Report

Counting carbon in global trade

Why imported emissions challenge the climate regime and what might be done about it

An essay series

Edited by Aarti Krishnan and Simon Maxwell

May 2020

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Cover photo: A shipping container in Mumbai Port, India. Credit: Cyprien Hauser.

Acknowledgements

This publication originated in a workshop on 'Certification as a route to reducing the global carbon footprint: Implications for developing countries', held at ODI on 3 September 2019. We are grateful to speakers and others for making papers available here and to all the participants in the workshop for their contributions. We also wish to thank Sara Pantuliano, Chief Executive of ODI, for contributing the foreword and the ClimateWorks Foundation for covering the cost of the publication. Special thanks to Dirk Willem te Velde, Director of the ODI International Economic Development Group, for his consistent encouragement and active support. We would like to thank the ODI Communications Team, Elizabeth Tribone and Natalie Brighty, for their support, and Hannah Caddick for her editorial input. Aarti Krishnan is grateful to the Economic and Social Research Council for support.

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Acronyms

3Ps	performance, participation, progressive realisation
AI	artificial intelligence
ATIS	Alliance for Telecommunication Industry Solutions
BCA	border carbon adjustment
CCC	Committee on Climate Change
CO_2e	carbon dioxide equivalent
COP	Conference of the Parties
CSO	civil society organisation
CSR	corporate social responsibility
DFID	UK Department for International Development
EMAS	Eco-Management and Audit Scheme
ETS	Emissions Trading Scheme
EU	European Union
Eurofer	European Steel Association
FAO	Food and Agriculture Organization of the United Nations
FDA	United States Food and Drug Administration
FRC	Financial Reporting Council
GDP	gross domestic product
GHG	greenhouse gas
$GtCO_2e$	gigatonnes of carbon dioxide equivalent
GVC	global value chain
HFC	hydrofluorocarbon
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
ITC	International Trade Centre
KPI	key performance indicator
M&S	Marks & Spencer
MRV	measurement, reporting and verification
$MtCO_2e$	megatonnes of carbon dioxide equivalent
NDC	nationally determined contribution
NGO	non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
RTA	regional trade agreement
SBTI	Science Based Targets initiative

SDG	Sustainable Development Goal
SECR	Streamlined Energy and Carbon Reporting
SME	small and medium-sized enterprise
SPS	sanitary and phytosanitary
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNFSS	United Nations Forum on Sustainability Standards
UNIDO	United Nations Industrial Development Organization
US	United States
USDA	United States Department of Agriculture
WBCSD	World Business Council for Sustainable Development
WRAP	Waste and Resources Action Programme
WRI	World Resources Institute
WTO	World Trade Organization
ZDHC	Zero Discharge of Hazardous Chemicals

Foreword

Sara Pantuliano

Covid-19 has diverted attention and resources. But it goes without saying that climate change remains both urgent and important. The world has already warmed by 1°C since pre-industrial times. If we do not act quickly, we will lose the chance to limit warming to 2°C, let alone 'well below 2°C' or 1.5°C – the targets enshrined in the Paris Agreement. Recent analysis shows that global greenhouse gas emissions need to fall by 3% a year between now and 2030 to limit warming to 2°C, and by 7% a year to limit warming to 1.5°C. Even the 3% target is unprecedented. Meanwhile, emissions are still rising. It is impossible to overstate the urgency and scale of change required. The ecological and human consequences of failure are unimaginable.

For a think tank like ODI, this means all hands on deck; the topic of climate change is not just for climate specialists. Designing, incentivising and implementing the right policy responses, in both high- and low-income countries, touches every area of our work – in economics, politics and social policy, in productive and social sectors, and in every other field. At the heart of our work must be a commitment to delivering global change in ways that recognise the legitimate needs of the poorest and of all social groups. Climate change, of course, is intimately linked to the other Sustainable Development Goals.

Traded emissions are only one piece of the puzzle, but they are an important one. The share of emissions linked to trade has grown sharply and may be as high as 38% globally. The United Kingdom provides a stark example: net imported emissions now account for over 40% of the country's total footprint and have risen to such an extent that they now cancel out almost all domestic, territorial reductions. In other words, the UK as a country is producing much less pollution within its borders but generating about the same level through its consumption. This is not only the result of deindustrialisation and the offshoring of polluting industries: in fact, that seems to be a minor factor. More important is that we are richer than we were, so are spending more, and there are more of us.

These shifts mean that traded emissions need to feature more prominently in the global climate regime. As they do so, issues of measurement, reporting and certification become crucial: they are the platform on which policy can be built. Already, there is considerable expertise on how to account for greenhouse gas emissions in firms and in the production of goods and services. In the essays in this volume, there are authoritative accounts of both the underlying standards and the different ways in which they are being applied at all stages of the value chain. The legal frameworks are beginning to be put in place. The public–private partnerships are impressive.

Low-income countries can benefit from better information of this kind and from new opportunities to acquire technology and present their goods in national and export markets. However, there are costs involved – and risks. Most important is to make sure that these countries have voice and ownership of new global standards and that producers do not suffer from a 'green squeeze', whereby costly imported standards devised elsewhere are imposed on poor farmers or workers. Border taxes on the carbon content of trade, as proposed in some high-income countries, could pose a significant risk to poor countries.

Here, then, is the task for development and other global policy actors: to understand the nature and scale of the problem; to devise appropriate policy; and to support change. Options for how to do this are to be found in technology transfer, finance and government regulation, and within international bodies like

the World Trade Organization and the United Nations Framework Convention on Climate Change. We do not yet have the answers, but we hope this publication will encourage further work.

I would like to express my personal thanks to all the contributors, to the ClimateWorks Foundation for its support with the publication costs, and to Aarti Krishnan and Simon Maxwell for editing the volume.

Part A Introduction

Chapter 1 Counting carbon in global trade: why imported emissions challenge the climate regime and what might be done about it

Aarti Krishnan and Simon Maxwell

1.1 Introduction: a climate regime under threat?

For almost 30 years, the climate regime can be characterised as having attempted to tackle a *global* problem by means of *voluntaristic, nationally driven* action. But the foundations of this regime are now under threat, with significant implications for developing countries.

The United Nations Framework Convention on Climate Change (UNFCCC), adopted at the Earth Summit in 1992, set out to 'stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system' (UN, 1992). It would do this by virtue of national parties to the Convention agreeing to 'formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions'. This voluntaristic, bottom-up approach to decarbonisation has been sustained through successive rounds of climate negotiations, most importantly in the 2015 Paris Agreement (UN, 2015a). Under the terms of this agreement, countries are required to submit and update national emissions reduction pledges in the form of 'nationally determined contributions' (NDCs) (UN, 2015b).

There are two main threats to this regime. The first is the growing importance of emissions traded across national borders, currently accounting for up to 38% of global emissions (Barrett),[1] with developed countries being net importers and emerging economies mostly net exporters. Consequently, territorial emissions are an increasingly unreliable guide to a country's climate footprint – and reductions in such emissions an unreliable guide to a country's contribution to climate action. In the UK, for example, both the absolute volume and the share of imported emissions have grown, with imported emissions now accounting for 43% of the country's total footprint (Barrett).

The second threat to the voluntaristic and nationally driven character of the climate regime is the increasing focus on action to reduce the carbon intensity of trade, including, of course, exports from developing to developed countries. The drivers include internal concern within companies and external pressure by civil society organisations, but also a growing body of legislation (Krishnan; Shanahan). Action is given added impetus by the prominence of climate and environment issues in trade negotiations (te Velde and Keane). For example, the European Commission's proposal for a 'European Green Deal', published in December 2019, says that 'the Commission will propose to make the respect of the Paris agreement an essential element for all future comprehensive trade agreements' (European Commission, 2019). Further, the Commission will introduce carbon border adjustments to ensure a level playing field in the trade sphere and will appoint a chief trade enforcement officer.

In the best case, developing countries may find that the reshaping of the climate regime acts to their benefit, for example, encouraging

1 All references in this form are to contributions in this volume.

faster progression to low-carbon output and opening new export opportunities for low-carbon products. In the worst case, however, developing countries may find themselves bearing increasing costs for monitoring and certifying carbon content and perhaps being at a competitive disadvantage in a low-carbon trading system. This has been described as a 'green squeeze' (Krishnan).

In this context, we aim to understand the challenge to the current climate regime, and to explore the implications for developing countries. Together with a group of distinguished and expert authors, we address five questions:

1. How and why is the geography of carbon emissions changing?
2. How are carbon emissions measured and how are the boundaries set?
3. What are the opportunities and challenges of carbon reporting and certification?
4. What are the implications for developing countries?
5. How should the climate regime adjust to ensure efficient and equitable outcomes?

We conclude that the fast-growing share of traded emissions in the global total requires a change to the climate regime, giving greater attention to traded emissions and consumption footprints than has been the case to date. There are opportunities for developing countries to embed green approaches in careful accounting, reporting and certification of greenhouse gas (GHG) emissions, at firm and possibly product levels.

However, there are also many difficulties and risks. The technical challenge of accurate GHG measurement and reporting should not be underestimated. There is also a significant danger that developing country producers may have to bear considerable additional costs, or may even find themselves excluded from participation in a value chain if developed country actors alone develop standards and drive them through supply chains.

Developing countries will require significant support in rolling out accurate accounting and reporting, and in securing a voice that facilitates the co-creation of standards; but, if efforts are successful, they will see lower emissions in both domestic and traded production.

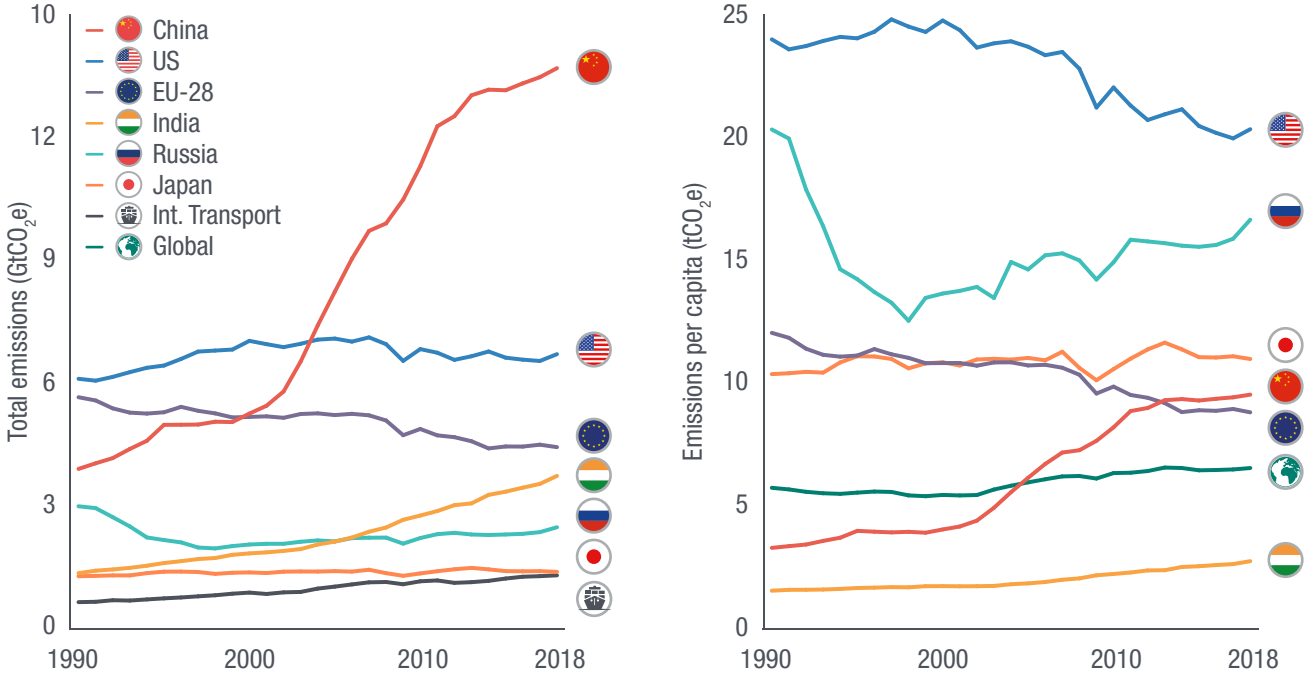
1.2 The changing geography of carbon emissions

Three decades ago, most GHG emissions originated in developed countries, and most were associated with domestic consumption. This is no longer the case. As Barrett summarises, emissions have grown rapidly in developing countries but with a considerable share associated with exports. Figure 1.1 illustrates the growth in emissions. China now accounts for the largest share of total emissions, with per capita emissions close to those of the European Union (EU). Barrett and Scott show that the largest developed economies all import more emissions embodied in goods and services than they export. For example, Europe's consumption-based emissions are 10% higher than its territorial emissions.

The UK is more 'import-intensive' than many other developed countries. As Barrett shows, this import intensity has risen significantly: in 2016, 43% of consumption-related emissions were imported, compared with 15% in 1990. Joffe notes that imports from non-EU countries are more carbon-intensive than those from EU countries, particularly food and construction-related goods (e.g. steel and cement).

It might be thought that the fall in territorial emissions and the growth in the share of imported emissions in the carbon footprint of developed countries are mainly the result of deindustrialisation in those countries – in other words, 'dirty' industries have been outsourced to developing countries. The offshoring of emissions and 'carbon leakage' is certainly an issue (see, for example, Plechaty et al., and a practical example from Krishnan involving China and India offshoring tanning to Kenya, Tanzania and Uganda). However, Barrett demonstrates for the UK that consumption dynamics are more important. For example, population growth and increases in total spend have been the main drivers of higher consumption-based emissions, offsetting improvements in both the carbon intensity of energy and production energy efficiency. For the world as a whole (see Chapter 2), increases in gross domestic product, and hence consumption, have outweighed

Figure 1.1 Total and per capita greenhouse gas emissions, 1990–2018



Notes: $GtCO_2e$ = gigatonnes of equivalent carbon dioxide
Source: UNEP (2019).

improvements in energy intensity, especially in non-OECD (Organisation for Economic Co-operation and Development) countries.

1.3 The measurement of carbon emissions

The national figures reported in the previous section are mostly based on modelling, using input-output tables. When it comes to products and companies, more granular measurement is required – and this is by no means straightforward. Yet accuracy is necessary, as a number of authors remind us (Hill; Jones; Scott), especially if comparisons are to be made between products made by different suppliers in different countries.

The World Resources Institute (WRI) provides an introduction to measurement. For companies to measure their own carbon emissions, or the emissions embodied in their products, they need to be able to define the boundaries of the company and to allocate emissions correctly between subsidiaries, joint ventures and so on. They need to decide whether to include end-of-life and recycling issues. And, most importantly, they need to decide whether to count only the emissions included within their own direct control, or also those emissions generated in the supply chain. As WRI explains, emissions are formally classified as falling into Scope 1, Scope 2 and Scope 3:

- A Scope 1 inventory covers a reporting organisation's direct GHG emissions.
- A Scope 2 inventory covers a reporting organisation's emissions associated with the generation of electricity, heating/cooling or steam purchased for own consumption.
- A Scope 3 inventory covers a reporting organisation's indirect emissions other than those covered in Scope 2.

It is easy to understand that measuring Scope 1 emissions is much more straightforward than measuring those under Scope 3, and that measuring company emissions is much less complex than measuring the emissions of dozens of different products, each of which contains dozens of different materials. Measuring Scope 3 emissions is especially problematic when

suppliers are widely scattered in remote locations and when complex issues like land-use changes have to be taken into account (Hill). Emissions during product use and end-of-life impact present further challenges and may, in fact, be the main source of emissions (Scott).

The principles are clear: accounting should be 'relevant, complete, consistent, transparent and accurate' (WRI). Different standards have been developed to meet different needs, by the GHG Protocol Initiative (WRI), the International Organization for Standardization and the Carbon Disclosure Project, as well as the Science Based Targets initiative (WRI). Shopley provides information about the CarbonNeutral Protocol. Wain and Murray describe Avieco's Smart Sustainability Certification, working mainly with small and medium enterprises. Jones describes the genesis of product carbon footprinting and labelling from the perspective of the Carbon Trust – one of the early pioneers of this work. Smith, working with Imperial College London and the Grantham Institute, discusses how artificial intelligence (AI) and machine learning can help us manage the large volumes of data involved in certification. Pulling the various approaches together in a country context, Shanahan describes the range of options used in the UK.

In many countries, reporting is voluntary. In others, including some developing countries, there is legislation. Shopley cites Colombia and South Africa. Shanahan provides detail on UK regulation, where reporting on Scope 1 and Scope 2 emissions is mandatory and reporting on Scope 3 emissions is voluntary but strongly encouraged. Recent legislation has extended the coverage of reporting requirements from about 1,200 to more than 12,000 UK businesses.

There are some shortcuts. The UK guidelines, for example, provide formulae for translating financial information into GHG emissions (Shanahan). Hill cites the rule of thumb that £1 billion of UK retail turnover on either clothing or food equals emissions of half a million tonnes of carbon dioxide equivalent (CO_2e). But shortcuts are no substitute for careful analysis.

Lastly, it is important to note that measurement and accounting are strongly linked to action, either in the context of direct or indirect emissions reductions or in relation to measures to offset emissions. Indeed, this is the raison d'être of all the certification approaches reviewed here. None of the standards described demands immediate elimination of all emissions. Instead, the focus is on having an action plan and committing to gradual improvement. Take, for example, the UK Environmental Reporting Guidelines cited by Shanahan. These guidelines call for key performance indicators that can include quantitative targets based on outcomes, such as reduction of emissions or incidents; quantitative or qualitative objectives in terms of inputs, such as completion of management system initiatives by a planned date; annual progress measured against a commitment to continuous improvement; or case studies providing evidence of programmes planned across a specified period. The chapters by WRI, Shopley, Wain and Murray, and Jones provide numerous examples of this approach.

1.4 Reporting and certification in practice

GHG or carbon certification can draw on a wealth of experience in other sectors, reviewed in this volume by Krishnan, who identifies as many as 246 voluntary sustainability standards in the world, many focused on environmental sustainability. These are in addition to mandatory standards, for example related to food safety.

As is the case with GHG reporting, sustainability standards reflect the commitment of companies to corporate social responsibility and help companies manage reputational risk. They also respond to external pressures, such as campaigns mounted by non-governmental organisations on issues like child labour or union representation, and environmental concerns.

Krishnan makes clear that standards present opportunities but also risks for developing countries, concluding that 'it is good to be optimistic about standards but with caution'. Standards can help spread best practice along supply chains and can create local spillovers, for example, in technology or management practice (see also Keane and te Velde). On the flip side, the application of standards can be difficult and

costly. Often, standards are adopted in developed countries and then pushed down the supply chain to second- and third-tier suppliers, offering few opportunities for consultation, and entailing additional costs – described as a 'green squeeze' on suppliers. Furthermore, Krishnan notes, there can be trade-offs between different standards, for example, between environmental and social objectives. And there are problems with 'label overload' as suppliers try to meet multiple demands (Jones).

Most of these concerns are also strongly reflected in the discussion about carbon reporting and accounting. Several of the authors, such as Wain and Murray, note the cost implications of full carbon accounting. Along with Jones, Wain and Murray discuss the danger of focusing on GHG emissions to the exclusion of wider environmental concerns. There may be risks in over-complicating reporting (Scott), but Wain and Murray conclude that 'overlooking other sustainability issues represents a missed opportunity'. Keane and te Velde are among those emphasising the opportunity of using standards to improve technology and efficiency within global value chains. Jones discusses the problem of label overload.

There are then implications for the design and implementation of carbon standards. From the general literature, Krishnan proposes three steps to promote win–win outcomes: (1) better standard design; (2) refocusing to deliver environmental justice; and (3) using financial incentives and disincentives (e.g. border carbon adjustment (BCA) taxes) along with standards. She emphasises the importance of voice and participation in designing standards, and the need to think of standards in process terms, as gradually improving and tightening over time: this is the idea of 'progressive realisation' familiar from the lexicon of human rights.

In the field of GHG and carbon certification, there is great attention to detailed and pragmatic standard design, by the GHG Protocol Initiative, Natural Capital Partners, Avieco, the Carbon Trust, governments (such as the UK) and others not represented here. WRI, Shopley, Wain and Murray, and Jones all discuss the need to build action into standards: Shopley talks about 'promoting immediate action to support deeper and wider transformation'. There are also developments in the field of labelling. Jones observes that:

> B2B and B2C communication require different approaches. Generally, B2B labels need to carry specific numbers, whereas a simpler message is often required for consumers, showing a direction of travel (reducing CO_2) or a positioning (CO_2 measured), for example. In some cases, fuller supporting detail can be made available on a website, potentially through scanning a QR code or via a weblink on packaging.

The AI approaches Smith describes can be useful here.

Perhaps the biggest gap relates to discussion of the voice and participation of suppliers in developing countries in the design and implementation of standards. There are hints, however, that options exist. Krishnan refers to the fair-trade standards, for example, which emphasise producer ownership and participation. Shopley describes how the company Betty & Taylors works on environmental issues with tea and coffee suppliers in Kenya, Malawi and Uganda. No doubt there are many such examples in the certification world.

Accounting, reporting and certification are constantly evolving. An important point several contributors make is that, after initial enthusiasm, interest in this area waned in the 2010s. Hill ascribes this decline partly to the complexity of the calculations and to the labelling challenges but is optimistic about the 'second decade' of environmental footprints. Jones agrees, adding that consumer interest has not always been sufficient. He also makes a point about critical mass: 'Without a critical mass of labelled products, within a specific retail category for example, consumers have nothing against which to compare a product footprint.' Still, the increasingly higher profile of the climate agenda leads to consensus in the contributions here that public interest and regulation are combining to mean the issue is now regaining momentum.

1.5 The implications for developing countries

Developing countries will not be able to escape the growing enthusiasm for accounting and reporting GHG emissions. Nor should they. Jones emphasises the value of carbon footprinting as a business information and decision-making tool and observes that 'many organisations have realised that they can use carbon footprinting as a platform to help solve cost, risk and strategy questions for their businesses, for example in scenario modelling for their supply chains.' Enterprises in developing countries increasingly face the same combination of internal and external pressures that Krishnan describes as applying to businesses in general. For Beynon, this is a matter of 'self-interest'. For Plechaty et al., recognising that trade policy can be a lever in global decarbonisation means that benefits will accrue to developing as well as developed countries, in equity and environmental integrity, among other things.

Furthermore, and as Krishnan notes, standard-setting in global value chains can help businesses in developing countries learn lessons, search for new technology and benefit from spillover effects. Keane and te Velde specifically emphasise this point and warn against restricting trade. Openness, they say, 'is key for innovation in general, and innovation is correlated with energy efficiency … Trade can be a friend of the environment.'

It seems obvious, then, that developing countries should engage with the carbon reporting agenda, if not embrace it. In so doing, they should pay attention to the 3Ps articulated by Krishnan: performance, participation and progressive realisation. Essentially, this means being co-creators of rules and standards, rather than simply rule-takers. As Beynon suggests, this involves:

> Better integrating macroeconomic, climate and trade policies within a medium- to long-term framework that takes account of rapidly changing, but still uncertain, markets for energy and carbon, as well as for the goods and services (and associated opportunities for trade) in which they are embodied. It also means being flexible and responsive, avoiding lock-in to carbon-intensive patterns of production and energy generation and building capability for climate smart development.

Of course, being active in this way is not straightforward, especially when capacity is limited, resources are constrained, technology is carefully guarded and power is concentrated elsewhere. As Wain and Murray point out:

> Certification in developing countries … would need to provide support to businesses to help them overcome these challenges. Any scheme needs to be consistent so as to provide clear expectations, to level the playing field between businesses and to reduce the likelihood of greenwashing. Funding would also likely be required to enable significant business uptake in the certification scheme.

This has implications for aid donors. Barrett points to the importance of technology being shared. Beynon discusses the need to support low carbon development, but also to 'support the critical if unglamorous process of improving carbon certification and tracking schemes and developing countries' capability to comply with them'. Plechaty et al. have interesting ideas about how philanthropy can help catalyse action, including specific proposals related to tackling carbon leakage, using public procurement and developing 'climate clubs'. As Beynon suggests, carrots rather than sticks – that is, rewards rather than punishments – may have more potential to facilitate and accelerate the necessary changes.

