of energy resources. While some decoupling between growth in energy use and GDP has been achieved, results to date are insufficient to effectively reduce air and GHG emissions. Relative decoupling between TES and GDP is occurring in all regions of the OECD, however, in OECD Asia-Oceania, it began much later (2003) than in OECD Europe and OECD America (1990).

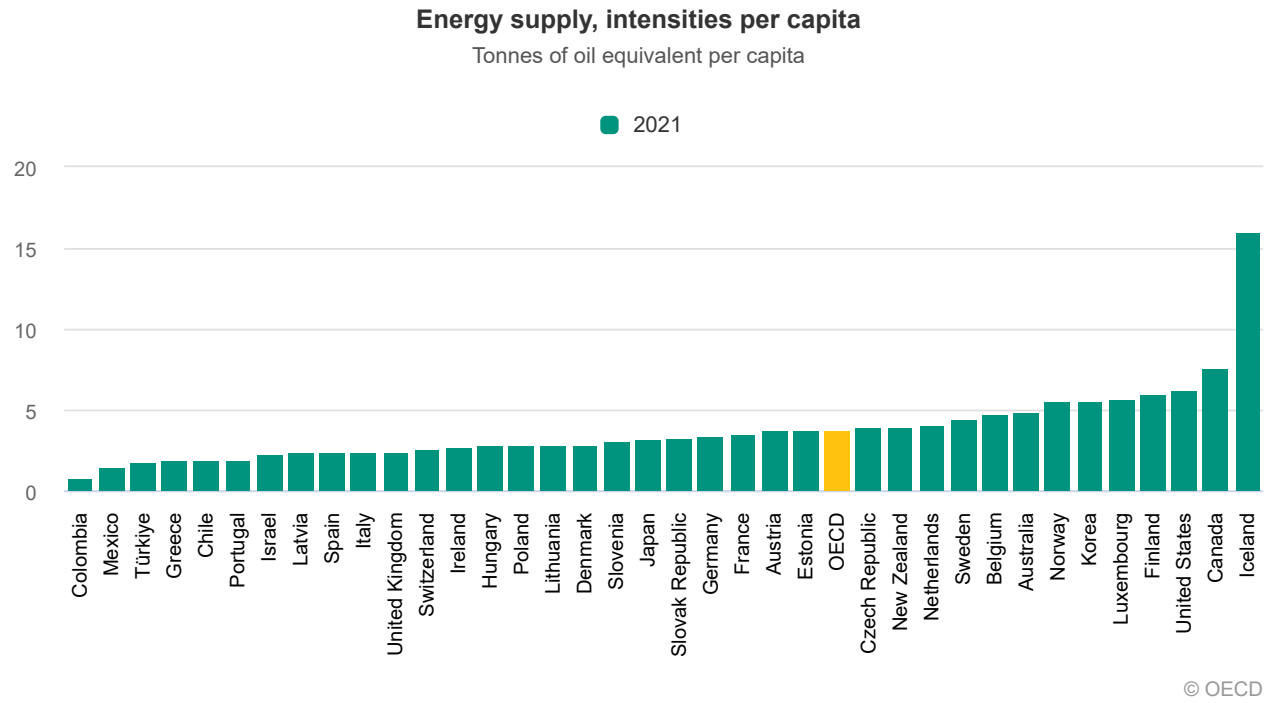
The supply structure varies considerably among countries. It is influenced by demand from industry, transport and households, by national energy policies and by national and international energy prices. Developments in TES were accompanied by changes in the fuel mix. Since 2000, OECD countries' reliance on fossil fuels declined although it remains close to 78%. The shares of solid fuels and oil slightly fell, while those of natural gas and renewable energy rose. Biofuels and waste, followed by hydro represent the largest renewable sources.

In 2021, renewable sources of energy such as wind and solar PV continued to grow, and electric vehicles set new sales records (IEA, 2022b). Renewables (i.e. solar, wind, liquid biofuels and biogases) with the lowest shares in TES exhibited the highest growth rates over the last decade, now making 30% of electricity production. The largest renewable sources are biofuels and waste, followed by hydro.

