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Futures food for thought



Chewing over consumption-based carbon emissions accounting

Overconsumption by some people is contributing to dangerous climate change, while other people hardly get by.

This paper hopes to stimulate thinking about how consumption-based carbon emissions accounting can help us develop a better understanding of the effect of consumption patterns on emissions, and also how to enable sustainable consumption patterns.

Sustainable consumption together with sustainable production patterns are integral to the 2030 global agenda for sustainable development, specifically to Sustainable Development Goal (SDG) 12.



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SUMMARY

Conventional thinking about mitigating climate change is based on strategies to lower carbon emissions arising from **production**.

By exploring the role that increasing **consumption** plays in driving carbon emissions, consumption-based carbon emissions accounting might provide us with new insights into challenges to and opportunities for driving the shift to a low-carbon economy.

A version of the approach might hold particularly useful application at local government level, or for businesses, especially along their product supply chain.

Many countries are already undertaking research into consumption-based carbon emissions, including the United Kingdom (UK), the United States (US), the Netherlands, Germany, Italy, Japan, Sweden and Norway.

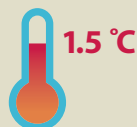
Consumption carbon accounting could offer three main benefits



It could encourage sustainable consumption together with sustainable production, integral to Sustainable Development Goal (SDG) 12.



It could drive action towards greater national emissions mitigation, increasing commitments under the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement.

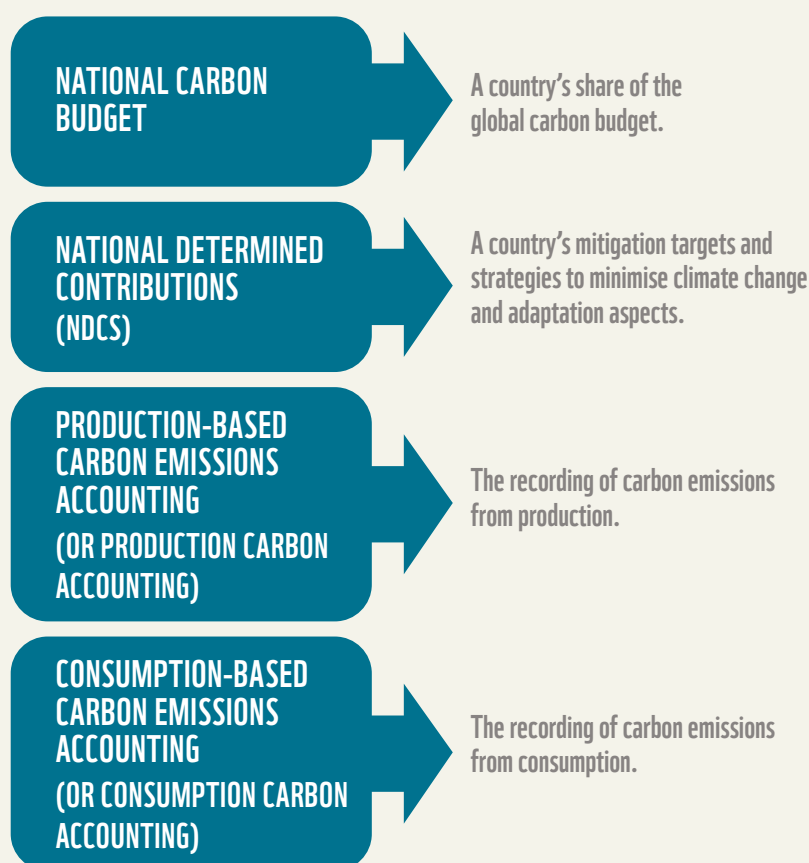


It could enable a country to engage in equity considerations and the fair distribution of its national carbon budget – its share of the **global carbon budget**.

The global carbon budget is the total amount of greenhouse gas emissions that can be emitted globally to limit the average global temperature increase. For a 66% chance of remaining within a 1.5 °C increase, we should emit no more than 400 billion tonnes (ever!) (Intergovernmental Panel on Climate Change (IPCC), 2014).

THE PARIS AGREEMENT AND SDG 12

The Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) may appear to have locked in a **production-based carbon emissions accounting approach**, as global negotiations and mitigation efforts are now based on countries' production-based **Nationally Determined Contributions**.¹ However, taking a **consumption-based carbon accounting** view remains relevant and complementary.²



¹ United Nations (UN), 2016b.

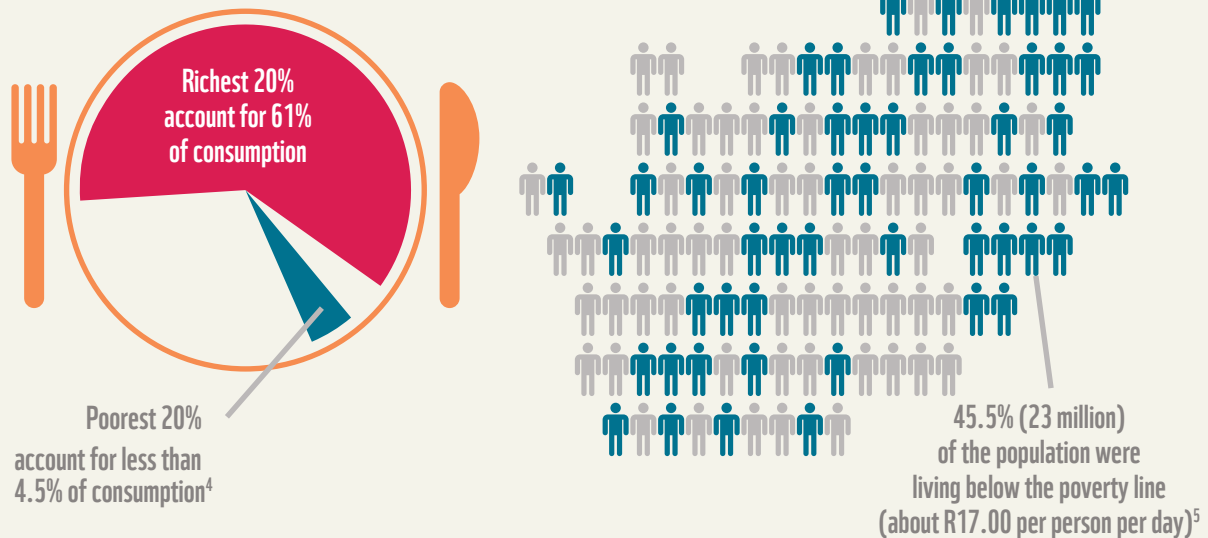
² Afionis, et al. 2016.



Equity considerations

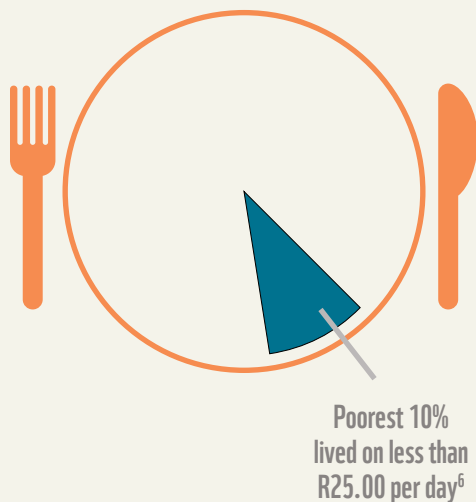
Poverty levels and income distribution should be used to determine the consumer segments that should be most targeted by climate change policy.

