

# Emissions Responsibility Accounting: A new look at emissions accounting

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## Introduction

Tackling climate change requires urgent action to reduce greenhouse gas emissions. To understand the scale of the task at hand, and measure progress, emissions must first be accounted for, and reported on accordingly. Emissions accounting is often defined by country borders, where governments have jurisdiction over the sources of greenhouse gas emissions. However, this approach does not address the full contribution of a country's economic activity to worldwide greenhouse gas emissions.

The world's nations are not sustained independently – a complex, interlinked system of trade between territories exists, with some areas producing more goods than others, and some areas consuming more goods than others. When emissions accounting considers a country's production or consumption, instead of its area of jurisdiction, greenhouse gas emission figures change drastically. This report provides a novel outlook on UK emissions accounting, providing a visual representation of the emissions the UK is involved in, highlighting areas for further research and suggesting emission reduction actions for industry and policy.

## Current emissions policy

The UK's emissions reduction targets in the Climate Change Act covers territorial emissions, i.e. emissions occurring in the UK. Due to issues of national sovereignty, this makes sense, as the UK has jurisdiction and control over how these emissions are produced. Territorial emissions are also the required accounting standard in the United Nations Framework Convention on Climate Change (UNFCCC), as these statistics are highly accurate and allow for direct comparisons between nations' progress towards climate targets. However, territorial emissions do not include many emissions the UK contributes to, and therefore underestimates the UK's contribution to climate change.

Production emissions refer to emissions from industries owned by UK companies, or related to UK government or citizen activity, anywhere in the world, including international aviation and shipping.

Consumption accounting provides a more extensive carbon footprint of the UK. It identifies the magnitude of emissions that relate to UK-based activities but occur elsewhere. Recent and extensive research and policy suggestions regarding consumption emissions and reducing emissions in a different territory (i.e. offshore) are provided by the UK Committee on Climate Change<sup>5</sup> (CCC) and the World Wildlife Fund<sup>6</sup> (WWF). However, even consumption accounting underestimates the UK's contribution to emissions as it neglects the impact of using products made in the UK but used elsewhere.

## Emissions accounting in the corporate world is different

The Greenhouse Gas Protocol is a widely used and well-developed accounting tool for corporations. It divides emissions into three scopes: Scope 1 measures direct emissions from facilities and vehicles owned by the respective corporation; Scope 2 measures indirect emissions from purchased