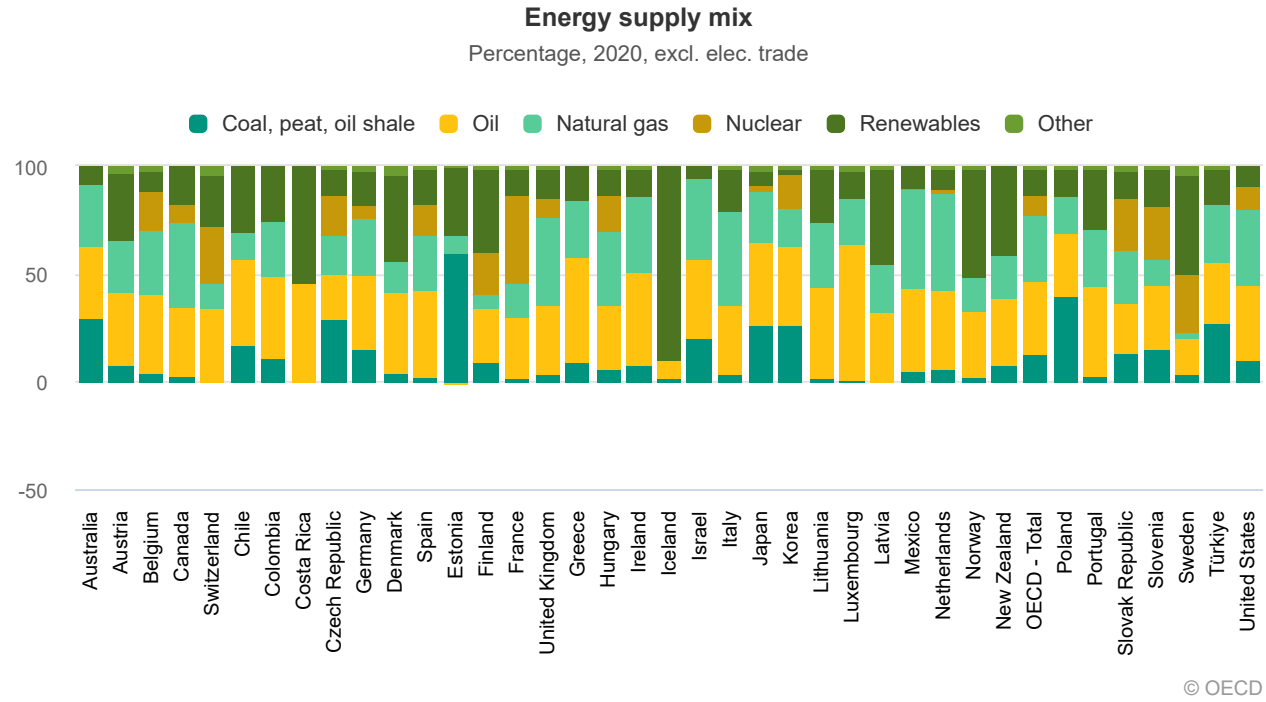
Indicators



Source: OECD calculations based on IEA, "World energy statistics", *IEA World Energy Statistics and Balances* (database), https://doi.org/10.1787/data-00510-en.

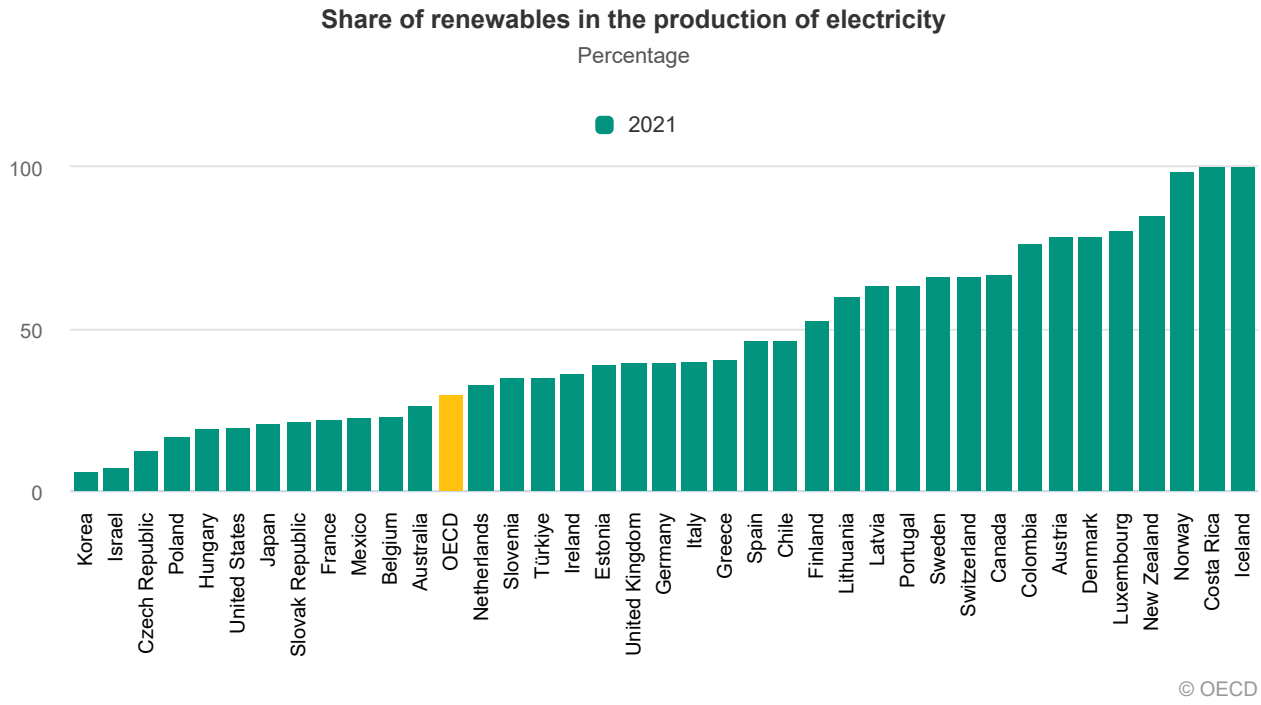


Source: OECD calculations based on IEA, "World energy statistics", *IEA World Energy Statistics and Balances* (database), https://doi.org/10.1787/data-00510-en.



Note: Estonia's energy supply is characterised by its strong reliance on domestically produced oil shale. Most of the oil shale production is transformed into other petroleum products (i.e. for heating, chemicals manufacturing, marine fuels) that are exported, and is counted as negative to oil in total energy supply, resulting in a negative share in the energy supply mix.

Source: OECD calculations based on IEA, "World energy statistics", *IEA World Energy Statistics and Balances* (database), https://doi.org/10.1787/data-00510-en.



Source: OECD calculations based on IEA, "World energy statistics", *IEA World Energy Statistics and Balances* (database), https://doi.org/10.1787/data-00510-en.