SOUTH AFRICA: 2011

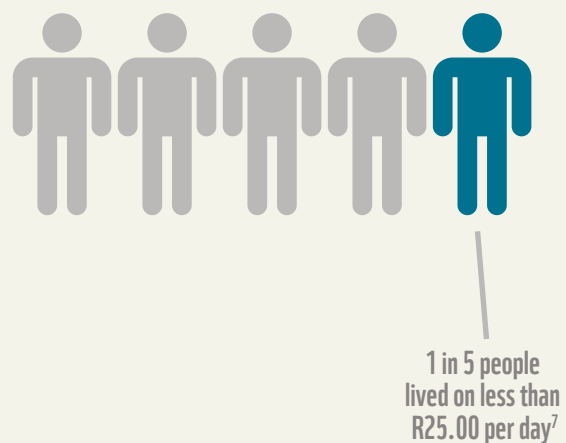


THE WORLD: 2015

WORLDWIDE:



DEVELOPING REGIONS:



3 According to the World Bank (2015), in 2011, the global poverty line was approximately R17.00 per day, per person. As of October 2015, it was set at approximately R25.00 per day, per person (both figures at 2/10/2017 exchange rate).

4 The World Bank (WB) and International Monetary Fund (IMF), 2015.

5 Statistics South Africa (SSA), 2014.

6 UN Sustainable Development Goals (SDGs), 2017.

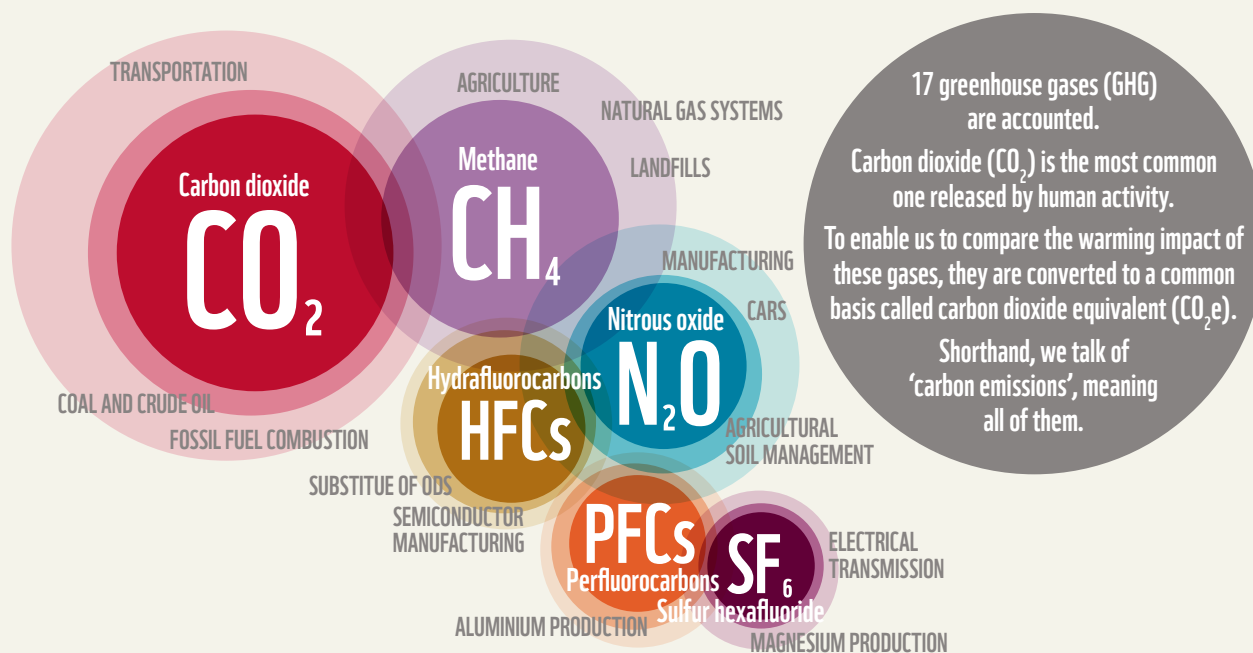
Food for thought!

Alongside production carbon accounting, consumption carbon accounting can assist in identifying and unlocking greater opportunities for climate change mitigation — within a country, and in relation to the UNFCCC-linked Global Climate Action Agenda of public and private entities.⁷

We are not suggesting that production carbon accounting be revisited or that targets be relaxed. Even if fully implemented, countries' mitigation targets are grossly inadequate to achieve the aggregated emissions reductions that are required to remain below 2 °C (let alone 1.5 °C).⁸

Using *both* production and consumption carbon accounting would intensify efforts and help advance the goals of the Paris Agreement, as well as SDG 12.

What are greenhouse gases?



SOURCE: EUBANKS, W. 2016. WHAT ARE GREENHOUSE GASES, MAIN SOURCES AND CLIMATE IMPACT. GREEN GROWING. [HTTPS://WWW.GREENANDGROWING.ORG/WHAT-ARE-GREENHOUSE-GASES/](https://www.greenandgrowing.org/what-are-greenhouse-gases/)

⁷ UN, 2016a.

⁸ Afionis, et al, 2017.



CONSUMPTION AS A CLIMATE CHANGE DRIVER

CONSUMPTION

the “possession and use of an increasing number and variety of goods and services” (Assadourian, 2010)



Like production, **consumption** drives climate change:⁹

- Consumption, together with rising incomes, is one of the greatest drivers of resource-use and environmental degradation globally.
- Consumer behaviour and lifestyle significantly impact energy-use and the resulting emissions — an overwhelming proportion of global GHG emissions arising from production can be linked to consumption patterns. This is a growing concern as consumerist behaviour and lifestyles in developed countries are being emulated by elites and the middle-class in many developing countries.
- Measures that stabilise or reduce consumption, stimulate behavioural changes, and perhaps facilitate the transition towards **collaborative consumption**, have a high mitigation potential. However, up until now, climate policy and mitigation initiatives have been concerned with direct emission levels and emission patterns from producing goods and services.

Collaborative consumption is a lifestyle model based on sharing, rather than ownership. Consumers move away from hyper-consumption, buying and owning things, to paying for the experience of temporarily renting or sharing goods and services. The model challenges traditional thinking, redefines property rights and ownership, and the fundamental principles of monetisation.



The unsustainability of consumption patterns and of the environmental threats posed by consumerism is reflected in the inclusion of sustainable consumption under SDG 12. This goal includes, for example, achieving sustainable management and efficient use of natural resources, a strong focus on waste, and implementing programmes on sustainable consumption and production. However, there has been relatively little focus on the impact of emissions associated with the consumption of goods.¹⁰

⁹ IPCC, 2014.

¹⁰ Davis and Caldeira, 2010.

WHAT IS CONSUMPTION-BASED CARBON EMISSIONS ACCOUNTING?

At a global level, consumption and production carbon accounting are two sides of the same coin.¹¹ Under both systems, total emissions remain the same and go into one global atmosphere, but they are allocated in a different manner.