Say, however, that progress is slow, for one reason or another. In this case, developing countries are likely to face the kind of carbon taxes mentioned in the EU Green Deal proposals, with potentially highly deleterious effects. These carbon taxes will probably be much harder to implement than often thought (Scott), with multiple exemptions, as Barrett explores. Keane and te Velde look at the issue in more detail, identifying the key sectors at risk (especially steel and aluminium), and at

the developing country exporters most likely to be affected (China, Brazil and South Africa, among others). They make the point that those advocating border carbon adjustments (BCAs) may find a way not to contravene World Trade Organization rules but may struggle more with possible contravention of the climate action principle of Common But Differentiated Responsibility, which means that developing countries should take action only insofar as they are able, with developed countries assuming most of the adjustment costs. There are also many technicalities involved in calculating the appropriate level of BCAs, given the heterogeneity among firms within a given sector: 'taxes will only work properly if each import batch has associated information on carbon intensity' (Keane and te Velde). Keane and te Velde point to the potential of blockchain technology to make tracking data easier; there is a link here to Smith's work on AI.

One further area should concern developing countries: the impact of changes in consumption on their export markets. Barrett, for example, emphasises the role that increased material efficiency can play, with impacts on imports of commodities like steel and cement. He also stresses that climate targets will not be met unless consumption patterns change. Joffe makes the same argument about materials efficiency and points also to the need to cut consumption of carbon-intensive products like red meat and dairy. The UK's net-zero action plan for 2050 is predicated in part on a 20% reduction in the consumption of these commodities. To the extent that these items are imported from developing countries, exports will be reduced, reinforcing Beynon's point that developing country planners should pay close attention to the prospects for their main export markets.

1.6 Next-generation climate regime

The evidence cited here illustrates evolution and intensification of efforts to account for carbon emissions, report on them and take action to reduce them. Voluntary standards have played an important part, along with regulation. Domestic, territorial and within-business accounting has had a dominant role, but there is strong recognition of transboundary issues and increasing acknowledgement that imported emissions need to be on the agenda. For entities in developed countries, Scope 3 emissions will be a large factor in the future development of carbon reporting. For the moment, Scope 3 emissions reporting remains largely voluntary. This will surely change.

In this context, it is surprising that the international climate regime remains so strongly focused on territorial emissions rather than on consumption emissions and total footprints. The UK again provides a case study. As Joffe makes clear, the independent UK Committee on Climate Change has 'focused principally, and consistent with its mandate, on policies to reduce UK territorial emissions'. Nevertheless, it has noted the rise in imported emissions and accepted that consumption emissions are rightly a key area of stakeholder interest. Indeed, Joffe reports that the Science and Technology Select Committee of the UK House of Commons has called for greater prominence of consumption emission statistics in its publications and demanded that progress in reducing territorial emissions not be achieved by 'offshoring' emissions.

The Select Committee goes further in concluding, 'We do not accept that territorial emissions should be the sole basis for international negotiations.' This seems an important point for the UNFCCC, given the renewed urgency of climate action and the emphasis in 2020 on renewing NDCs with greater ambition. The question is whether the United Nations Framework Convention on Climate Change (UNFCCC), at an appropriate time, should consider asking countries submitting revised NDCs to also report on traded emissions and propose how these might be reduced. This could include action on aviation and shipping, as Keane and te Velde recommend, but also on various actions linked to technology transfer, finance and trade. Krishnan and Maxwell examine the scope for an enhanced accountability framework in the UNFCCC.

References

European Commission (2019) The European Green Deal. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2019) 640 final. Brussels: European Commission (https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf)

UN – United Nations (1992) United Nations Framework Convention on Climate Change. UN Doc. FCCC/INFORMAL/84. Bonn, Germany: UNFCCC (https://unfccc.int/resource/docs/convkp/conveng.pdf)

UN (2015a) 'The Paris Agreement'. Bonn, Germany: UNFCCC (https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement)

UN (2015b) 'Nationally determined contributions (NDCs)'. Bonn, Germany: UNFCCC (https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs)

UNEP – United Nations Environment Programme (2019) *Emissions gap report 2019*. Geneva, Switzerland: UNEP

Part B Setting the scene

Chapter 2 Imported emissions: an overview and policy options

John Barrett

2.1 Why imported emissions matter

Greenhouse gas emissions are rising – mainly because of increases in Asia

Emissions of global greenhouse gases (GHGs) continue to rise, having increased by approximately 4.2% between 2017 and 2019 alone (Peters et al., 2019). The reason for the continued increase is that renewables have not displaced fossil fuels, but simply provided for an increase in energy demand. In turn, global energy demand is closely linked to the continued growth of consumption. Energy intensity is falling but, overall, there is no evidence that energy demand has been decoupled from global economic growth (Hickel and Kallis, 2019; Sakai et al., 2019). Figure 2.1 illustrates recent trends for OECD and non-OECD countries.

Figure 2.1 Average annual growth rates of key drivers of global CO_2 emissions and components of greenhouse gas emissions

Notes: GDP = gross domestic product; PPP = purchasing power parity; LUC = land-use changes; GHG = greenhouse gas; CH_4 = methane; N_2O = nitrous oxide
Source: UNEP (2019), reproduced with permission.

From a geographical perspective, while GHG emissions are declining slowly in Europe, they continued to increase between 1990 and 2018 in Asia, North and South America and Africa (Figure 2.2). The substantial growth in GHG emissions has occurred in Asia, where they are now three times higher than they were in 1990 and continue to grow, with a 3.3% increase between 2017 and 2018.

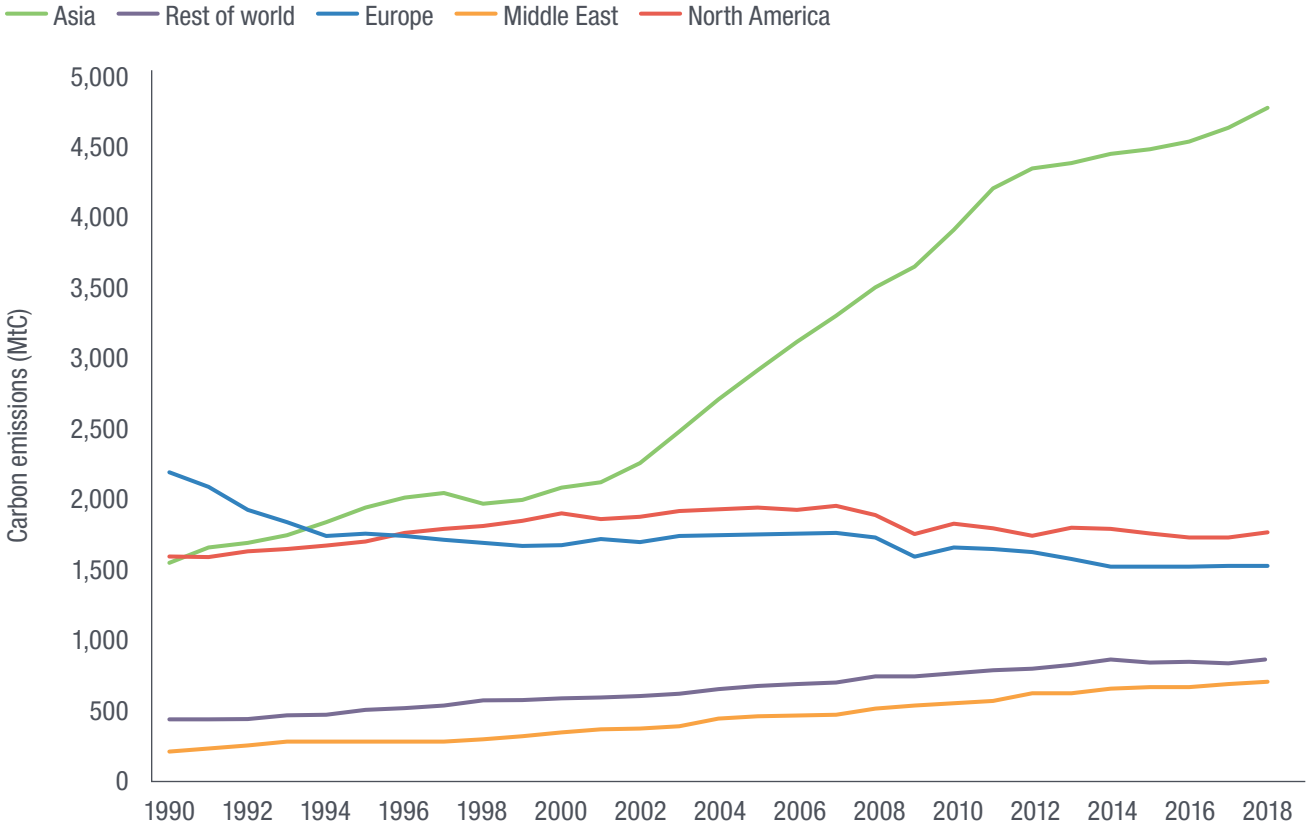
But traded emissions are also important

The above figures are calculated on a territorial basis, where emissions occurring within the country are allocated to the country. The United Nations Framework Convention on Climate Change requires countries to report their annual GHG emissions on this basis, defined as 'emissions and removals taking place within national (included administered) territories and offshore areas over which the country has jurisdiction' (IPCC, 1996: 5).

However, GHG emissions can also be calculated from a consumption perspective, which estimates the emissions associated with the consumption of a country, irrespective of where the goods and services were produced. Conceptually, consumption emissions can be described as: *consumption = production-based emissions – emissions embodied in exports + emissions embodied in imports* (Barrett, et al., 2013).

One consistent finding in the literature is that industrialised nations tend to import more emissions, embodied in the foreign-made products that they consume, than they export, consequently becoming net importers (Sakai and Barrett, 2016). Therefore, the rise in emissions from Asia is considerably more complex than providing for increased demand within the country; increasingly, Asia has become the 'factory of the world', exporting materials and products to consumer-led markets in North America and Europe.

Figure 2.2 Territorial carbon emissions by world region, 1990–2018



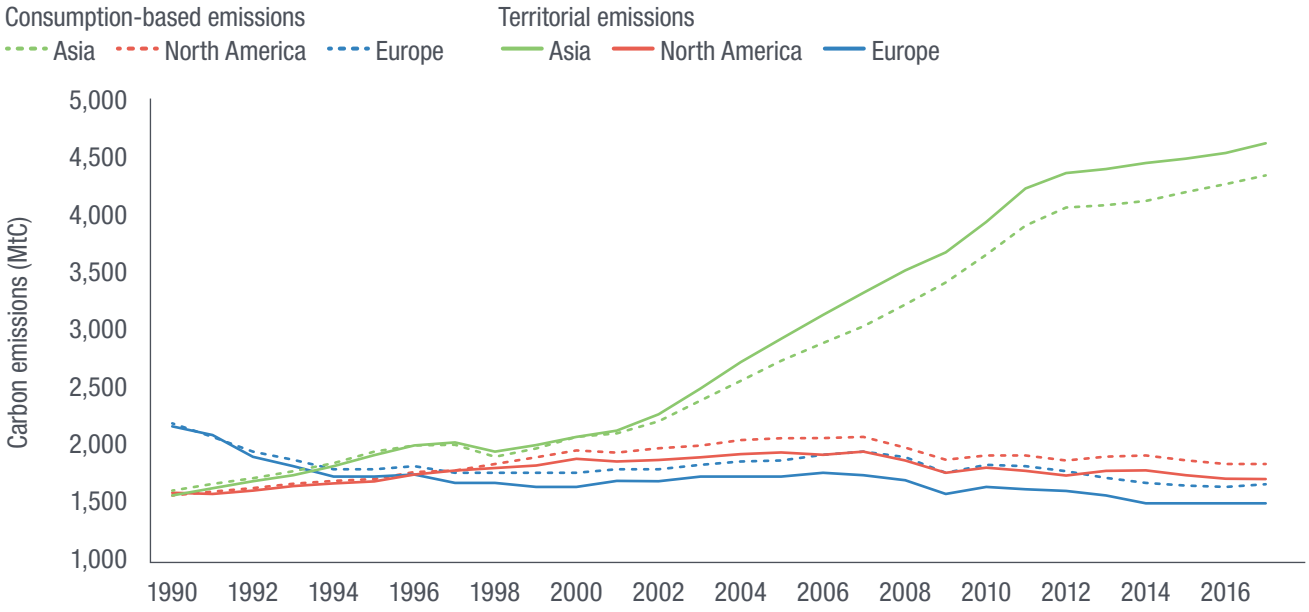
Source: Friedlingstein et al. (2019); Peters et al. (2019).

Figure 2.3 shows the variation in territorial and consumption in Asia, Europe and North America, accounting for the large majority of global GHG emissions.

Europe's consumption-based emissions are 10% higher than its territorial emissions. For Asia, emissions reduce by 6% under the consumption accounting approach. Figure 2.4 breaks this down for the 10 largest countries in terms of gross domestic product (GDP), representing two-thirds of the global economy.

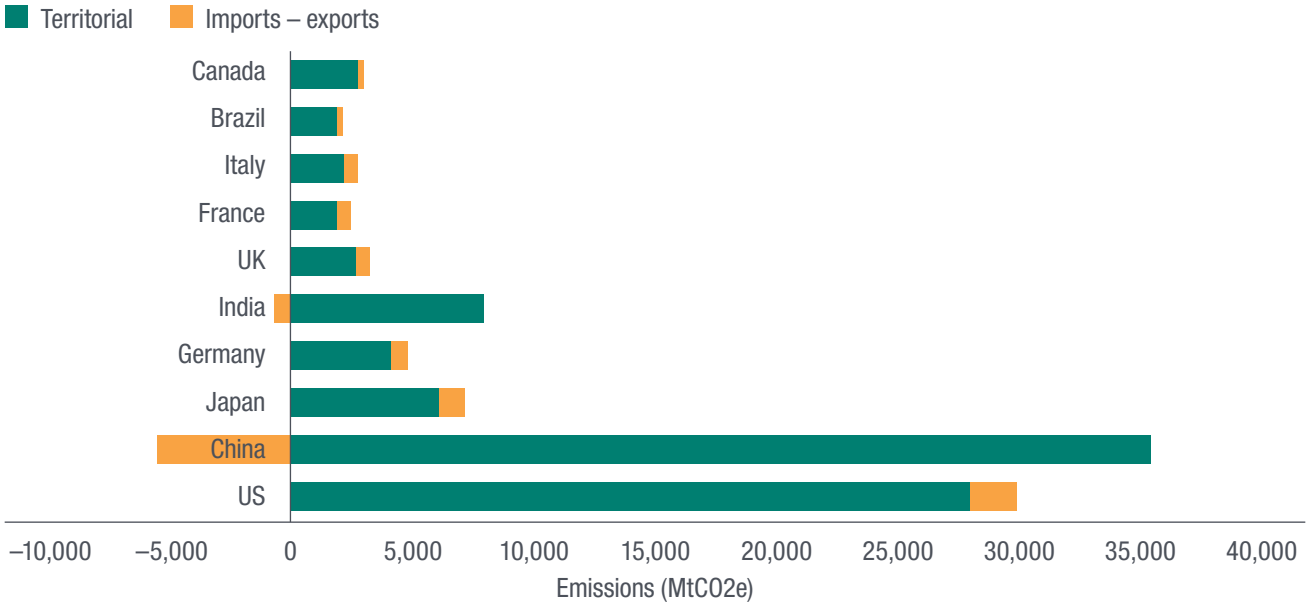
The UK provides a powerful example of the difference between territorial and consumption emissions. As Figure 2.5 shows, net territorial emissions in 2016 amounted to 473 megatonnes of carbon dioxide equivalent ($MtCO_2e$) and

Figure 2.3 Territorial and consumption-based carbon emissions, 1990–2016



Source: Friedlingstein et al. (2019); Peters et al. (2019).

Figure 2.4 Emissions associated with the 10 largest countries based on GDP

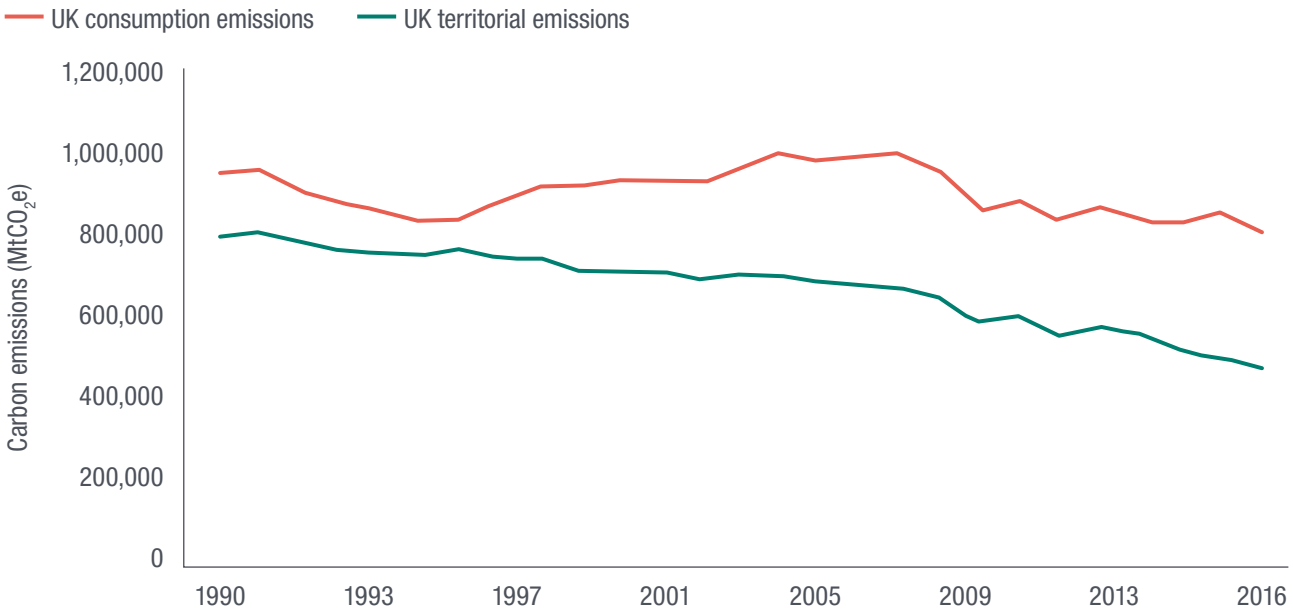


Source: Friedlingstein et al. (2019); Peters et al. (2019).

imported emissions to 364 $MtCO_2e$. Adding these together gives total consumption emissions of 837 $MtCO_2e$, of which 43% was imported. The figure also shows that the share of imported emissions has been rising, largely offsetting falls in territorial emissions.

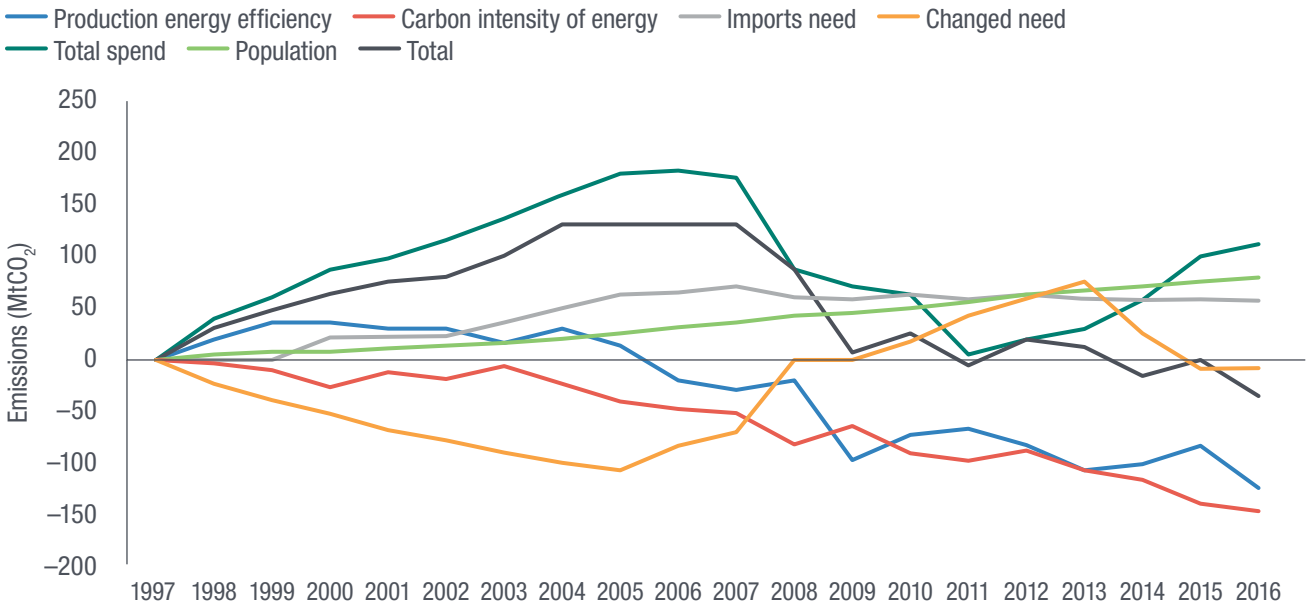
In the UK case, again illustrating a global trend, the main drivers have been rising population and rising income, clearly offsetting domestic improvements in production energy efficiency and in the carbon intensity of energy (Figure 2.6). An important point on this evidence is that deindustrialisation in the UK is not a major driver.

Figure 2.5 UK territorial and consumption emissions, 1990–2016



Source: Spaiseret al. (2019).

Figure 2.6 Key drivers of consumption-based greenhouse gas emissions in the UK, 1997–2016



Source: Barett et al. (2019)

Traded emissions account for up to 38% of the global total – with China having the largest share

To put the global numbers into context, global growth in GDP has been closely coupled with growth in global trade, meaning there is an ever-increasing disconnection between the location of production and that of consumption. When considering the emissions embodied in all globally traded products, one of the most comprehensive studies suggests that, in 2008, they accounted for 26% of global emissions, increasing from 20% in 1990 (Peters and Hertwich, 2008). More recent analysis, using models with further disaggregation of countries, suggests this figure could be as high as 38% of global emissions (ibid.). Further, the proportion of global emissions embodied in trade is remaining constant. China has, by some margin, the greatest embodied emissions in trade. They are so significant that they represent over half of net global traded emissions.

2.2 What might be done?

The aim of any policy to address the emissions embodied in trade must be either to improve the energy efficiency or carbon intensity of production or to reduce the consumption of the most carbon-intensive materials and products. The key policy options are taxation, technology transfer and action on consumption.

Border carbon adjustments look attractive, but are difficult …

Ideally, there would be a consistent global climate policy in place that ensures each country is reducing its emissions to achieve globally agreed targets. However, this is clearly not the case. Current commitments by countries fail to achieve the globally agreed targets and there is variation in the level of ambition (Scott et al., 2018). Further, there is no global carbon price that is universally applied. In this context, industries in countries with a more stringent climate regime unsurprisingly raise the concern that they are economically disadvantaged. Such pressures in the EU, for example, have led to the free allocation of carbon allowances under the EU Emissions Trading Scheme, actively undermining progress on emissions reduction.

To compensate for varying taxation regimes, and to ensure a level playing field, industry has widely called for BCAs. The reality, however, is that BCAs are highly complex to implement. This is clearly known by industry in Europe, leading it to argue for a low carbon price within the EU Emissions Trading Scheme. As Figure 2.4 shows, the largest implications of any BCA would be in China. There is a danger that any measure to place a carbon price on imports from China would be seen as protectionism. There is widespread acceptance that a BCA would be acceptable under international trade law. However, it would clearly affect relations between countries such as the US and China, which are currently placing additional tariffs on traded goods.

While it may be legally possible, the practical implementation of any scheme would therefore be highly challenging. As outlined by Sakai and Barrett (2016), the intent of a BCA is that the price of imports reflect the carbon price imposed by the importing country. This is very difficult, as establishing the carbon intensity of production is complex. While some imports will be of a specific material, like steel, that is universally produced using the same production method globally, the majority of imports will be products made of hundreds of different materials, with complex global supply chains. There is also the issue of whether country-level carbon intensity per material or product applies or whether the carbon intensity associated with a specific factory is used.

Another difficulty relates to the fact that imports could be subjected only to the same carbon price imposed on domestically produced products. Therefore, if a country has an emissions trading scheme, this would need to be taken into account. The difference in the carbon price between the two schemes would have to be applied.

… and may have limited scope

A further problem is that BCAs may have limited scope, given the exemptions built into possible schemes, including for least developed countries, with respect to those emitters using 'best available technologies' and for sectors that account for less than 5% of a country's exports. Sakai and Barrett (2016) show that in the EU, of nearly 3 $GtCO_2e$

of imported emissions from mostly developing countries (see Figure 2.7: 'non-Annex B'), only a small proportion can realistically be taxed.