Comparability and interpretation

Data quality is not homogeneous for all countries. In some countries, data are based on secondary sources, and where incomplete, estimates were made by the IEA. In general, data are likely to be more accurate for production and trade than for international bunkers or stock changes; and statistics for biofuels and waste are less accurate than those for traditional commercial energy data. Estonia strongly rely on domestically produced oil shale (transformed into other petroleum products and exported). This production is counted as negative to oil in total energy supply, resulting in a negative share in the energy mix.The high values for Iceland are due to a significant increase in the production of hydro- and geothermal power mainly used in aluminium smelters. The supply structure, which may vary considerably among countries is dependent on final demands by industry, transport and the household sector, and is highly influenced by national energy policies and endowments in energy resources.

For further details see the metadata in the source databases listed under *Sources* below.

Taxes relevant for climate change

Key messages

- In the OECD area, climate change-related taxes raised USD 770 billion in 2020, representing the majority of environmentally related tax revenue (90%).
- The bulk of climate change related tax revenue comes from taxing energy and transport; pollution and resource tax bases play a minor role in generating revenue.
- Overall, the share of environmentally related tax revenue (ERTR) compared to GDP, continues to decline in OECD countries. ERTR is also decreasing, it represented 1.5% of GDP in 2020, down from 1.8% of GDP in the early 2000s.

