

# Consumption-driven emissions: new opportunities for EU climate mitigation

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## Key messages

- Between 1990 and 2020, global CO<sub>2</sub> emissions increased by 63%, while emissions in the EU decreased by 29%. Yet this reduction doesn't capture the environmental footprint of the EU, which extends beyond its borders due to the import of emissions-intensive goods and services to satisfy EU demand.
- Since 2015, the EU has been a net importer of CO<sub>2</sub> emissions: the emissions associated with goods and services imported for EU consumption exceed emissions associated with its exports, signalling a growing adverse impact of EU consumption on other countries.
- More than 30% of the EU's imported emissions originate outside the EU, with the remainder traded within EU's borders. China was the largest exporter of emissions to the EU accounting for 8.5% of EU consumption-based emissions, followed by Russia (4.8 %), the United States and India (both 1.6 %).
- Projections point to a rise in environmental impacts of EU consumption up to 2030, highlighting the need for additional measures to align with global climate goals.
- To lower consumption-based emissions we put forward a set of recommendations. Foremost among these are to: set binding targets at the EU-level; standardize methods for CBEs accounting; set mandatory reporting requirements on member states; strengthen existing EU legislation to better address CBEs; enhance transparency in trade and value chains; foster partnerships with trading partners committed to sustainable production practices; and provide capacity-building support to developing countries to enhance their sustainable production practices.

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## 1. Introduction

Between 1990 and 2020, territorial CO<sub>2</sub> emissions in the EU were cut by 29% even as global emissions increased by 63%. However, this reduction underestimates the EU carbon footprint because of imports of emissions-intensive goods and services to satisfy EU demand.

The IPCC attributes some two-thirds of greenhouse gas emissions to consumption. In 2021, the EU's consumption-based CO<sub>2</sub> emissions were estimated at 3.5 billion metric tonnes, corresponding to about 9% of global CO<sub>2</sub> emissions (37.9 billion tonnes), which

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is disproportionate to its 5.7% share of the world population. This underscores the necessity for targeted policies and measures to address households' consumption-based emissions (CBEs), given their significant contribution to overall emissions in the EU and their role in emissions and environmental pressures globally.

The EU could substantially boost climate action by addressing these consumption-based emissions and setting an example for other nations to follow. To explore the potential for EU action and global leadership in this area, we carried out an EU policy analysis and three case studies on the opportunities and barriers to address CBEs in Denmark, France and Sweden. This brief presents a summary of results from the study. For a more detailed analysis, find the [full report here](#).

We found a strong willingness to address CBEs at the member state level and an increasing focus on CBEs in EU policy measures. There remains a focus on making progress through efficiency gains, while there is potential for more systematic transitions to shift patterns of consumption.

Our analysis concludes that the main barriers are the lack of standardized monitoring systems, the complexity and lack of transparency in global supply chains, and the need for member states to coordinate efforts to tackle CBEs through effective targets, common policies and measures. Opportunities lie in leveraging the EU's influence to set common targets for CBEs at the EU level, and , supporting member states as well as developing countries in transitioning to low-carbon practices, and boosting demand for products produced with minimal environmental impact.

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**Territorial emissions** refer to the greenhouse gas emissions produced within the geographical boundaries of a specific region, country, or territory. These emissions are generated from activities like burning fossil fuels for energy, industrial processes, transportation, and agriculture that occur within the territory. Territorial emissions are commonly used to assess a country's or region's direct contribution to climate change and are often reported in national greenhouse gas inventories.

**Production-based emissions** are similar to territorial emissions but also include emissions of European economic actors outside European borders.

**Consumption-based emissions (CBEs)**, also known as carbon footprints or emissions embodied in consumption, refer to the greenhouse gas emissions associated with the production of goods and services consumed by individuals, households, or entire nations, regardless of where in the world the production occurs. This includes emissions from the entire supply chain of goods and services, including production, transportation, and disposal.

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## 2. Variation in emissions points to opportunities for solutions at EU level

In 2021, the average households' consumption-based emissions footprint in the EU 27 was 8.0 tonnes CO<sub>2</sub>e equivalent per person, ranging from 11.0 tonnes CO<sub>2</sub>e per person in Denmark and Luxembourg to 4.6 tonnes per person in Slovakia.