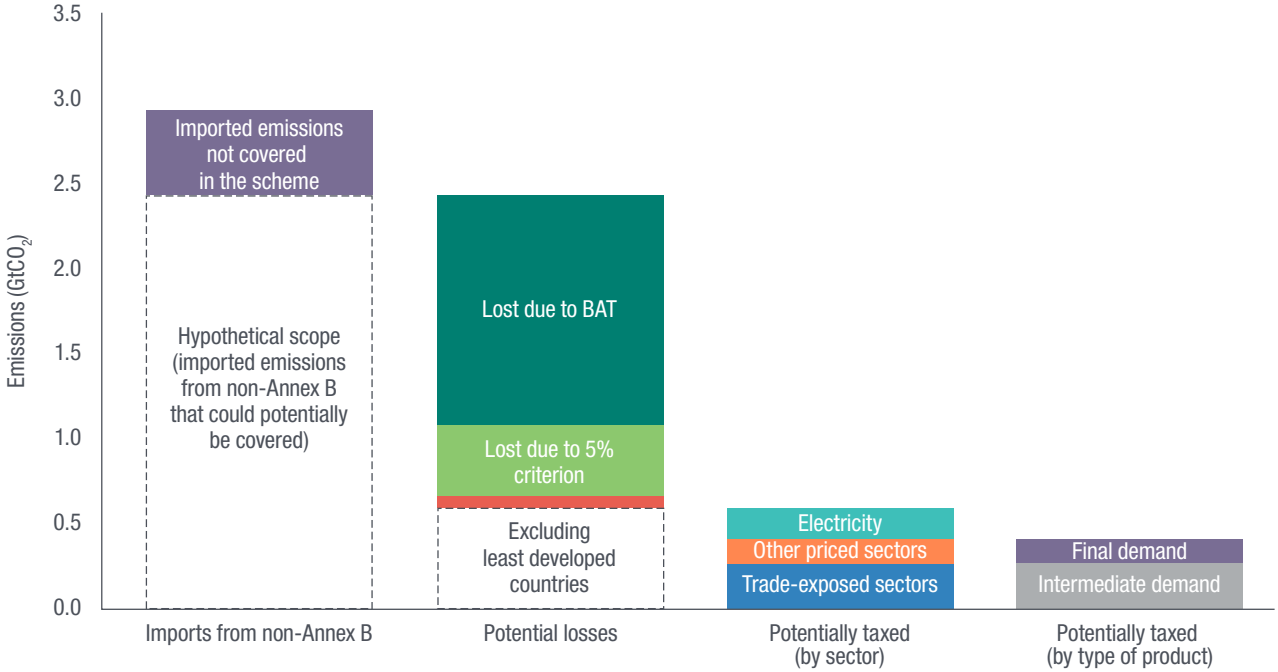
Thus, we have to question whether imposing a BCA would make a substantial difference in terms of ensuring the global target of reducing GHG emissions to net-zero by 2050 is met. Placing a carbon price on industry in Europe with the EU Emissions Trading Scheme has been shown to have very little effect on emissions reduction. The scheme has been plagued with political interference and lobbying, ensuring the carbon price has remained low. The market has, historically, completely collapsed, undermining investment in low-carbon alternatives. A carbon price has generally been used to ensure mitigation options that have a small additional cost become economically viable. However, small reductions in emissions over a long period are entirely inconsistent with the need for rapid reductions in emissions.

Focus on material efficiency and consumption

As previously mentioned, the increase in carbon-intensive imports relates to increases in the demand for materials and products. One potential policy that could be implemented without any international agreement is a resource consumption strategy that seeks to use materials and products more efficiently to reduce the total use of materials. This directly addresses the key driver: unsustainable patterns of consumption. There is considerable evidence that policies that make the economy more circular – extending the lifetime of products, increasing the utilisation rate of carbon-intensive products (e.g. a car) and replacing goods with services – can have a substantial effect on GHG emissions (Scott et al., 2018). This could involve a range of policy instruments, from product standards to innovation funds for new business models. In relation to product standards, within the EU there is the possibility of extending the Eco-Design Directive to incorporate standards for the embodied energy of products, as well as the operational energy of energy-using products.

Certification and labelling can play a part in incentivising greater material efficiency, at least for consumer products. It is worth noting, however, that this approach does not work so well for products that are not consumer-facing.

Figure 2.7 Embodied emissions in global trade: border carbon adjustments possibilities



Notes: 'Non-Annex B' refers to those countries not included in Annex B of the Kyoto Protocol, which lists industrialised countries and economies in transition that have their GHG emissions capped under the Kyoto Protocol.
Source: Sakai and Barrett (2016).

For example, the construction sector is a major source of emissions in the UK.

As far as developing countries are concerned, funds could be made available to ensure that the best available technology is installed in high-producing countries. This could take the form of direct funding, the sharing of new technologies and shared innovation funds between countries. In essence, it could provide a collaborative approach to addressing inefficiencies and the more rapid replacement of outdated high-carbon technologies.

In the end, the trade of materials and products highlights the key driver of global emissions – consumption. Improvements in technology and the efficiency of production are highly unlikely to deliver the required emissions reduction. Therefore, domestic resource consumption strategies that fundamentally change our use of products are required to reduce the total throughput of materials and products.

2.3 Conclusion

The current mitigation options have been unable to achieve the scale of change required to truly address the climate crisis. Therefore, the fact that materials and products are traded offers an additional point of intervention to deliver low-carbon products. While BCAs may be highly problematic, other options are available that encompass a more collaborative approach to ensure future industrial development does rely on low-carbon technologies. Achieving carbon targets will also require action to reduce consumption.

References

Barrett, J.R., Peters, G., Weidmann, T., Scott, K., Lenzen, M., Roelich, K. and Le Quéré, C. (2013) 'Consumption-based GHG emissions accounting in climate policy: a UK case study' *Climate Policy* 13(4): 451–470

Friedlingstein, P., Jones, M., O'Sullivan, M., Andrews, R.M., Hauck, J., Peters, G.P., … and Zaehle, S. (2019) 'Global carbon budget' *Earth System Science Data* 11: 1783–1838 (https://doi.org/10.5194/essd-11-1783-2019)

Hickel, J. and Kallis, G. (2019) 'Is green growth possible?' *New Political Economy* (https://doi.org/10.1080/13563467.2019.1598964)

IPCC – Intergovernmental Panel on Climate Change (1996) *IPCC guidelines for national greenhouse gas inventories*. Geneva, Switzerland: IPCC

Peters, G. and Hertwich, E. (2008) 'CO2 embodied in international trade with implications for global climate policy' *Environmental Science & Technology* 42(5): 1401–1407

Peters, G., Andrew, R., Canadell, J.G., Friedlingstein, P., Jackson, R.B., Korsbakken, J.I., Le Quéré, C. and Peregon, A. (2019) 'Carbon dioxide emissions continue to grow amidst slowly emerging climate policies' *Nature Climate Change* 10: 3–4

Sakai, M. and Barrett, J. (2016) 'Border carbon adjustments: addressing emissions embodied in trade' *Energy Policy* 92: 102–110

Sakai, M., Brockway, P., Barrett, J. and Taylor, P. (2019) 'Thermodynamic efficiency gains and their role as a key "engine of economic growth"' *Energies* 12: 110 (https://doi.org/10.3390/en12010110)

Scott, K., Owen, A., Giesekam, J. and Barrett, J. (2018) 'Bridging the climate mitigation gap with economy-wide material productivity' *Journal of Industrial Ecology* 23(4): 918–931 (https://doi.org/10.1111/jiec.12831)

UNEP – United Nations Environment Programme (2019) *Emissions Gap Report 2019*. Geneva, Switzerland: UNEP

Chapter 3 Standards and certification: an overview

Aarti Krishnan

Carbon standards and carbon certification are special cases of standard-setting and certification more generally. This chapter explores the lessons of wider experience for work on reducing carbon emissions. It identifies the pitfalls and the risk of a 'green squeeze' on suppliers in developing countries. It concludes with a call for carbon standard-setting and certification to focus on performance, participation and progressive realisation.

3.1 Introduction

There are many standards operating in the international system

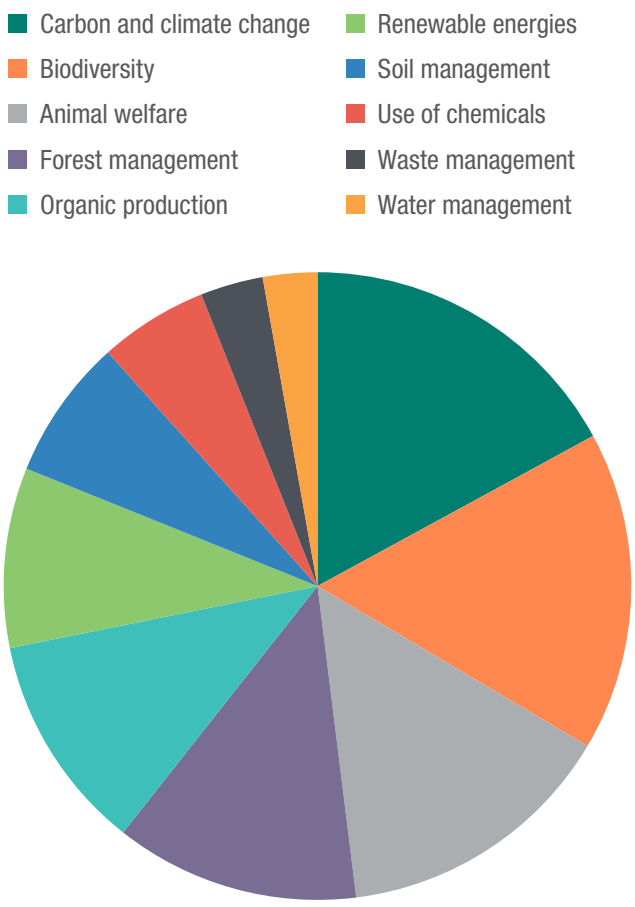
Globalisation has led to the fragmentation of production and a change in the trade flows of capital, intermediary and final goods, fostering global value chains (GVCs) and global production networks. Heightened environmental awareness, combined with activism from civil society organisations (CSOs), is increasing pressure on lead firms to take responsibility for the ecological footprint along entire GVCs. Simultaneously, many firms in GVCs seek to gain competitive advantage from 'going green'. This has led to a proliferation of standards and certification.

According to the International Trade Centre (ITC) Standards Map, there are over 246 voluntary sustainability standards in the world, with many applicable across multiple sectors: 30% of sustainability standards are related to agriculture and food processing, 15% to textile and garments, 14% within consumer electronics and 8% in the energy sector. The remainder are distributed across services, fisheries, mining and forestry. Digging deeper, the environmental dimension features heavily within these standards, with most focusing on waste and water management, followed by biodiversity, soil management and carbon and climate change (Figure 3.1).

Created by a multiplicity of actors

There are two broad categories of standard – mandatory and voluntary. Mandatory standards include public standards (government/national) and intergovernmental (e.g. sanitary and phytosanitary (SPS)); voluntary standards can be led by the private sector, an industry association/consortium, individual non-governmental organisations (NGOs), an alliance of NGOs, the public sector or collaborative agreements, as Table 3.1 shows.

Figure 3.1 Environment-related requirements within standards



Source: Author's own, based on ITC data.

Table 3.1 Types of standard

Mandatory/ voluntary	Standard design/lead stakeholders	Standard	Monitoring[i]	Example
Mandatory	Intergovernmental, e.g. World Trade Organization, Food and Agriculture Organization of the United Nations	SPS, Codex Alimentarius	Carried out by firms involved	Food sector
	National – US Department of Agriculture (USDA)	US Food and Drug Administration food safety and modernisation	Carried out by UDSA	Food traceability
Voluntary	Private sector	Company-led standards/codes of conduct	First, second party	Starbucks – CAFÉ, Unilever – Sustainable Agriculture Code
	Industry consortium of private firms	Industry association or group led	First, second and third party	Global GAP, British Retail Consortium, Eurofer, ATIS
	NGOs	NGO-led	Third party	Fairtrade, Rainforest Alliance
	Alliance of NGOs/CSOs	Group of NGOs come together to develop a standard	Third party	Clean Clothes Campaign, Buy Clean, ISO 9001/14001
	Public sector-led voluntary standards	Government-led standards with support from NGOs and business	Third party	UDSA Organic, Green Building Council
	Collaborative agreements/ multi-stakeholder	Jointly governed by NGOs and business	Second, third party	Forest Stewardship Council (FSC), Roundtable on Sustainable Palm Oil, GHG Protocol, Extractive Industries Transparency Initiative

Notes: i First-party monitoring is an internal audit that an organisation performs on itself; second-party monitoring is an external audit that an organisation performs on a supplier of goods or services; and third-party monitoring involves an external audit that is conducted by an independent organisation upon another.
Source: Author's own, adapted from UNFSS (2018).

Standards are proliferating as a result of internal and external forces

Standards have not proliferated in a vacuum but are driven by external and internal pressures. External pressures include consumers, social movements, NGOs and civil society, governments and other policy actors. For instance, environmental justice movements, like Extinction Rebellion and Climate Justice Action, are groups committed to taking action to prevent catastrophic climate change, including demanding change in the patterns of production and consumption. In the same vein, alliances of NGOs and labour unions have come together to promote sustainable agendas like the Clean Clothes Campaign and the Blue Green Alliance (Buy Clean). These involve labour unions and NGOs focusing on the improvement of working conditions in the garment and sportswear industries (Clean Clothes Campaign, n.d).

There are also NGO-led campaigns, like the Detox Campaign that Greenpeace promoted in the fashion industry, where many global brands decided to commit fully to the reduction or elimination of hazardous materials in the production of clothes. This included the development of institutional agreements, such as the creation of the ZDHC (Zero Discharge of Hazardous Chemicals) Foundation in 2011, which comprised firms such as Marks & Spencer, Nike, Levi Strauss, Arvind Limited and C&A.

Regional and national governments play an important role in setting environmental regulation – see, for instance, the proposed Green New Deal in the US and the European Green Deal in the EU, both of which support investment in green infrastructure and finance across pollution-intensive sectors. National governments have developed mandatory environmental standards, such as the US Food and Drug Administration (FDA) food-safety rules, which make food traceability mandatory within the US. Other examples are compulsory greenhouse gas (GHG) reporting for firms in

the UK, and effluents and emissions standards in India and China to curb resource-intensive activities in manufacturing sectors.

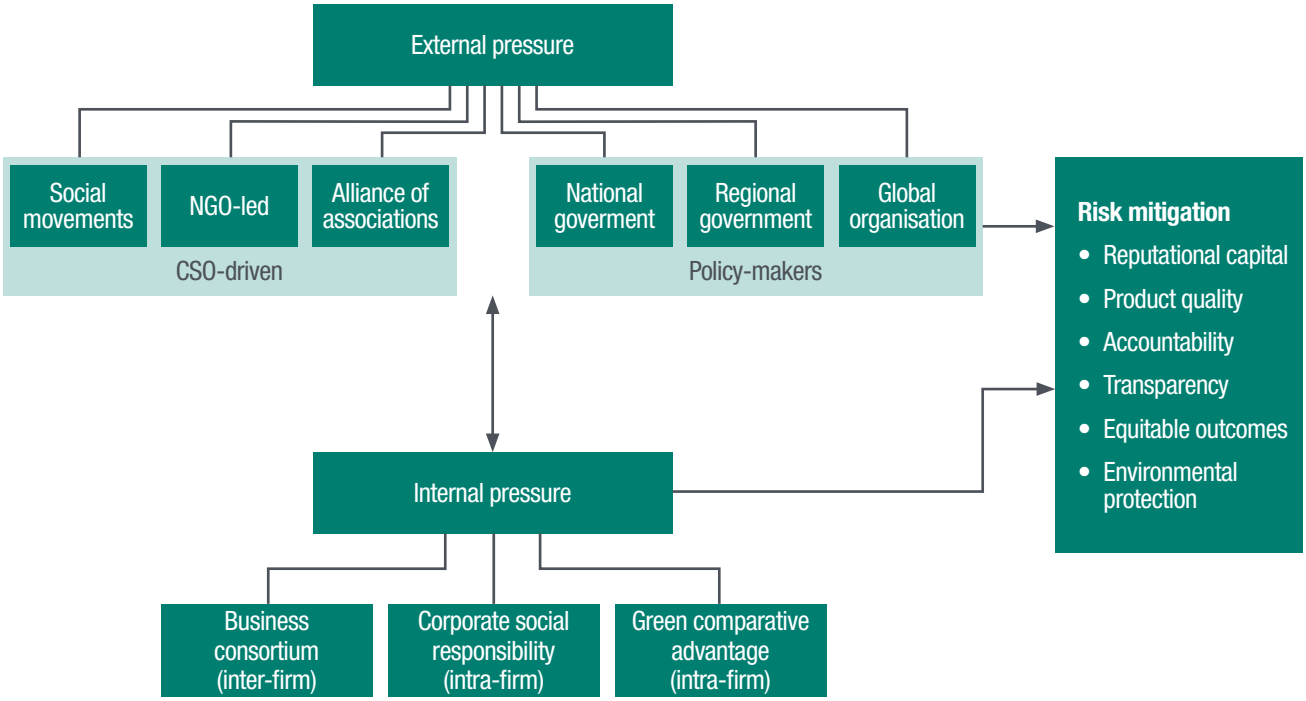
Furthermore, supranational organisations such as the World Trade Organization (WTO) require compliance with mandatory SPS rules that set minimum requirements for food safety standards and pro-environmental enhancement. Another globally governed mandatory standard is the UN Food and Agriculture Organization of the United Nations (FAO) Codex Alimentarius, which is a collection of internationally recognised standards, codes of practice, guidelines and other recommendations relating to food, food production and food safety.

Standards also play an important role in realising trade deals. For instance, several multilateral trade agreements, such as the Maputo Convention on the Protection of Nature and Natural Resources (adopted in 2003), provide a pathway to using standards as a means to environmental protection. There are also specific regional and bilateral deals, such as the EU–Japan Economic Partnership Agreement, which has a sustainable-development chapter encompassing the environment, and the EU and Caribbean agreements on 'poverty reduction and environmental protection', which support sustainable development.

Internal drivers include corporate social responsibility (CSR) (environmental/social governance) and a search for product differentiation. For instance, conglomerates such as Unilever, Tata and Nestlé have dedicated CSR reports, delineating their CSR initiatives, milestones and outcomes. Another source of inter-firm activity is industry associations or business consortia, such as the British Retail Consortium and the European Steel Association, Eurofer, which provide impetus to develop sustainability standards that can be used across a sector, as well as to create a level playing field across firms.

Some of the key risks these external and internal pressures aim to mitigate are linked to the reputational capital of firms, enhancing accountability and transparency, achieving equitable social and economic outcomes, and improving environmental protection and conservation (Figure 3.2).

Figure 3.2 External and internal pressures supporting the proliferation of standards



3.2 Benefits and risks of standards

Standards can potentially benefit low- and middle-income countries

In terms of global trade, standards can play various roles across and within a GVC, especially when considering low- and middle-income countries. They can be used as instruments to govern or regulate value chains, facilitate trade opportunities, transfer best practices, build trust between multiple actors across a value chain and create local spillovers (Figure 3.3). If standards are leveraged optimally, they can potentially reduce transaction costs within a value chain, reduce coordination failures and complement national policies of green transformation.

However, standards can create a green squeeze on low- and middle-income country suppliers

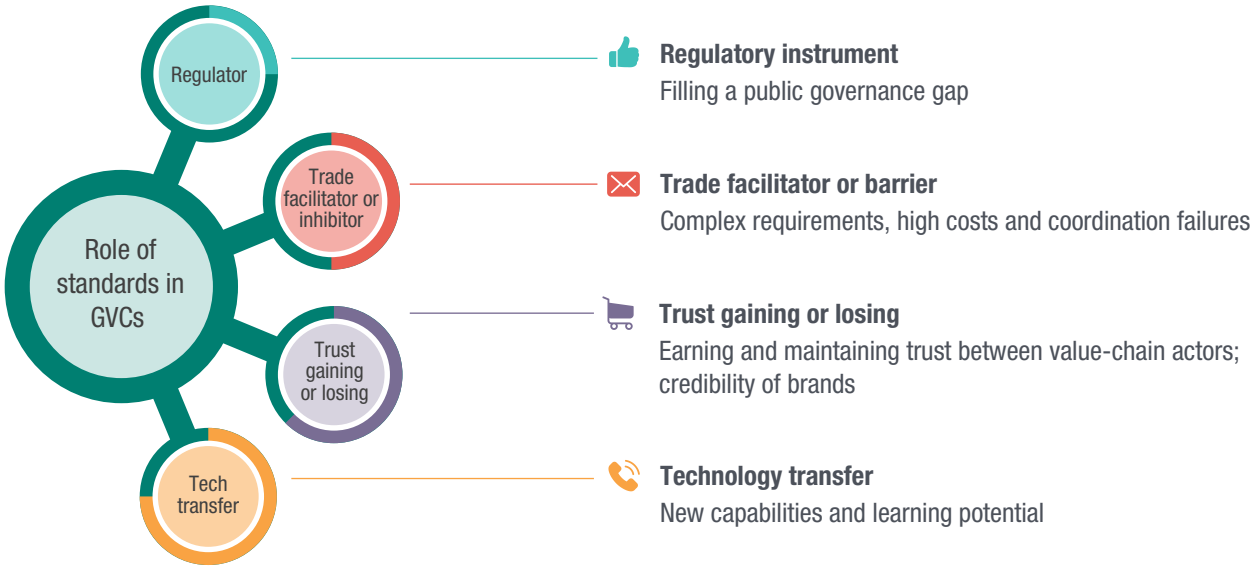
Low- and middle-income countries can benefit from standards, for example via increased opportunities for value addition and diversification, better worker rights and achieving net-zero emissions for product lines (Bush et al., 2015; UNFSS, 2018). But at the same time, the high costs of certification (audit costs), the need to learn complex practices and lack of transparency in the modus operandi of standards (Krauss and Krishnan, 2016) can lead to marginalisation of the poorest suppliers in the GVC (Evers et al., 2014; Lambin and Thorlakson, 2018).

The onerous 'green' demands from standards created by developed countries are often pushed down the value chain to second- and third-tier suppliers (e.g. micro and small enterprises, farmers) in low- and middle-income countries, creating a top-down 'green supplier squeeze' (Ponte, 2019). Southern suppliers also face additional costs through 'certification overload', with suppliers required to adhere to different labels, so they are crowded onto packaging. From a trade perspective, certification can cause trade distortions and overburden trade agreements. It may also, in some cases, be incompatible with WTO rules. And there can be unrecognised trade-offs between the different objectives of certification.

Furthermore, the proclaimed goal of sustainability standards is to create win–win situations, by reconciling environmental (e.g. adapting to climate change, increasing biodiversity), social (e.g. women's empowerment, paying fair wages, building capacities of farmers and workers) and economic (e.g. promoting industrial growth) policy objectives. This suggests standards need to 'synergistically' achieve positive economic, social and environmental outcomes (Krishnan and Foster, 2018; Ponte, 2019). But synergies are often difficult to achieve, as the parameters of attaining economic versus social versus environmental outcomes vary significantly.

Internationally, there are trade-offs that arise with mounting pressures to go green. Rather than

Figure 3.3 Role of standards in value chains in low- and middle-income countries



Source: Author's own.

leading to systemic change towards net-zero, they can lead to 'pollution-shifting'. For example, a ban on domestic tanning factories led to India and China importing raw and tanned leather from Ethiopia, Kenya and Uganda, thereby decreasing territorial pollution but increasing imported pollution and effectively externalising environmental costs (Krishnan et al., 2018).

Overall, it is good to be optimistic about standards, but with caution.

Research across different sectors – agriculture and agro-processing, wood and paper (including furniture), extractive industries (oil, gas, precious metals and metals), textiles and apparel, leather and electronics – suggests that standards support an increased probability of suppliers in low- and middle-income countries achieving positive economic outcomes in terms of productivity enhancements, value addition, improved quality and, in some cases, diversification. However, the results in relation to social and environmental outcomes are mixed (Krishnan, 2018; UNFSS, 2018). The key social outcomes highlighted are struggles related to gaining workers' rights and bargaining power in value chains, impinging on negotiations for better contracts, job stability and wage levels. The environmental outcomes highlighted are poor resource use, increased GHG emissions and biodiversity loss.

Box 3.1 provides an example of standards that have created net benefits.

Box 3.1 Fair trade in the food sector

Fair trade certification aims to provide farmers with guaranteed prices and premium payments that can be used to improve productivity and to support producer organisations. Studies have shown that its use in the cocoa sector in Ghana, Côte d'Ivoire and Nicaragua has led to an average increase of 20% in the income of farmers, an 18% increase in cocoa yields, an increase of 12% in farmers able to diversify to other products and greater knowledge transfer on good agricultural practices (Krauss, 2017; Barrientos, 2019).