*The word **consumption** in ‘consumption-based carbon accounting’ is about emissions caused by all forms of final demand for goods and services — by individuals or households, business and government.*

Main differences between consumption and production carbon accounting

Consumption carbon accounting	Production carbon accounting
It accounts for emissions from the products and services bought by the people who live in a country.	It accounts for emissions emitted during the production of goods and services within a country, regardless of whether the production is for a domestic or overseas market.
It allocates emissions to consumers of goods and services .	It allocates emissions to emitters of carbon emissions.
It avoids counting emissions twice by counting emissions embedded in imports , while excluding emissions from goods and services produced for exports — these are counted at the point where the goods or services are used by the end consumer.	All emissions generated from the production of goods and services within a country are added together as the country's total emissions .

NOTE: The UNFCCC requirements for a country's national GHG Inventory uses a production-based accounting system (IPCC, 2006).

SOURCE: INFORMATION ADAPTED FROM DAWKINS AND OWEN, 2010; AND AFIONIS, ET AL, 2017.

¹¹ Afionis, et al, 2017.



Example of the difference in the two approaches

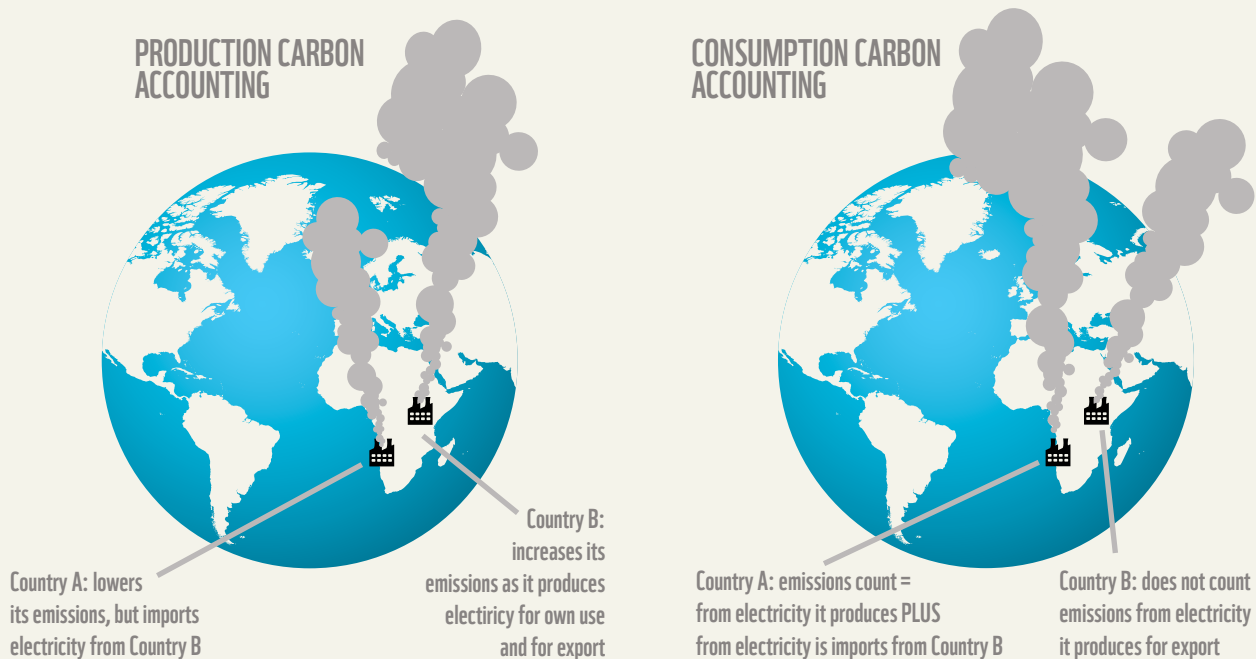
Country A relies on fossil fuels. To reduce its high emissions level, it restricts fossil fuel-based electricity generation. But, it fails to implement measures to reduce the demand for electricity, or to invest in renewable energy technologies. It therefore does not have enough electricity to meet domestic demand and needs to import electricity from **Country B**, which produces its electricity from fossil fuels.

With production carbon accounting:

- **Country A** lowers its emissions because it burns less fossil fuels within its borders to create electricity.
- **Country B** increases its emissions because it produces a surplus of electricity for its own domestic needs and for export.

With consumption carbon accounting:

- **Country A** counts the emissions from the electricity it uses — from electricity it produces and electricity it imports. The fossil fuels-based electricity it imports increases its emissions levels, even though it is generated in another country.
- **Country B** does not count the emissions from the electricity it exports. It is left with the same emissions levels it had from producing electricity for its own use.



BENEFITS OF THE CONSUMPTION-BASED APPROACH

The consumption-based approach provides a more complete picture of causes of emissions and offers a wider range of mitigation options. Government, companies, households and society potentially benefit in varying ways from this.

The value of consumption carbon accounting



BENEFITS TO GOVERNMENT

- Drives national and subnational ambition to reduce emissions
- Encourages sharper carbon pricing and policy
- Fosters broader sustainable consumption
- Helps local government deliver a healthy environment
- Focuses on cost-effective ways to change behaviour



BENEFITS TO COMPANIES

- Focuses on cost-effective ways to change behaviour
- Encourages understanding of product lifecycle emissions
- Enhances business case for low-carbon investment
- Provides effective demand-side mitigation measures
- Encourages fair share of mitigation effort and global carbon space
- Encourages fairer allocation of emissions embodied in global trade



BENEFITS TO HOUSEHOLDS AND SOCIETY

- Encourages fair share of mitigation effort and global carbon space
- Encourages fairer allocation of emissions embodied in global trade
- Uses carbon budgeting for developmental goals



CARBON PRICING

a market price or a tax
per tonne of carbon
emissions

Drives national and subnational ambition to reduce emissions

Consumption carbon accounting is compatible with the Paris Agreement, although not required by it.

- Understanding emissions from a consumption perspective can motivate countries or municipalities to achieve emissions reductions beyond those from production efficiency gains. It can contribute to the efforts to restrict global warming to the 1.5 °C ‘safer’ limit.
- Countries will be expected to strengthen their commitments at each five-year review to measure progress towards achieving the goals of the Paris Agreement. Going as far as possible to decouple consumption and consumption lifestyles from emissions can be a strategy for improving and delivering on targets.

CARBON LEAKAGE

to relocate high-
emitting production or
manufacturing plants to
another country, and to
then import the finished
carbon-intensive
products back into the
country

Encourages sharper carbon pricing and policy

Many countries have instituted or plan to introduce **carbon pricing** — a price or tax on carbon to help them meet their commitments under the Paris Agreement. Consumption carbon accounting can help:

- Enhance the scope of carbon taxes, which often only cover Scope 1 and 2 emissions (see page 17).
- Provide insights into the extent to which **carbon leakage** may occur because of carbon pricing, and help manage it. Related to carbon leakage is carbon outsourcing. This is when a country outsources carbon-intensive domestic production to a developing country, resulting in a reduction in the outsourcing country's own emissions and an increase in the developing country's emissions (see page 20).



Example of carbon leakage

- **Country A** introduces carbon pricing mechanisms to try meet its emissions reduction targets. A carbon-intensive **company** has three plants in **Country A** but now decides to relocate to **Country B**, which has less or no emission controls — typically a developing country
- The benefit of relocation for the **company** and **Country A** is a reduction in their production emissions. However, the total *global* emissions remain the same, or even increase if the energy supply or production processes in **Country B** are more carbon-intensive.