As prosperity and population grow in the EU, consumption-based emissions can be expected to increase unless systematically addressed. Increases in production efficiency, however, are not enough to offset increasing consumption-based emissions, or address resource use in general (European Environment Agency, 2024) In light of these variations and expected trends, we understand that individual member states might struggle to address emissions effectively on their own and would benefit from coordinated efforts at the EU level.

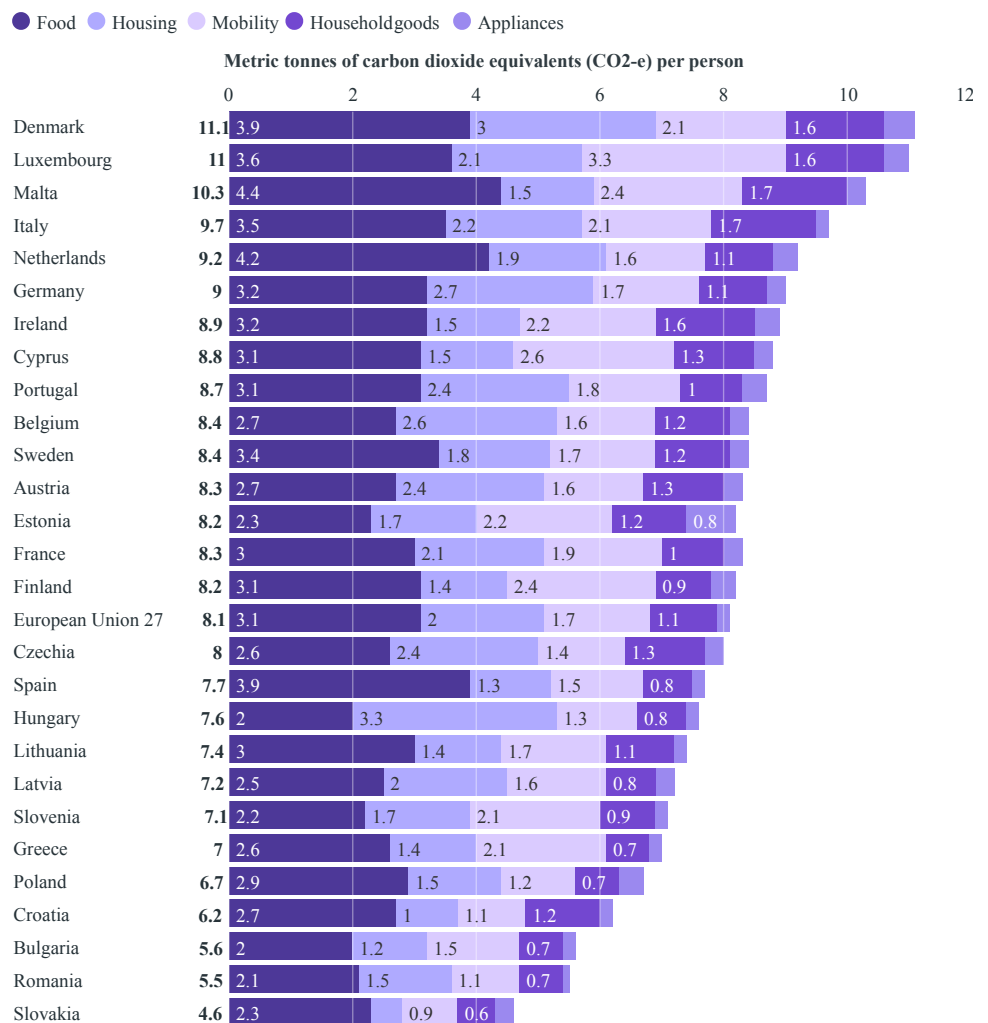


Figure 1. Carbon footprint for all EU member states in 2021, and per category of consumption.  
 Source: European Commission. (2023). Consumption Footprint Platform | EPLCA [dataset].  
<https://eplca.jrc.ec.europa.eu/ConsumptionFootprintPlatform.html>

### 3. Consumption hotspots

Based on European Commission data, the main consumption “hotspots” at the EU level are *food*, *housing* and *mobility*. *Food*, along with *household goods*, is also the category with the least variation in consumption among member states. While the lowest total

emissions are from the category *appliances*, it is the consumption category with the largest variation between member states, followed by *housing*, then *mobility*.