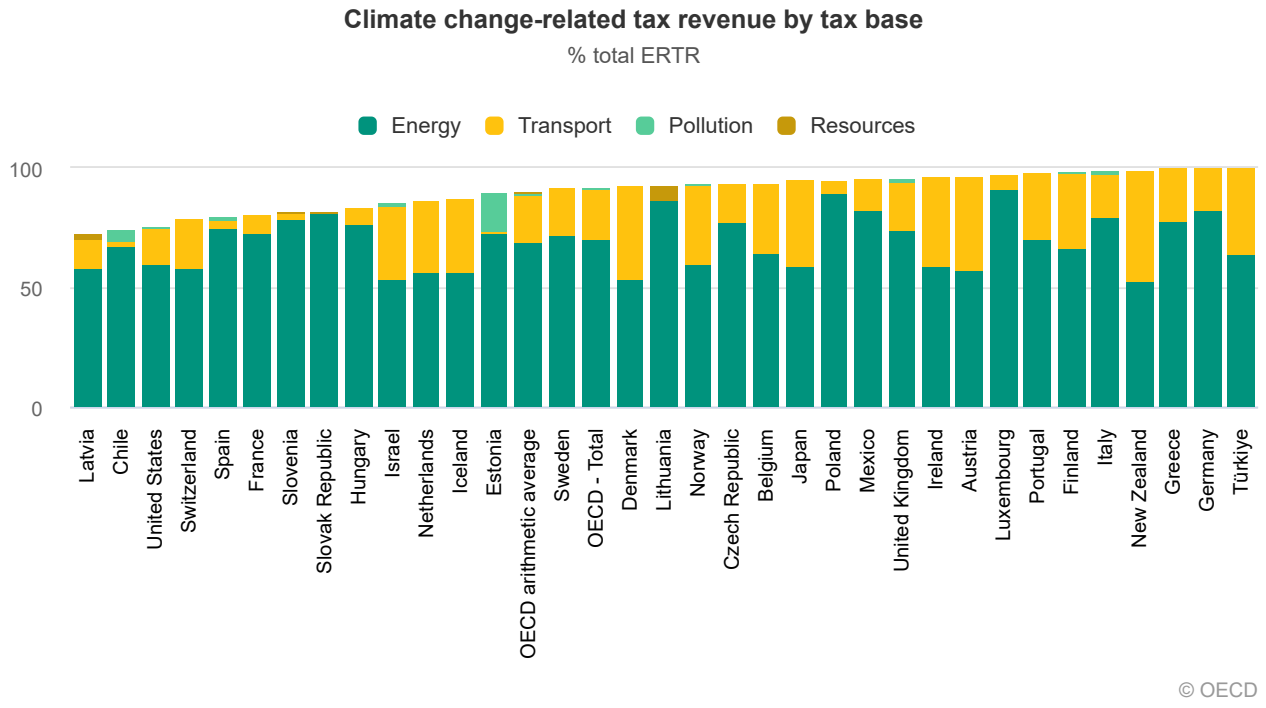
Climate change

Main trends and recent developments

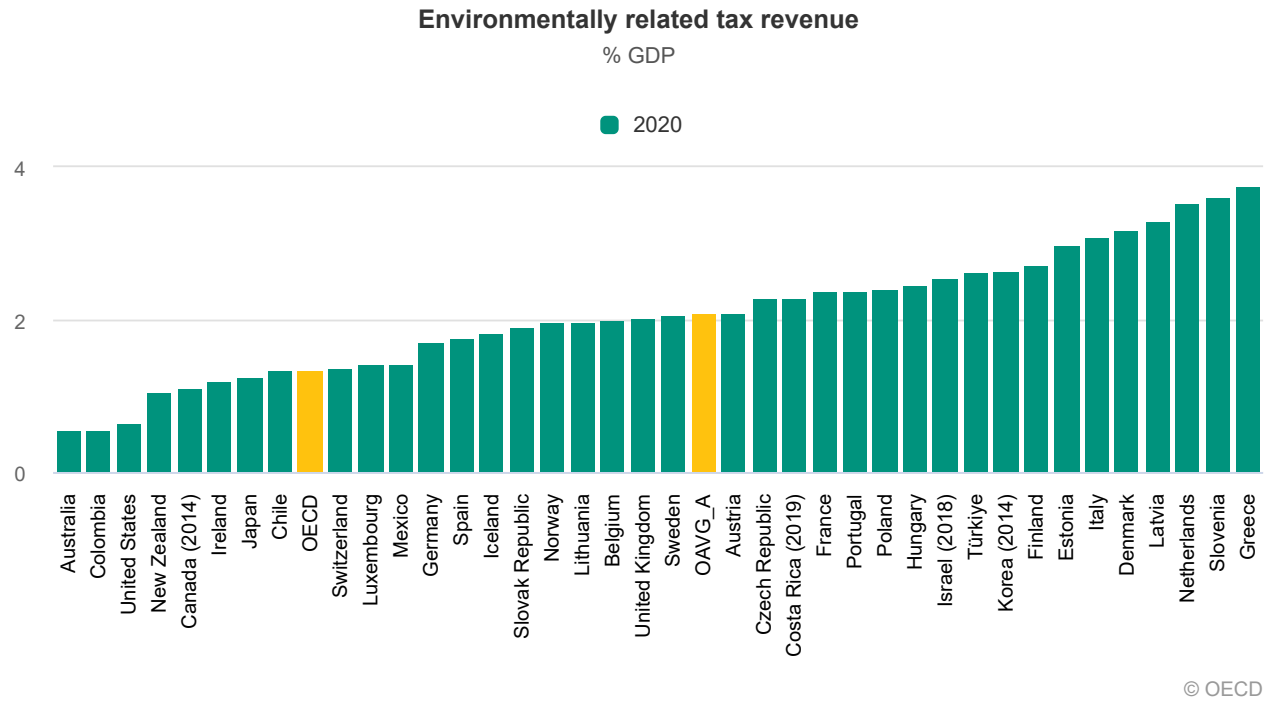
In the OECD area, climate change-related taxes raised USD 770 billion in 2020, representing the majority of environmentally related tax revenue (90%). This share has remained relatively unchanged since 2000. The bulk of revenue coming from taxes directed at climate change is raised from taxing energy (77%), in particular motor fuels, and transport (22%), while pollution and resource tax bases play a minor role in generating revenue. Pricing CO2 and energy remains the most economically efficient tool to bend the direction of carbon emissions globally, and create favourable conditions to mobilise private finance and investment required to achieve global mitigation objectives. Taxes on tax bases such as logging, forestry products and land use change, in turn, can help safeguard planetary carbon sinks and encourage carbon sequestration.

Overall, the share of environmentally related tax revenue (ERTR) continues to decline in OECD countries, amounting to 5% of total tax revenue in 2020, down from 5.9% in early 2000s. Compared to GDP, ERTR is also decreasing and reached 1.5% of GDP in 2020 down from 1.8% of GDP in the early 2000s. The decreasing trend is a combination of factors, namely, that tax rates are typically defined in physical units (e.g. per litre) and hence are set in nominal terms. Without inflation adjustment, these rates decrease in real terms over time. While countries such as Denmark, the Netherlands and Sweden have implemented such adjustments, most OECD countries do not yet apply inflation adjustments to environmentally related taxes. Another factor contributing to this trend is the increase in crude oil prices up until mid-2014, which triggered substitution away from motor fuel use, also making adjustments in nominal tax rates on motor fuels politically difficult. Yet some countries, such as Slovenia, Costa Rica, Turkey and Estonia strengthened the role of environmentally related taxes and have tripled their share of tax revenue since 2000.

Indicators



Source: OECD, "Environmental policy: Environmentally related tax revenue", *OECD Environment Statistics* (database), https://doi.org/10.1787/df563d69-en.



Source: OECD, "Environmental policy: Environmentally related tax revenue", *OECD Environment Statistics* (database), https://doi.org/10.1787/df563d69-en.

Comparability and interpretation

The indicators on environmentally related taxes should not be used to assess the "environmental friendliness" of the tax systems. For such analysis, additional information, describing the economic and taxation structure of each country, is required. Moreover, a number of environmentally related taxes can have important environmental impacts even if they raise little (or no) revenue. In addition, revenue from fees and charges, and from royalties related to resource management, is not included.

Comparisons of ERTRs in OECD countries provide a useful starting point for analysing the impact of environmental taxation, however, comparing only the levels of revenue does not provide the full picture of a country's environmental policy, as it does not provide information on the levels of tax rates or the exemptions applied. Other parts of the OECD PINE database, including information on tax rates and exemptions, allows deeper assessment of the environmental impacts of these taxes. In addition, governments may choose to implement environmental policy using a range of other instruments, including fees and charges, expenditures (both direct and subsidies) and regulation, some of which are also detailed in the PINE database (see http://oe.cd/pine for information on the use of alternative instruments in countries).

For further details see the metadata in the source databases listed under Data sources below.