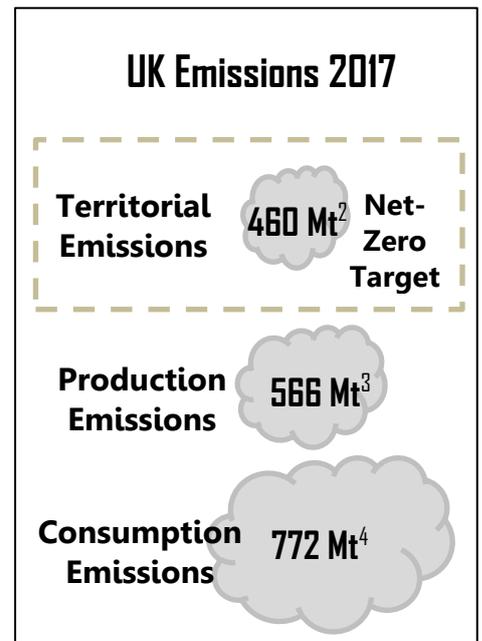
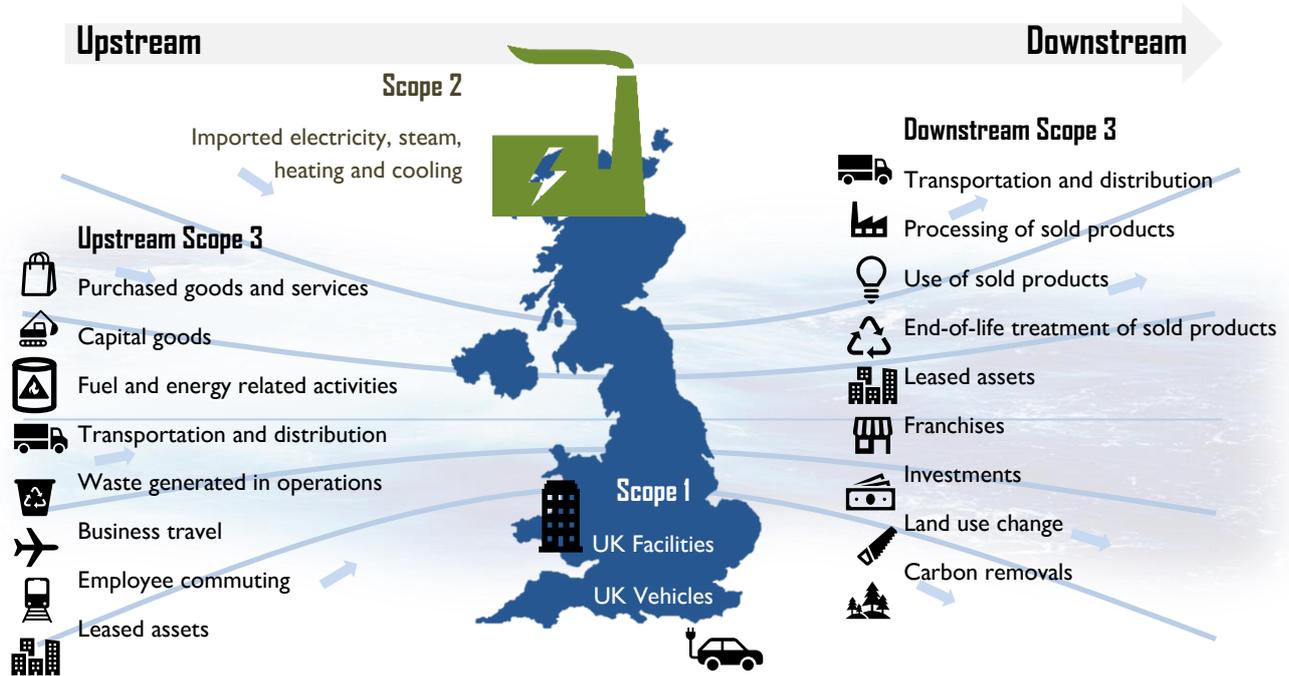


Figure 1: Different approaches to emissions accounting show a significantly different level of UK emissions

electricity and heat; and Scope 3 measures any other indirect supply chain emissions both leading up to the production of the product (i.e. upstream), and post-production in the distribution of the product (i.e. downstream).

These additional emissions covered in Scope 3 – indirect supply chain emissions – are often the largest sources of emissions and can comprise more than 90% of a company's total emissions<sup>7</sup>.



**Figure 2: A Scope 1, 2 and 3 emissions model of the UK, including indirect upstream and downstream emission sources, based on the corporate Greenhouse Gas Protocol model<sup>7</sup>.**

Scope 1, 2 and 3 analysis on industry sectors on a global level found that the emissions from materials, manufacturing, services, buildings and agriculture were primarily Scopes 2 and 3<sup>8</sup>, indicating that a broader focus than just Scope 1 emissions is needed to realise the potential impact that industry can have on greenhouse gas emissions reductions.

This accounting approach, currently used for the private sector, could be applied at a national level, targeted at specific sectors, to highlight emission reduction possibilities in the upstream supply of a product and the downstream use of a product. Here, we call this approach 'Emissions Responsibility Accounting'.

