

Carbon emissions in regions and by sector

Carbon dioxide (CO₂) is the primary greenhouse gas emitted through human activities. While CO₂ occurs naturally in the atmosphere and is part of the earth's carbon cycle – the exchange of carbon between the atmosphere, oceans, soil, plants, and animals – human activities alter the carbon cycle by adding additional CO₂ into the atmosphere and at the same time influence the ability of natural carbon sinks, such as forests and oceans, to remove CO₂ from it. Despite the fact that CO₂ emissions come from a variety of natural sources, man-made emissions have accounted for the majority of the CO₂ increase in the atmosphere since the beginning of the industrialisation.

Wide ranges in CO₂ emissions per capita exist among regions within OECD countries. The highest values of CO₂ per capita were registered in some regions of Australia, Canada, Chile, Greece, New Zealand and the United States, and, among non-OECD countries, the Russian Federation (Figure 5.9). Regional CO₂ emissions reached values as high as 550 tonnes per capita in Canada, and as low as 4.6 tonnes per capita in India. Part of these differences can be explained by the presence of greenhouse gas in low densely populated regions.

Compared to 2005, average per capita CO₂ emissions decreased in almost all OECD countries in 2008, particularly in Canada, and, for non-OECD countries, in Brazil.

Levels of gross domestic product (GDP) tend to be positively correlated with CO₂ emissions since industrial production and other anthropogenic sources of CO₂, such as fossil fuel-based transportation and electricity production, tend to be higher in economically thriving regions. However, the

Definition

Carbon dioxide (CO₂) emissions in regions are estimated by adjusting national emission data with population grid data and infrastructure location. They include emissions from all sources with the exception of air transport, international aviation and shipping.

CO₂ emissions from transport include road and non-road transportation.

GDP/CO₂ is a measurement of the carbon intensity of production at the regional level.

carbon intensity of a region, i.e. the ratio of regional GDP and regional CO₂, shows large regional differences, suggesting room for improvements (Figure 5.10). CO₂ efficiency of production increased across most OECD countries between 2005 and 2008.

The sectoral configuration of regional economies differs across OECD countries, and service sector based economies tend to be less carbon intensive. This highlights the need to better understand the mechanisms that drive CO₂ efficiencies, understanding the source of emissions by sector in different regions. The energy sector represents at least half of the total CO₂ emissions in most of the countries (Figure 5.11). In many countries, the concentration of CO₂ emissions by energy in a few regions is due to the fact that these regions produce electricity for the whole country. The share of CO₂ emissions from transport exceeds 50% in about half of the regions with the highest share of CO₂ emissions from transport (Figure 5.12).

Source

CO₂ emissions: EDGAR spatial emission datasets, JRC, <http://edgar.jrc.ec.europa.eu/>.

See Annex B for data sources and country-related metadata. See Annex C for details on data estimation.

Reference years and territorial level

2008; TL3 for OECD countries; TL2 for Brazil, China, India, the Russian Federation, and South Africa.

Further information

Piacentini, M. and K. Rosina (2012), "Measuring the Environmental Performance of Metropolitan Areas with Geographic Information Sources", *OECD Regional Development Working Papers*, No. 2012/05, OECD Publishing, <http://dx.doi.org/10.1787/5k9b9ltv87jf-en>.