Fossil fuel subsidies and other support measures

Key messages

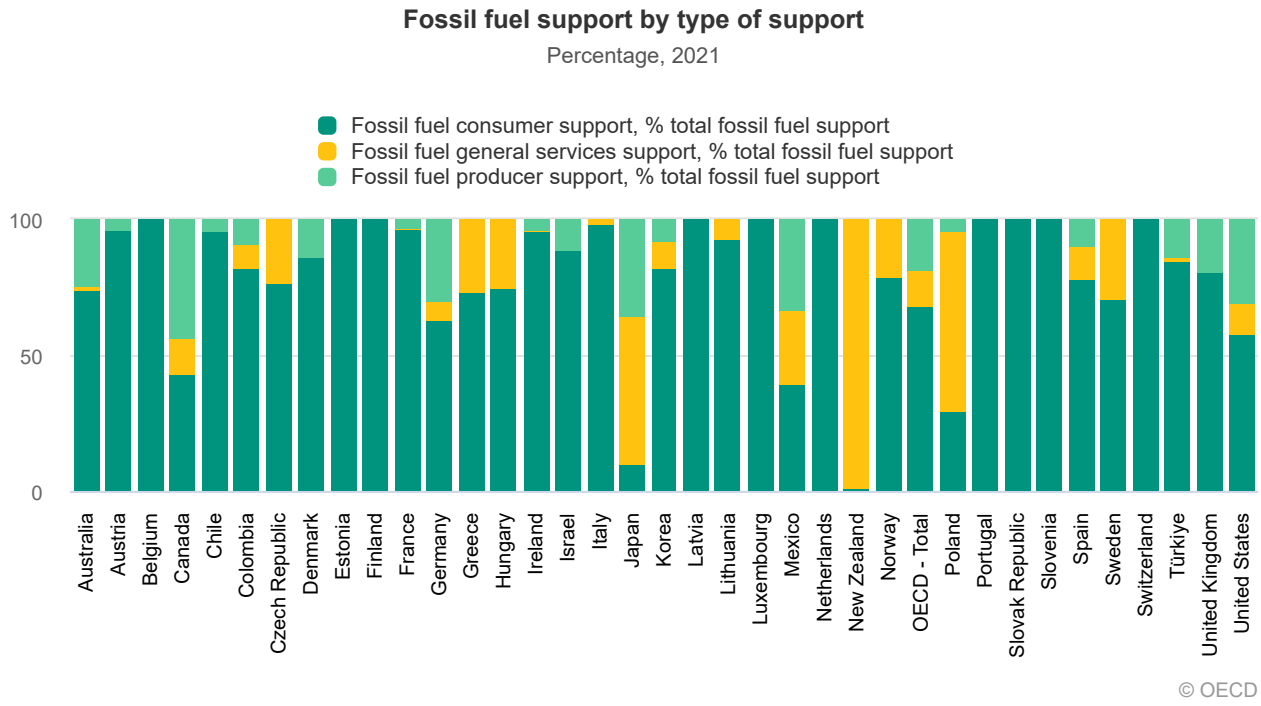
- The 51 OECD, G20, and Eastern Partnership economies covered by the OECD Inventory provided around USD 227 billion in support for fossil fuels in 2021, a 27% increase compared to the previous year.
- This was mostly the result of the rise in energy prices with the rebound of the global economy. Support for producers reached levels not previously seen in OECD tracking efforts. In addition, consumption subsidies are anticipated to rise even further in 2022 due to higher fuel prices and energy use.

Main trends and recent developments

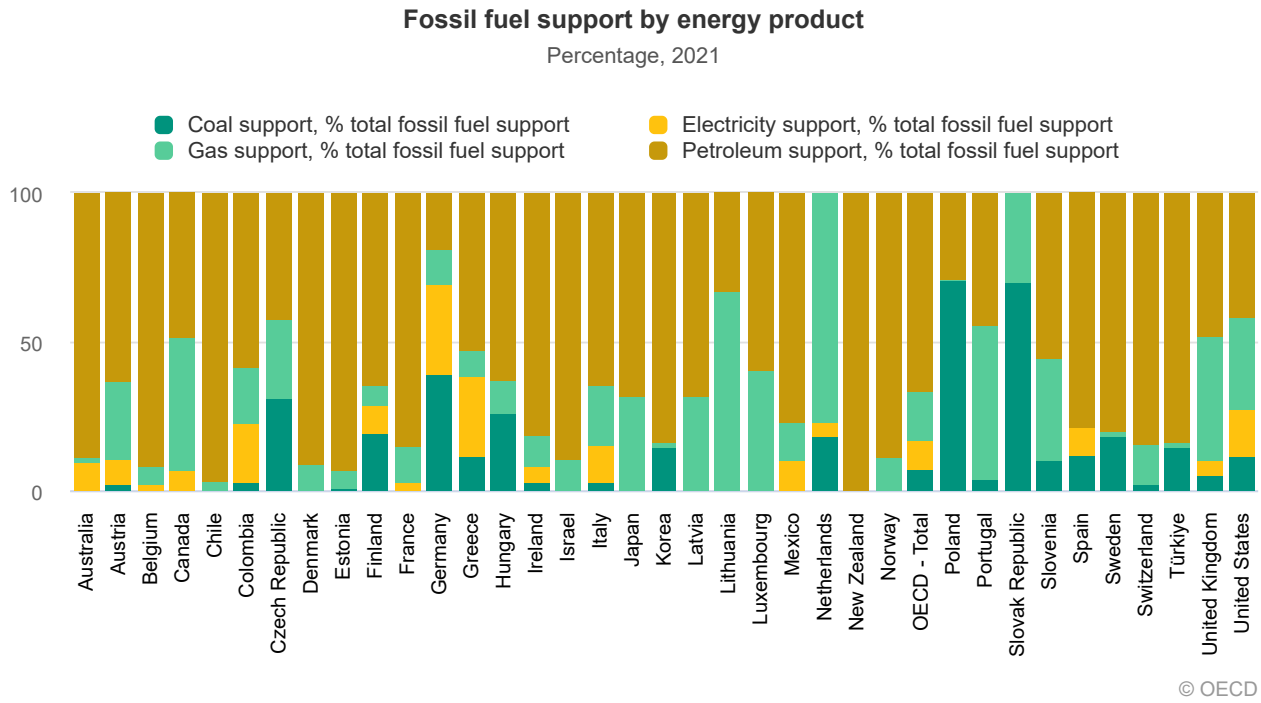
Many governments continue to support fossil fuel production and use financially, in particular oil and gas. This undermines the effectiveness of environmental policies by lowering the cost of emitting carbon and is a barrier to moving towards a more energy efficient and low-carbon economy. It can also impose a strain on government budgets.

