April 2021

POLICY BRIEF:
THE IMPACT OF 'CONSUMPTION' EMISSIONS ON THE UK'S CARBON FOOTPRINT

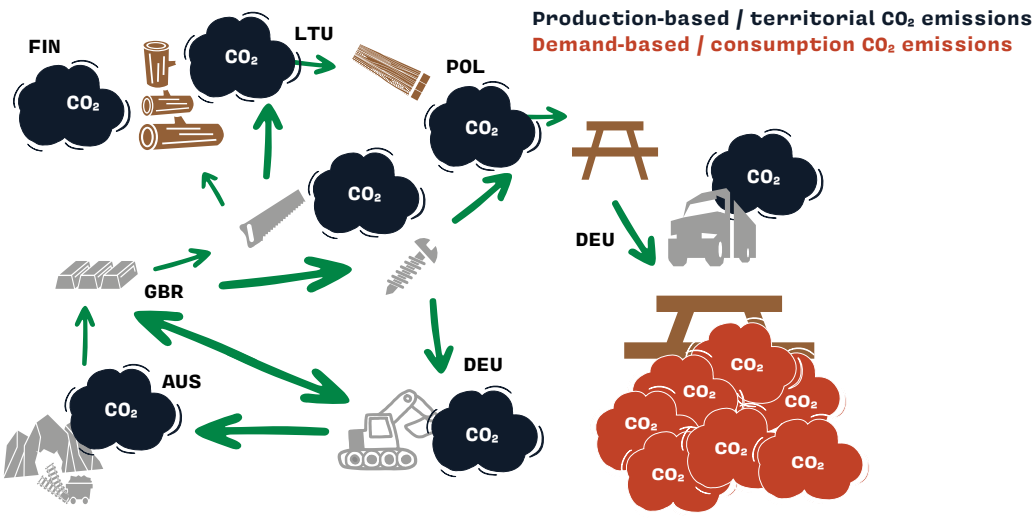
Our policy briefs offer insight and analysis to help inform ongoing policy development as relates to carbon pricing. This brief was written by Izzy Goldstein, Senior Campaign Manager at the Zero Carbon Campaign.

What are consumption emissions?

Consumption emissions are the emissions embodied in all products that are consumed (purchased and used) in any given country. This **demand-based calculation** includes imports and the emissions associated with their production.

This is opposed to **'territorial emissions'**, which is a **production-based** calculation that only accounts for emissions produced within any given jurisdiction's borders (i.e as a result of UK production and combustion). Currently, the UK's Climate Change Act and associated Carbon Budgets only account for territorial emissions (although this may be set to change).[1] The Climate Change Committee have recommended that the UK reduces its consumption emissions by 90% below 1990 levels by 2050.[2]

FIG 1: THE ORIGINS OF EMISSIONS IN THE PRODUCTION OF A WOODEN TABLE



Source: OECD (2016). CO_2 emissions embodied in consumption.

UK consumption emissions: a brief history

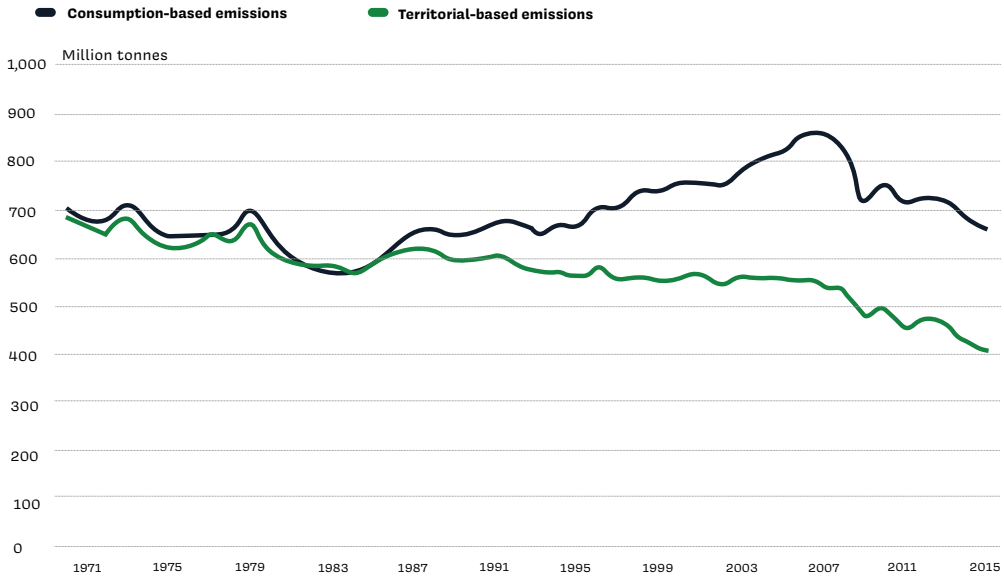
On average between 1970 and 1986, UK consumption-based emissions were only marginally (0.2%) higher than territorial-based emissions. This is attributed to the UK importing fewer emissions during that period, because the UK had a larger manufacturing sector than it does currently, which was able to meet domestic demand for goods. However, after 1986, the gap between consumption-based and territorial-based emissions began to widen. By 2007, consumption-based emissions reached their peak and were 37% higher than the territorial emissions.[3]