The variation in both per capita emission levels across consumption categories and member states underscores the importance of understanding the specific drivers of emissions in different sectors and regions. With a better understanding of the variations and similarities in member states' consumption, the EU will be in a better position to support them by designing tailored policy measures and targets to address consumption hotspots, ultimately contributing to more targeted and effective emission reduction efforts across the EU.

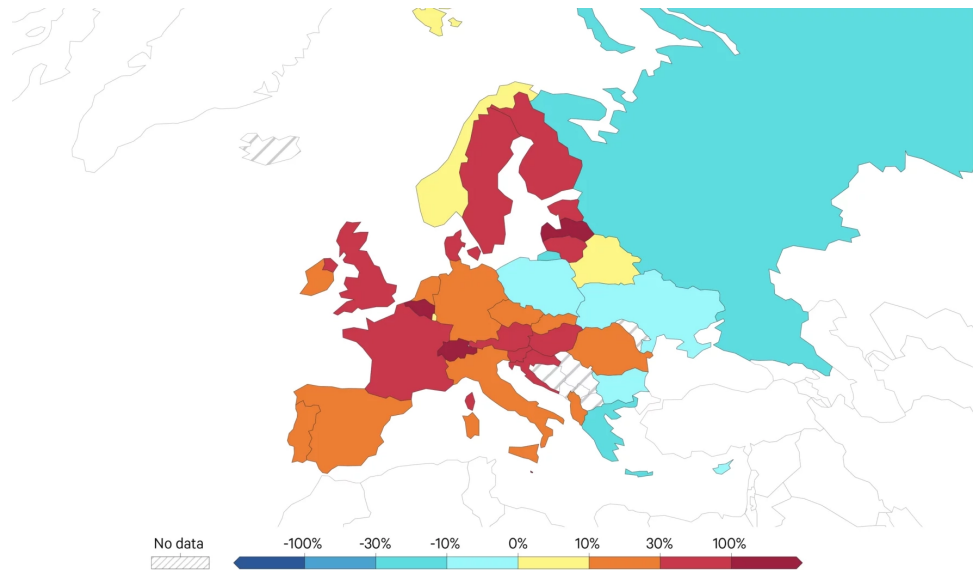


Figure 13. Share of CO2 emissions embedded in trade among the EU 27 in 2021. Positive values (red) represent net importers of CO2. Negative values (blue) represent net exporters of CO2. *Global Carbon Project (2023). Share of CO2 emissions embedded in trade, Global Carbon Budget with major processing by Our World in Data.*

## 4. Differences in trade

When it comes to trade, the average share of CO<sub>2</sub> emissions embedded in imports to EU member states was 8% in 2021, but as shown in Figure 2, the range differs substantially between member states. Malta has the highest share, with emissions embedded in imports at 500% the level of their domestic emissions, followed by Latvia and Belgium at around 110%, meaning that emissions embedded in their imports are greater than the emissions embedded in their exports. As a net exporter, Greece is at the other end of the scale with -12% embedded in trade, followed by Bulgaria and Poland, both -4%, meaning that the carbon footprint associated with these countries' exports is larger than the carbon footprint of their imports.

## 5. Policies to address consumption-based emissions in the EU

As in many other parts of the world, efforts to reduce greenhouse gas emissions within the EU and its member states have traditionally focused on levies for emissions on

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producers, alongside product energy efficiency measures (Grubb et al., 2020). The “polluter pays” approach affects consumers indirectly as higher prices are passed through from producers, yet it rarely targets specific consumption categories or the behavioural shifts required for deep decarbonization (Morfeldt et al., 2023).

Recent and planned EU policies have begun to target household CBEs through carbon pricing and emission restrictions on imports, but the coverage of products and services remains limited. The EU could build on and address gaps in existing measures to address households’ consumption behaviour by working more with measures that emphasize the need to shift or avoid consumption, as a complement to the current focus on efficiency measures in production. In recently adopted policy measures, there is scope to apply carbon pricing and carbon footprint requirements to cover additional sectors, products and services. More uniformly applied pricing and standards restricting carbon footprints in products and services prioritizing consumption hotspots such as food, housing, and mobility could drive behaviour change, but will also require oversight of the impacts on vulnerable groups.