A business may relocate for different reasons, which are not always because of climate change policy or carbon pricing. However, allocating emissions to consumers, as per consumption carbon accounting, can reduce the incentive to import carbon-intensive goods and services, and thereby reduce or eliminate carbon leakage.¹²

¹² Pan, et al, 2008.



Cape Town Energy 2040 covers a range of measures over the next five years towards achieving the goal of a low carbon, resilient, resource efficient and equitable future for Cape Town.

Helps local government to deliver a healthy environment

Local governments are close to the needs, wants and behaviours of the residents for whom they must deliver services and an environment conducive to earning a living, and enjoying a secure and healthy life. Consumption carbon accounting is a useful approach for cities and towns. Some local and regional climate change plans display features of a consumption-based approach as depicted in the examples below.



LESS DEPENDENCY ON COAL with extensive embedded renewable generation in the commercial and residential sectors

THERMALLY EFFICIENT LOW COST HOUSING with better access to energy services

INCREASED ACCESS TO PUBLIC TRANSPORT with reduced travel time & distance

HIGH LEVEL ENERGY EFFICIENCY IMPLEMENTED

WASTE MINIMIZATION, RECYCLING & REUSE

Fosters broader sustainable consumption

Consumption carbon accounting can be a useful tool for identifying national policies and interventions designed to foster sustainable consumption more broadly, and a proxy indicator for tracking progress towards fulfilling SDG 12.

- Essential shifts in the scale and pattern of consumption are needed to achieve both climate change mitigation and global development goals. To make these changes, governments and communities rely on their ability to influence the expectations, choices, behaviours and lifestyles of consumers. Current efforts, such as public awareness campaigns and the introduction of eco-labels, have not made an impact on a large scale.¹³
- Consumption emissions data can reveal trends in consumption emissions over time. This in turn can offer insights into the consumption behaviours behind emissions; the categories where consumption is growing; and consumerist lifestyles that are responsible for the unsustainable use of resources. This data can also provide a clearer indication of the behaviour changes that are required, and a measure of the impact of initiatives undertaken.

Focuses on cost-effective ways to change behaviour

Consumption carbon accounting may facilitate more cost-effective emission reductions (to the economy as a whole, not necessarily for particular businesses) by allowing for policies that target consumer behaviour. Such behavioural changes may be needed to reach emissions targets. If these behavioural changes are achieved, they could enable emissions targets to be met at lower costs. For example, a retailer could educate customers about buying local products, and thus could reduce its own emissions from transport, rather than replacing its vehicle fleet with electric vehicles sooner than it may want to.

Enhances the business case for low-carbon investment

Consumption carbon accounting:

- Can improve the case for investing in the production of low-carbon technologies that would otherwise be considered unviable or expensive. These technologies may be relatively emissions-intensive to produce, but result in lower emissions than alternatives, when the total lifecycle emissions are taken into account.¹⁴
- It can encourage a shift towards consumption of lower-carbon goods. Economies reliant on exports will need to invest in cleaner and more efficient production systems to safeguard their export markets.
- It can support responsible production and consumption under SDG 12.

¹³ Seyfang and Paavola, 2008.

¹⁴ Deloitte Access Economics, 2015.



SHUTTERSTOCK.COM

Provides effective demand-side mitigation measures

Current climate mitigation policies and efforts related to consumption have primarily centred on energy efficiency or improving energy conservation practices — switching off lights when leaving a room, adjusting the indoor temperature. We largely ignore or inadequately target other dimensions of consumption.¹⁵ This is mainly because the production-based perspective breaks down emissions by industries and sectors, for example by energy production or energy-intensive industries, and provides limited or no information on how the goods and services manufactured by these industries are consumed.

By contrast, a consumption-based perspective provides a more comprehensive picture of the underlying drivers of emissions and the role that manufactured products and services play.¹⁶ It can assist with the following:

- Unlocking more options for emissions reduction by pointing to potential demand-side oriented interventions in government policy, organisations' plans, and in our daily lives.
- Facilitating a greater understanding of how different policy measures encourage or discourage emissions reduction, by bringing in the demand-side dimension.
- Helping to improve the effectiveness of specific measures by revealing where further opportunities or barriers might lie.¹⁷

¹⁵ Clarke, et al. 2014. In Schane, et al, 2016.

¹⁶ House of Commons Energy and Climate Change Committee, 2012.

¹⁷ House of Commons Energy and Climate Change Committee, 2012.



Consumption carbon accounting can improve the case for investing in the production of low-carbon technologies that would otherwise be considered expensive. These technologies, such as the above solar farm, will result in lower emissions.



Encourages understanding of product lifecycle emissions

Consumption carbon accounting helps companies better understand **Scope 3 emissions** embodied in their supply chains. In some sectors, these emissions represent a significant proportion of their total supply chain emissions. Understanding Scope 3 emissions can help companies better manage the environmental footprint of their supply chains. They may then translate this into information for consumers, such as using eco-labels, to guide consumption decisions.

SCOPE 1 EMISSIONS:

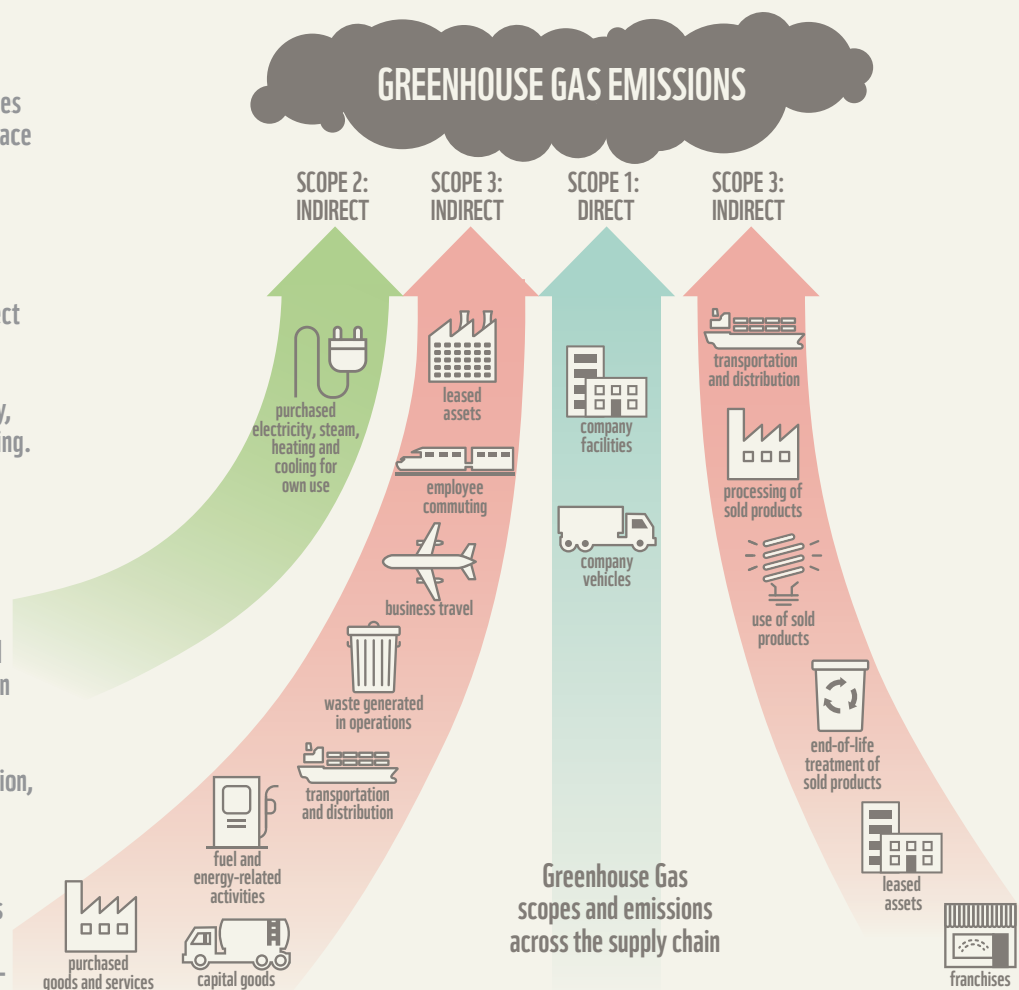
From direct emission sources from activities that take place within a company's own facilities.