### **Mapping this approach onto the UK: Emissions Responsibility Accounting**

Analysing the flow of emissions through the UK economy encompasses the three existing accounting standards (territorial, production and consumption accounting) into one. Territorial emissions can be seen in the upstream flow of emissions from a given country, whilst consumption emissions can be seen in the downstream flow of emissions supplied to a given country. The full volume of emissions that are relevant to the UK economy, at the bridge between production and final consumption, represent products and serviced used actively in the UK economy. The volume of these emissions is greater than all three current emission standards.



## How does the Emissions Responsibility Approach compare with current accounting?

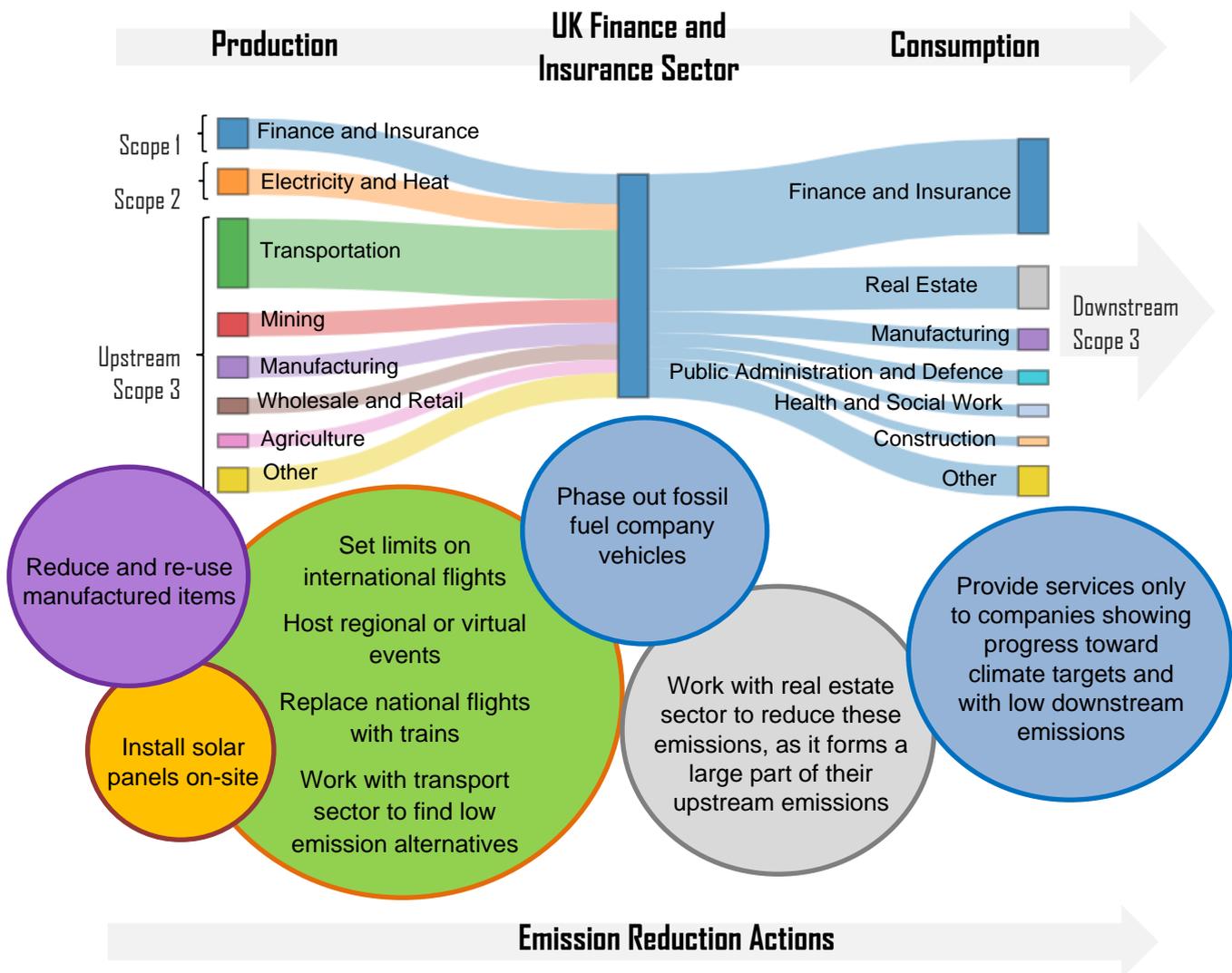
Table 1 below shows the scope of each accounting standard, indicating how the new approach might differ from those already in use.