The 51 OECD, G20, and Eastern Partnership economies covered by the OECD Inventory, provided around USD 227 billion in support for fossil fuels in 2021, a 27% increase compared to the previous year. This was mostly the result of the rise in energy prices with the rebound of the global economy. Support for producers reached levels not previously seen in OECD tracking efforts. Those subsidies have partly offset producer losses from domestic price controls as global energy prices surged in late 2021. In addition, consumption subsidies are anticipated to rise even further in 2022 due to higher fuel prices and energy use.

Indicators



Source: OECD, "OECD Inventory of Support Measures for Fossil Fuels" (database), http://www.oecd.org/fossil-fuels.



Source: OECD, "OECD Inventory of Support Measures for Fossil Fuels" (database), http://www.oecd.org/fossil-fuels.

Comparability and interpretation

The OECD Inventory of Support Measures for Fossil Fuels, which covers 51 OECD, G20, and Eastern Partnership economies, identifies and estimates policies that support the production or consumption of fossil fuels. It includes direct budgetary transfers and tax expenditures that may provide a benefit or preference for fossil-fuel production or consumption relative to alternatives. Unlike direct budgetary expenditures, where outlays can usually be measured, tax expenditures are estimates of the fiscal revenue that is foregone due to a particular feature of the tax system that reduces a tax rate relative to a benchmark tax rate. It is important to note that definitions of tax expenditures, and the benchmarks used to estimate their size, are nationally determined. Hence, (i) tax expenditure estimates could increase either because of greater concessions, relative to the benchmark tax treatment, or because of a raise in the benchmark itself; (ii) international comparison of tax expenditures could be misleading, due to country-specific benchmark tax treatments.

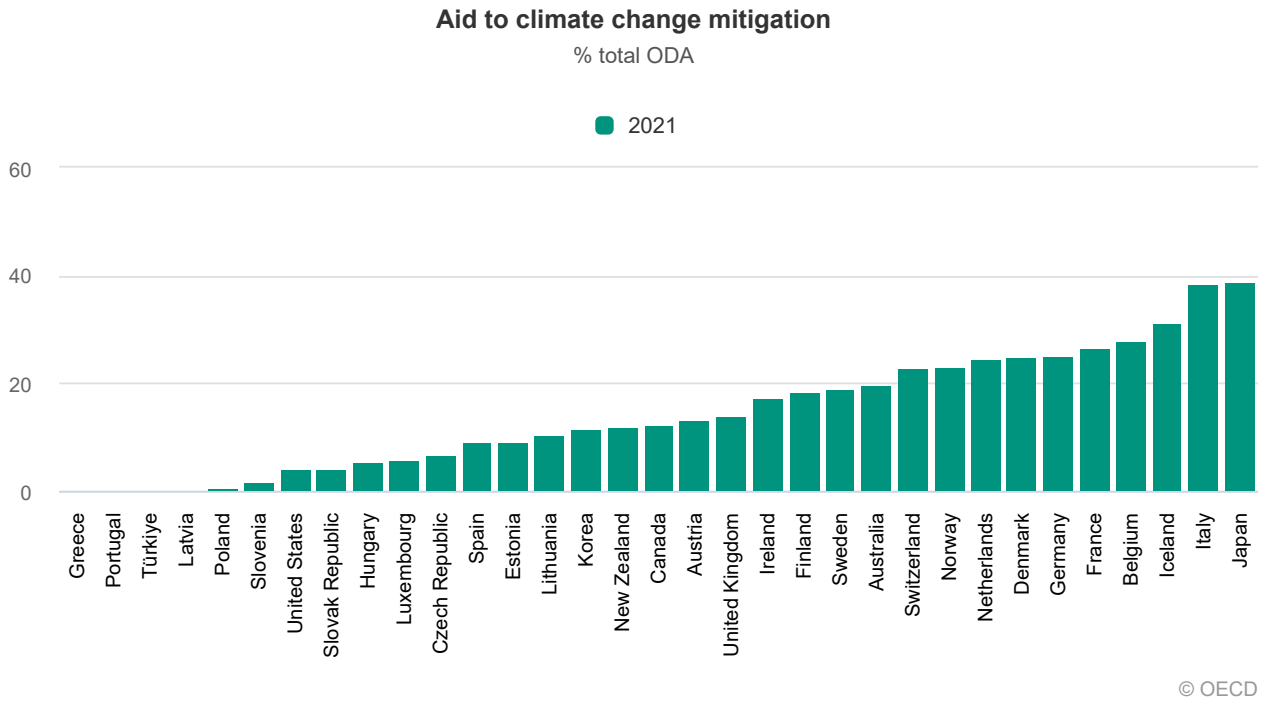
Measures appearing in the OECD Inventory are classified as support without reference to the purpose for which they were first put in place or their economic or environmental effects. No judgment is therefore made as to whether or not such measures are inefficient or ought to be reformed.