SCOPE 2 EMISSIONS:

From energy-related indirect emissions that a company purchases or acquires for own use, such as electricity, steam, heating and or cooling.

SCOPE 3 EMISSIONS:

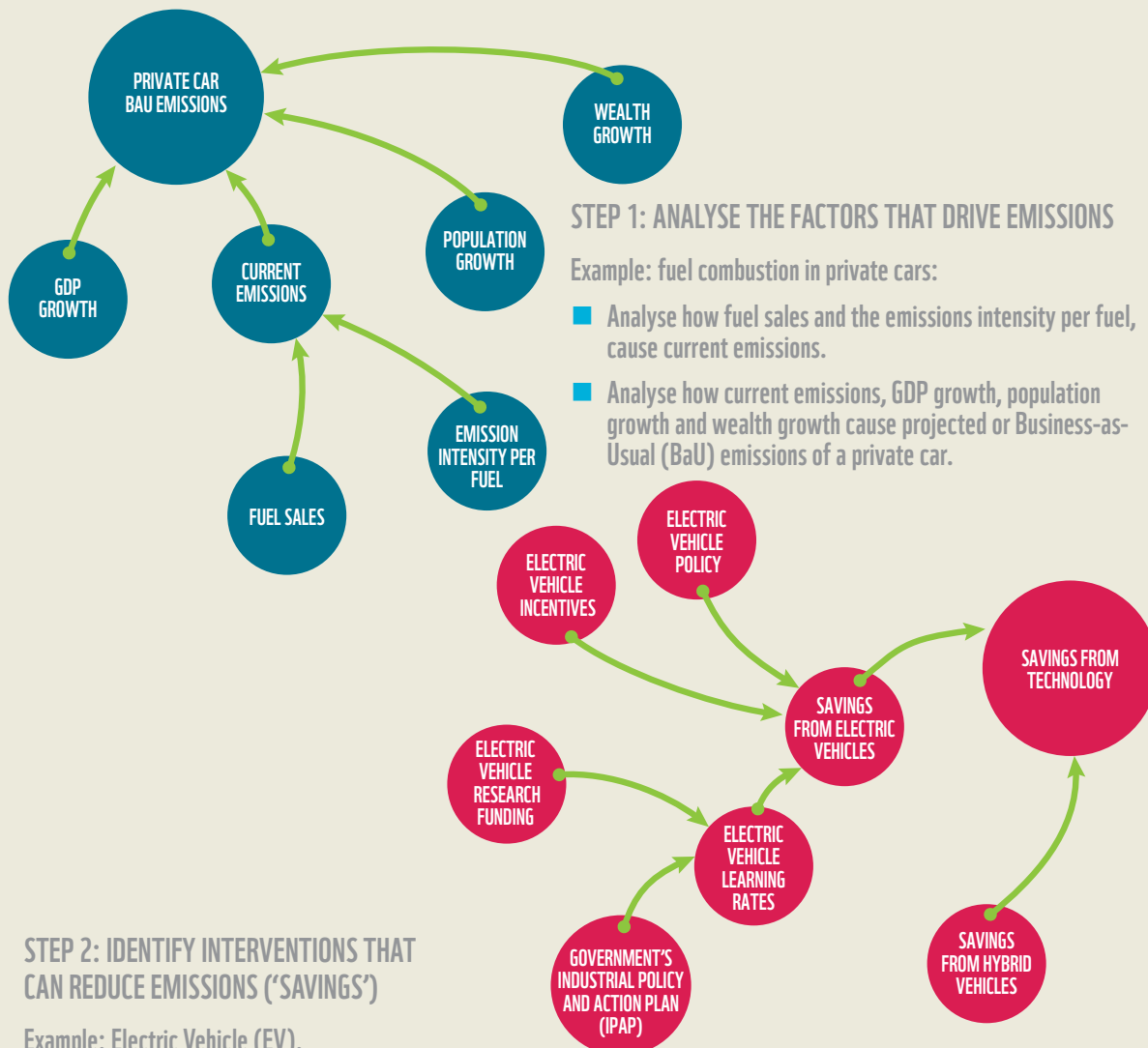
From indirect emissions from activities such as the extraction and production of purchased materials and fuels. They are embodied in the goods and services the company purchases from suppliers, and the distribution, use and disposal of its products by its customers, from or to anywhere in the world. Embodied emissions are another company's Scope 1 and 2 emissions — generated in making the product.



SOURCE: ADAPTED FROM GHG PROTOCOL'S CORPORATE VALUE CHAIN (SCOPE 3) ACCOUNTING AND REPORTING STANDARD, WORLD RESOURCES INSTITUTE (WRI) AND THE WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT (WBCSD), 2011.

Example of production-based view of emissions produced from private cars

The focus is on analysing how much energy is used and its associated emissions, and identifying interventions to reduce emissions.



STEP 2: IDENTIFY INTERVENTIONS THAT CAN REDUCE EMISSIONS ('SAVINGS')

Example: Electric Vehicle (EV).

- Identify how research funding and the government's Industrial Policy and Action Plan (IPAP) have impacted EV learning rates, which in turn has impacted savings from EVs.
- Identify how EV incentives and policy have impacted savings from EVs.
- Identify how savings from EVs and from hybrid vehicles have reduced emissions from technology.