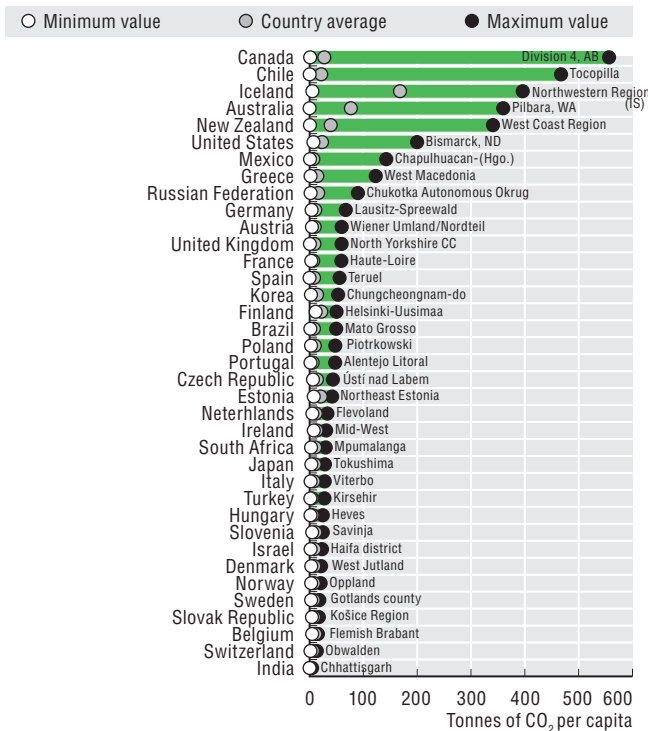
Figure notes

Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

5. ENVIRONMENTAL SUSTAINABILITY IN REGIONS

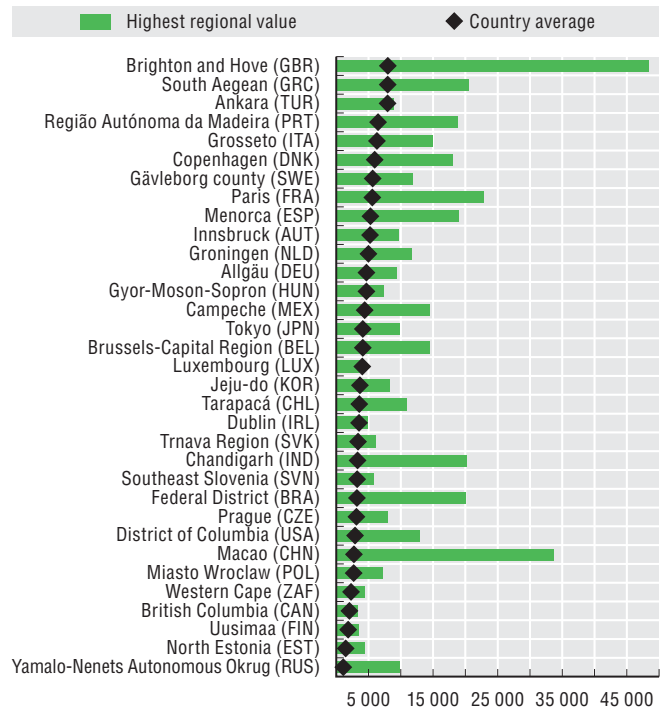
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5.9. TL3 regional range in CO₂ emissions per capita, 2008



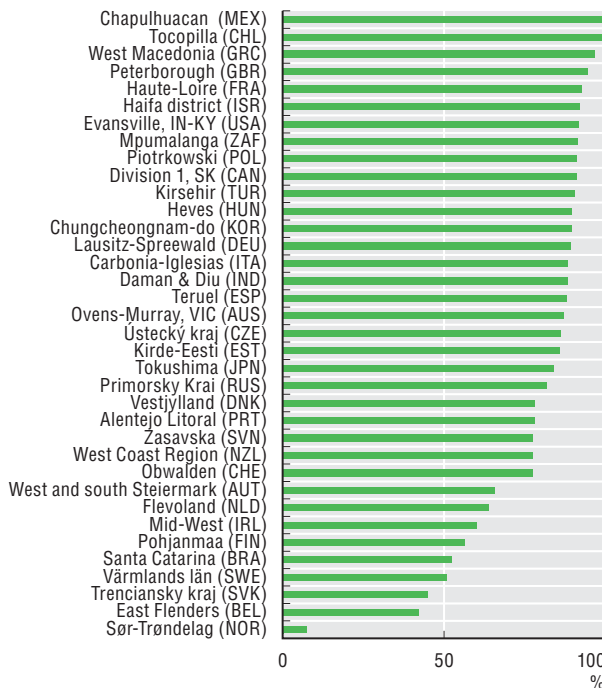
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5.10. TL3 region with the highest GDP to CO₂ ratio and country average, 2008



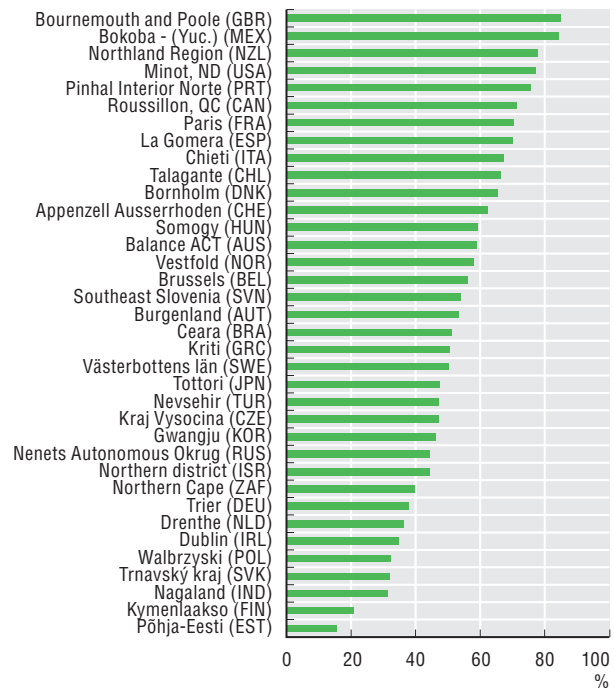
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5.11. Share of CO₂ emissions from the energy sector, highest regional (TL3) value by country, 2008



StatLink <http://dx.doi.org/10.1787/888932914976>

5.12. Share of CO₂ emissions from the transport sector, highest regional (TL3) value by country, 2008



StatLink <http://dx.doi.org/10.1787/888932914995>



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