Table 1: The coverage of different accounting standards

Accounting Standards	Includes	Does Not Include
<b>Territorial</b> <i>Measured by the Department for Business, Energy &amp; Industrial Strategy<sup>2</sup></i>	Emissions taking place within national and administered territories and offshore areas over which the country has jurisdiction. N.B. These are the emissions reported in UNFCCC national greenhouse gas inventories.	Emissions emitted in international territory, such as international aviation, shipping, and from UK businesses and residents abroad, as well as any emissions embedded within the upstream and downstream supply chain of manufactured goods and services imported into and exported out of the UK.
<b>Production</b> <i>Measured by the Office for National Statistics<sup>3</sup></i>	Emissions from industries owned by the UK, located anywhere in the world, as well as emissions from international aviation, shipping and activities of UK citizens in the UK and abroad.	Emissions from the activities of industries and citizens of other nations within the UK. Emissions embedded within imports. Downstream emissions of exports.
<b>Consumption</b> <i>Measured by the Department for Environment, Food &amp; Rural Affairs<sup>4</sup></i>	Production emissions, plus emissions from the production of imports into the UK.	Emissions from the production and downstream impacts of exports out of the UK.
<b>Emissions Responsibility approach</b>	Consumption emissions, plus the emissions from the use of all products manufactured in the UK	Emissions from the use of goods produced by UK owned-industries outside the UK and sold outside the UK.

## Using the Emissions Responsibility Approach to identify supply chain emission reductions

Investigating a particular sector using Emissions Responsibility Accounting will reveal the upstream and downstream sources of sectoral emissions, allowing for targeted emission reduction actions. As one sector's downstream emissions are another sector's upstream emissions, there exist multiple players in multiple industries who may be interested in, and indeed can contribute to, the same emission reductions.



**Figure 3: The flow of emissions through the UK Finance and Insurance Sector. By identifying the Scope 1, 2 and 3 production emission sources, and the sectors to which the emissions are supplied, appropriate emission reduction actions can be set. Analysed using Cabernard et al<sup>1</sup>.**

The public and private sector could then think of an even wider set of leverage points than currently used e.g. through sovereignty (as with current accounting), corporate investment, as consumers, as employers, or as a manufacturer or importer.

The table below shows how new information from this accounting approach could be used in decision making.

<b>What Emissions Responsibility Approach reveals by sector</b>	<b>Emission reduction actions</b>
45% of the education sector's upstream emissions can be attributed to the production of electricity, gas, steam and air conditioning supply	Emission reductions may be a combination of decarbonising the national grid by transitioning to renewables, as well as introducing renewable technology to the education sector itself, such as installing solar panels in schools, or reducing the education sector's energy demand by energy saving and efficiency measures.
40% of the construction sector's upstream emissions can be attributed to the production of manufactured goods	Emission reductions may be a combination of the construction sector providing novel, environmentally friendly designs, and the manufacturing sector decarbonising their operations. Cross-sector collaborations may include the construction sector building with more recycled and repurposed materials, and the manufacturing sector providing repurposed building materials.

### Action for businesses and sectors

Corporations and sectors should look at their activity data to find their upstream and downstream emissions. Comprehensive guidance is provided by the GHG Protocol but, in principle, carbon emissions can be found by calculating the organisation's activity data by readily available emission conversion factors.