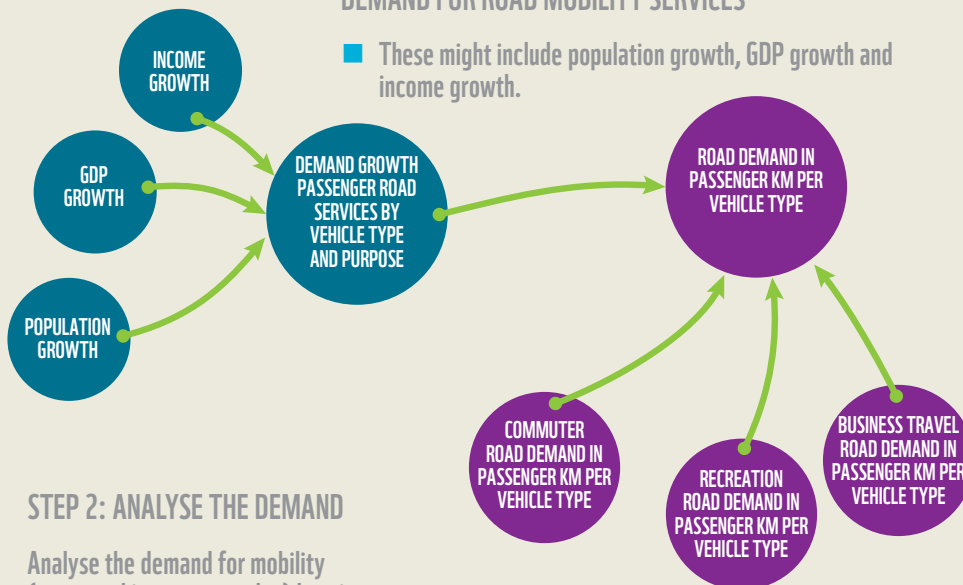


Example of consumption-based view based on the demand for mobility services

The focus is on what service is provided by the energy used and its associated emissions, rather than just how much energy is used.

STEP 1: IDENTIFY THE FACTORS DRIVING INCREASED DEMAND FOR ROAD MOBILITY SERVICES

■ These might include population growth, GDP growth and income growth.

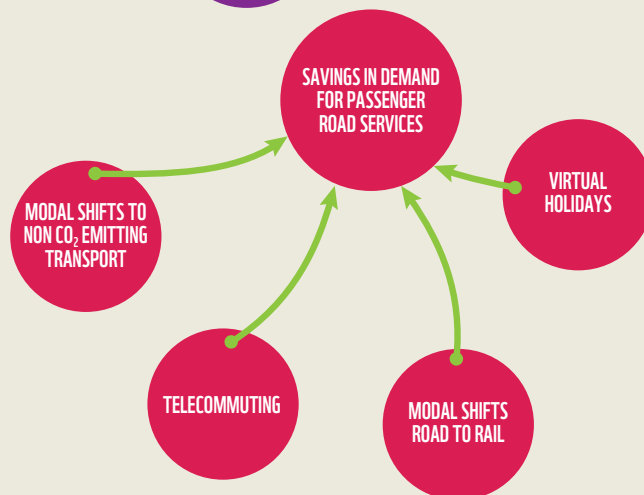


STEP 2: ANALYSE THE DEMAND

Analyse the demand for mobility (measured in passenger-km) by trip reason (commuting, business trips, recreation) and vehicle type. This can be done for all modes of mobility services, here road is shown.

STEP 3: IDENTIFY INITIATIVES TO REDUCE THE DEMAND

Identify initiatives to reduce the demand for road mobility, such as modal shifts to non-CO₂ emitting transport, telecommuting, modal shifts from road to rail, and virtual holidays.



CARBON OUTSOURCING

to outsource carbon-intensive domestic production to a developing country, resulting in a reduction in the outsourcing country's own emissions and an increase in the developing country's emissions

Encourages fairer allocation of emissions embodied in global trade

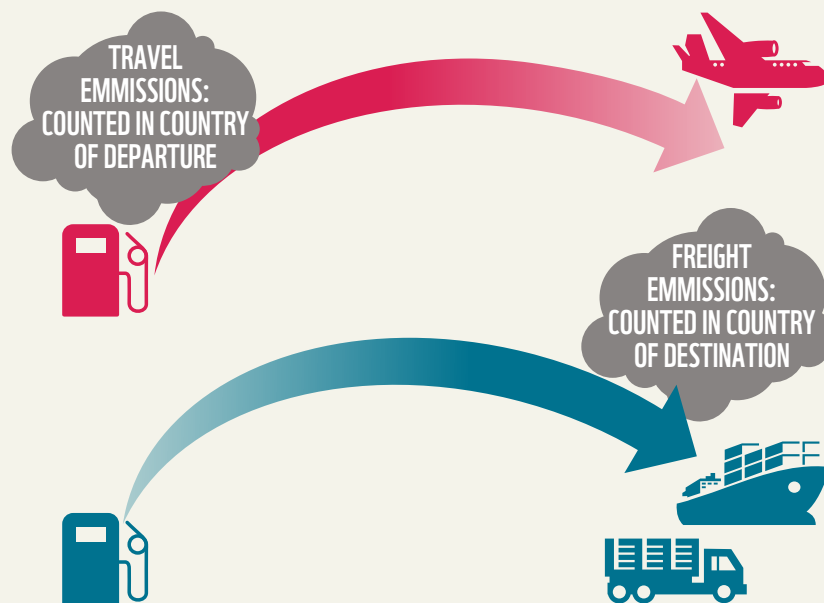
The allocation of emissions embodied in international trade is important in evaluating the real impact that each country has on climate change and its responsibility for emissions.

Consumption carbon accounting is a fairer system:

- It avoids the problems of **carbon outsourcing** and leakage, as it captures the emissions associated with the global trade of goods and services by allocating emissions to consumers.
- Unlike production carbon accounting, it does not disproportionately penalise countries with base metal industries that by their nature are carbon-intensive and are often located in developing and emerging countries, such as the aluminium smelters in South Africa. These metals are needed worldwide, and their emissions would be accounted at the point of use.¹⁸

Transport and travel

Currently, the emissions that arise from transport and travel in international trade are not included in national GHG emission totals. They are reported separately based upon where the fuel is sold, i.e. by the country of departure.



In consumption carbon accounting, these emissions are counted where the goods or services are consumed:

- Travel emissions would be counted in the country of departure (for the account of the businessperson or tourist who is buying travel).
- Freight emissions would be counted in the country of destination, where the purchase of goods is made.¹⁹

¹⁸ Ferng, 2003; and Peters, 2008.

¹⁹ Bruckner, et al, 2010.

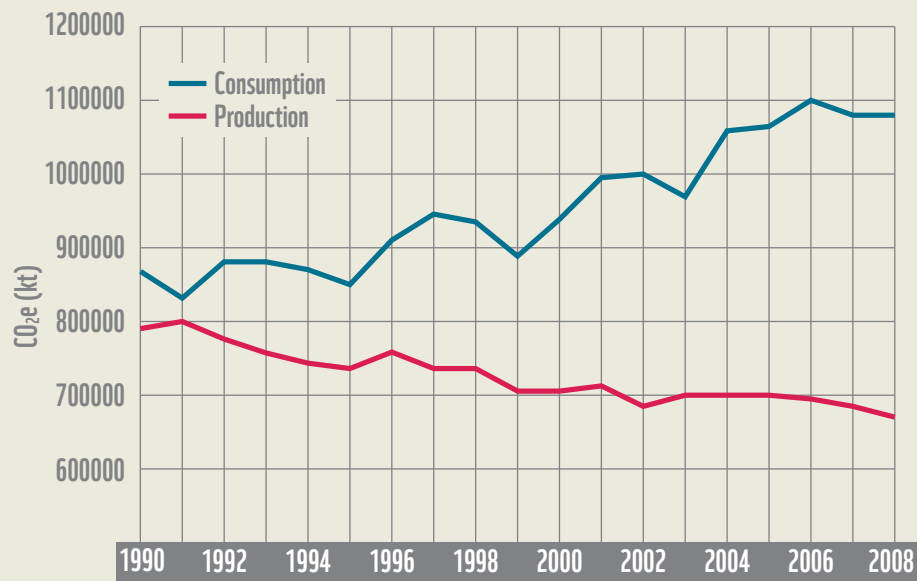


The problems of carbon outsourcing and leakage

The UNFCCC's Kyoto Protocol required developed countries to cut their emissions by specified amounts and allowed developing countries to participate voluntarily through the Clean Development Mechanism (CDM). It was thus possible for developed countries to reduce their own emissions through carbon outsourcing and carbon leakage (see page 11). These approaches have become the dominant mode of emissions reduction by many developed countries and have resulted in increasing emissions in developing ones.²⁰

Research shows that from 1990–2008, using consumption carbon accounting and including imports, the UK's carbon emissions **increased by 20%**, rather than declining, as they had registered using the production carbon approach (see graph below).²¹

UK GHG Emissions 1990–2008



SOURCE: DEFRA, 2012.