Towards best practice in standard-setting and certification

For standards to be effective, there is a need to create not only equitable win–win outcomes across value-chain actors but also outcomes that work across very different economic, social and environmental dimensions. Three steps are needed to promote win–win outcomes: (1) participatory standard design; (2) refocusing to deliver environmental justice; and (3) using financial incentives and disincentives (e.g. border carbon adjustment (BCA) taxes) along with standards. Each of these ranges from smaller changes or alterations to standards to more radical solutions that require structural change.

Participatory standard design. Most voluntary standards are set by actors based in developed countries (Ponte, 2019). These actors have the power to design the control points within a standard. Their design is affected by regulation within the developed-country and the demands made by developed country consumers and businesses (Nadvi, 2008). This precludes actors in supplier countries (low- and middle-income countries) from participating in the design and decision-making process of standards with which they need to comply. Thus, there is an asymmetric power imbalance in favour of developed countries. Significant research alludes to the contestations that arise when implementing standards are imposed in the Global South, because of the failure to incorporate local norms and cultures into the standards (e.g. Barrientos, 2019; Gereffi, 2019). Therefore, those who are setting standards must ensure that the design process is participatory, open and consensus-driven to enable smooth uptake and compliance implementation.

Environmental justice. Most GHG standards focus on the firm or enterprise as a unit of analysis, without considering the implications for environmental justice. Justice needs to be viewed through a lens of fairness, so that all members of society can use the environment equally. Conforming to environmental justice requires a society to care collectively for the environment and to participate in the development, implementation and enforcement of environmental laws, regulations and policies (Mohai et al., 2009). Incorporating distributive and environmental justice aspects into GHG standards can reorient

them to better capture the implications for the most vulnerable actors in GVCs.

In keeping with the need to incorporate environmental justice into standards, standard design could attempt to separate climate certifications from wider sustainability standards and, thus, focus on a carbon (net-zero emissions) standard as a standalone certification rather than as part of an all-inclusive sustainability certification.

The modus operandi of climate certification varies from sustainability standards. For instance, carbon-related standards, such as Science Based Targets, Buy Clean, ISO 14001 and the GHG Protocol, that focus on net-zero emissions are a special case of sustainability standard. These GHG standards have been applied across multinational corporations in the Global North and South and have led to zero-emissions product lines by increasing the efficiency of production processes. However, implementing GHG standards is expensive, with significant investment required to map the value chain and measure direct and indirect emissions (GHG Protocol, 2019).

Financial incentives and disincentives. The usefulness of command and control measures has often been depicted in terms of the polluter-pays principle. Here, those who produce pollution should bear the costs of managing it, to prevent damage to human health or the environment (Schwartz, 2018). Ongoing incentives include cap and trade, while recent discussions have centred on BCAs. BCAs are based on the idea that a country may impose domestic taxes and charges on imports and exempt or reimburse them on exports (Mehling et al., 2019). On the one hand, BCAs can contribute to an environmentally just approach by equalising the emissions; on the other, they can act as a trade barrier and prevent economic growth in low- and middle-income countries.

3.3 Conclusion

When designing and implementing standards, the 3Ps – performance, participation and progressive realisation – need to be considered.

Performance. Standards have been shown to reduce transactions costs and improve functioning in a value chain, and they can be a source of positive economic, social and environmental outcomes. However, high costs, the complexity of standards and label overload can often constrain the transformative potential.

Participation. Low- and middle-income suppliers often find themselves subjected to standards or reporting requirements, with little scope for participation or 'voice', and often with different priorities to those they themselves would choose. There is a risk of a top-down 'green squeeze' on these suppliers, which may affect their ability to continue to participate in value chains. There is a need to design standards that are participatory at the outset, which can create win–win situations for all involved.

Progressive realisation. Every standard has different implications for different actors, thus devising incremental changes to tackle challenges as they emerge can facilitate the design of an effective standard. For instance, standards need to be flexible and normative enough so they can be modified and adapted to suit specific needs and contexts. For instance, standards can be developed to have a 'modular' approach, to start from incremental and simpler requirements that can be achieved with less asset-specific investment and complex knowledge and eventually move to more stringent environmental requirements. This allows firms that adopt environmental standards to progressively realise environmental goals, in a structured and systematic fashion.

References

Barrientos, S. (2019) *Gender and work in global value chains: capturing the gains?* Cambridge, UK: Cambridge University Press

Bush, S.R., Oosterveer, P., Bailey, M. and Mol, A.P. (2015) 'Sustainability governance of chains and networks: a review and future outlook' *Journal of Cleaner Production* 107: 8–19

Clean Clothes Campaign (n.d.) 'Who we are'. Clean Clothes Campaign webpage (https://cleanclothes.org/about)

Evers, B.J., Amoding, F. and Krishnan, A. (2014) *Social and economic upgrading in floriculture global value chains: flowers and cuttings GVCs in Uganda*. Working Paper No. 42. Manchester, UK: Capturing the Gains, University of Manchester

Gereffi, G. (2019) 'Economic upgrading in global value chains' in S. Ponte, G. Gereffi and R. Raj-Reichert (eds) *Handbook on global value chains*. Cheltenham, UK: Edward Elgar Publishing

Krauss, J. (2017) 'What is cocoa sustainability? Mapping stakeholders' socio-economic, environmental, and commercial constellations of priorities' *Enterprise Development and Microfinance* 28(3): 228–250

Krauss, J. and Krishnan, A. (2016) *Global decisions and local realities: priorities and producers' upgrading opportunities in agricultural global production networks*. Discussion Paper No. 7. Geneva: United Nations Forum on Sustainability Standards

Krishnan, A. (2018) 'The origin and expansion of regional value chains: the case of Kenyan horticulture' *Global Networks* 18(2), 238–263

Krishnan, A. and Foster, C. (2018) 'A quantitative approach to innovation in agricultural value chains: evidence from Kenyan horticulture' *European Journal of Development Reseach* 30(1): 108–135

Krishnan, A., te Velde, D.W. and Were, A. (2018) *Kenya-UK trade and investment relations: taking stock and promoting exports to the UK*. SET Report. London: Overseas Development Institute

Lambin, E.F. and Thorlakson, T. (2018) 'Sustainability standards: interactions between private actors, civil society, and governments' *Annual Review of Environment and Resources* 43: 369–393

Mehling, M.A., van Asselt, H., Das, K., Droege, S. and Verkuijl, C. (2019) 'Designing border carbon adjustments for enhanced climate action' *American Journal of International Law* 113(3): 433–481

Mohai, P., Pellow, D. and Roberts, J.T. (2009) 'Environmental justice' *Annual Review of Environment and Resources* 34: 405–430

Nadvi, K. (2008) 'Global standards, global governance and the organization of global value chains' *Journal of Economic Geography* 8(3): 323–343

Ponte, S. (2019) 'Green capital accumulation: business and sustainability management in a world of global value chains' *New Political Economy* 25(1): 72–84

Roemer, J.E. (1998) *Theories of distributive justice*. Cambridge MA: Harvard University Press

Schwartz, P. (2018) 'The polluter-pays principle' in M. Faure (ed.) *Elgar encyclopedia of environmental law*. Cheltenham, UK: Edward Elgar Publishing Limited

UNFSS – United Nations Forum on Sustainability Standards (2018) *Voluntary sustainability standards, trade and sustainable development*. Third Flagship Report. Geneva: UNFSS

Part C Certification in practice

Chapter 4 Lessons from the first decade of environmental footprints

Rowland Hill

4.1 How I met environmental footprints

I started my working career as a Marks & Spencer (M&S) store manager. That was nearly 40 years ago, in the days before IT platforms, when everything was managed by counting up and comparing. Do jumpers or coats sell best? Red or blue first? All decided by numbers.

When I started the second part of my career, in sustainability, I couldn't believe how little evidence was available for decision-making. Fortunately, a relatively new science, known variously as environmental footprinting, life-cycle assessment or carbon accounting, was developing quickly and was, for the first time, offering up the opportunity to generate robust numbers.

I first encountered environmental footprints in the mid-1990s when, for the M&S board, I got hold of 12 floppy discs (remember them?) from Going Green, the UK government's environmental education programme. You stuck the floppy disc in your new-fangled size-of-a-small-house computer, answered questions about your lifestyle and an underwhelming graphic told you how many planets would be required if everyone lived like you. Converting consumption into a calculation of land area. That was it: I was hooked.

4.2 The first decade of environmental footprinting

Through my work at M&S we became one of the first companies anywhere in the world to perform environmental assessments with attributable emission numbers.

In an environmental profit-and-loss analysis with Forum for the Future in 2000, M&S undertook product life-cycle assessments with Environmental Resource Management in 2001 and 2002 and a full value-chain carbon footprint assessment in 2010. We made our operations carbon neutral and PAS 2060-compliant in 2012 with Natural Capital Partners, and made our products carbon neutral in 2013. We were the first retailer to: (a) hold all three Carbon Trust Standards in 2014; (b) adopt dual (market- and location based) reporting; (c) conduct footprints of online retailing options in 2015; (d) win the UN Momentum for Climate Change Solutions Award in 2017; and (e) adopt the Science Based Targets Initiative.

We really have been through the full set of T-shirts!

While the maths had already been around for two decades, it was in the years after 2009 that corporates and policy-makers had the first decade of environmental footprints.

Walmart was instrumental in funding The Sustainability Consortium from 2009.[2] Widely described at the time as the world's green labelling scheme (a description Walmart itself loathed), the Consortium considered nine environmental impacts plus human rights.

A series of similar initiatives sprang up around the world, with the government-funded Waste and Resources Action Programme (WRAP) managing the UK's main protagonist, the Product Sustainability Forum. The Forum focused on four environmental impacts and for a while also acted as a global coordinator (WRAP, n.d.).

In 2010, the French government even got close to passing legislation mandating product

2 www.tsc10.sustainabilityconsortium.org

carbon labels as part of the Grenelle II process. And in 2011, the European Commission embarked on what is now a very long series of trials on Product Environmental Footprints, which considers up to 16 environmental impacts, and Operational Environmental Footprints, which is a sum total of products and operations put together. The original idea was that the results might form the basis of EU environmental policy, but after eight years of trials, it is more likely to become attached to the Eco-Management and Audit Scheme (EMAS) environmental management standard (European Commission, n.d.).

However, around 2012, efforts stalled. And all this potential legislation and labelling vanished as quickly as it had arrived.

4.3 Why it all stalled

A question of accountability

Even with protocols, standards and audits, the numbers are never an exact science and rarely comparable. The standard originally developed by the World Business Council for Sustainable Development and the World Resources Institute (WRI) in the late 1990s is based on a pragmatic apportioning of accountability.

For instance, in the UK, accountable emissions have been reduced to around 300 million tonnes but, in truth, about the same again has been 'offshored', with someone else now accountable for much of the nation's consumption. In the corporate world, some fabulous examples have appeared in sustainability reports over the years, where both partners in shared facilities have claimed that the other is accountable.

Working out who is accountable is complicated. Take, for example, the carbon footprint of a shop. If I run a shop and pay the utility bills, I am accountable for emissions. If I run a shop and utilities are provided as a service, the service provider is accountable for some of the emissions. If I have a 50% share in the shop, I am 50% accountable; if I turn the shop into a franchise and get someone else to run it, I am not accountable at all. In total, there are roughly 10 different permutations of calculating the carbon footprint of a shop. They are all legitimate; they just reflect different decision-making accountabilities within the business models of running a shop.

So, imagine the complexity when it comes to multi-tier global supply chains.

Interpreting the results

For companies, seemingly small details make a huge difference. Supermarket chain Tesco had an ambitious plan to carbon footprint label all its products but found that the results were often confusing, with apparently similar products turning out to have widely different footprints because of what looked like a small detail. In one case, for instance, the source of heating for greenhouse tomatoes was decisive. Sometimes the figures also exposed irreconcilable trade-offs. Low carbon/high water impacts compared with high carbon/low water impacts – which is best?

Which to choose?

Consumers could not understand the labelling. What exactly did 10g CO_2 mean on the side of a bottle of a carbonated drink that just happened to contain CO_2 as an ingredient?

Too many variables

Lastly, policy-makers struggled to make sense of this multi-option, multi-variable decision-making matrix, opting instead for the simpler decisions offered by the circular economy, where judgements are based largely on assessments of physical waste. Far less considered, but understandable.

4.4 What the numbers told us

For all these challenges, we have learnt a lot. In the retail sector, for example, we now know several important things:

- Stores, offices, warehouses and delivery fleets account for less than 5% of our total footprint.
- £1 billion of UK retail turnover on clothing or food equals half a million tonnes of carbon dioxide equivalent (CO_2e). Look at your favourite retailers' turnover and you can work it out.
- On average, at least 50% of emissions will be outside the UK, much outside the EU.

- The largest emissions are concentrated in raw-material sourcing and processing (which for a retailer is often the second or third tier of the supply chain and sometimes commoditised).
- Including the direct emissions from land use can add 20% to emission numbers.
- Including indirect emissions from land use can add 80% to emission numbers.
- The numbers have power only if they are shared and understood.
- None of us can afford wastage, because it has already accounted for emissions right across the value chain: 1% waste equals 1% of the entire carbon footprint being lost.
- We have little direct influence on many of the key supply-chain impacts.
- It is becoming clearer that entire systems need to change – and, in many cases, this system is outside the UK.

4.5 Hopes for the second decade of environmental footprints

In what I would call the first decade of product footprinting just gone (2009–2019), we learned that we could calculate emissions and that they gave us valuable information to help us act, but that they rarely provided simple answers. And that there is some truth in the old Benjamin Disraeli/Mark Twain adage: lies, damned lies and statistics. Statistics are valid only if you take the trouble to understand what they mean.

Today, the whole concept of footprinting lives on in three main forms. First, as operational eco-standards, such as the International Organization for Standardization (ISO) and EMAS, where figures can be more accurate. Second, in the new vogue for science-based targets, which, for me, still seems to have many of the same weaknesses. And third, in the loftier concept of natural capital accounting – an attempt to wrap habitats and land use into an even bigger set of all-encompassing 'big data'.

The climate emergency means that, in the next decade, we have no option but to learn how to use this data much more effectively. I would like to see the 'more four':

1. more collaboration and sharing of data, which is not an end in itself
2. more sector partnerships with policy-makers to make fundamental changes to consumption
3. more policy balance and a zero-carbon circular economy
4. more acceptance of the need for transitional mitigation arrangements (carbon credits).

References

European Commission (n.d.) 'The development of the PEF and OEF methods'. European Commission webpage (https://ec.europa.eu/environment/eussd/smgp/dev_methods.htm)

WRAP – Waste and Resources Action Programme (n.d.) 'Product Sustainability Forum (PSF)'. WRAP webpage (www.wrap.org.uk/content/product-sustainability-forum-psf)

Chapter 5 The GHG Protocol

World Resources Institute[3]

The monitoring, reporting and certification of emissions by public and private entities has become something of an industry. There are many different standards and certificates available, driven by internal and external forces, including government regulation.

Much of this work is underpinned by the suite of standards developed by the Greenhouse Gas (GHG) Protocol.[4] Launched in 1998, the GHG Protocol is a partnership between the World Resources Institute (WRI), a global environmental non-governmental organisation (NGO), and the World Business Council for Sustainable Development (WBCSD), a Geneva-based coalition of 170 international companies. The GHG Protocol provides comprehensive global standardised frameworks to measure and manage GHG emissions from private- and public-sector operations, value chains and mitigation actions.

Core principles underpin all the standards. These are that accounting and reporting should be relevant, complete, consistent, transparent and accurate (Table 5.1).

5.1 Defining the scope: emissions across a value chain

There are many technicalities to do with definitions and procedures. A key issue, however, is that of boundaries. Do reporting entities, in particular companies, stop measuring, so to speak, at the factory gate? Or do they take responsibility also for reporting GHG emissions along the supply chain – and, indeed, for product disposal at the end of life?

Box 5.1 Principles of GHG accounting and reporting

Relevance – Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.

Completeness – Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.

Consistency – Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.

Transparency – Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.

Accuracy – Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.

Source: WBCSD/WRI (2004).

3 Derived, with assistance from WRI colleagues, from material on the GHG Protocol website: http://ghgprotocol.org. Section 5.3 on implications for developing countries added by the editors.

4 See http://ghgprotocol.org.

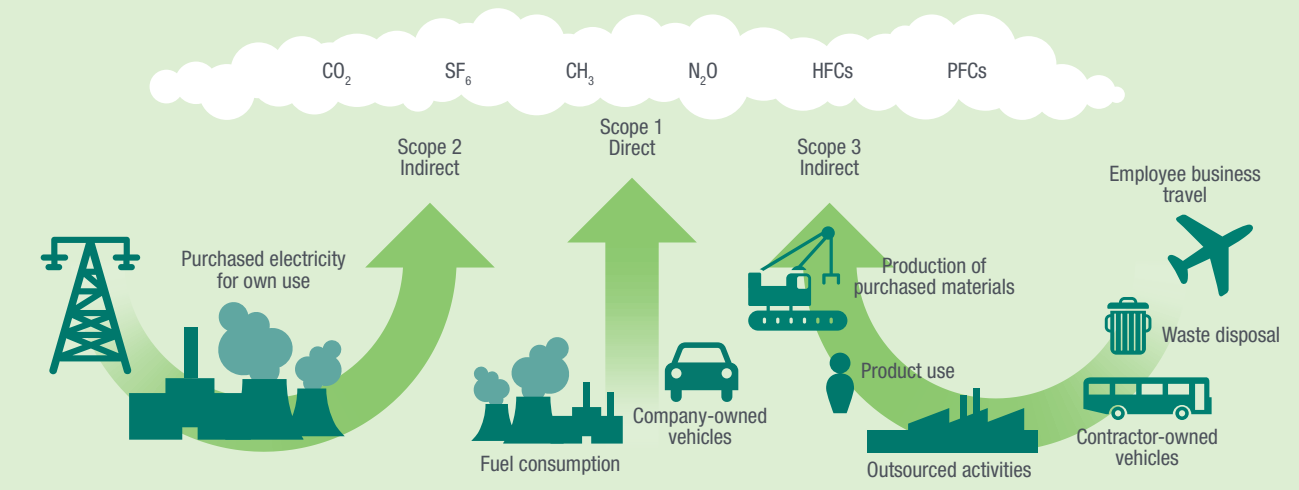
Formally, emissions are classified as falling into Scope 1, Scope 2 and Scope 3 (Figure 5.1):

- A Scope 1 inventory covers a reporting organisation's direct GHG emissions.
- A Scope 2 inventory covers a reporting organisation's emissions associated with the generation of electricity, heating/cooling or steam purchased for own consumption.
- A Scope 3 inventory covers a reporting organisation's indirect emissions other than those covered in Scope 2.

Typically, companies separately account for and report on Scope 1 and Scope 2 at a minimum.[5]

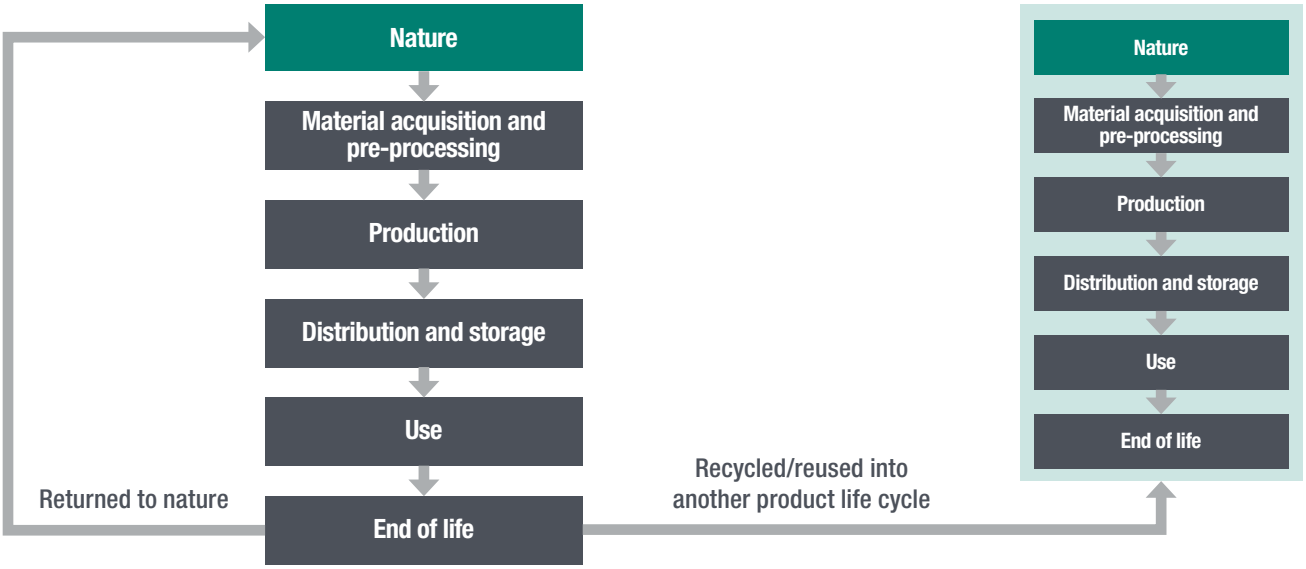
When it comes to products, there are again many technicalities, for example, related to whether a product is an intermediate or a final good. However, the core of the GHG protocol is to take a life-cycle approach, from material acquisition through to end-of-life disposal (Figure 5.2). The GHG Protocol's Product Standard is intended specifically to support performance tracking of a product's GHG inventory and emissions reductions over time. Additional prescriptiveness

Figure 5.1 Overview of scopes and emissions across a value chain



Source: Adapted from WBCSD/WRI (2004).

Figure 5.2 The five stages of a product life cycle



Source: WBCSD/WRI (2011b).

5 For more on Scope 3 and value-chain reporting and accounting, see WBCSD/WRI (2011a).

on the accounting methodology, such as allocation choices and data sources, is needed for product labelling, performance claims, consumer and business decision-making based on comparison of two or more products, and other types of product comparison based on GHG impacts. The Product Standard does not support claims regarding the overall environmental superiority or equivalence of one product versus a competing product.

5.2 Applying the GHG Protocol standards

The GHG Protocol has been used to inform the preparation of related standards, like those of the International Organization for Standardization,[6] the Carbon Disclosure Project[7] and the Science Based Targets initiative.[8] There are also many examples of successful application of the Protocol standards, especially by companies making use of the standards to set targets and measure progress.

For example, at company level,[9] Tata Steel, Asia's first and India's largest integrated private-sector steel company, sees reducing its GHG emissions through energy-efficiency as a key element of its primary business goal: the acceptability of its product in international markets. Each year, in pursuit of this goal, the company launches several energy efficiency projects and introduces less-GHG-intensive processes.

To succeed in these efforts and be eligible for emerging trading schemes, Tata Steel must have an accurate GHG inventory that includes all processes and activities, allows for meaningful benchmarking, measures improvements and promotes credible reporting. Tata Steel's managers now have access to online information on energy usage, material usage, waste and by-product generation and other material streams. Using this data and the GHG Protocol calculation tools, Tata Steel generates two key long-term, strategic performance indicators: specific energy consumption (gigacalories per tonne of crude steel) and GHG intensity (tonne of carbon dioxide equivalent (CO_2e) per tonne of crude steel). These indicators are key sustainability metrics in the steel sector worldwide and help to ensure market acceptability and competitiveness.

As an example of a product-level exercise,[10] consider the case of Swire Beverages. As one of the Coca-Cola anchor bottlers, Swire Beverages manufactures, sells and distributes Coca-Cola products. The company conducted life-cycle GHG studies for nine of the Coca-Cola-branded products produced in mainland China. The results showed that packaging and refrigeration by retailers were the processes that generated the most significant GHG emissions and risks, especially for small and medium-sized products.

Swire Beverages either leases or sells refrigerators at a discount to retailers. Following completion of the inventory and evaluation of reduction opportunities, the company installed energy-efficient refrigerator equipment and aggressively pursued hydrofluorocarbon (HFC) recovery and HFC-free technologies. The new equipment uses 35% to 40% less electricity while reducing the usage of HFC134a, a refrigerant with high global warming potential. Swire also calculated that, if all retailers installed the new refrigerators, it would save 5% to 16% of the life-cycle GHG emissions of drinking products, depending on their size.

Swire Beverages and Coca-Cola also identified packaging reduction as a key climate mitigation strategy and rolled out a new packaging design for a bottled water product in China. The new plastic bottle design reduces packaging material weight by 34% and is estimated to reduce GHG emissions by 11% over the product life cycle. The new design also helps Swire Beverages save on the procurement cost of packaging materials.

Product-level certification is difficult, however. It tends to be time-consuming and expensive

6 For example, ISO 14044 on life-cycle assessment (ISO, 2006).

7 See www.cdp.net/en.

8 See https://sciencebasedtargets.org.

9 For the GHG Protocol Corporate Standards, see WBCSD/WRI (2015).

10 For the GHG Product Standard, see WBCSD/WRI (2011b).

to prepare, does not easily enable comparison between products and is not internationally harmonised. Furthermore, many product analyses have little stakeholder engagement and are not publicly available. Thus, the future of carbon footprint labelling for products is uncertain.