This implies that the decoupling of gross domestic product (GDP) from territorial CO_2 emissions has not been achieved solely as a result of policy to promote a cleaner fuel mix and reduced energy consumption,[4] but also as a result of Labour and Macroeconomic policies that have powered shifts away from labour-intensive industries to tech and service sector-based industries.[5]

As a result, UK based production has been increasingly outsourced to other jurisdictions - notably India and China - where goods are produced in a more carbon intensive way. This is a phenomenon experienced in other developed economies too, and has resulted in a two tiered system of global trade: with net exporters on one hand, and net importers on the other.[6]

Since 2008, UK territorial and consumption-based emissions have declined. This reduction in emissions coincided with the global economic downturn in 2008, as well as strengthened efforts to reduce UK territorial emissions heralded by the passing of the Climate Change Act in the same year. Territorial emissions have continued to decline since the economic recovery, which suggests that the renewed focus on environmental policy that followed the Act's introduction - including joining the EU Emissions Trading Scheme and legislating for a Carbon Price Floor - has taken effect. Consumption emissions have also continued to decline since 2009, albeit at a slower pace than territorial emissions.[7]

FIG 2: DIFFERENT MEASURES OF CO_2 EMISSIONS, 1970 TO 2015, UK



Source: Office for National Statistics (2019). The decoupling of economic growth from carbon emissions: UK evidence.

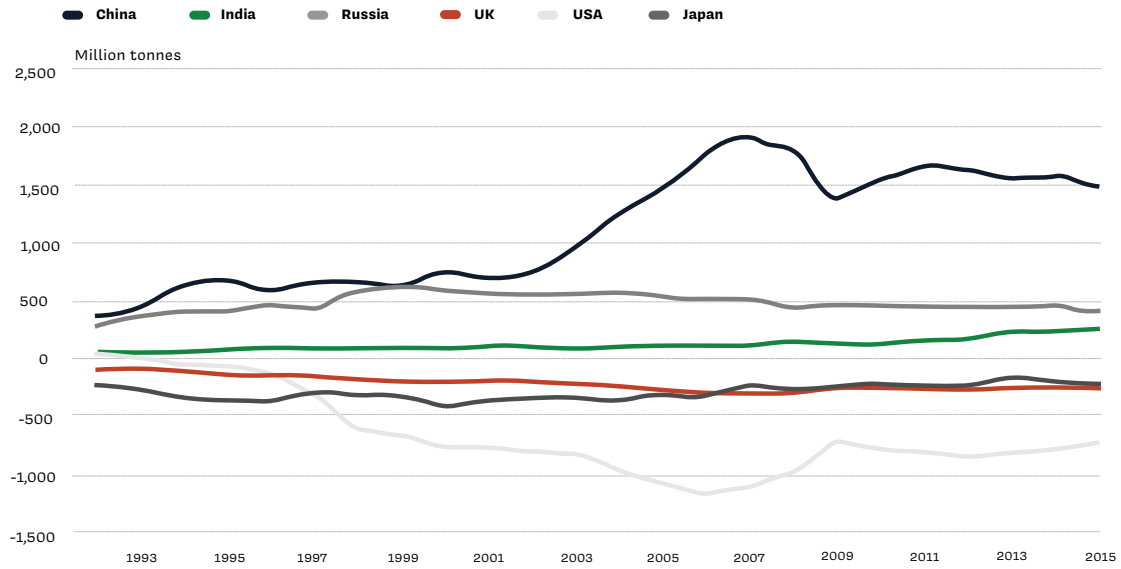
Consumption Emissions: Current state of play:

Taking into consideration population differences, the UK is the largest net importer of CO_2 amongst the G7.[8] 46% of the UK's carbon footprint comes from emissions released overseas to satisfy UK consumption, compared to 54% of emissions that are domestically sourced.[9]

The overseas proportion of the UK's carbon footprint has increased substantially in recent years – from just 14% in 1990 to 46% in 2016 – thus reducing the scope of UK climate policy to affect emissions associated with consumption.[10]

This failure to contain consumption emissions is reflected in UK emissions reduction statistics: although emissions within the UK's borders reduced by 41% between 1990 and 2016, the consumption-based footprint only dropped 15%.[11]

FIG 3: NET TRADE OF CARBON EMISSIONS, BY TOP IMPORTERS AND EXPORTERS, 1992 TO 2015



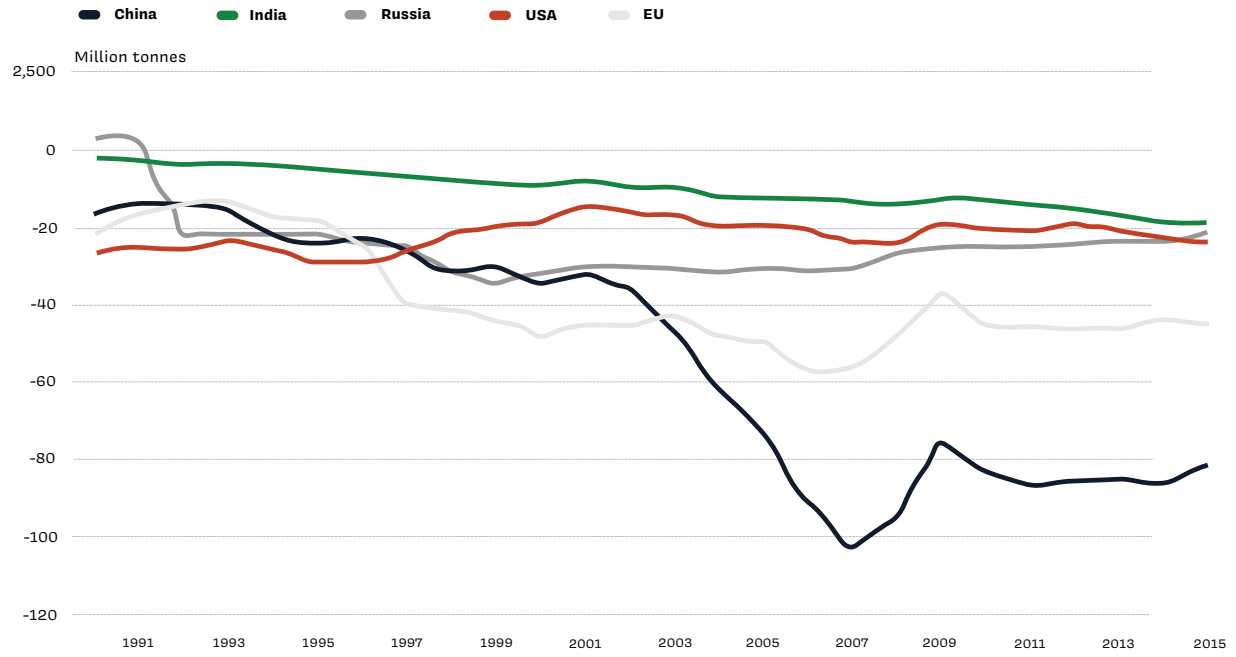
Source: Office for National Statistics (2019). The decoupling of economic growth from carbon emissions: UK evidence.

The UK has the highest net import of carbon emissions from China (82 million tonnes in 2015), followed by the EU (45 million tonnes), and the USA (24 million tonnes).[12]

Continent-level analysis also highlights the relative contribution of imported emissions to the UK's overall carbon footprint. The UK stands out as the only European country besides Luxembourg to top the highest bracket of emissions in some regions (like the South West of England),[13] and per capita average carbon footprints in several British regions are treble that of countries in Eastern Europe such as Romania, Bulgaria and Hungary, which have some of the lowest carbon footprints in the EU.[14]

A causal link between wealth and carbon footprint can also be observed at a country level, with wealthier regions bearing a much larger share of responsibility for their countries' total emissions than those with lower average incomes. This highlights the relationship between high household income and carbon intensive consumption, which has been well documented.[15]