Official development assistance

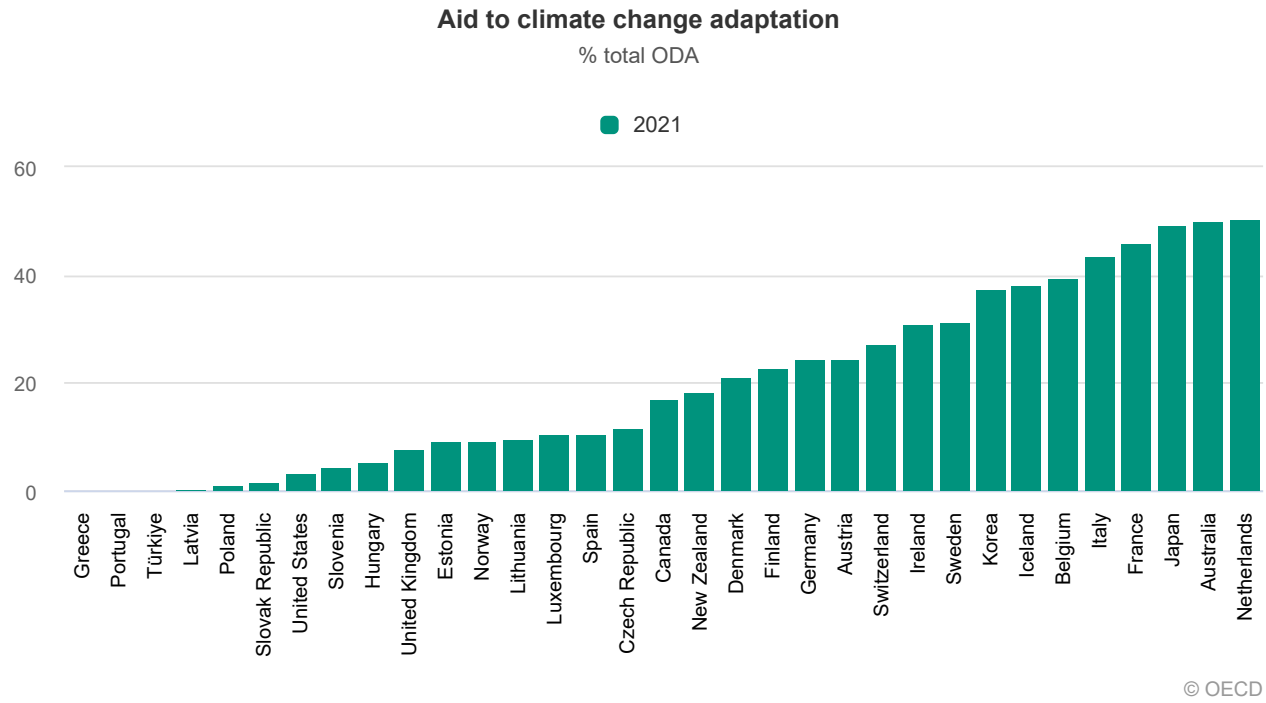
Key messages

- In 2020, members of the OECD Development Assistance Committee (DAC) allocated a record high 33% of their bilateral official development assistance (ODA) to climate objectives. For the first time, adaptation-related ODA surpasses mitigation-related ODA (OECD, 2022).
- Of all climate-related activities funded by bilateral ODA, 39% had adaptation objectives, 37% had mitigation objectives and 24% pursued both(OECD, 2022).

- Over one-third of climate-related ODA supports climate action as a principal objective, and the remainder has it as a significant (secondary) objective. Asia is the main recipient (41% of the total), followed by Africa (25%).
- While this growth is promising, the majority of ODA flows have still not been aligned with the objectives of the Paris Agreement.



Source: OECD, "Creditor Reporting System: Aid activities targeting Global Environmental Objectives", *OECD International Development Statistics* (database), https://doi.org/10.1787/9c778247-en.



Source: OECD, "Creditor Reporting System: Aid activities targeting Global Environmental Objectives", *OECD International Development Statistics* (database), https://doi.org/10.1787/9c778247-en.

Glossary

Annual surface temperature change: changes in the mean surface air temperature over land compared to the baseline period 1981-2010 (measured in Celsius degrees (°C)).

Carbon dioxide (CO2) emissions from energy use (production-based CO2 emissions): Refer to gross direct CO2 emissions from fossil fuel combustion, emitted within the national territory. Human-caused emissions from other sources are not included. Emissions from oil held in international marine and aviation bunkers are excluded. CO2 removal by sinks, indirect emissions from land use changes and indirect effects through interactions in the atmosphere are not taken into account.

Carbon footprint (demand-based CO2 emissions): Refer to the CO2 from energy use emitted during the various stages of production (in the country or abroad) of goods and services consumed in domestic final demand.

OECD Indicators on **Carbon dioxide (CO2) emissions embodied in international trade** (TECO2) are derived by combining the OECD Inter-Country Input-Output (ICIO) Database and the International Energy Agency (IEA) statistics on CO2 emissions from fuel combustion. Emissions from fuels used for international aviation and maritime transport (i.e. aviation and marine bunkers) are also considered.

For more information, see web page: http://oe.cd/io-co2.

Climate change-related tax revenue: Revenue raised from taxes and auctioning of tradable permits directed at climate change. These include specific taxes on i) energy products and revenue from auctioning of CO2 tradable allowances; ii) use of motor vehicles, iii) pollution (e.g. cement production); and iv) resource extraction (e.g. forestry taxes).

The information on taxes and the associated tax revenue is extracted from the OECD Policy Instruments for the Environment (PINE) database (http://oe.cd/pine). The PINE database, contains quantitative and

qualitative information on over 3500 policy instruments in 110 countries worldwide. Policy instruments are tagged into 13 environmental domains that represent the focal issues (environmental externalities). Instruments can have both a direct and an indirect effect on several environmental domains; however, only the domain to which the instrument has a direct effect is considered. For more details, see the metadata to the *OECD Environmentally related tax revenue dataset*.