5.3 Implications for developing countries

Nevertheless, the emphasis on measuring, reporting and certifying GHG emissions in developed countries has implications for developing-country suppliers wishing to participate in those markets.

First, if action on GHGs results in lower costs, then developing-country suppliers will be at a competitive disadvantage if they fail to set targets and reduce emissions.

Second, developing-country suppliers may face demands for higher standards of reporting with respect to final or intermediate goods shipped to developed countries, particularly as attention shifts increasingly to Scope 3 measurement and monitoring.

Third, developing countries may need to be able to report accurately on emissions in order to claim exemption from border carbon adjustments imposed by developed countries, such as those the EU is currently preparing.

Fourth, to the extent that carbon footprint labelling continues to evolve, developing-country exporters may face consumer pressure to improve measurement and reporting.

Finally, of course, GHG measurement, reporting and certification are also domestic issues in developing countries. The pressures to match international standards are likely to increase as countries submit revised nationally determined contributions as part of the Paris Agreement. New pledges with higher ambition have been strongly encouraged for the Glasgow Conference of the Parties,originally scheduled for 2020, and now due to take place in 2021, and will be required in future on five-year cycles.

References

ISO – International Organization for Standardization (2006) ISO 14044:2006 – life-cycle assessment: requirements and guidelines. Geneva, Switzerland: ISO

WBCSD and WRI – World Business Council for Sustainable Development and World Resources Institute (2004) *The Greenhouse Gas Protocol: a corporate accounting and reporting standard – revised edition*. Geneva, Switzerland: WBCSD; Washington DC: WRI (https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf)

WBCSD and WRI (2011a) *GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard*. Geneva, Switzerland: WBCSD; Washington DC: WRI (https://ghgprotocol.org/standards/scope-3-standard)

WBCSD and WRI (2011b) *GHG Protocol Product Life Cycle Accounting and Reporting Standard*. Geneva, Switzerland: WBCSD; Washington DC: WRI (https://ghgprotocol.org/product-standard)

WBCSD and WRI (2015) *GHG Protocol Corporate Accounting and Reporting Standard – revised edition*. Geneva, Switzerland: WBCSD; Washington DC: WRI (https://ghgprotocol.org/corporate-standard)

Chapter 6 The power of carbon-neutral certifications to reduce embodied emissions in international trade

Jonathan Shopley

6.1 Product certification solutions for embedded emissions in the international trade of goods and services

World trade transcends national boundaries and has a dominant influence on greenhouse gas (GHG) emission patterns across the global economy. This has encouraged some national governments and regional blocs, such as the European Union, to explore whether border carbon tax adjustments could be an effective approach to accounting for the emissions embedded in internationally traded products and services.

Climate-progressive companies, for their part, are seeking readily available, credible and easily understood information about embedded GHG emissions associated with products and services to help consumers take meaningful action on their growing preference for climate-compatible consumption. This has led an increasing number of corporations to measure, reduce and offset unabated emissions associated with the life cycle of their products and services to make claims of carbon neutrality or net-zero.

Carbon-neutral certifications communicate their voluntary climate action to consumers, enabling them to make informed decisions in line with their purchasing preferences. The CarbonNeutral Protocol[11] is an open-source guide for businesses that commit to carbon neutrality. It provides businesses with the option to carry a CarbonNeutral® logo across three classes of certification: entities, products and services, and activities.

This chapter explains how the Protocol's principles and five-step approach support CarbonNeutral® product and service certifications. It presents a case study on how voluntary certification works in practice and explores how carbon neutrality could become a mainstream mechanism to account for climate impacts across world trade.

6.2 The making of a CarbonNeutral® certification

Three broad principles underpin the CarbonNeutral® Protocol, clarifying its purpose, approach and value to businesses taking action ahead of and beyond compliance to achieve carbon neutrality immediately and in line with a net-zero global economy by 2050.

Promoting immediate action to support deeper and widespread transformation

Carbon neutrality is a voluntary action taken immediately by an entity to fully compensate for the global-warming impact of its GHG emissions. When entities act ahead of and beyond regulation, it accelerates transformation to a sustainable and resilient net-zero economy. Carbon-neutral entities reduce emissions under their direct control and enable mitigation activities elsewhere that require finance to deliver mitigation in line with Intergovernmental Panel on Climate Change (IPCC) guidance and the

11 The CarbonNeutral Protocol (Natural Capital Partners, 2020) has been developed and is managed by Natural Capital Partners (www.naturalcapitalpartners.com).

United Nations Framework Convention on Climate Change goals and in ways that deliver against the United Nations' (UN) Sustainable Development Goals (SDGs). Carbon neutrality under the CarbonNeutral® Protocol is achieved when the net GHG emissions associated with an entity, product or activity are zero for a defined duration.

Built on conservative estimation, best practice, transparency and continuous improvement. Public claims of carbon neutrality account for GHG emissions and the compensating emission reductions in accordance with best-in class, third-party standards. This ensures that claims have integrity and the same meaning throughout the global economy. Entities making public claims of carbon neutrality commit to conservative approaches and to disclosing the basis (methodologies, standards, protocols) underpinning their claims.

Committed to pragmatism and impact
Achieving carbon neutrality is an actionable, understandable and pragmatic response that any entity can adopt to meet its climate objectives and play a meaningful role in driving carbon-emission reductions across the global economy. A CarbonNeutral® logo enables entities to communicate to key stakeholders their commitment to carbon neutrality, so they may be recognised and rewarded for their progressive action.

The CarbonNeutral® Protocol sets out a five-step process to carbon-neutral certification:

1. **Define the subject** that will be certified CarbonNeutral®. This can be an entity, product or service, or activity and may be distinct from the legal entity seeking the certification. The Protocol sets out the Scope 1, 2 and 3 emission sources required or recommended to be included in a subject's GHG assessment and CarbonNeutral® certification.
2. **Measure the subject's GHG emissions** to provide a complete and accurate GHG inventory over a relevant timescale. The Protocol provides guidance as to which independent third-party measurement standards can be used (including the Greenhouse Gas Management Corporate and Product Protocols, ISO 14064 and the British Standard Institute's PAS 2050).
3. **Confirm a target** to achieve carbon neutrality for the certification period, delivered through internal abatement of GHG emissions and the retirement of environmental instruments (carbon credits and renewable energy certificates) to compensate for unabated emissions. The balance between abatement (that is, measures to reduce emissions internally) and offsetting varies across different businesses over time depending on their operating and business models. It is a core principle of carbon neutrality in support of a net-zero global economy that abatement must increase over time. Approaches to setting abatement targets (such as those defined by the Science Based Targets initiative)[12] are recommended to ensure gross or actual emissions decrease over time, in line with climate science.
4. **Achieve the target** through a cost-effective combination of internal emission reductions and the use of external environmental instruments. Unabated Scope 1 and Scope 3 emissions are netted out by retiring carbon credits from emission-reduction projects established under credible third-party standards, including the Gold Standard for the Global Goals, Verra's Verified Carbon Standard or the American Carbon Registry. Scope 2 emissions may be netted out by retiring carbon credits or may be zero-rated through the retirement of energy attribute certificates (including Renewable Energy Certificates and Guarantees of Origin).
5. **Communicate carbon-neutral status** and advocate for wider transformation to a net-zero global economy. The CarbonNeutral®

12 https://sciencebasedtargets.org.

certification logo is the primary mechanism by which clients communicate their carbon-neutral status and advocate for a wider transformation to a net-zero global economy[13].

6.3 A case study: Bettys & Taylors takes its coffee and tea brands CarbonNeutral® and supports resilient livelihoods in Africa

Bettys & Taylors, which markets some of the UK's top-selling tea (Yorkshire Tea) and coffee brands (Taylors of Harrogate), launched its carbon-neutral products in 2019. The way it did so provides a model example of how carbon-neutral products can:

- help build supply-chain resilience by providing sustainable sources of finance to supply-chain initiatives that deliver against climate mitigation, adaptation and selected SDG priorities
- put a price on carbon (i.e. the cost of the carbon credits), which helps the company find the right balance between internal abatement and compensation: abatement opportunities that can reduce emissions at a lower cost than carbon credits will tend to be prioritised
- use a simple and easy-to-understand claim of carbon neutrality to communicate with customers in ways that deliver differentiation and increase preference and loyalty.

The Bettys & Taylors carbon-neutral products draw on the CarbonNeutral® Protocol's certification to communicate its actions to consumers. The company purchases its carbon credits from emission-reduction projects within its supply chain to compensate for its unabated emissions across Scopes 1 to 3. The projects generate emission reductions in the form of verified carbon credits, as well as a range of co-benefits that build resilience within and across supply-chain communities.

For example, in Kenya, the company's carbon finance incentivises smallholder tea farmers to plant trees on their land, which improves soil health, creates new income from fruits and nuts, provides shade for tea plants and introduces conservation farming techniques to increase productivity. Betty & Taylors' reforestation programme is led by tea farmers so that the solutions work for their specific needs. In Malawi, where forest cover has reduced by 32% in less than 40 years, Taylors' carbon finance for efficient cookstove projects enables smallholder tea farmers to reduce the rate of deforestation for fuel use, save time and money collecting or purchasing fuel and reduce indoor air pollution, which affects family health. Similarly, in the coffee-growing region of Mount Elgon in **Uganda**, many households still rely on open fires in the home for cooking, leading to dangerous levels of indoor air pollution. Taylors is funding a project to introduce efficient cookstoves to communities to reduce the risk of illness and save the money previously spent on fuel, and to reduce deforestation from the collection of firewood.

In aggregate, the purchase and retirement of third-party verified carbon credits from these projects for the CarbonNeutral® tea and coffee brands have resulted in the planting of 1.5 million trees and the distribution of 10,000 cookstoves, with the programme already engaging 70,000 people in smallholder communities.

6.4 Future of carbon-neutral certifications in global trade

As countries contemplate border carbon tax adjustments to account for the embedded carbon in imported goods and services, carbon-neutral products and services have the potential to generate a move from voluntary action by progressive corporations to mainstream responses to national and regional compliance

13 Carbon-neutral companies that currently use CarbonNeutral® certification to communicate their carbon neutrality to consumers and key stakeholders include Microsoft (for 825,000 Xbox consoles), Logitech (for all its gaming products), Sky (company), Neal's Yard Remedies (company) and Bulldog (product).

requirements. Countries where the option of offsetting has been incorporated into national compliance regimes include Colombia and South Africa, which have enacted domestic carbon tax legislation that allows entities to reduce their exposure to the carbon tax when emissions are offset with permissible carbon credits.

With the International Organization for Standardization considering an ISO standard for carbon neutrality, there is real potential for the pioneering work by companies like Bettys & Taylors to evolve into a compliance-grade approach to certification that enables carbon-neutral certified products to seek exemption from border carbon taxes. This will enable a pragmatic response to the control and reduction of embedded carbon in the international trade of goods and services.

References

Natural Capital Partners (2020) *The CarbonNeutral Protocol: the global standard for carbon neutral programmes*. London and New York: Natural Capital Partners (https://carbonneutral.com/pdfs/The_CarbonNeutral_Protocol_Jan_2020.pdf)

Taylors of Harrogate (2019) 'Carbon neutral tea and coffee'. Taylors of Harrogate, 26 April (www.taylorsofharrogate.co.uk/carbon-neutral-tea-and-coffee)

Taylors of Harrogate (2020) *Taylors Sustainability Report 2019*. Harrogate, UK: Taylors of Harrogate (https://report.taylorsimpact.com)

Chapter 7 Avieco's Smart Sustainability certification

Emily Wain and Daniel Murray

7.1 Working with clients to tackle their sustainability challenges

Sustainability means something different for every business. For some, it is a matter of compliance; for others, it means seeking a competitive advantage within their market. At Avieco, we work with clients of all shapes and sizes across a range of industries to provide bespoke solutions to their sustainability challenges. These solutions include carbon reporting, sustainability strategies, verification and assurance, energy and waste management, renewable energy, a responsible supply chain and packaging. Many of our clients are household names, including Google, Royal Mail Group, ASOS and Amnesty International. However, we have also worked with hundreds of small and medium-sized enterprises (SMEs).

Regulatory mechanisms, such as Streamlined Energy and Carbon Reporting (SECR), and increasing expectations from stakeholders have driven large business uptake on sustainability reporting, leading to the exploration of wider sustainability issues. Action on sustainability is, however, still largely voluntary for SMEs. And internal expertise is usually limited, with very restricted resources available to progress the agenda. Avieco has, therefore, launched a certification scheme aimed specifically at SMEs.

7.2 Supporting SMEs to demonstrate action in sustainability

Avieco has supported over 1,500 SMEs with carbon certification for more than 10 years, providing a simple, affordable and efficient way to quantify, understand and reduce their environmental impacts, manage energy costs and communicate positive action and achievements to their stakeholders. Avieco aims to make sustainability action and certification more accessible to smaller businesses at a lower cost than international standards.

Approximately half of the SMEs that we have worked with approached us directly. However, we identified early on that, even with costs kept to a minimum, for some SMEs expense was still going to be a sticking point. We, therefore, explored funding, which has been provided by trade membership and public bodies. Trade membership bodies often want to make an environmental offering available to their members, which allows them to be competitive and acts as added value for the membership body. Public funding has come through programmes financed by the European Regional Development Fund and local authorities, which typically provide 12 hours of free support to help SMEs understand and reduce their environmental impact and costs.

7.3 Allowing SMEs to go beyond carbon with sustainability

Given the drive towards business sustainability, and the time and resource constraints facing SMEs with regard to acting on each sustainability topic separately, Avieco has broadened the scope of certification to include a wider range of key sustainability topics. These are: carbon footprinting, waste management, social responsibility, sustainable procurement and sustainability of products. Carbon reduction is still of huge importance, but overlooking other sustainability topics represents a missed opportunity. For example, social responsibility does not feature as part of a carbon footprint, but is significant for a business working in or with industries at high risk of modern slavery. SMEs can now achieve a wider sustainability certification from Avieco: Smart Sustainability certification.

7.4 Smart Sustainability supports SMEs on their sustainability journey

Most important to SMEs is being able to demonstrate to their stakeholders, particularly customers, that they are taking credible action to become sustainable. Smart Sustainability allows SMEs to follow a four-step process, providing a framework of sustainability action across the key topics:

1. baseline measurement
2. set intent
3. take action
4. measure success.

This process supports businesses in following a guided sustainability journey, tailored to SMEs, to demonstrate improvement over time. For any business, becoming sustainable does not happen overnight; Smart Sustainability encourages SMEs to set out what they plan to achieve, take tangible action, measure progress against targets and constantly improve.

There are three levels to the Smart Sustainability certification: bronze, silver and gold. Each requires increased action and demonstrable success against targets. This incentivises SMEs to increase action in sustainability across the multiple topics.

7.5 Why SMEs pursue carbon and sustainability certification

During Avieco's work with SMEs, we have found the following to be the main drivers of pursuing carbon or sustainability certification:

- **Meeting tender requirements.** SMEs have reported winning increased work through tenders by holding a carbon certification.
- **Standing up to competitors.** In a competitive market, SMEs are increasingly expected to demonstrate their business as responsible to its customers.
- **Driving operational efficiency.** The certification process identifies significant areas for improvement, which often drives efficiency, resource and cost savings.
- **Legitimising existing efforts.** Many SMEs are already taking a certain level of sustainable action but have no statement of achievement to demonstrate this to stakeholders.
- **Process provides direction on action.** SMEs are often time- and resource-constrained. Certification provides a framework for tangible action and measurement.

7.6 Environmental certification for SMEs comes with challenges

Challenge 1: Lack of resources

Both Avieco and our clients have come across multiple challenges. One of the biggest challenges is a lack of resources, in terms of capital input, time, capacity and, therefore, commitment. Most SMEs have a limited number of hours available to focus on sustainability issues and certification. For many, the priority has to be developing and winning business, meaning that capacity for a certification scheme is restricted. Most SMEs also have limited capital available for a certification, with their primary focus on keeping the business up and running.

Over the past 10 years of delivering certification to SMEs, Avieco has evolved the certification with solutions to these challenges in mind. Keeping the cost of certification down, by providing detailed guidance documents and frameworks and through structured one-on-one advice sessions, ensures its accessibility to the majority of SMEs. We have also addressed the challenge of capacity and commitment by making stakeholder engagement a mandatory component of the certification requirements. For example, certification requires senior management sign-off on policies and action plans, which ensures top-level management commitment from each participating business.

A lack of resources is likely to be particularly prevalent for SMEs in developing countries that are setting out to achieve an environmental certification. This will be the case whether the certification is voluntary or mandatory. However, if mandatory, SMEs in developing countries could be threatened by the requirements of investment in a certification when they are trying to make ends meet and may 'squeeze' them out of an already competitive market within their supplier value chain. This is referred to as the 'green squeeze'.

Challenge 2: Ensuring certification rewards and drives action

Both SMEs obtaining the certification and their customers are aware of the risk of greenwashing. With Smart Sustainability, Avieco aims to incentivise transparent disclosure of sustainability action through disclosure agreements, ensuring the business provides accurate information on its sustainability agenda.

In previous years, it has been enough for businesses to report on their sustainability metrics and current situation. This is no longer the case: tangible action demonstrated through continuous improvement over time is now widely expected. Smart Sustainability certification incentivises action with rewards at three levels of achievement, as well as rewarding improvement over time through metric measurement against a target or baseline.

Transparent disclosure could be even more challenging to incentivise in developing countries, where corporate transparency is typically less well established. One way to address this, and to improve the credibility of any environmental certification scheme in a developing country, is through improved audits, assurance and verification. These concepts are firmly established within the financial accounting community. However, implementing this would require the involvement of regulatory bodies and, therefore, capital input.

7.7 Support for an environmental scheme in developing countries would need to be carefully considered

Environmental certifications come with benefits and challenges, to both the certifying businesses and the certification providers. SMEs participate in voluntary environmental certifications for many reasons, all of which are as applicable in developing countries as they are in the UK. There are, however, many challenges – primarily lack of resources, the risk of greenwashing and the challenge of ensuring tangible action – that are likely to be more prevalent in developing countries.

Most environmental certifications are voluntary, and this is also the case for the Avieco Smart Sustainability certification. However, any mandatory certification in developing countries, or for cross-border trade, would need to provide support to businesses to help them overcome these challenges. Any scheme needs to be consistent so as to provide clear expectations, to level the playing field between businesses and to reduce the likelihood of greenwashing. Funding would also likely be required to enable significant business uptake in the certification scheme.

Avieco has worked with membership bodies, councils and other funding bodies to support SME environmental implementation and has found that on-the-ground, in-person support is most effective. Local delivery partners providing support and advice to businesses can ensure that any potential certification scheme is widespread and correctly implemented. One additional benefit of this approach is skills development within local communities. This has been recognised within the world of carbon offsetting, for example, where voluntary offsets are now typically aligned with Sustainable Development Goal co-benefits. For example, tree planting projects in Kenya have been designed such that local women farmers contributing to the project are given access to leadership courses, with the project subsequently being aligned with SDG 5 on Gender Equality.

Environmental certification has multiple benefits for businesses, so a more widespread approach for developing countries should be considered. However, known challenges are likely to be exacerbated in developing countries and, therefore, support for any potential environmental certification scheme should be carefully considered, implemented and monitored.

Chapter 8 The carbon labelling journey

Hugh Jones

The recent launch of the Quorn 'Take a step in the right direction' campaign promises to herald a significant shift in consumer carbon awareness (Quorn, n.d.). The campaign features TV advertising centred around the food's carbon and climate impact; certified 'farm-to-shop' carbon footprint information for 30 of the best-selling products available on the company's website; and carbon footprint labels citing specific figures for product life-cycle carbon dioxide equivalent (CO_2e) appearing on pack in 2020.

It comes at a time of mounting consumer and corporate interest in product carbon footprinting. For example, two-thirds of consumers questioned in a April 2019 YouGov survey supported the idea of a recognisable carbon label to demonstrate that products have been made with a commitment to measuring and reducing their carbon footprint (Carbon Trust, 2019). A similar majority (66%) said they would feel more positive about suppliers that could demonstrate they were making efforts to reduce the carbon footprint of their products (ibid.). The survey questioned over 9,000 consumers in seven European and North American countries; the level of support for carbon footprint labelling was higher than in comparable surveys across the previous decade.

8.1 A shift in interest

In 2007, the Carbon Trust launched the world's first carbon footprint label and, around this time, companies such as Tesco and PepsiCo carried labels on packs for prominent product lines.[14] But interest in product carbon footprint labelling dipped following its initial success between 2008 and 2011.

A number of factors conspired to damp interest in on-pack footprint labelling:

- Consumers were not deemed sufficiently interested in a product's carbon footprint.
- Carbon footprinting itself, despite the emergence of agreed technical standards, was and is complex. It requires boundaries and assumptions to be expertly set, otherwise the footprints for two similar products may not be easily comparable; if pragmatic boundaries are not agreed, the exercise of carbon footprinting and labelling can be complex and expensive.
- For many retail products, there is limited pack space on which to carry a carbon label, especially given the prominence of other information, such as nutrition labels on food packaging.
- Without a critical mass of labelled products, within a specific retail category, for example, consumers have nothing against which to compare a product footprint.

Carbon was also increasingly perceived as a somewhat narrow indicator of a brand or product's sustainability, and other environmental factors – such as water stewardship and biodiversity – came under consideration. This list of other factors has continued to grow to include a company's work practices and use of child labour, for example; the nutritional value of food products, especially the sugar content and how heavily processed it is; and issues around plastic pollution and packaging waste in general – a growing public concern in the UK since the broadcasting of *Blue Planet II* by the BBC in 2017. Carbon emissions are just one

14 For more information on the Carbon Trust, wee www.carbontrust.com.

aspect of sustainability and there can be complex relationships and trade-offs between them, given the carbon impacts of alternative materials and resource reuse.

However, even when the initial surge in labelling demand started to wane, interest persisted in carbon footprinting as a business information and decision-making tool and this interest remains high. Many organisations have realised that they can use carbon footprinting as a platform to help solve cost, risk and strategy questions for their businesses, for example, in scenario-modelling for their supply chains in a constrained carbon future.

This has been amplified as supply chains have come under increasing scrutiny and as the ambition to reduce environmental impacts across the full value chain has grown. In some industries, reducing in-use or end-of-life impact has become an emerging focus in product design. Business-to-business communication of carbon footprinting data has been steadily rising.

8.2 Ongoing label interest

Some companies have continued to carry a label because, with so few other products doing so, communicating a footprint reduction (or even simply the act of footprinting) is itself positive evidence of environmental responsibility. Plus, growing public demand for transparency, sometimes driven by specific events (e.g. the horsemeat scandal in the UK food industry), has led to heightened consumer interest in product information, including carbon footprints.

Progressive businesses, looking for a distinctive narrative, have also shown interest in specialised claims and labels. Some businesses have reduced selected product footprints and offset the balance, allowing them to carry a carbon-neutral label (e.g. Danone; see Carbon Trust, n.d.a); others have sought to compare selected products with an 'industry average' to demonstrate they have a 'lower carbon' alternative (e.g. Sichuan Qianwei Fengsheng Paper Industry; see Carbon Trust, n.d.b). The latter is perhaps the closest carbon labelling has got to the example of energy performance labelling of white goods in terms of seeking to inform consumer choice.

The three concepts, of 'measuring' a product's carbon footprint, 'reducing' a product's own carbon footprint over time and being a product with a 'lower' carbon footprint than market alternatives, can each be used appropriately for labelling depending on the sector.

8.3 Policy and corporate alignment

Since the Paris Agreement in 2015 and the formation of the Science Based Targets initiative (SBTI) in 2015, carbon's position as a key concern for all leading businesses has been growing, and it is now near the top of the business agenda. More than 800 companies have committed to setting stretching and consequential carbon targets through the SBTI, with impacts on thousands more organisations through their supply chains.

Now we are seeing policy and corporate agendas for carbon targets converge again. National targets for net-zero emissions have been declared in a number of jurisdictions, including the UK, and companies are setting equivalent targets in the corporate context. Although this is an area where there is yet to be a formally agreed standard, it seems likely that a corporate net-zero-by-2050 target will involve a stretching 1.5°C science-based target trajectory across a company's entire value chain, coupled with certified greenhouse gas removals. These removals will require significant technology developments in the intervening years, such as direct air capture with carbon storage or long-term soil sequestration with biochar. This may also shine a light on different qualities of carbon offsets, as more companies look to define and neutralise their current, future and even historical carbon impacts.