### **Next steps**

- Set mandatory requirements on member states to report annually to EU institutions on CBEs, complementing existing reporting obligations on territorial emissions.
- Establish short and long-term EU targets for consumption-based emissions, complementary to targets on territorial emissions.
- Expand policy measures targeting households’ consumption and associated impacts to shift and avoid consumption to complement efficiency measures, including more uniform carbon pricing and standards restricting carbon footprints in products and services.

### **Existing frameworks to build on**

- Housing and mobility consumption hotspots can be addressed by the ETS2 (emissions trading system for retailers of fuels such as gas for heating and cooking, and petrol or diesel for vehicles, based on their carbon content). It will be important to monitor the effects of the ETS2 on household behaviour patterns and consider adjustments to maintain a meaningful carbon price.
- The EcoDesign Regulation, which aims to improve EU products’ environmental performance, and put forward delegated acts specifying a wider range of product groups and requirements for them, such as limits on carbon footprints, based on science-based benchmarks.
- It will be important to consider policy impacts on vulnerable groups. We recommend monitoring and expanding EU and member state schemes, such as the EU’s Social Climate Fund, to protect vulnerable groups exposed to increased prices arising from consumption-oriented policies. For these schemes to contribute to policy acceptance and legitimacy, they must be well-targeted, sufficiently resourced and be complemented by wider programs to ensure all groups in society have access to low-carbon goods and services.

## 6. Trade can be part of the solution

Trade has been a central pillar of the EU since its inception. As attention increases on CBEs, it is important for the EU to be more mindful of the carbon embedded in its imports and take effective measures to mitigate emissions embedded in trade. Recently, the EU policy scope has reached beyond EU borders by requiring importers of goods and services to monitor and compensate for social and environmental impacts in the supply chain. The EU has extensive trade connections and, with its large single market, it influences production requirements that affect emissions embedded in trade across and within its borders. Sustainable trade can create job opportunities, economic growth, strengthen diplomatic ties, and support economic growth in developing countries.

As Figure 3 shows, in 2021 about two-thirds (69%) of EU's consumption-based CO<sub>2</sub> emissions were generated from imports between EU countries. G20 countries accounted for 21%, and the remainder – around 12% – originated from the rest of the world (i.e. non-EU and non-G20 countries).

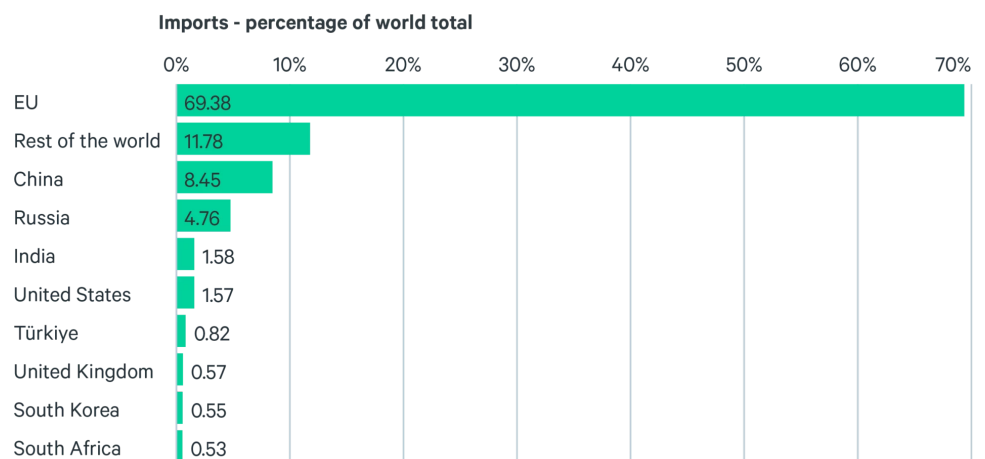


Figure 3. The 10 regions or countries most responsible for greenhouse gas emissions resulting from EU imports in 2021, as a percentage of world total.  
Source: Eurostat

As Figure 3 shows, in 2021 about two-thirds (69%) of EU's consumption-based CO<sub>2</sub> emissions were generated from imports between EU countries. G20 countries accounted for 21%, and the remainder – around – originated from the rest of the world (i.e. non-EU and non-G20 countries).

Looking at individual countries, China was the largest exporter of goods to the EU (8.5%), followed by Russia (4.8%), the US and India (both 1.6%). Given that the largest share of CBEs is generated from trade between EU member states, internal EU measures could make the most difference in reducing CBEs.