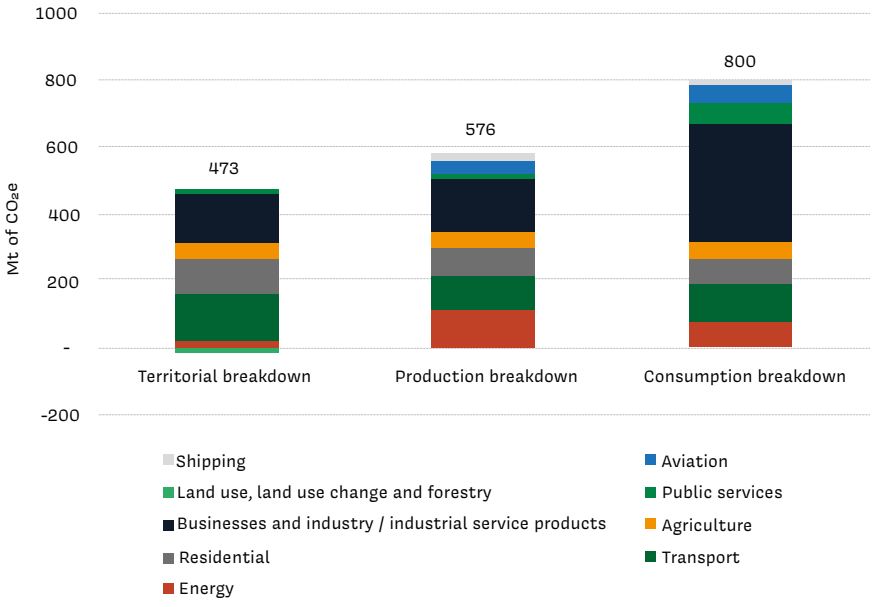
FIG 4: NET IMPORT OF UK'S CARBON EMISSIONS, BY MAIN COUNTRIES AND REGIONS, 1990 TO 2015



Source: Office for National Statistics (2019). The decoupling of economic growth from carbon emissions: UK evidence.

When we break down production, consumption and territorial emissions by sector, we can see that UK consumption is overwhelmingly driven by business and industry. This is because (unlike territorial accounting) consumption accounting covers the full supply chain in this sector; including emissions released abroad to meet UK demand.[16]

FIG 5: BREAKDOWN OF TERRITORIAL, PRODUCTION AND CONSUMPTION EMISSIONS BY SECTOR, 2016



Source: WWF (2020). Carbon Footprint: Exploring the UK's contribution to climate change.

Consumption emissions: the future

Britain's exit from the EU raises questions about whether EU member countries will preserve their role as exporters to the UK.[17] Given the relatively low carbon intensity of EU imports compared with the rest of the world,[18] it is important to consider the implications of a possible replacement of EU trade partners with other non-EU countries in terms of the UK's total carbon footprint.

If we focus on imports of embodied CO_2 emissions (see fig 6), we see that in 2015, China was by far the largest exporter of embodied emissions to the UK; representing 35% of the UK's total imported embodied emissions in that year.[19]

Many non-EU countries (and more carbon intensive exporters) also enter in the top 10 of the CO_2 import flows beyond China: USA (third), India (fourth), South Africa (sixth), Vietnam (ninth). A possible shift from EU to non-EU trading partners deriving from Brexit would therefore substantially alter the CO_2 import flows for the UK in the near future. This could greatly increase UK consumption emissions paving the way for policies such as 'Border Carbon Adjustments' to drive international ambition on emissions reductions.[20] Indeed, data analysis shows that a 10% shift of UK imports from EU partners to its main non-EU trading partners (India, China, and US) would increase its emissions responsibility by 5%.[21] The increase in UK emissions responsibility would more than double (+11%) in case of a 30% shift of UK imports. Similar results would apply if the UK replaced its current EU partners with its main Commonwealth trading partners as a result of Brexit.