Meanwhile, the Task Force on Climate-related Financial Disclosures is reflecting the call for an increasing level of climate risk analysis at board level. This is raising the importance of carbon in terms of both corporate strategy and investment finance allocation.

The increased focus on climate change has also helped bring carbon back as the main business indicator in the field of sustainability: there are 16 Sustainable Development Goals (SDGs) beyond climate action – but if climate change is not adequately addressed, many of the other SDGs will be so much harder to achieve.

8.4 Trends in labelling

As a result of these shifts in the policy and corporate landscapes, the Carbon Trust has seen in the past six months a material upsurge in corporate interest in carbon footprint labelling for both products and packaging. Labels often reflect emission reductions from innovation, such as through circularity or bio-content in manufacturing (e.g. Tetra Pak).

We are finding that business-to-business and business-to-consumer communications require different approaches. Generally, business-to-business labels need to carry specific numbers whereas a simpler message is often required for consumers, showing a direction of travel (reducing CO_2) or a positioning (CO_2 measured), for example. In some cases, fuller supporting detail can be made available on a website, potentially through scanning a QR code or via a weblink on packaging.

From a policy perspective, carbon labelling is primarily voluntary, with the potential for broader sector-based adoption, such as Environmental Product Declarations in the construction industry. Nevertheless, with the UK's policy advisor, the Committee on Climate Change, pointing to the climate benefits of diets that move away from carbon-intensive animal products, there is a potential policy link to carbon footprint labelling for at least certain food types.

Other trends we expect to see continue are as follows:

- Carbon labelling, as it currently exists, remains a highly technical exercise, which is likely to remain the prerogative of current and aspiring sustainability leaders.
- Some companies continue to explore multi-criteria labelling, factoring in other environmental and social indicators.
- Technologies are continually being explored, ranging from image recognition (to give the consumer the ability to access 'live footprint' information for a product via a smartphone) to artificial intelligence (for rapid category or product real-time footprint estimation).

The 2019 YouGov survey showed that the proportion of respondents who do not consider the carbon footprint of a product when selecting a purchase had reduced to just over half; 21% took carbon into account. It remains to be seen how quickly this growing proportion can become the majority.

8.5 International labelling schemes

Over the past decade, public bodies in a number of countries have set up and promoted carbon labelling schemes.

Thailand's government-backed carbon-reduction labelling scheme had one of the largest uptakes, including among food products, whereas schemes in other countries, ranging from Japan to Switzerland to Brazil, have experienced varying degrees of success. Our view is that scheme uptake levels have been strongly influenced by the degree of external funding available. The European Union has funded pilots around its Product Environmental Footprint concept, and developments are awaited with interest.

More broadly, the key underlying technical standards in common use (PAS 2050 and ISO 14067) have relatively few differences – mainly in their approaches to disclosure rather than in their approaches to calculation. This means that, for companies that really want to progress in this area, the technical landscape is something that can be navigated. With continuous improvement to enhance their value, footprint certification and labelling have a place in an increasing number of company plans.

References

Carbon Trust (n.d.a) 'Danone – carbon neutral certification and labelling for Evian'. Carbon Trust webpage (www.carbontrust.com/our-projects/danone-carbon-neutral-certification-and-labelling-for-evian)

Carbon Trust (n.d.b) 'Lower Carbon Label'. Carbon Trust webpage (www.carbontrust.com/what-we-do/assurance-and-certification/product-footprint-certification/lower-carbon-label)

Carbon Trust (2019) 'Research reveals consumer demand for climate change labelling'. Carbon Trust Press Release, 3 April (www.carbontrust.com/news-and-events/news/research-reveals-consumer-demand-for-climate-change-labelling)

Quorn (n.d.) 'Carbon emissions: food for thought'. Quorn webpage (www.quorn.co.uk/carbon-footprint)

Chapter 9 Achieving robust, science-based measurement, reporting and certification of carbon emissions through artificial intelligence and machine learning

Martin Smith

The next 10 years will determine whether or not we, as global citizens, make a successful transition to sustainable growth and avoid the worst effects of climate change. However, current indications are that we will fall short of meeting this challenge and of keeping global warming below 1.5°C to 2°C, which is considered the threshold of catastrophe. In spite of all the global climate advocacy and the legislation and progress on green energy, we have produced more emissions in the past 20 years than we did in the previous 20. Clearly, the scale and urgency of the challenge we now face requires an acceleration of action and the pursuit of new tools and avenues to address the crisis.

Of all the alternatives, the consumer products and services sector offers the most potential. It is a massive segment, responsible for more than 60% of CO_2 emissions worldwide. Moreover, growth in consumption shows little sign of abating. It is predicted that by 2021 China alone will add $1.8 trillion in new consumption – roughly the size of Germany's consumer economy (Walters, 2017). Clearly, concerted international efforts to curb emissions from the goods we all buy would make a sizable difference to global emissions.

While much has been achieved through the measurement, reporting and certification of products and services, as yet it hasn't been possible to calculate or estimate 'full life-cycle emissions' at product level. This is owing primarily to the size of the global sector and the complexity of manufacturing processes and their supply chains. However, recent advances in artificial intelligence (AI) and machine learning, coupled with the rise of big data, have given us an opportunity to tackle carbon pollution from this sector on a global scale.

9.1 The AI solution to the carbon footprint of everything

For the past three years, a collaboration of scientists, researchers and leaders in the field of product life-cycle assessment have been working to overcome one of the most important barriers to curbing global carbon emissions, namely: 'Is it possible to calculate the carbon emissions of all consumer goods?' This has culminated in Imperial College London, the project's expert academic partner, successfully devising an unprecedented method that uses big data and machine learning to calculate instantly the carbon emissions of all consumer goods, taking into account their full life cycle, and to rank comparable goods accordingly. A growing consortium is coming together to develop this work into a functioning mechanic. While this task will not be easy, the initiative's goal is simple: 'To give it to the world to use for free'.

Currently, calculating footprints is an essentially manual, data-heavy and prohibitively costly process. However, as computer science has evolved to give us software that learns from experience, adapts to new inputs and completes tasks – at extraordinary speed – that resemble human intelligence, it is now possible to automate the task of carbon footprinting.

Imperial College London and the Grantham Institute have concluded that such a system could, for the first time:

- have the potential to calculate or estimate more accurately than any extant system the carbon footprint of any consumer product, and to instantly compare and rank goods within product ranges
- reduce the cost of footprinting, across all sectors, to a fraction of today's levels
- go far beyond any existing automated mechanism for calculating carbon footprints by calculating or estimating the whole life cycle of consumer products
- employ a high level of automation
- have the capacity to incorporate other resource-efficiency priorities within the algorithms in the future (water usage, toxins, etc.)
- be able to compare and rank products within price ranges, allowing consumers to buy the least 'carbon-intensive' goods within their budget
- calculate or estimate emissions at any point in a given product's supply chain
- estimate the 'uncertainty of results' that current manual approaches are not capable of revealing.

9.2 A basic overview of the proposed mechanism

The system relies on building two distinct databases. The first will combine multiple existing international databases that hold thousands of records pertaining to the carbon emissions (carbon footprint) of materials, processes and manufacturing. The second, which will be unique to the project, will identify and store sets of product features, which can be used to identify the most important features in terms of carbon impact. The system can then automatically calculate a carbon footprint by incorporating multiple data from the first database over the chosen features of the product described in the second.

However, Imperial's design goes much further. This is because much of the information needed to describe a product will be unavailable (e.g. a manufacturer may not have released all the specifications of a product, or the composite parts have been sourced from multiple countries). This is when the machine-learning algorithms are deployed. These will fill in the missing values so that the system can ensure the footprints of different products can be calculated in the most similar way possible, thus enabling comparability. The result is a system that will be able to instantly calculate and compare footprints of all consumer products with a degree of accuracy unparalleled by any other means. Moreover, as the system evolves and incorporates more data over time, its accuracy will improve.

9.3 Quick and ambitious carbon reductions

The importance of the successful development of an AI system capable of instantly calculating and ranking the emissions of goods cannot be understated. This will give governments, businesses and citizens an unprecedentedly accurate mechanism for tackling global greenhouse gas emissions. Incorporated within applications such as e-commerce search engines or procurement platforms, it could be used by anyone whose goal is sustainable purchasing – consumers, procurement professionals and manufacturers. Currently, 1.8 billion people shop online (Clement, 2019). Public procurement spends $9.5 trillion on goods and services every year (World Bank, 2018). In other words, the impact of their combined purchasing power to reduce carbon emissions is massive.

The mechanism can provide solutions for multiple stakeholders.

Governance

As leaders raise their ambition on tackling climate change, successful implementation of this project can give them a new and significant addition to their portfolio of mitigation resources. This will enable governments to:

- drive new, sustainable economic growth
- support low-carbon development for developing countries
- take account of the emissions embodied in imports and, thus, of total consumption emissions
- impose new tariffs, such as border carbon adjustment schemes

- support policy initiatives, such as 'traffic-light' labelling systems for CO_2 and other pollutants on consumer goods
- make significant emissions cuts through more informed procurement choices; in 2015, the UK's public procurement market alone was valued at over £260 billion – 13.6% of gross domestic product (Institute for Government, 2019), yet making effective emissions cuts from this sector has, until now, been unobtainable
- provide an answer to the challenge frequently put to climate-change leaders by concerned citizens and businesses: 'Tell us what we can do.'

Business

By making the system's core algorithms freely available globally to entrepreneurs and businesses to incorporate into the products, services and applications they provide, we can spark a new wave of sustainability-based innovation and technology. Furthermore, while many companies want to be more sustainable in their consumption and production, there are currently few financial incentives to encourage them to do so. By being able to rank goods according to their CO_2 impact and by making the results available for use on consumer-facing applications, such as online marketplaces, we can give companies real incentives to improve the sustainability of their products. They will have a new means of increasing their sales other than price – namely, improving their products' carbon emissions and, consequently, their rankings. Other uses of the system include:

- consumer search engines, apps and devices
- supporting full life-cycle environmental certification, reporting and labelling
- procurement and supply-chain platforms
- industry and manufacturing footprinting tools
- consumer-facing footprinting, public-engagement and behavioural-change tools.

Consumers

Historically, engaging the public to act on environmental issues quickly and en masse has been very challenging. Barriers, including cost, time and inconvenience, or knowing which actions are most important or how to take them, mean 'calls to action' often go unanswered. This project can give people the opportunity to help make significant cuts to global emissions by using their combined purchasing power to transform our materials economy, and at no cost to themselves.

9.4 Conclusion

New technology must lead the way if we are to meet the Paris Agreement goals. At the vanguard of that effort, AI has the greatest potential to bring about systematic change to 'business as usual' without inflicting economic devastation on the sector. As it stands, virtually nobody is aware, with any accuracy, of the implications of the purchasing decisions they make. Recent advances in AI and machine learning, coupled with the rise of big data, can change that.

References

Clement, J. (2019) 'E-commerce worldwide – statistics & facts'. Statista, 12 March (www.statista.com/topics/871/online-shopping)

Institute for Government (2019) 'Procurement after Brexit'. Institute for Government, 22 May (www.instituteforgovernment.org.uk/explainers/public-procurement)

Walters, J., Gao, H., Hui, V., Wang, A., Yang, J. and Lyu, Z. (2017) 'Five profiles that explain China's consumer economy'. Boston Consulting Group, 27 June (www.bcg.com/publications/2017/globalization-accelerating-growth-consumer-products-five-profiles-that-explain-chinas-consumer-economy.aspx)

World Bank (2018) 'Why modern, fair and open public procurement systems matter for the private sector in developing countries'. World Bank, 22 May (www.worldbank.org/en/news/feature/2018/05/16/why-modern-fair-and-open-public-procurement-systems-matter-for-developing-countries)

Part D Policy perspectives

Chapter 10 Consumption emissions in UK policy

David Joffe

The UK was the first country to legislate for climate targets, with the Climate Change Act 2008, which originally set out a commitment to an 80% reduction in greenhouse gas (GHG) emissions by 2050 from a 1990 base, later updated to net-zero GHG emissions by 2050 (CCC, n.d.a). The Act mandated the creation of the independent Committee on Climate Change (CCC) to ensure that emissions targets were evidence-based and independently assessed.[15] It also required the government to set legally binding carbon budgets that capped GHG emissions over a five-year period. Five of these have so far been legislated, running up to 2032 (CCC, n.d.b). The sixth (2033–2037) will be recommended in 2020.

The Committee also reports annually on progress, most recently in July 2019 (CCC, 2019a). It publishes analytical reports, for example, the reviews of hydrogen, biomass and land use (all November 2018), and advice at the government's request, for example, the May 2019 report 'Net zero: the UK's contribution to stopping global warming' (the 'Net Zero' report) (CCC, 2019b).

It is fair to say that, historically, the CCC has focused principally, as is consistent with its mandate, on policies to reduce UK territorial emissions. The Committee has placed a lesser focus on consumption footprints and on imported emissions, although we did publish a report on 'Reducing the UK's carbon footprint' (CCC, 2013) and continue to consider these issues within our approach and our reports.

In its 2019 advice on setting the net-zero target (CCC, 2019a), the Committee highlighted that:

> The scenarios [to reach net-zero] involve additional reductions in the UK's consumption emissions as they include measures like resource efficiency that cut emissions from production overseas as well as in the UK. However, consumption emissions will only reach net-zero once the rest of the world's territorial emissions are also reduced to net-zero. At this point the UK can expect to pay slightly more to cover the costs of low-carbon production of the goods we import.

Within that advice, the fact that the UK's consumption emissions are significantly higher than its production emissions was one of the justifications for an earlier recommended date for UK GHG emissions to reach net-zero on a production basis (2050) compared with the world as a whole (2070).

The Net Zero report (CCC, 2019b) also noted that changes to demand – including the consumption of still-high-carbon goods, with a high share of imports such as industrial products and food – would mean that reducing the UK's production emissions to net-zero would also reduce emissions in other countries:

> The changes required to reduce UK GHG emissions to net-zero would also support reductions in emissions outside the UK, by reducing the UK's imports of high-carbon goods and services. It will be important to monitor estimates of UK consumption emissions closely and ensure that, as a minimum, the gap between consumption and territorial emissions does not widen. Should it do so this may require further UK action to reduce emissions. Overall, it is likely that the reduction in UK territorial emissions in our scenarios would result

15 www.theccc.org.uk.

> in a larger reduction in global emissions, particularly if policy is developed with life-cycle emissions in mind.

The Committee's 2019 progress report (CCC, 2019a) has a section on consumption-based accounting, referencing data produced for the Department of the Environment, Food and Rural Affairs.[16] It notes, among other things, that:

> Whilst the UK-produced part of our consumption emissions has fallen (-156 $MtCO_2e$) since 1997, the imported part has risen (+79 $MtCO_2e$) particularly in the decade prior to 2007.
>
> The historical profile of consumption emissions is driven by imported emissions from non-EU countries: as of 2016 they are responsible for 79% of total UK imported emissions. This is despite only 45% of UK imports originating from these countries, implying that more carbon-intensive products tend to be imported from outside the EU.
>
> If the data are disaggregated by product and sector, then emissions arising during the production of agricultural goods, including food, have the largest contribution (27 $MtCO_2e$) to total imported emissions, followed by emissions released during the generation of electricity to make imported goods (25 $MtCO_2e$), and then emissions arising in the construction industry (21 $MtCO_2e$ in 2016).
>
> There are certain goods which the UK imports in substantial volumes and whose production or use is currently more difficult to decarbonise. Such goods include fossil fuels, industrial products (steel and cement) and foods such as red meat and dairy … In our Net Zero report we identified a number of measures that could be taken to reduce consumption of these goods, such as using steel and cement-based products more efficiently and eating a diet with a lower proportion of red meat and dairy products.

Within the UK, and in respect of territorial emissions, regulation and product standards have played an important part in driving change. The 2019 Progress Report discusses the impact of regulation in such areas as home heating, renewable energy, vehicle emissions and building regulations.

The question then arises as to whether regulation, and particularly the measurement, reporting and certification of carbon content, has a key role in reducing imported emissions. This is a question that has become more pertinent with the UK's exit from the European Union. The country will, for example, be responsible for producing its own nationally determined contribution for the next round of climate pledges. Of course, the UK was due to host the postponed climate talks in Glasgow in 2020.

The CCC has consistently constructed its scenarios to assume that production remains in the UK and is decarbonised, and to ensure that all measures included lead to genuine emission reductions from a global as well as a UK perspective. It has also consistently pushed for mechanisms to ensure UK producers are not put at a competitive disadvantage as a result of policies to reduce emissions.

Setting UK emission reduction targets on a production basis remains appropriate for a number of reasons:

- This measure most closely maps to the levers under the UK's control.
- It is the basis of international emissions accounting as set by the UNFCCC.
- It is simple and transparent, which is important in understanding where progress in reducing emissions is being made.

Some have supported supplementing the targets on a production basis with targets for consumption emissions. The House of Commons

16 See contribution by John Barrett in this volume.

Science and Technology Committee concluded in July 2019 that:

> Progress against the UK's emissions reductions targets must not be achieved by 'offshoring' UK industry and displacing the UK's territorial emissions to be counted instead in its consumption emissions. The Government should do more to meet its commitment to increase the prominence of consumption emissions statistics in its publications. The Government … should consider the impact of all policies on consumption emissions as well as territorial emissions, and ensure that progress is not achieved by 'offshoring' emissions to other countries to the detriment of the global environment. We do not accept that territorial emissions should be the sole basis for international negotiations. The United Kingdom's decarbonisation targets should also include consumption emissions (STC, 2019: para. 16).

In the coming years, there is a need for the UK to consider the following for a carbon-neutral 2050.

First, the greatest contribution the UK can make to reducing its consumption emissions footprint is to reduce its territorial emissions on the path to net-zero emissions by 2050. The policy levers to achieve this are in UK hands.

Second, the issue of imported emissions clearly matters, given their substantial share of the UK consumption emissions footprint. As the UK seeks to end its contribution to rising global temperatures, it will be important to bear down on these emissions as well.

Third, consumption changes have a part to play. For example, the Committee has included a 20% cut in the consumption of red meat and dairy in its net-zero scenario for 2050 (CCC, 2019b). Broadly speaking, the greater the role of the demand side in achieving net-zero emissions, the greater the reduction will be in its consumption emissions footprint.

Fourth, to the extent that costs of decarbonisation could make UK production uncompetitive with imports that face lesser pressure to reduce emissions, a mechanism to limit the emissions intensity will also have the benefit of providing a level playing field to UK production.

Consumption emissions are rightly a key area of stakeholder interest. The CCC will consider this to the extent we can during another busy year in which we are recommending statutory targets for production emissions, and it will remain a key issue going forward.

References

CCC – Committee on Climate Change (n.d.a) 'UK regulations: the Climate Change Act'. Committee on Climate Change webpage (www.theccc.org.uk/tackling-climate-change/the-legal-landscape/the-climate-change-act)

CCC (n.d.b) 'Carbon budgets: how we monitor emissions targets'. Committee on Climate Change webpage (www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets)

CCC (2013) *Reducing the UK's carbon footprint and managing competitiveness risks*. London: Committee on Climate Change (www.theccc.org.uk/publication/carbon-footprint-and-competitiveness)

CCC (2019a) *Reducing UK emissions: 2019 progress report to Parliament*. London: Committee on Climate Change (www.theccc.org.uk/publication/reducing-uk-emissions-2019-progress-report-to-parliament)

CCC (2019b) *Net zero: the UK's contribution to stopping global warming*. London: Committee on Climate Change (www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming)

STC – Science and Technology Committee (2019) *Clean growth: technologies for meeting the UK's emissions reduction targets – Twentieth Report of Session 2017–19*. London: House of Commons (https://publications.parliament.uk/pa/cm201719/cmselect/cmsctech/1454/1454.pdf)

Chapter 11 Managing government regulation for carbon reporting and action

Gary Shanahan

The UK experience provides a case study of how regulation can be used to drive both reporting and action on greenhouse gas (GHG) emissions and energy reduction, especially by the private sector. At present, this is mandatory for Scope 1 and 2 emissions and voluntary, though strongly encouraged, for Scope 3 emissions. The last of these, in particular, is relevant to developing-country participants in supply chains.

Since 1 October 2013, the Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013 have required all UK-quoted companies to report on their global GHG emissions as part of their annual directors' report (UK Government, 2013a). From 1 April 2019, following the implementation of Streamlined Energy and Carbon Reporting (SECR) through the Companies (Directors' Report) and Limited Liability Partnerships (Energy and Carbon Report) Regulations 2018, all large UK businesses must disclose in their annual directors' report the UK annual energy use and GHG emissions from gas, electricity and transport (including business travel) for which they are responsible and the key energy-efficiency actions taken over the year (UK Government, 2018). The 2018 Regulations also extend the obligations on quoted UK companies to disclosure of energy consumption and a report of the key energy-efficiency actions they have taken in this regard (ibid). The government encourages all other companies to report similarly, although this remains voluntary.

The government also publishes conversion factors for GHG reporting on an annual basis, which are suitable for use by UK-based organisations of all sizes and for international organisations reporting on UK operations (UK Government, 2013b).

The government encourages organisations to submit their disclosures electronically using the SECR taxonomy published by the Financial Reporting Council (FRC) in December 2019 (FRC, 2019; UKAP, 2019). The taxonomy is an addition to the FRC taxonomies suite. While it is not mandatory to tag SECR data, the government is keen to enable companies that file their annual reports digitally to be able to report their SECR data in the same way, to ensure the same level of transparency is available to external users.

Environmental Reporting Guidelines provide detailed guidance on both mandatory and voluntary reporting, covering a range of environmental impacts as well as GHGs (UK Government, 2019). In addition to technical information on how to set the boundaries of an organisation and how to manage the mechanics of reporting, the Guidelines describe the use of key performance indicators (KPIs) to set targets and monitor improvement. These can include quantitative targets based on outcomes, such as the reduction of emissions or incidents; quantitative or qualitative objectives in terms of inputs, such as the completion of management-system initiatives by a planned date; annual progress measured against a commitment to continuous improvement; or case studies providing evidence of programmes planned across a specified period.

The Guidelines build on numerous standard-setting, reporting and verification frameworks (Box 11.1).

Box 11.2 summarises the core principles of environmental reporting. Note especially the emphasis on comparability and transparency.

Box 11.1 Standard-setting, reporting and verification frameworks

Three types of formal environmental management systems are recognised in the UK: ISO 14001 (BSI, 2015); the European Union (EU) Eco-Management and Audit Scheme (European Commission, n.d.); and BS 8555 (BSI, 2016).

The Climate Disclosure Standards Board's[i] Climate Change Reporting Framework sets out an approach to boundary-setting that seeks to align with the boundaries used for financial reporting. Although it has been written for reporting climate impacts, it can be used for reporting other impacts.

There are two internationally recognised standards for the verification of sustainability reports, ideally used together, as they complement one another. The first is the International Audit and Assurance Standards Board's ISAE3000 'Assurance engagements other than audits or reviews of historical financial information'. The second is AA1000AS13 from AccountAbility (the Institute of Social and Ethical AccountAbility). AA1000AS is a free, open-source set of principles that addresses sustainability and corporate social responsibility aspects of reports. ISO 14064-3 and ISAE 3410 are widely used standards for the verification of GHG emissions reports.

The Guidelines also refer to the GHG Protocol, especially the Corporate Accounting Standard (WBCSD/WRI, 2015).

Source: UK Government (2019).

i www.cdsb.net.

Box 11.2 Principles for accounting for and reporting environmental impacts

The following principles should be applied when collecting and reporting on environmental impacts:

Relevant. Ensure the data collected and reported appropriately reflect the environmental impacts of your organisation and serve the decision-making needs of users – both internal and external to your organisation.

Quantitative. KPIs need to be measurable.

Accurate. Seek to reduce uncertainties in your reported figures where practical. Achieve sufficient accuracy to enable users to make decisions with reasonable confidence as to the integrity of the reported information.

Complete. Quantify and report on all sources of environmental impact within the reporting boundary you have defined. Disclose and justify any specific exclusions.

Consistent. Use consistent methodologies to allow for meaningful comparisons of environmental impact over time.

Comparable. Companies should report data using accepted KPIs rather than inventing their own versions of potentially standard indicators.

Transparent. This is essential to producing a credible report. Address all relevant issues in a factual and coherent manner, keeping a record of all assumptions, calculations and methodologies used.

Source: UK Government (2019).

The guidance on Scope 2 and Scope 3 follows these principles.

For Scope 2 emissions, while explicit reporting on renewable energy and associated emissions is not a mandatory requirement under the SECR legislation, organisations are encouraged to use 'dual reporting' if they wish to reflect their consumption of renewable energy. Organisations

are encouraged to use location-based grid average emission factors to reflect their physical consumption of electricity and, where they wish to reflect their purchases of renewable energy, they may additionally report a 'market-based' figure. In doing so, organisations are also recommended to seek to specify whether the renewable energy is additional, subsidised and supplied directly, including through on-site generation or through a third party. A similar 'dual reporting' approach should be taken for biogas and biomethane (including 'green gas').