There is not enough detailed public data about the composition of imports and exports from different trade partners. Neither is there detailed data available on the total greenhouse gas emissions or the emission intensities connected to imports from different countries.

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While there certainly is a necessity to closely monitor the embedded impacts in the EU's imports and impose requirements on exporting countries to reduce their production-related emissions, the EU must be mindful of developing countries' need for support to transition to low-emission production methods.

### Next steps

- Foster partnerships with trading partners committed to sustainable production practices and low-carbon technologies to reduce the carbon intensity of imported goods.
- Enhance transparency of trade flow data with EU trading partners to track the environmental and other impacts of imported goods and services to better target consumption hotspots such as food, housing and mobility.
- Provide capacity-building support to member states as well as developing countries to enhance their sustainable production practices and monitoring capabilities, and promote sustainable trade practices that align with EU emission reduction goals.

### Existing frameworks to build on

- Develop the trade and sustainable development chapters of EU trade agreements with technical and financial support to address emissions associated with exports to the EU, especially those contributing to EU consumption hotspots.
- Engage EU trading partners to support mechanisms for disclosing the carbon footprint of products and services placed on the EU market, as is required for Carbon Border Adjustment Mechanism (CBAM) registries and the forthcoming Digital Product Passport, to enable consumers and businesses to make informed purchasing decisions based on sustainable consumption practices.
- Consider expanding existing policies, such as the CBAM, to include more product groups and a wider range of indirect emissions to appropriately price the environmental costs of imported goods.
- Build on the strongest features of the [FIGARO](#) and invest in a comprehensive database on imported and exported emissions linked to household consumption that discloses detailed statistics on traded products, country of origin, and associated environmental impacts. Explore opportunities to learn from the [EXIOBASE](#) database.

## 7. What are we missing?

### Beyond CO<sub>2</sub>

A large part of the consumption-based statistics available at the EU level only cover CO<sub>2</sub> emissions. According to the IPCC, CO<sub>2</sub> emissions from fossil fuel combustion and industrial processes made up almost 70% of global anthropogenic greenhouse gas emissions in 2019. (This excludes net CO<sub>2</sub> from land use, land-use change and forestry – CO<sub>2</sub>-LULUCF – which would make up 13% of the total greenhouse gas emissions if it were included.)

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Even if CO<sub>2</sub> is by far the most common of all greenhouse gases, around 30% of total greenhouse gas emissions are left out from these estimates. Among these are methane (CH<sub>4</sub>), which is the most prominent with 22% of total emissions, followed by nitrous oxide (N<sub>2</sub>O) at 6%, and fluorinated gases at 3%. In order to assess and mitigate the full impact of the EU's consumption, there is a need to expand attention beyond CO<sub>2</sub>.

## Public consumption and investments

Consumption-based footprints at the national level typically allocate consumption to one of three categories: households, governments and investments. Governments and the public sector's consumption involve schools, hospitals, rescue services, and roads. Investments represent, for example, housing, machinery, and luxury goods that are used repeatedly or continuously over several years. However, these two categories are often not included in official statistics. Preliminary findings from the European Topic Centre on Circular Economy and Resource Use (ETC CE) suggest that in 2021, households in the EU generated 65% of the EU's total consumption footprint. Meanwhile, 36% of consumption-based footprints from governments (11%) investments (20%), non-profit goods and services (1%) and changes in inventories (4%) remain excluded from the EU's official statistics on member states' CBEs.

## Next steps

- Invest more in Eurostat's database [FIGARO](#) to ensure it provides robust, rigorous, and regularly updated data. The database should allow for a standardized approach for monitoring CBEs at the EU and member state level to include a broader range of indicators beyond CO<sub>2</sub>, as well as actors of final consumption, to support comprehensive consumption-based estimates.

## Existing frameworks to build on

- Build on and learn from other initiatives, that include a wider range of greenhouse gas emissions and indicators for environmental impact, such as [EXIOBASE](#) and the EU Joint Research Centre's method for assessing consumption footprints.

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This brief summarizes the findings and recommendations in the following SEI report: Axelsson, K., Gong, J., Dugast, C., Lambe, F., Maquet, P. & Suljada, T. (2024). Consumption-based emissions: a new frontier for EU climate policy. SEI Report, June 2024. Stockholm Environment Institute, Stockholm.  
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