FIG 6: UK IMPORT FLOWS IN 2015 FROM ITS MAIN TRADING PARTNERS IN MONETARY TERMS, IN TERMS OF CO_2 EMBODIED EMISSIONS, AND CARBON INTENSITIES OF THE TRADING PARTNERS

Country	UK Imports (monetary value)	UK CO_2 Import Flows	Carbon Intensity
	US Thousand $	*Mt CO_2*	*Kg CO_2*
Germany	94.348.064	21.8	0.23
China	62.979.613	60.5	0.96
United States	58.066.453	16.6	0.29
Netherlands	47.549.003	10.4	0.22
France	38.703.822	5.2	0.13
Belgium	31.402.186	6.6	0.21
Italy	25.055.800	4.8	0.19
Spain	21.605.506	4.7	0.22

Poland	12.434.605	7.6	0.62
Turkey	11.067.618	4.6	0.42
Canada	10.717.280	3.8	0.36
India	9.325.949	10.8	1.16
Czech Republic	7.445.307	4.4	0.60
South Africa	5.904.050	7.7	1.31
Vietnam	4.880.660	5.2	1.07
Australia	2.881.053	0.9	0.33
New Zealand	1.303.125	0.2	0.19

Conclusion

If the UK is to demonstrate true climate leadership, they must take action to reduce the contribution of imported emissions to the UK's overall carbon footprint, and address the volume of emissions that are currently embodied in global trade. Success relies to a large extent on the levels of climate policy ambition shown by other countries, especially to ensure reductions in - rather than reallocations of - UK consumption emissions. This makes UK leadership on global net zero all the more essential; although around 50% of the UK's imported emissions now come from territories covered by net zero commitments,[22] there remains a large gap between countries' stated ambitions and tangible policies to deliver significant emissions reductions in the near term.

As hosts of COP26, the UK has a key role to play, both through the example it sets domestically, and by the international progress it drives at what John Kerry has described as "the last best chance the world has to...avoid the worst consequences of the climate crisis."

Endnotes

[1] The Telegraph (2020). Carbon footprint of imported goods could be included in emissions target, minister says. Available here.

[2] CCC (2020). Sixth Carbon Budget. Available here.

[3] Syed, A (2020). The decoupling of economic growth from carbon emissions: UK evidence. Office for National Statistics. Available here.

[4] Identified by Carbon Brief as the two largest drivers behind the UK's 38% reduction in territorial emissions since 1990. Source available here.

[5] Pettinger, J (2017). Relative decline in UK manufacturing. Economics Help. Available here.

[6] A country can be considered a net exporter of CO_2 emissions when its territorial-based emissions are higher than its consumption-based CO_2 emissions. The reverse is true for the UK, being a net importer of CO_2 emissions.

[7] "The UK's carbon footprint from consumption fell 21% between 2007 and 2017, compared to a 38% fall in territorial emissions." The Telegraph (2020). UK consumption emissions drop - despite rise in footprint of imports. Available here.

[8] The Guardian (2019). Britain now G7's biggest net importer of CO_2 emissions per capita, says ONS. Available here.

[9] WWF (2020). Nearly half the UK's Carbon Footprint down to emissions from abroad. Available here.

[10] Ibid.

[11] Ibid.

[12] Syed, A (2019). The decoupling of economic growth from carbon emissions: UK evidence. Office for National Statistics. Available here.

[13] Encompassing both direct emissions, and emissions embodied in imports.

[14] Carbon Brief (2017). Mapped: How 'embodied' footprints compare across Europe. Available here.

[15] This has been highlighted by several studies, for example:

- Burke, J et al. (2020). Distributional impacts of a carbon Tax in the UK: Report 2, Analysis by Income Decile. The Grantham Research Institute on Climate Change and the Environment (LSE), Vivid Economics and the University of Leeds. Available here.
- Owen, A and Barrett, J (2020). Reducing inequality resulting from UK low-carbon policy, Climate Policy. Available here.

[16] WWF (2020). Carbon Footprint: Exploring the UK's contribution to climate change. Available here.

[17] Fezzigna, P et al (2019). Revising Emission Responsibilities through Consumption-Based Accounting: A European and Post-Brexit Perspective. MDPI. Available here.

[18] Note that, although the products themselves are relatively low in carbon intensity, the UK imports a huge volume from the EU - hence their status as the second biggest importer of emissions to the UK.

[19] In 2015, 175 Mt of the UK's CO_2 emissions were embodied in trade, 60.5 Mt of which was a result of imports from China. Calculation based on data presented in Fezzigna, P et al (2019). Revising Emission Responsibilities through Consumption-Based Accounting: A European and Post-Brexit Perspective. MDPI. Available here.

[20] In general, when trade flows from a country with a higher carbon intensity to a country with a lower carbon intensity, the balance in terms of greenhouse gas emissions is negative as the exported product is produced in a less efficient country.

[21] Fezzigna, P et al (2019). Revising Emission Responsibilities through Consumption-Based Accounting: A European and Post-Brexit Perspective. MDPI. Available here.

[22] CCC (2020). Sixth Carbon Budget. Available here.