

Science for Environment Policy

Greenhouse gas emissions from household consumption mapped across the EU

An inventory of carbon footprints has been developed for 177 regions across 27 EU Member States. The map is the first to quantify greenhouse gas emissions associated with household consumption across the EU. It reveals significant regional differences based on income, household size and urban versus rural living.

Under the [2020 climate and energy package](#), the EU committed to cutting greenhouse gas (GHG) emissions to 20% below 1990 levels by 2020. Designing policies to achieve this requires comprehensive emissions data; however, most datasets cover either large international regions or individual countries, which hide important differences between countries.

To help policymakers to design consumption-based mitigation policies, the authors of this study performed the first ever regional assessment of household carbon footprints across the EU¹.

The EU-funded² researchers developed a map of carbon footprints associated with household consumption for the [EU-27](#), which was further split into 177 regions. Carbon-footprint calculations were based on regional consumer expenditure and environmental and trade data from the [EXIOBASE](#)³ database, which provides emissions data for 43 countries and 200 product sectors.

The analysis revealed significant variability in GHG emissions across countries³. Eastern European countries, such as Hungary and Romania, had the lowest carbon footprints, while Luxembourg and the UK had the highest emissions. Emissions also varied significantly within countries' regions, varying between 0.6 tonnes of carbon dioxide equivalent per capita (tCO₂e/cap) and 6.5 tCO₂e/cap.

Transport emissions were the largest source of emissions, overall accounting for around 25% of the carbon footprint of households (varying regional importance between 13%–44% across regions). Food was also a significant source of household emissions, contributing to 18% of EU household emissions (varying regional importance between 11%–32%).

The study also identified the socio-economic, geographic and technical factors (such as building standards and the carbon intensity of the local electricity mix) associated with higher carbon footprints. Income was the most important driver, with a rise in annual salary of €1 000 associated with an increase in emissions of 265 kg of CO₂e. Thus, €1 000 rise in income would result in about 450, 300 and 150 kgCO₂e/cap increase in footprint at the 25th, 50th and 75th income percentile of the regional sample respectively (at income levels of 8 100 euros per capita/annual net income (€/cap), 14 100 €/cap and 20 800 €/cap respectively). The researchers, therefore, found the effect of income to be non-linear, so the change of emissions would depend on the income level for the country.

Countries with greater income inequality, such as Italy, Spain and the UK, therefore had the widest emissions ranges.

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Source: Ivanova, D., Vita, G., Steen-Olsen, K., *et al.* (2017) Mapping the carbon footprint of EU regions. *Environmental Research Letters*. 12 : (5): 054013.

This study is freely available at:
<http://iopscience.iop.org/article/10.1088/1748-9326/aa6da9>.

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1. An interactive version of the maps show consumption-based impacts by various environmental indicators (e.g. carbon, land, water and materials) and consumption categories (e.g. food, shelter, mobility) is available here: <http://www.environmentalfootprints.org/regional>.

2. The Green Lifestyles, Alternative Models and Upscaling Regional Sustainability (GLAMURS) project was supported by the European Commission under the Seventh Framework Programme. See: <http://glamurs.eu>.

3. The EXIOBASE database was developed as part of the Compiling and Refining Environmental and Economic Accounts (CREEA) project, which was also funded by the European Commission under the Seventh Framework Programme. See: <http://www.exiobase.eu>, <http://www.creea.eu>.

4. Full carbon footprint maps can be seen [here](#).

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Other drivers of carbon footprint were household size (larger households had lower emissions), urban vs rural living (with households in urban areas contributing on average 650 kg CO₂e/capita fewer emissions within the transport category) and level of education (with better educated households having generally higher consumption levels and, therefore, emissions).

This is the first study to quantify the GHG emissions associated with household consumption at a regional scale across the EU, providing unique insights into carbon footprints across Member States. The data from the survey could be used to drive local decision-making processes, including designing and monitoring more intelligent regional climate mitigation policies.