The guidance on Scope 3 reporting is based on the GHG Protocol Corporate Accounting and Reporting Standard (the 'Corporate Standard') and so corresponds with many widely used national and international voluntary schemes such as ISO 14064-1, the Carbon Disclosure Project and the Climate Disclosure Standards Board's Climate Change Reporting Framework. This guidance is also based on a second standard from the GHG Protocol team: the Corporate Value Chain (Scope 3) Standard (WBCSD/WRI, 2011). This is referred to as the 'GHG Protocol Scope 3' standard.

An especially useful section of the GHG protocol describes how to estimate Scope 3 emissions using financial information. The Guidelines note, however, that financial information should be used only to gain an overview of emissions in a supply chain in cases where the only data available are how much money has been spent on a particular item. It should not be used in cases where the kilowatt-hours (kWh) of electricity generated from a particular fuel type/distance travelled in particular types of transport is known, or where environmental information for compliance under schemes such as the EU Emissions Trading System is provided; using these data will give more accurate figures.

Overall action in this area is summarised in Box 11.3, emphasising engagement with suppliers and procurement decision-making.

It is too early to assess fully the impact of the new SECR framework, as the first company annual reports including the required SECR disclosures (for businesses with reporting years of 1 April–31 March) are not expected to be filed before the second quarter of 2020. What is clear is that there is already increasing interest in the new requirements, which have expanded the number of organisations required to report 10-fold, from around 1,200 quoted UK companies to around 12,000 large or quoted UK businesses. It is also clear that there is increasing interest from stakeholders in the consistency and transparency of disclosures and from the financial sector in assessing the climate-related impacts and risks of investments.

For the future, the UK government has legislated to set a net-zero obligation by 2050, underpinned by a trajectory of carbon budgets already established in law to 2032. The government has

Box 11.3 A process to determine the impacts upstream in the supply chain

- Identify companies from which goods and services are purchased.
- Categorise your expenditure/emissions into sector groupings.
- Assess the typical environmental impacts and risks for each sector.
- Determine where to focus your efforts. Clearly, some suppliers, even in the same sector, have more significant environmental impacts than others. It is important to prioritise your suppliers in a way that takes into account both the amount of money you spend with them and relative environmental impact.
- Engage with your suppliers. Encourage your suppliers to report on the key impacts.
- Influence purchasing decisions with the information gathered. Improvements in your suppliers' environmental performance will be more likely if they know that this is a factor in your organisation's buying decisions.
- Consider post-contract supplier development to focus on engaging suppliers in continuous improvement in environmental management.

Source: UK Government (2019).

also set an ambition for businesses to improve their efficiency by at least 20% by 2030, helping save companies an estimated £6 billion in energy costs annually in 2030 and contributing up to 22 million tonnes of carbon dioxide equivalent ($MtCO_2e$) of non-traded carbon savings towards the fifth carbon budget.

The government has also published a Green Finance Strategy that recognises the role of the financial sector in delivering strong, sustainable and balanced growth alongside global and domestic climate and environmental objectives. The Strategy sets out the proposals for putting green finance at the heart of delivering the UK's Clean Growth Strategy, 25-Year Environment Plan and Industrial Strategy. In the Strategy, the government also commits to review progress in 2020 on greening the UK's financial system and on Task Force on Climate-related Financial Disclosures implementation.

References

BSI – British Standards Institution (2015) ISO 14001:2015 – environmental management. London: BSI (www.bsigroup.com/en-GB/iso-14001-environmental-management)

BSI (2016) BS 8555:2016 – environmental management systems. London: BSI (https://shop.bsigroup.com/ProductDetail?pid=000000000030339300)

European Commission (n.d.) 'Policy: EMAS Regulation'. European Commission webpage (https://ec.europa.eu/environment/emas/emas_publications/policy_en.htm)

FRC – Financial Reporting Council (2019) 'The Streamlined Energy & Carbon Reporting (SECR) Taxonomy'. FRC webpage, 17 December (www.frc.org.uk/news/december-2019-(1)/the-streamlined-energy-carbon-reporting-(secr)-tax)

UK Government (2013a) *The Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013* (www.legislation.gov.uk/ukdsi/2013/9780111540169/contents)

UK Government (2013b) 'Government emission conversion factors for greenhouse gas company reporting'. gov.uk webpage, updated 4 June 2019 (https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting)

UK Government (2018) *The Companies (Directors' Report) and Limited Liability Partnerships (Energy and Carbon Report) Regulations 2018* (www.legislation.gov.uk/uksi/2018/1155/contents/made)

UK Government (2019) *Environmental reporting guidelines: including streamlined energy and carbon reporting guidance* (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/850130/Env-reporting-guidance_inc_SECR_31March.pdf)

UKAP – UK Accounting Plus (2019) 'FRC publishes a streamlined energy & carbon reporting (SECR) taxonomy'. UKAP webpage, 19 December (www.iasplus.com/en-gb/news/2019/12/the-streamlined-energy-carbon-reporting-secr-taxonomy)

WBCSD and WRI – World Business Council for Sustainable Development and World Resources Institute (2011) *GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard*. Geneva, Switzerland: WBCSD; Washington DC: WRI (https://ghgprotocol.org/standards/scope-3-standard)

WBCSD and WRI (2015) *GHG Protocol Corporate Accounting and Reporting Standard – revised edition*. Geneva, Switzerland: WBCSD; Washington DC: WRI (https://ghgprotocol.org/corporate-standard)

Chapter 12 A new accountability framework to prepare for a new climate regime

Aarti Krishnan and Simon Maxwell[17]

12.1 'Trust' is central to attaining climate resilience …

There has been a gradual erosion of trust in global and national institutions in relation to achieving climate-neutral growth. Power (1997) coined the term 'audit society' as a response to a general loss of trust in institutions such as the law and the legal system, government, multinational corporations and the media. The 'audit society' describes a world in which central institutions submit to more extensive reporting obligations. This implies the need to develop overarching legal and social mechanisms that regulate internal and external organisational relationships.

Global 'watchdogs' such as the United Nations Framework Convention on Climate Change (UNFCCC) conform to this model, setting universal goals, providing space for negotiation, pressuring the powerful and elite to support the less developed and providing a scientific basis for measuring climate progress. The UNFCCC entered into force on 21 March 1994. Today, it has near-universal membership, with ratification by 197 countries, known as Parties to the Convention. The UNFCCC provides the foundation for intergovernmental action to combat climate change and its impacts on humanity and ecosystems. Under it, all Parties are obliged to increase transparency[18] and to communicate to the Conference of the Parties (COP) information relevant to adaption and mitigation of greenhouse gas (GHG) emissions at the national level through a measurement, reporting and verification (MRV) framework (UNFCCC, n.d.a).

In 2015, the Paris Agreement established an enhanced transparency framework, the core arrangements of which are presented in Figure 12.1. In sum, the framework makes it possible to track the progress of implementation and the achievement of nationally determined contributions, through reporting, technical expert reviews and multilateral capacity-building support.

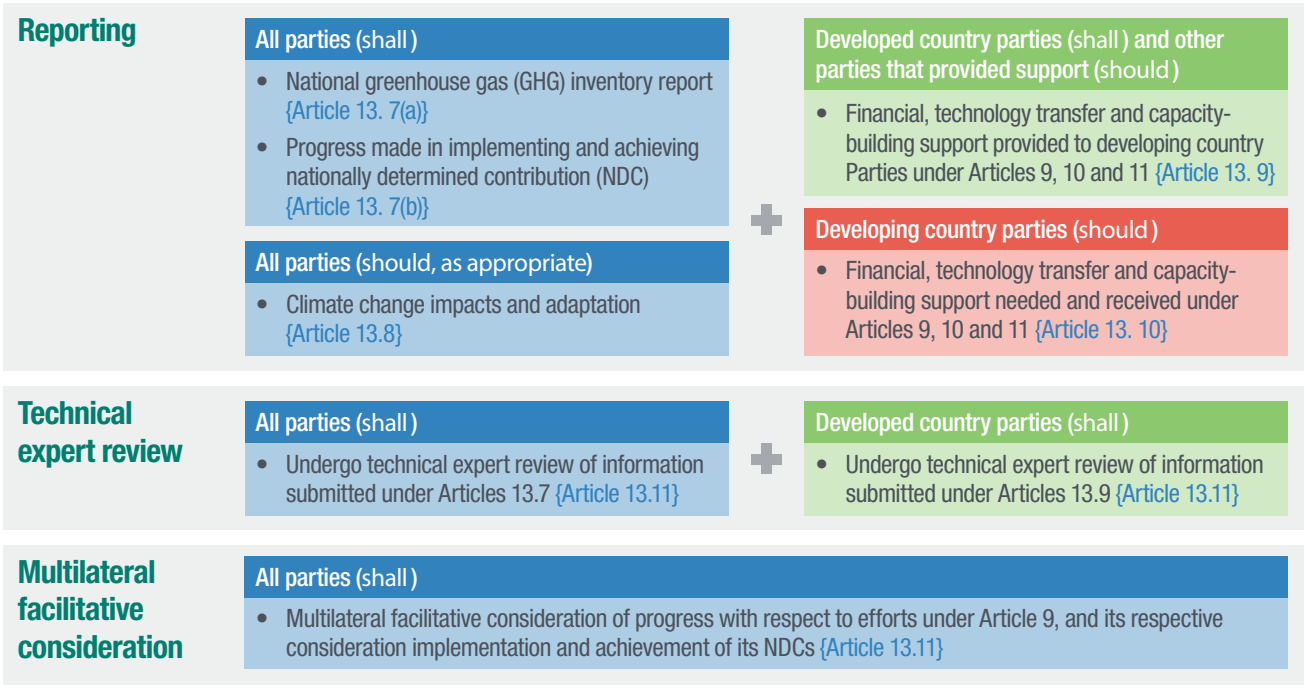
However, two critical aspects have been to some extent overlooked in the new MRV framework. First, it focuses more on the geographical – in other words, national – 'scope' of emissions, as opposed to 'traded' or consumption-based emissions. Second, although it articulates the need to be transparent, accountability also needs to be included within the framework, so that, along with visibility, an individual or organisation has a duty to answer in some way for how they have conducted their affairs (Hood, 2010).

Thus, the current framework, which hinges on territorial scope, suggests that organisations are 'accountable' only for emissions taking place within a geographical boundary, negating the possible accountability required when considering 'consumption and traded emissions'. Accountability needs to be considered through the entire value chain, and there needs to be greater recognition of the merit of climate action undertaken outside the geographical boundary of point source reduction.

17 This note draws on material from and informal conversations with staff members of the United Nations Framework Convention on Climate Change (UNFCCC).

18 Measures to significantly enhance transparency of action and support under the Convention were adopted as part of the Bali Action Plan at the 13th Conference of the Parties (COP 13) and elaborated in decisions adopted at subsequent COP sessions.

Figure 12.1 Paris Agreement transparency framework



Notes: The transparency framework shall provide flexibility in the implementation of the provisions of this Article to those developing country parties that need it in the light of their capacities {Article 13.2); The transparency framework shall recognize the special circumstances of the least developed countries and small island developing States {Article 13.3}.
Source: UNFCCC (n.d.a).

12.2 Principles for a new accountability framework

A new accountability framework consisting of four key elements is needed. These elements are as follows.

Territorial or geographical emissions

'These include emissions and removals taking place within national (including administered) territories and offshore areas over which the country has jurisdiction' (IPCC, 1996: 5). However, GHG emissions that arise in international territories, including those from international aviation and shipping, are reported only as a memo and not allocated to individual countries. Such a system can be called a 'territorial-based emissions inventory' (Barrett et al., 2013).

Consumption and traded emissions

These are especially important in the context of cities, which are both production and consumption centres. Consumption and traded emissions are harder to measure and require a value-chain approach. For instance, accounting of consumption-based emissions can include sectors such as aviation and shipping.

Emissions related to technology transfer

These include climate technologies that help reduce GHGs, such as renewable energies like wind energy, solar power and hydropower. To adapt to the adverse effects of climate change, we use climate technologies, such as drought-resistant crops, early warning systems and sea walls. There are also 'soft' climate technologies, like energy-efficient practices or training for using equipment (UNFCCC, n.d.b).

It is important to create an accountability framework that puts the onus on developed countries exporting the technology, not to export fossil fuel-based technologies to developing countries. The UNFCCC has a Technology Mechanism (accelerating and enhancing climate technology development and transfer), which works through a Technology Executive Committee and the Climate Technology Centre and Network (UNFCCC, n.d.c). These

provide technical assistance to developing countries, create access to knowledge on climate technologies and foster collaboration among climate technology stakeholders. They also support technology needs assessment, help build national capacity and facilitate the implementation of prioritised climate technologies. However, there is still a need to nuance the 'type of technology' that crosses borders to ensure it supports climate-change mitigation. Developed countries that intend to pursue a net-zero target should be accountable if they export technologies that do not engender achieving the net-zero agenda worldwide.

Climate finance accountability

Countries need to be 'accountable' when, for instance, investing in the upstream part of a fossil-fuel value chain, especially if there is a will to decarbonise. This recognises the influence and power of multinational corporations and developed-country governments, which can lead to more or less in terms of emissions, depending on the type of technology transferred and the level of investment.

12.3 What the UNFCCC can do

The UNFCCC primarily supports parties during negotiation and facilitates dialogue between parties so they find convergence in their deliberations, while also providing technical and measurement expertise. The UNFCCC Secretariat has developed a distinct competence in each of the four types of accountability. Furthermore, it has significant expertise in supporting non-party stakeholders, such as subnational governments, non-governmental organisations and corporates, so they can align activities with long-term goals and measure their impacts. The UNFCCC acts by harmonising and cooperating with World Trade Organization plurilateral rules with the UNFCCC multilateral agreements.

Accountability is intrinsically linked to the 'intention' and the moral compass of stakeholders. A new accountability framework distributes onus onto the actors that are the centres of power and enables the debate to engage more broadly with a gamut of issues beyond territory, to include consumption and the wider ecosystem of finance and technology.

References

Barrett, J.R., Peters, G., Wiedmann, T., Scott, K., Lenzen, M., Roelich, K. and Le Quéré, C. (2013) 'Consumption-based GHG emission accounting: a UK case study' *Climate Policy* 13(4): 451–470

Hood, C. (2010) 'Accountability and transparency: Siamese twins, matching parts, awkward couple?' *West European Politics* 33(5): 989–1009

IPCC – Intergovernmental Panel on Climate Change (1996) 'Guidelines for national greenhouse gas inventories: reference manual'. Cambridge, UK: Cambridge University Press

Power, M. (1997) *The audit society.* Oxford, UK: Oxford University Press

UNFCCC – United Nations Framework Convention on Climate Change (n.d.a) 'What is transparency and reporting?'. UNFCCC webpage (https://unfccc.int/process-and-meetings/transparency-and-reporting/the-big-picture/what-is-transparency-and-reporting)

UNFCCC (n.d.b) 'What is technology development and transfer?'. UNFCCC webpage (https://unfccc.int/topics/climate-technology/the-big-picture/what-is-technology-development-and-transfer)

UNFCCC (n.d.c) 'Technology mechanism'. UNFCCC TT Clear webpage (https://unfccc.int/ttclear/support/technology-mechanism.html)

Chapter 13 Trade and climate: friends or foes?

Jodie Keane and Dirk Willem te Velde

There is an environmental crisis. And only a transformed economic system can provide a pattern of economic growth that is consistent with environmental sustainability. Policy-makers are also reconsidering the role of trade policy in this context. The creation of a level playing field with third countries through border carbon adjustments (BCAs) aims to incentivise exporting countries to adjust their carbon footprint to the same level of the importing country. However, restricting trade will also lead to weaker incentives for innovation and energy efficiency and the potential for trade diversion.

13.1 Border carbon adjustments and the emissions trading system

At the end of 2019, the European Commission sent its clearest intentions to back up its Green Deal with punitive BCA measures (European Commission, 2019); these will be imposed on trading partners that are deemed not to be taking appropriate actions to mitigate climate change. Because of the continued challenges regarding the inclusion of land use change within carbon accounting measures, the EU's BCAs will target manufacturing exporters. This essay explores which traders are likely to be hit and how they might adapt; how such measures could be challenged within the World Trade Organization (WTO); and whether BCAs are not actually counterproductive.

Since the adoption of the Paris Agreement in 2015, policy-makers have been charged with taking all necessary action now to address climate change (UNFCCC, 2015). To support the EU's ambitious Green Deal and to ensure that European producers, especially those participating in the EU's Emissions Trading Scheme (ETS), are not put at a competitive disadvantage to other traders – because they are taking actions to mitigate climate change, such as reducing emissions through improving technology or purchasing carbon credits – the European Commission is ready to apply BCAs if required. This situation may arise in such cases where carbon-intensive products from sectors such as steelworks and the production of iron, aluminium, metals, cement, lime, glass, ceramics, pulp and paper[19] are imported from countries without comparable emissions reductions schemes to the EU; for example, if producers within the EU shift production to countries without emissions reductions schemes (known as carbon leakage).

The imposition of a BCA (a tariff applied to imports based on carbon content) is intended to ensure the cost of imported goods increases relative to that of domestic goods and, therefore, to level the playing field between EU producers, which must reduce the emissions associated with production, and those exporters that may not be doing so. Some of the main concerns regarding the imposition of BCAs relate to equity and the principle of Common but Differentiated Responsibility within the United Nations Framework Convention on Climate Change. Under this principle, the burden of emissions reductions must fall primarily on developed economies. However, the EU's BCA will be applied regardless of country classification in order to ensure European producers are not put at a competitive disadvantage.

While the full details of the proposed BCAs remain to be worked out, steel, cement and aluminium are the sectors most likely to be affected. Developing-country exporters of these products, such as Brazil, China, Russia and South Africa, will be required to purchase carbon

19 The EU's ETS has expanded in its sectoral coverage over time (European Commission, n.d.).

allowances or face a carbon-related tariff and, therefore, to de facto participate in the EU's ETS. The extent to which a BCA will affect consumer demand will depend on the price elasticity of demand and the nature of value-chain governance. For example, there is evidence that, for Organisation for Economic Co-operation and Development countries, the cost increase associated with a $100 per ton carbon tax is usually fairly small, within the range of around 1%–5% of production value (Ellis et al., 2010).

13.2 Practical challenges in the implementation of BCAs

There are practical challenges regarding the implementation of BCAs. For example, trade data and tariffs relate to product categories. If a certain product is imported, it will face a certain tariff. However, different companies may trade the same type of product but produce it under very different conditions using different technologies. The evidence suggests there is considerable heterogeneity among firms within a given sector with respect to energy efficiency (see, e.g., UNIDO, 2019). The taxes will work properly only if each import batch has associated information on carbon intensity. Currently, these measures do not exist at scale. However, it may be possible to roll out blockchain and digital pilots that do this well. A really important task is to promote convergence of energy efficiency across firms.

While a carbon tax within the EU across producers may be preferable to use of a BCA – which is a 'unilaterally decided trade barrier' (Horn and Sapir, 2019) – this is likely to be rejected by European governments, which have not (yet) conferred these decision-making powers on the Commission. Over time, however, it is likely that some form of carbon tax will be required as reform of the current ETS proceeds (the existing mechanism dates back to the Kyoto Protocol). The EU's ETS remains the world's largest mechanism of its type, accounting for over three-quarters of international carbon trading. It operates as a cap-and-trade system, with a limit on the total number of allowances available to reduce GHG emissions. While theoretical discussions usually portray carbon taxes and emissions trading schemes as alternatives, in practice, a jurisdiction often implements both instruments to address emissions by different sources (Haites, 2018). The EU's reform of its ETS will include the scrapping of free allowances to some sectors (e.g. airlines) while others will continue to benefit, and will expand the mechanism's sectoral coverage (e.g. to include maritime transport).[20]

Countries seeking to defend their trade interests from BCAs may point out that they do have equivalent measures in place; these could include an ETS. Indeed, in the most recent decade, the European Commission has been instrumental in establishing emissions trading schemes within a number of developing countries (e.g. China) (European Commission, 2018). Alignment has been achieved between the ETS of the EU and Switzerland, and equivalence secured. But the EU's tougher stance is likely to heat up an already tense global trading landscape, given ongoing disputes between the EU and the US and in view of the current US administration's intention to withdraw from the Paris Agreement by 4 November 2020 (a day after the presidential election – although individual states such as California and Quebec will continue their own carbon emissions-reductions schemes).

The EU's actions, should they come to fruition, may present particular challenges at the multilateral level and within the WTO – though, naturally, the Commission seeks to avoid these. The global trading system relies on not only trust and goodwill among trading partners but also two founding principles: most-favoured nation and non-discrimination. Equal treatment is required of like products and any discrimination between foreign and domestic producers contravenes these principles. However, a degree of constructive ambiguity remains, since Article 20 on General Exemptions of the General Agreement on Tariffs and Trade provides some space for governments to address environmental concerns, as long as certain conditions are met. These conditions will invariably increase the

20 See European Commission (n.d.) and European Commission (2019).

complexity of a BCA and include: (1) careful consideration of how importing countries' domestic policy measures address climate change; and (2) enabling individual foreign producers to prove their energy efficiency (Crosby, 2008).

One area that deserves far greater attention is the pricing of carbon and its measurement within production (and consumption). Ultimately, it is the price of carbon that will determine the value of the BCA; the EU can be seen to be clearly establishing itself as the rule-maker within this sphere and remains unchallenged at the current time. However, carbon markets themselves are unlikely to cover many of the costs that will enable countries to engage in carbon trading, including financial and legal institutions and essential MRV systems at the national level (Keane et al., 2010). It is the latter of these that ultimately underpin all emissions trading schemes. Given the complexity of CO_2 valuation across all products and services, future trade disputes are likely to be related to the price of carbon itself.

13.3 Would border carbon adjustments be counterproductive?

Finally, but perhaps most importantly, we should also consider whether a BCA would not in fact be counterproductive. Currently, it is production that produces by far the most emissions; a small share comes from transport (ships, trucks, etc.), although this can be greened as well. This means that, ultimately, the most important thing is to increase production efficiencies. Trade barriers by country A on imports from country B could simply lead to the diversion of trade from country A to country C. Further, trade and openness are key to innovation in general, and innovation is correlated with energy efficiency (Cantore et al., 2016).

A major concern is that limiting trade will lead to worse conditions for innovation and for improving production efficiencies. And most gains can be made by addressing construction and transport sectors at home. Therefore, we need to consider the behavioural incentives to green production that come from creating a level playing field with third countries, as opposed to those that weaken incentives for innovation and that generate the potential for trade diversion. Trade can be a friend to the environment; perhaps a well-thought-out pilot that provides information on carbon footprinting through blockchain, scaled up when it works, could make it also less of a foe.

References

Cantore, N., Calì, M. and te Velde, D.W. (2016) 'Does energy efficiency improve technological change and economic growth in developing countries' *Energy Policy* 92(C): 279–285

Crosby, A. (2008) 'Border carbon adjustment'. Prepared for Seminar on Trade and Climate Change, Copenhagen, 18–20 June

Ellis, K., Cantore, N., Keane, J., Peskett, L., Brown, D. and te Velde, D.W. (2010) *Growth in a carbon constrained global economy*. ODI Research Report. London: Overseas Development Institute

European Commission (n.d.) 'EU Emissions Trading System (EU ETS)'. European Commission webpage (https://ec.europa.eu/clima/policies/ets_en)

European Commission (2018) 'Emissions trading: European Commission and China hold first policy dialogue'. European Commission Climate Action News, 26 April (https://ec.europa.eu/clima/news/emissions-trading-european-commission-and-china-hold-first-policy-dialogue_en)

European Commission (2019) The European Green Deal. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2019) 640 final. Brussels: European Commission (https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf)

Haites, E. (2018) 'Carbon taxes and greenhouse gas emissions trading systems: what have we learned?' *Climate Policy* 18: 955–966

Keane, J., MacGregor, J., Page, S., Peskett, L. and Thorstensen, V. (2010) *Development, trade and carbon reduction: designing coexistence to promote development*. ODI Working Paper. London: Overseas Development Institute

Horn, H. and Sapir, A. (2019) 'Border carbon tariffs: giving up on trade to save the climate'. Bruegel Institute, 29 August (https://bruegel.org/2019/08/border-carbon-tariffs-giving-up-on-trade-to-save-the-climate)

UNFCCC – United Nations Framework Convention on Climate Change (2015) Adoption of the Paris Agreement. UN Doc. FCCC/CP/2015/L.9/Rev.1. Bonn, Germany: UNFCCC (https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf)

UNIDO – United Nations Industrial Development Organization (2019) *Industrial Development Report 2020*. Vienna: UNIDO

Chapter 14 Development policy implications of carbon certification and border carbon adjustments

Jonathan Beynon

14.1 Introduction and context

The scale and urgency of the climate challenge is becoming ever more apparent, with the poorest developing countries least responsible yet hardest hit. Climate change threatens to undo recent development gains, with 100 million people at risk of being pushed into poverty by climate change by 2030 and 720 million by 2050 (World Bank, 2015; Granoff et al., 2015). After years of progress, the number of people suffering from hunger is already on the rise, with adverse weather conditions among the key drivers of this trend. Between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year from malnutrition, malaria, diarrhoea and heat stress (WHO, 2014). By 2025, 1.8 billion people will be living in countries or regions facing absolute water scarcity (UN-Water, n.d.). And, while estimates of the economic damages caused by climate change remain uncertain and contested, some forecasts anticipate a 75% fall in gross domestic product for the poorest countries by the end of the century in a 'business-as-usual' scenario as a result of climate change (Global Finance, 2019).