Questions business and sectors should be asking themselves:

- What are my upstream sources of emissions and how can these be reduced?
- What business and industries are my emissions being supplied to? Can I work with these industries to reduce the supply chain of emissions?
- What is the emissions impact of the downstream industries I am supplying? Are these industries meeting climate targets?
- Can I set Scope 1, 2 and 3 emission reduction targets in order to cover my full supply chain of emissions?
- What emissions will the use of my products, output or services generate? What alternative business models or products could I consider to address this challenge?

### Action for research institutions

The magnitude of a full Emissions Responsibility assessment of the UK is still unknown. Research institutions should develop accurate and timely methodology to analyse the full emission supply chain of the UK and its sectors. Emphasis on the UK's indirect downstream impacts is needed. These impacts include, but are not limited to, the processing, transportation, use and end-of-life

treatment of UK products and services in international territory, as well as the indirect impact of UK investments.

### **Action for NGOs**

To achieve the greatest impact on emissions, NGOs should focus on the sectors with the greatest emissions. Traditionally, decarbonisation efforts have been focussed on the direct emissions of these sectors. However, emphasis should be given to supply chain emissions, and particularly to those emissions sources where there is the greatest scope for influence.

### **Action for government organisations**

Replacing territorial emissions with production, consumption or novel emissions accounting methods creates issues of national sovereignty and moves the discussion towards climate action. If applied widely, this will lead to double-counting of emissions. However, double-counting is not necessarily a problem, depending on the purpose of the accounting, and related reporting and actions. It may become valuable to have two regions feeling responsibility for overlapping, shared emissions, and this approach might encourage a collaborative approach to reducing those emissions.

Novel accounting approaches should complement territorial accounting to measure the UK's total impact on climate change and create a net zero economy – not only domestically but globally.

Specific policy suggestions are as follows:

- Introduce mandatory Scope 1, 2 and 3 emissions accounting requirements for UK registered businesses, industries and sectors
- Introduce a UK-specific accounting tool and methodology, based on the Greenhouse Gas Protocol that is applied to businesses today
- Estimate economy-wide Scope 1, 2 and 3 emissions from this data
- Explore appropriate targets for territorial, consumption, production, and ultimately Scope 3 emissions that would complement the net zero emission target within the UK's legal boundaries
- Ensure measures are put in place as to not defer businesses from registering in the UK due to additional costs associated with reducing Scope 1, 2 and 3 emissions

### **Pioneering the Emissions responsibility accounting approach**

Achieving net zero emissions globally is the only way to address the root cause of climate change. The UK, as a major economy with considerable international influence, has a particularly important role in driving forward the transition to net zero emissions. The UK must begin by acknowledging and quantifying its full involvement in greenhouse gas emissions worldwide. It is no longer enough to count emissions from the area of production (as in territorial emissions) – decisions need to be made regarding the emissions in products we choose to consume or to sell, and the emissions we choose to produce through our economy, taking the full supply chain into account. The UK should use its role as COP26 president to lead by example and to set a high standard for greenhouse gas reduction efforts.

## References

- [1] L. Cabernard, S. Pfister and S. Hellweg, "A new method for analyzing sustainability performance of global supply," *Science of the Total Environment*, no. 684, pp. 164-177, 2019.
- [2] Department for Business, Energy & Industrial Strategy, "Final UK greenhouse gas emissions national statistics: 1990-2017," 2019.
- [3] Office for National Statistics, "UK Environmental Accounts 2019," 2019.
- [4] Department for Environment, Food & Rural Affairs, "UK's Carbon Footprint 1997 - 2017," 2020.
- [5] Committee on Climate Change, "Reducing UK emissions: 2020 Progress Report to Parliament," 2020.
- [6] WWF-UK, "Carbon Footprint: Exploring the UK's Contribution to Climate Change," 2020
- [7] Greenhouse Gas Protocol, "Corporate Value Chain (Scope 3) Accounting and Reporting Standard," 2011.
- [8] E. Hertwich and R. Wood, "The growing importance of scope 3 greenhouse gas emissions from industry," *Environmental Research Letters*, vol. 13, no. 10, 2018.