More recent estimates suggest that production in other countries, accounts for **31%** of Australia's, and **more than 50%** of the UK and France's carbon footprint.²² By the same measure, one estimate suggests that around **30%** of China's emissions are produced on behalf of consumers in other countries.²³

>50%

of UK and France's
carbon footprint is
produced in other
countries

31%

of Australia's
carbon footprint is
produced in other
countries

20 See for example, Helm, et al, 2007 for the United Kingdom; and Deloitte Access Economics, 2015.

21 Barrett, et al, 2012.

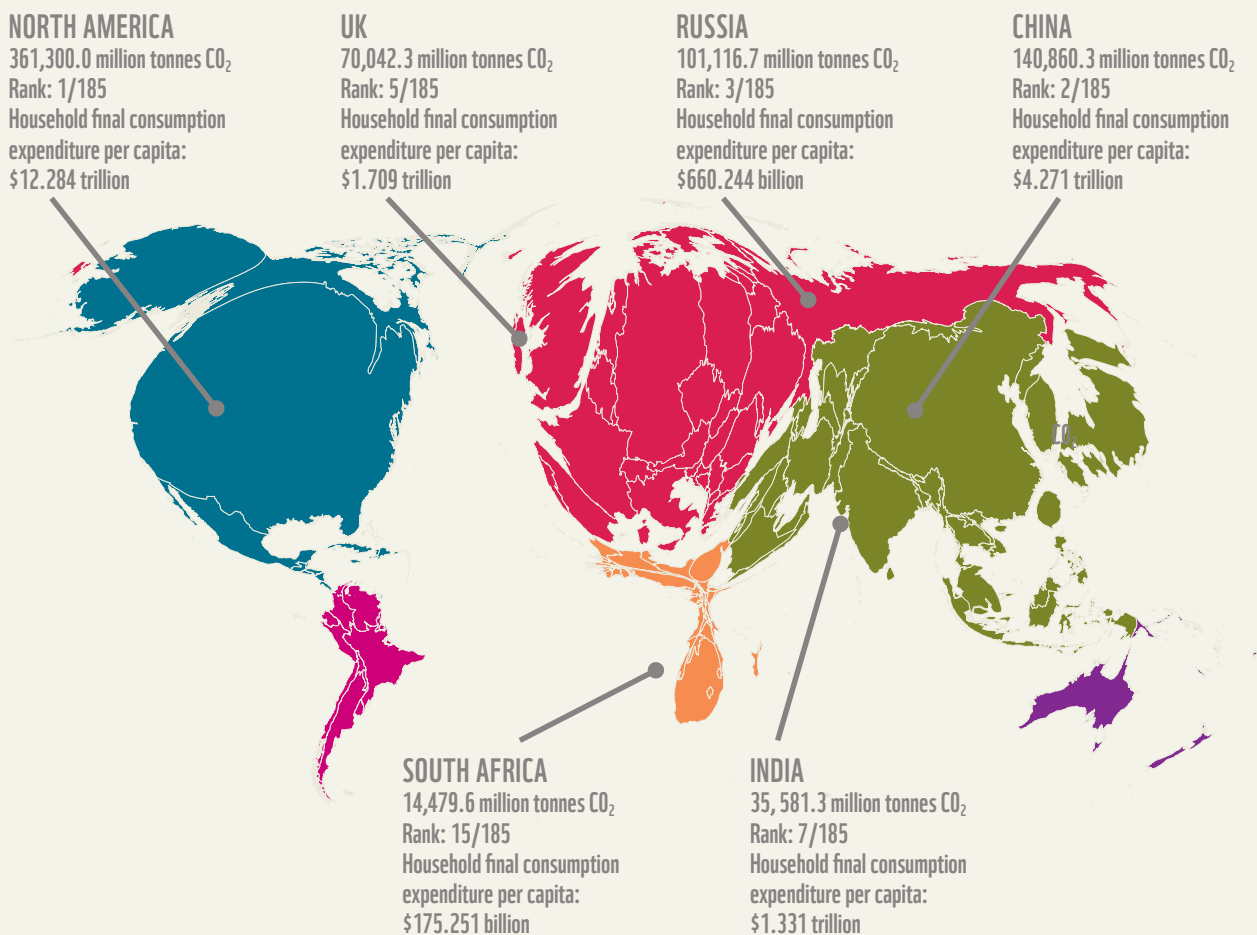
22 Deloitte Access Economics, 2015.

23 Bruckner, et al, 2010.

Encourages fair share of mitigation efforts and the global carbon space

Consumption carbon accounting encourages more just and equitable climate change mitigation measures. The carbon map below, for example, uses country size to visually show CO₂ emissions from energy use, from 1850 to 2011. These historical (or 'cumulative') emissions remain relevant because CO₂ can remain in the air for centuries. Europe and the US dominate, having released around half the CO₂ ever emitted.

Carbon map: CO₂ emissions from energy use 1850-2011



© CARBONMAP.ORG BY KILN.DIGITAL
SOURCE: WWW.CARBONMAP.ORG/#HISTORICAL

There is also information on the map about the household final consumption expenditure per capita of various countries. This is the market value of all goods and services purchased by households for one year, divided by the country's average population for that year. On the map, the information is presented in current US dollars, for 2015-2016.²⁴

²⁴ World Bank national accounts data, and OECD National Accounts data files.



Matching responsibilities with consumption levels

Using information about energy use and mitigation efforts, production and consumption carbon accounting can reveal where the benefits of high emitting production are being enjoyed, and strengthen the case for high emitters taking on levels of responsibilities that match their consumption levels. This is pertinent across, as well as within countries.

- Richer countries can be expected to take on the greater burden for the reduction in emissions, given that they bear most responsibility for higher past emissions; and that they have the greatest capacity to solve the problem. They are also better able to reduce emissions without unduly or excessively impacting the welfare of their people.²⁵
- Unsustainable consumption practices of the affluent and burgeoning aspirations to such lifestyles is putting increasing pressure on environmental systems. Measures derived from consumption carbon accounting can target restraining high emitters, while ensuring that the burden is not placed on low-income groups who make low or negligible contributions to emissions.

GRANDFATHERING

where existing producers (countries or companies) continue with their high emissions, and enjoy a lion's share of the available global or national carbon budget

Uses carbon budgeting for developmental goals

Consumption carbon accounting can provide a robust base for strategically sharing out carbon budgets.