14.2 Recent UK commitments

In 2019, the UK government committed both to achieve net-zero emissions by 2050 and to ensure that all its official development assistance was aligned with the 2015 Paris Agreement. The 'Planet' has become more prominent: it is one of five objectives in the UK Department for International Development's (DFID) new Single Departmental plan, with a focus on supporting efforts to mitigate and adapt to climate change and prevent environmental degradation (DFID, 2019). And at the UN Climate Action Summit in September 2019, the UK pledged to double its international climate finance to £11.6 billion over the next five-year period (2021/22–2025/26). DFID, together with the Department for Business, Energy and Industrial Strategy and the Department of Agriculture, Environment and Rural Affairs, is currently preparing a new climate and environment strategy to ensure these funds are spent to best effect.

14.3 Development and climate change: policy challenges

In any such strategy, the following are widely recognised:

- Future effort and climate finance will need to continue to focus on both mitigation and adaptation. Without mitigation, there are risks of irreversible change to which it will be impossible or extremely costly to adapt. Without adaptation, the ability of poor people to cope with the by then unavoidable effects of climate change will be compromised.
- At a macro level, economic development that raises growth and prosperity remain key to the enhanced resilience of developing countries, while the poor should not be made to 'pay for the planet' by having their development options unduly constrained. At the same time, the rapidly changing economics of renewable energy and other technological innovations are transforming prospects for low-carbon development.
- Policy and regulatory reforms, nationally and internationally, are vital to creating the necessary incentives that will accelerate the needed transition to a carbon-neutral world. Carbon pricing, fossil-fuel subsidy reform, efficiency standards and environmental

protections are all needed. It is not all, or only, about spending money.

14.4 Border carbon adjustments and certification

To date, the potential for border carbon adjustments (BCAs), and the certification needed to underpin them, as part of those policy and regulatory reforms has appeared limited. It has been constrained by both political concerns about compliance with World Trade Organization (WTO) rules and protectionist abuse, and practical concerns about measuring and certifying the carbon content of different goods on which such taxes might be levied.

However, most legal scholars judge BCAs to be compatible with the WTO, while new technology opens new possibilities for carbon certification and tracking. The political space for BCAs is opening up and consumer attitudes in favour of local, lower-carbon products are also shifting. The experience of plastics in the wake of the David Attenborough *Blue Planet* series illustrates how rapidly public opinion and political action can change. Demand for certification will only grow.

For many developing countries, BCAs and certification present both threats, for which they may need help preparing, and opportunities, which they may need help exploiting. For example, the technical requirements of complying with new certification rules and trading standards are likely to be significant and beyond the current capability of many developing countries, while the carbon costs of freight may further disadvantage developing countries already facing higher costs of trade.

On the other hand, less carbon-intensive patterns of production and the potential to leapfrog advanced economies in a switch to lower-carbon technologies may confer advantages over more carbon-intensive rivals. Moreover, it is possible that exemptions from BCAs or carbon certification requirements may be possible for the poorest countries (analogous to the advantages that least developed countries enjoy through, for example, the EU's Everything But Arms trade arrangements) – at least in the short to medium term. However, there are no guarantees that these exemptions would be in least developed countries' long-term interest, as global patterns of demand change.

14.5 Policy implications

For developing countries, there is a need to better integrate macroeconomic, climate and trade policies within a medium- to long-term framework that takes account of rapidly changing, but still uncertain, markets for energy and carbon, as well as the goods and services (and associated opportunities for trade) in which they are embodied. It also means being flexible and responsive, avoiding locking into carbon-intensive patterns of production and energy generation and building capability for climate-smart development.

For donors, this means supporting low-carbon development in, and technology transfer to, developing countries, ensuring that both are at the heart of country development diagnostics and strategies. It means further mainstreaming climate-smart development into development policies and practice. It also means being willing to support the critical if unglamorous process of improving carbon certification and tracking schemes and developing countries' capability to comply with them.

These measures are increasingly important both for the global good and for national self-interest.

But, given continued political and practical difficulties in the application of BCAs and carbon certification, it is likely that carrots, rather than sticks, will offer more potential to facilitate and accelerate the necessary changes in greenhouse gas emissions.

References

DFID – UK Department for International Development (2019) *Department for International Development single departmental plan*. London: DFID (www.gov.uk/government/publications/department-for-international-development-single-departmental-plan/department-for-international-development-single-departmental-plan--2)

Global Finance (2019) 'Poorest countries in the world 2019'. *Global Finance*, 17 April 2019 (https://www.gfmag.com/global-data/economic-data/the-poorest-countries-in-the-world)

Granoff, I., Eis, J., McFarland, W., Hoy, C., Watson, C., de Battista, G., Marijs, C., Khan, A. and Grist, N. (2015) *Zero poverty, zero emissions: eradicating extreme poverty in the climate crisis*. London, ODI (www.odi.org/publications/9690-zero-poverty-zero-emissions-eradicating-extreme-poverty-climate-crisis)

World Bank (2015) 'Shockwaves: managing the impacts of climate change on poverty'. Webpage. World Bank (www.worldbank.org/en/news/feature/2015/11/08/rapid-climate-informed-development-needed-to-keep-climate-change-from-pushing-more-than-100-million-people-into-poverty-by-2030)

World Bank (n.d.) 'Climate Change'. Webpage. World Bank (https://www.worldbank.org/en/topic/climatechange/overview)

WHO – World Health Organization (2014) *Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s*. Geneva, Switzerland: WHO (https://apps.who.int/iris/handle/10665/134014)

UN-Water (n.d.) 'International Decade for Action 'WATER FOR LIFE' 2005–2015'. Webpage. New York and Geneva, Switzerland: United Nations Department for Economic and Social Affairs (UNDESA) and UN-Water

Chapter 15 Trading blame or exporting ambition? How trade can drive emissions and how trade policy can be mobilised for climate action

Dan Plechaty, Lina Fedirko and Surabi Menon

The relationship between international trade and greenhouse gas (GHG) emissions is not simple: trade is both exacerbating the climate crisis in some sectors and spreading clean technologies in others. The sheer volume of traded goods and services and the varied policy regimes they are subject to offer the potential both for clean procurement and, conversely, for carbon leakage. In this context, trade policy is a tool that can be mobilised for climate action. We propose four options for action and philanthropic support.

15.1 Accounting for trade impacts and the contribution trade policy can make

International climate negotiations and national climate policies focus almost exclusively on accounting for territorial GHG emissions, which are bound to countries' borders and are the basis of agreements formed under the aegis of the United Nations Framework Convention on Climate Change. While consumption-based accounting methods are more complex, they offer an alternative perspective on the impact each country has on global GHG emissions. Assessing consumption flows rather than just production reveals that many countries with export-oriented economies consume less themselves than their territorial emissions might imply (e.g. China) and import-oriented economies have a higher impact than otherwise assumed (e.g. many EU Member States). The lack of transparency across global supply chains can hide the overall carbon intensity of certain activities from the consumer and give a false sense of progress on curtailing GHG emissions within a nation's borders.

The decarbonisation of the global economy requires a truly unprecedented effort to accelerate transition away from incumbent energy sources and manufacturing processes, as well as the end-use consumption outcomes that result. These systems and the global trade networks that support them have been optimised over many decades and will require the shift of a staggering quantity of resources towards the research, development, demonstration and deployment of cleaner alternatives. Trade policy can make a significant contribution to rapid decarbonisation. The benefits will accrue to both developed and developing countries in terms of mitigation outcomes, equity, environmental integrity, technology diffusion and low-cost climate finance.

15.2 Policy levers and opportunities for philanthropy

Given the vast reach of trade, there is a need to assess how and where to advocate for policies that help realise its potential to drive decarbonisation. Philanthropic resources deployed for public good have the power to catalyse action and accelerate solutions. We highlight a few trade-related areas of engagement where philanthropic support can help early action.

Tackling carbon leakage

Carbon leakage is the transfer of carbon emissions from developed to developing countries. It can be difficult to quantify, as lax environmental standards in developing countries are often correlated with other factors that make outsourcing attractive, such as low-cost labour and raw materials. Moreover, more stringent

environmental standards in developed countries can drive greater leakage. One approach that has been debated is the adoption of a border carbon adjustment (BCA) on imported goods, based on their carbon intensity. This would, in theory, disincentivise leakage to countries with low environmental standards. While promising, the approach would likely run into many legal and logistical challenges (Morris, 2018). While jurisdictions such as the EU have adopted suboptimal workarounds, such as free allocation of pollution permits to EU producers and indirect cost recovery for higher-priced inputs (like electricity), there is an opportunity to weigh in on potential improvements in policy mechanisms. Working on carbon-leakage issues would require national policy-level engagement.

In this case, early support through philanthropy could be used to:

- fund research that looks at ways to quantify carbon leakage and model impacts from less to more stringent environmental standards
- support civil society engagement on policy mechanisms for BCA
- fund feasibility studies of various policy mechanisms that target carbon leakage.

Public procurement, the private sector and supply chains

Countries, states and businesses can use their procurement expenditures to reward and incentivise the production of goods and services by cleaner means. Individual cities that set net-zero targets can also use their purchasing power to drive beneficial changes, as they often procure from outside their borders a larger percentage of their food, energy and other carbon-intensive goods. In the absence of tailored policy, their net-zero targets may be undermined by indirect land use change and emissions from their demand for food and fuel. Examples of successful efforts in this area are:

- the minimum performance standards in California's Buy Clean legislation (Box 15.1) (State of California, n.d.)
- sustainability metrics in public procurement scorecards in the Netherlands (OECD, 2016)
- Scope 3 emissions in business inventories, which can have the same effect in concert with internal Science Based Targets.

Philanthropy can engage by:

- supporting the transfer of Buy Clean to other US states and other countries
- broadening the scope of the original Buy Clean policy to span more sectors
- supporting civil society's development of robust accounting frameworks to encourage cities and private sector to incorporate Scope 2 and 3 emissions in the formulation of their net-zero targets.

Climate clubs

A blunt but potentially effective measure would be the creation of climate clubs (Nordhaus, 2015), in which group(s) of progressive countries with substantive purchasing power agree to take emission-reduction measures in concert with each other and to sanction non-participants via trade restrictions or pricing adjustments. This could create incentives to improve environmental standards for markets to maintain competitiveness and access.

Box 15.1 Case study: Buy Clean California

The Buy Clean campaign was initiated in 2016 to advance polices that aligned California's procurement processes for infrastructure with the state's goals to reduce GHG emissions. The Buy Clean effort brought together a coalition of labour and environmental groups, with legislation signed into law by Governor Jerry Brown in 2017. Philanthropy was instrumental in aligning stakeholders to achieve a first-of-its-kind policy win.

Philanthropy can support:

- governance and architecture of climate clubs that facilitate low-cost climate finance and enhanced technological diffusion within members of the club
- studies that look at how carbon clubs, World Trade Organization (WTO) rules, free trade or regional trade agreements operate with each other and maintain environmental integrity while enhancing mitigation outcomes.

Trade regulatory approaches

The preamble establishing the agreement that underpins the WTO discusses the trade of the world's resources in accordance with sustainable development. Despite this key language, the avenues for leveraging pathways for climate-friendly trade have to date been limited, because expanding the WTO language in favour of climate outcomes would require hard-to-achieve universal support of all WTO members. Instead, debates on environmental protection and trade have played out through the WTO's dispute settlement mechanism, which has recently come under attack (Baschuk, 2019). Along with increasing volumes of trade, there has been concern about fairness and equity in trade, evident by the rising number of WTO disputes.

A more feasible approach in this area is to advance climate outcomes through regional trade agreements (RTAs). RTAs include a limited number of countries that already have a baseline alignment around their original agreement, thus making it easier and more likely to reach alignment on climate goals. Many RTAs already include environmental provisions (e.g. the Canada–EU Comprehensive Economic and Trade Agreement and the Trans-Pacific Partnership), which can be further strengthened. RTAs also include unfavourable provisions that can be removed, such as the Investor–State Dispute Settlement provision, which the fossil-fuel industry has used to block environmental and climate-related regulations and laws (Podesta et al., 2019).

Box 15.2 describes the case of the EU–Mercosur free trade agreement.

Philanthropy can support:

- civil society on the design and development of trade agreements that ensure fairness and equity principles are incorporated
- transparency and accountability regarding climate outcomes in trade agreements.

Box 15.2 Case study: driving climate action with trade

The most recent example of attempted climate leverage in trade is the EU–Mercosur free trade agreement, finalised in Osaka in 2019 after 20 years of negotiation. The deal covers 780 million people and aims to save over $4.5 billion worth of duties every year by eliminating 93% of tariffs on imports to the EU on products such as beef, poultry, sugar and ethanol and 91% of tariffs on imports to Mercosur such as cars, car parts, chemicals and machinery. The agreement received attention for including a joint commitment of both trade partners to implement the Paris Agreement, as well as a sustainable development provision that emphasises sustainable forest management and conservation as well as protection for labour rights, and responsible business conduct. Despite a climate clause, the agreement does not actually outline pathways for tracking compliance and accountability and leaves climate action at the discretion of the member states (Abdenur, 2019).

References

Abdenur, A.E. (2019) 'A double-edged sword: the climate politics of the Mercosur-EU Agreement'. Climate Diplomacy, 20 August (www.climate-diplomacy.org/news/double-edged-sword-climate-politics-mercosur-eu-agreement)

Baschuk, B. (2019) 'What's next for the WTO after sabotage by the U.S.'. Bloomberg Quick Take, 26 July (www.bloomberg.com/news/articles/2019-07-26/how-a-global-trade-slump-might-soon-sink-into-chaos-quicktake)

Morris, A. (2018) *Making border carbon adjustments work in law and practice*. Washington DC: Tax Policy Center

Nordhaus, W. (2015) 'Climate clubs: overcoming free-riding in international climate policy' *American Economic Review* 105(4): 1339–1370

OECD – Organisation for Economic Co-operation and Development (2016) *Country case: green public procurement in the Netherlands*. Paris: OECD Publishing

Podesta, J., Goldfuss, C., Higgins, T., Bhattacharyya, B. and Yu, A. (2019) *A 100 percent clean future*. Washington DC: Center for American Progress

State of California (n.d.) 'Buy Clean California Act'. State of California webpage (www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Buy-Clean-California-Act#@ViewBag.JumpTo)

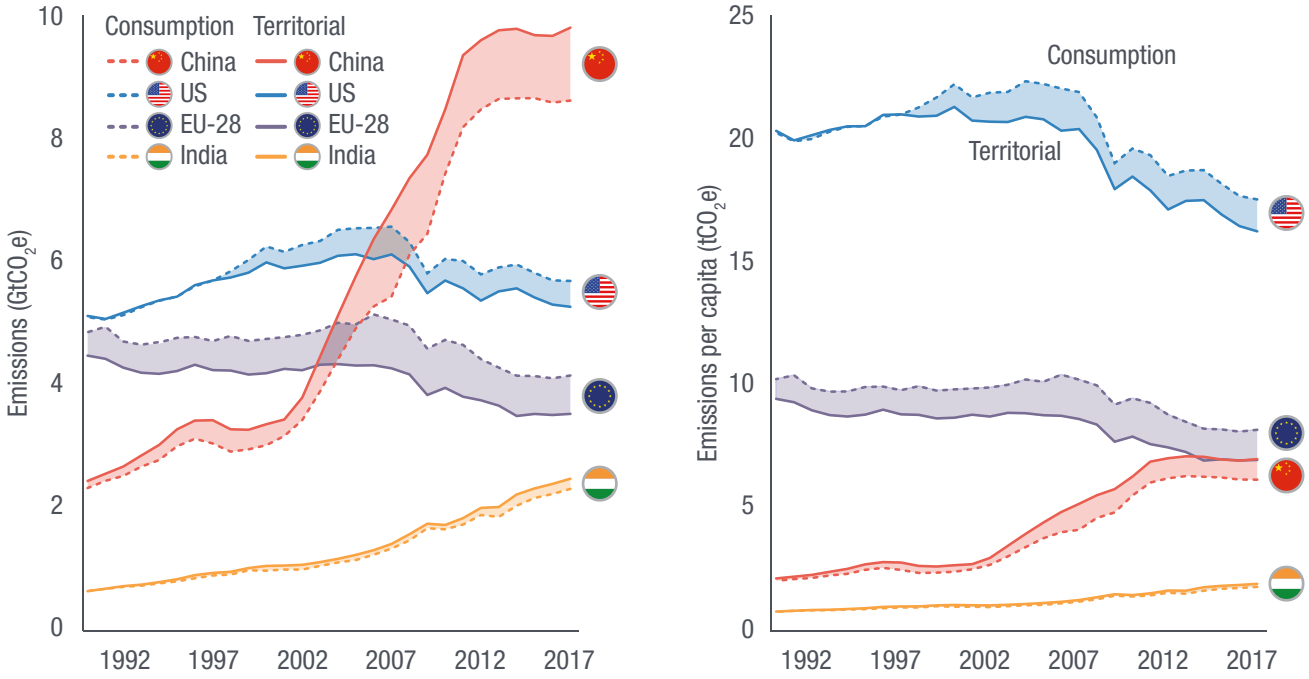
Chapter 16 The measurement, reporting and certification of carbon emissions: implications for developing countries

Andrew Scott

The world's climate emergency needs to be addressed by using every tool at our disposal. To achieve the 1.5°C global heating goal, greenhouse gas (GHG) emissions must reduce at an unprecedented rate – 7.6% a year – every year for the next decade (UNEP, 2019).[21] The focus in international negotiations on reducing territorial (or production) emissions clearly has not resulted in the reductions required to avert potentially catastrophic climate change. Tools to achieve emission reductions on the demand side that focus on consumption emissions, including certification schemes, could complement action to reduce territorial emissions.

In a world where traded goods account for 20% to 25% of CO_2 emissions (Davis and Caldeira, 2010), disparity between countries' territorial emissions and consumption emissions (Figure 16.1) raises several questions. How should consumption emissions be measured in a consistent and transparent way across countries? Who is responsible for emissions and taking action to reduce them – producers or consumers? How can global action to address the climate

Figure 16.1 Disparity between territorial and consumption emissions, selected countries



Source: UNEP (2019).

21 To achieve the 2°C goal in the Paris Agreement, emissions must reduce by 2.7% a year between 2020 and 2030 (UNEP, 2019).

crisis be taken fairly, given that the net flow of emissions embodied in traded goods is from developing to developed countries?

Certification schemes may have a role to play in measuring consumption emissions. There is a multiplicity of existing schemes,[22] established by various organisations – mostly non-government and voluntary – for various reasons, not necessarily related to climate change. For the measurement of GHG emissions (carbon intensity), the key considerations for a certification scheme are its primary purpose – that is, whose behaviour the certificate intends to change (consumers, retailers, producers) – and the unit that is to be certified (product, company or sector).

Certification schemes can be used to inform consumer choice and persuade them to go for a specific option; to drive negotiations within supply chains and improve operational efficiency; and to ensure accountability and secure finance or meet regulations. Certification can also be used by different stakeholders for risk management. But would a voluntary certification scheme for the carbon intensity of imports make a significant difference to the behaviour of producers in exporting countries or consumers in importing countries? Many of these schemes have been developed by companies and organisations in industrialised countries with limited input from developing countries (Beuchelt and Virchow, 2011). They may be biased towards certain sectors or in favour of large-scale producers that benefit from economies of scale in the cost of certification, putting small-scale businesses and farmers at a disadvantage.

Existing environmental certification and carbon offsetting schemes are widening their scope to include social and economic factors such as labour conditions and poverty reduction. They may aim to capture progress towards a broader sustainable development objective, but this could distract from GHG emissions accounting. When the aim of certification is to influence consumer behaviour, simple messages, such as carbon neutrality or comparisons with competitor products, may be more effective than a label specifying carbon content.

Certification schemes can apply to products or businesses. Consumption-based emissions accounting, attributing consumption emissions in a country,[23] is likely to have a product focus. The quality and consistency of consumption-based emission accounts could be affected by uncertainties in data (e.g. input–output tables and trade statistics) and by variations in methodology (IPCC, 2014). Certification schemes could require a large amount of detailed information about a product's value chain and would have to accommodate wide variation in the emissions from different producers. The cost and complexity of robust product certification could be a challenge for many producers in developing countries, who may require technical assistance to be able to participate in certification schemes (Beynon).

What is included in the certification (or standard) and where in the value chain certification is applied could affect measures intended to reduce emissions, because the emissions embodied in different goods can occur at different stages of the product life cycle (Broekhoff et al., 2019). For example, a large share of the life-cycle emissions of manufactured goods, such as electrical appliances, can occur during the use of the product or, in the case of plastics, at the end of its life.

The EU is actively pursuing border carbon adjustments (BCA), which would require a form of certification of the carbon content of traded goods as a measure to reduce consumption emissions (Keane and te Velde). Because a BCA is a regulatory measure and not a voluntary certification scheme, agreement will be required between governments about how to measure the carbon intensity of goods produced in importing and exporting countries. Trade negotiations are typically slow moving, and it is likely to take years to reach agreement before BCAs can be introduced, let alone achieve changes in consumption or production. But we have only 10 years to halve

22 Krishnan (this volume) notes 246 schemes listed by the International Trade Centre Standards Map. Eco Label Index lists 463 eco-labels including 33 (www.ecolabelindex.com).

23 For city-based consumption emissions, see C40 (2018).

global GHG emissions and to have a chance of averting catastrophic climate change.

The potential limitations of BCAs, as a tool to reduce GHG emissions rapidly need to be weighed alongside the question of whether developed countries addressing embodied emissions in traded goods is the most effective way to reduce their consumption emissions. Perhaps their focus should be on the carbon intensity of all consumption – domestic goods and services as well as imports. A large proportion of product life-cycle emissions occurs at the use stage, after goods have been manufactured or imported (Moran et al., 2018). This includes emissions from energy consumption, transport and buildings, which lend themselves to territorial emissions accounting (Broekhoff et al., 2019).

A major challenge in achieving emission reduction pathways consistent with the 1.5°C goal will lie in growing resource-intensive consumption (IPCC, 2018). A consumption-based approach to emissions reduction, which could be assisted by voluntary certification schemes, would provide insights into the fundamental drivers of emissions (Gulati and Naudé, 2017) and the changes in consumer behaviour necessary to achieve the scale of emission reductions required.

References

Beuchelt, T. and Virchow, D. (2011) 'Carbon labels – pitfalls for developing countries?' *Rural21* 5(2): 39–41

Broekhoff, D., Erickson, P. and Piggott, G. (2019) *Estimating consumption-based greenhouse gas emissions at the city scale: a guide for local governments*. Stockholm: Stockholm Environment Institute

C40 (2018) *Consumption-based GHG emissions of C40 cities* (www.c40.org/researches/consumption-based-emissions)

Davis, S.J. and Caldeira, K. (2010) 'Consumption-based accounting of CO_2 emissions' *PNAS* 107(12): 5687–5692

Gulati, M. and Naudé, L. (2017) *Chewing over consumption-based carbon emissions accounting*. Stellenbosch: WWF South Africa

IPCC – Intergovernmental Panel on Climate Change (2014) *AR5 synthesis report*. Cambridge, UK: Cambridge University Press

IPCC (2018) *Global Warming of 1.5C Special Report*. Cambridge, UK: Cambridge University Press

Moran, D., Wood, R., Hertwich, E., Mattson, K., Rodriguez, J.F.D., Schanes, K. and Barrett, J. (2018) 'Quantifying the potential for consumer-oriented policy to reduce European and foreign carbon emissions' *Climate Policy* 20(S1): S28–S38 (https://doi.org/10.1080/14693062.2018.1551186)

UNEP – United Nations Environment Programme (2019) *Emissions Gap Report 2019*. Vienna: UNEP

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