Greenhouse gas emissions statistics: The following sources of greenhouse gas statistics are used in this document:

- National GHG inventories: OECD Environment Statistics (database) based on national inventory submissions to the United Nations Framework Convention on Climate Change (UNFCCC, CRF tables), and replies to the OECD State of the Environment Questionnaire. These statistics come from official submissions of GHG emissions data by Parties to the UNFCCC. Complete data sets including and excluding land use, land-use change and forestry (LULUCF) are available for Annex I Parties to the UNFCCC and partial data sets are available for non-Annex I Parties.
- IEA statistics on CO2 emissions: IEA estimates of CO2 emissions from fuel combustion are calculated using IEA energy data and the default methods and emission factors from the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.
- IEA/EDGAR statistics on total GHG emissions: This dataset combines IEA statistics on CO2 from fossil fuel combustion with data for CO2 from non-energy-related sources and gas flaring, and emissions of methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride from the Emissions Database for Global Atmospheric Research (EDGAR). The EDGAR database includes partial coverage of emissions from land use, land-use change and forestry (direct emissions from forest fires, emissions from decay of aboveground biomass that remains after logging and deforestation, emissions from peat fires and decay of drained peat soils).

Greenhouse gas emissions by source (territory principle): Greenhouse gas (GHG) emissions refer to the sum of GHGs that have direct effects on climate change and are considered responsible for a major part of global warming: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3).

Greenhouse gas emission estimates are divided into main sectors, which are groupings of related processes, sources and sinks:

- Energy (energy industries, manufacturing industries, transport and other energy uses)
- Industrial Processes and Product Use (IPPU)
- Agriculture
- Waste
- Other (e.g., indirect emissions from nitrogen deposition from non-agriculture sources).

They refer to GHGs emitted within the national territory and exclude CO2 emissions and removals from category 4 - Land use change and forestry. They do not cover international transactions of emission reduction units or certified emission reductions.

Official Development Assistance: Total ODA comprises both screened and non-screened ODA bilateral commitments. ODA data are obtained from the Aid Activities Targeting Global Environmental Objectives dataset of the Creditor Reporting System of the OECD International Development Statistics Database.

Climate change

Environmentally related Official Development Assistance (ODA) is expressed as a percentage of total ODA. Environmentally related ODA is identified using marker "Environment" and the set of “Rio Markers”. The Rio Markers specifically screen for policy objectives of a cross-sectorial nature, including climate change, biodiversity and desertification. This variable includes only data on bilateral commitments and is calculated by aggregating up from the level of the individual projects in order to avoid double-counting. ODA commitments identified using the "Environment" marker (principal or significant objective) include activities that are intended to produce an improvement in the physical and/or biological environment of the recipient country, area or target group concerned or include specific action to integrate environmental concerns with a range of development objectives through institution building and/or capacity development. The “Environment” marker was introduced in 1992.

- Climate change mitigation-related aid is defined as activities that strengthen the resilience of countries to climate change and that contribute to stabilisation of GHG concentrations by promoting reduction of emissions or enhancement of GHG sequestration. The climate change mitigation marker was introduced in 1998.
- Climate change adaptation-related aid, approved by OECD-DAC members in December 2009, is defined as aid in support of climate change adaptation and complements the climate change mitigation marker, thus allowing presentation of a more complete picture of aid in support of developing countries’ efforts to address climate change. The climate change adaptation marker was introduced in 2010

Total fossil fuel support: Comprises Consumer Support Estimates (CSE), Producer Support Estimates (PSE) and General Services Support Estimate (GSSE), for petroleum, coal and natural gas. Measures that benefit individual producers are classified under the PSE, while those that benefit individual consumers are classified under the CSE. Measures benefitting producers or consumers collectively are classified under the GSSE, as are measures that do not increase current production or consumption of fossil fuels but that may do so in the future. The definition of support encompasses policies that can induce changes in the relative prices of fossil fuels in the support estimate level.

Fossil fuel support by type of support refer the share of consumption, production and general services support in total fossil fuel support.

Fossil fuel support by fuel refer to the share of petroleum, coal and gas support in in total fossil fuel support.

Total energy supply: Total energy supply (TES) is made up of production + imports – exports – international marine bunkers – international aviation bunkers ± stock changes. Primary energy comprises coal, peat and peat products, oil shale, natural gas, crude oil and oil products, nuclear, and renewable energy (bioenergy, geothermal, hydropower, ocean, solar and wind). Electricity trade is included in total primary energy supply, but excluded from the calculation of the breakdown by source.

The share of renewables in the production of electricity. The main renewable forms are hydro, geothermal, wind, biomass, waste and solar energy.

Total fossil fuel support: Comprises Consumer Support Estimates (CSE), Producer Support Estimates (PSE) and General Services Support Estimate (GSSE), for petroleum, coal and natural gas. Measures that benefit individual producers are classified under the PSE, while those that benefit individual consumers are classified under the CSE. Measures benefitting producers or consumers collectively are classified under the GSSE, as are measures that do not increase current production or consumption of fossil fuels but that may do so in the future. The definition of support encompasses policies that can induce changes in the relative prices of fossil fuels in the support estimate level.

Fossil fuel support by type of support refer the share of consumption, production and general services support in total fossil fuel support.

Fossil fuel support by fuel refer to the share of petroleum, coal and gas support in in total fossil fuel support.

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