- The production-based approach focuses on cutting emissions down from a production-as-usual projection. This lends itself to **grandfathering**.
- The consumption-based approach could give an indication of how much carbon could be 'spent', what it could be spent on, who should be enabled to emit how much, and for what purpose.²⁶



SOURCE: CITY OF CAPE TOWN, 2015.

Projects that support Cape Town Energy2040: rooftop photovoltaic systems, energy efficient lighting for street lights, traffic lights and buildings; public and non-motorised transport.

²⁵ Grasso and Roberts, 2014.

²⁶ Lake District National Park Authority in House of Commons Energy and Climate Change Committee, 2012.

CHALLENGES OF THE CONSUMPTION-BASED APPROACH

The consumption-based approach is not without its challenges which would need to be overcome, if it is to yield effective results alongside the production-based approach.

The difficulties of consumption carbon accounting





CARBON INTENSITY

the amount of emissions caused on average per unit output of a specified activity, for example, grams of CO₂ released per megajoule of energy produced

South Africa's electricity supply is very carbon intensive because it is based on coal-fire plants. This in turn makes any activity and product using the electricity, carbon intensive.

Accounting and methodological complexities

- Developing consumption-based emissions inventories is a challenging process, as they incorporate production emissions as well as information, such as sectoral carbon intensities in international trade.
- Consumption-carbon accounting is reliant on global trade data and models. These are very data-intensive and cannot be produced annually. Alternative methods could be used, but it would require additional work to publish the necessary input datasets more regularly.
- The supply chain of many manufactured goods extends across different countries. Supply chain information linking goods and services to their original place of manufacturing may be too complicated to achieve.²⁷
- All countries involved in the supply chain must keep valid and standardised data about the **carbon intensity** involved in producing each product. This is used to calculate emissions embodied in that product. Such data requires more complex calculations and possibly many assumptions, which could lead to high uncertainty about emissions data.²⁸

A company which has part of its production process in another country (e.g. in Country B), might legitimately argue that the carbon intensity of its operations in Country B is better than the carbon intensity of Country B as a whole. As the embedded carbon of goods become more of a factor in the marketplace, globalised companies might resort to accounting emissions along their supply chain for themselves. While it is commendable that companies become increasingly vigilant about their emissions, it would not help with a global accounting system, and there would be no independent means of verification.²⁹

Obstacles to effectiveness

- It can be difficult to make policy that regulates identifiable and manageable organisational entities, because customer behaviour which is not governable by companies is inserted into the emissions reduction equation.³⁰
- Targeting domestic production emissions enables very direct control of emissions, whereas pricing emissions embodied in imported goods may not have the effect of reducing the same quantity of emissions. It also provides inefficient signals for emissions reduction.³¹

Shifting responsibility without agency

Shifting responsibility from producers to consumers, means that consumers bear the costs of emissions reduction regardless of where the products they buy are produced. However, consumers may not always be able to exert pressure on the producers.

²⁷ Dawkins and Croft, 2017

²⁸ Dawkins and Croft, 2017

²⁹ For more information about datasets about emissions embodied in trade see Peters, 2008, or for datasets about time series with trade see Peters, et al, 2009.

³⁰ Afionis, et al, 2017.

³¹ Jakob, et al, 2013.

**CHOOSE COLLABORATIVE
COMMUNITY**

Share car use and
community bicycles



**RESPONSIBLE
AND SUSTAINABLE
CONSUMPTION**



**CONSIDER WHAT
YOU BUY**

Buy from local and
sustainable sources



REDUCE WASTE

Carry reusable bags,
recycle plastic bottles, save trees,
use renewable resources



Food for thought!

Consumption carbon accounting does not offer a panacea for climate change mitigation.³² It also cannot replace production carbon accounting required for national GHG Inventories and the Paris Agreement. It should rather be considered as a **complementary** tool that can yield the following benefits:

- A more complete picture of the **causes** of emissions through better analysis and understanding of the effect of consumption patterns on emissions
- A wider range of **mitigation options** along the supply chain and at the point of final consumption
- The identification of business and consumer **behaviour change** initiatives, which can create conditions conducive to the uptake of low-carbon and sustainable technologies, products and services
- **Shared responsibility** across business, household and individual consumers to act to address emissions. This makes it more possible to directly address consumption as a driver of increasing emissions. However, factors such as poverty levels and income distribution must be taken into consideration to determine the consumer segments to target
- The development of **government policy** that enables changes in consumption, and is directed at strategies that are most effective, and are cheaper and quicker to reduce emissions
- An analytical tool that can be used to good effect at **subnational levels** of government, where residents' consumption is closely linked to a local government's emissions profile and mitigation strategy, and consumption-targeted interventions can have direct and manageable impact.

Talking points

- What insights does consumption carbon accounting provide into **emissions drivers and reduction opportunities**? What innovative mitigation strategies might surface?
- How might the approach be used to address concerns of **equity** in the climate change mitigation policy within the country?
- How does the approach fare from a **social welfare** point of view? What negative impacts might mitigation initiatives identified by this approach have on the poor? How can these be avoided?
- How can **business** use the approach to:
 - identify new low-carbon market opportunities, and expand these?
 - identify new technological innovations that assist in emissions reduction?
 - substantiate investments in low-carbon production?
 - foster cleaner supply chains?
- Since consumption is impacted by climate change, how might a consumption lens lead to **integrated adaptation and mitigation** approaches?
- Even if it is not feasible to keep comprehensive consumption carbon accounts, a method for using the consumption angle as an **analytical tool** could be developed, with rough quantums. How could such an analytical tool be applied to particular mitigation problems or policy being developed?

32 Liu, 2005.



Futures food for thought

The climate change mitigation debate in South Africa needs to move from improving efficiency within a projection of the existing economy, to innovation and options beyond the constraints of the current dispensation and structure of the economy. It may take step changes in the development path to achieve mitigation adequate to South Africa domestic and international commitments, and maximise economic development and social wellbeing. Business models presently unconsidered may be waiting in the wings.

The 'Low-carbon development frameworks in South Africa' project seeks to deepen understanding of, and reveal opportunities for, transitions to a low-carbon economy. It facilitates and develops contributions at the intersection of climate change mitigation, economic development and socio-economic dimensions, across immediate, medium and long-term horizons.

Working variously with government, business and labour, the project reaches from providing input to emerging government mitigation policies and measures; through investigating the business and socio-economic case for selected mitigation initiatives which hold growth potential in energy, transport, industry, waste, and land use; to analysing potential future economic trajectories and the systemic opportunities offered by these.

This paper is one in a set of 'Food for thought' papers. It examines how consumption-based carbon emissions accounting can help us gain insight into the effect of consumption patterns on emissions, and examine a wider range of mitigation options along the supply chain and at the point of final consumption.

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WWF South Africa's Policy and Futures Unit undertakes enquiry into the possibility of a new economy that advances a sustainable future. The unit convenes, investigates, demonstrates and articulates for policymakers, industry and other players the importance of lateral and long term systemic thinking. The work of the unit is oriented towards solutions for the future of food, water, power and transport, against the backdrop of climate change, urbanisation and regional dynamics. The overarching aim is to promote and support a managed transition to a resilient future for South Africa's people and environment. The organisation also focuses on natural resources in the areas of marine, freshwater, land, species and agriculture.

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