

# Briefing

## The Four Footprints

### An FAQ for policy-makers on the land, water, materials and carbon footprint indicators of resource use.

#### Summary

The Four Footprints provide a dashboard indication of the consumption of natural resources. They work together as an essential tool for measuring resource use as part of a strategy to ensure economies are sustainable and resilient. Datasets already exist or are in development.

#### 1. Why do we need to measure resource use?

Worldwide demand for natural resources is rapidly increasing due to:

- Growth of the world population;
- Continued high levels of consumption in the developed world;
- Rapid industrialisation of developing countries and a growing global middleclass.

As a result we're breaching what many commentators describe as environmental limits, or planetary boundaries<sup>1</sup>. In response there is increasing talk of 'circular economy'<sup>2</sup> business models to boost resource efficiency. These include more recycling of resources within the economy, but seldom involve limits on consumption.

#### Won't market forces ensure we live within environmental limits?

As with climate change, the environmental and social devastation caused by the relentless growth in demand for natural resources urgently requires government interventions to correct market failure. But how do we connect the global facts of planetary boundaries with the day-to-day experience of running companies and economies?



Indonesian tin mine involving forest destruction and forced evictions. The rapidly growing tech sector is contributing to an expansion in demand for tin. Ulet Ifansasti/Friends of the Earth

---

<sup>1</sup> Oxfam's "Doughnut" <http://www.oxfam.org/en/grow/policy/safe-and-just-space-humanity> and WWF's "One Planet Living" [http://wwf.panda.org/what we do/how we work/conservation/one planet living/](http://wwf.panda.org/what_we_do/how_we_work/conservation/one_planet_living/) approach both frame this effectively.

<sup>2</sup> The Ellen MacArthur Foundation publish *McKinsey and Company* reports on the Circular Economy, available at <http://www.ellenmacarthurfoundation.org/circular-economy>

---

For more than 40 years we've seen that the wellbeing of people and planet go hand in hand – and it's been the inspiration for our campaigns. Together with thousands of people like you we've secured safer food and water, defended wildlife and natural habitats, championed the move to clean energy and acted to keep our climate stable. Be a Friend of the Earth – see things differently.

## The Four Footprints: An FAQ for policy-makers.

**Carbon footprinting provides a positive example of resource measurement.** It allows –

- Measurement of the rate at which different actors generate greenhouse gases;
- Identification and communication of where and how to mitigate emissions;
- Discussion of how to apportion ‘shares’ of what scientists advise is a safe global carbon budget.

However, to ensure the resilience of our economies and to understand our global environmental impacts we need a communicable set of indicators that provide an *overarching* assessment of resource use and dependence – the ‘Four Footprints’ of land, water, materials and GHGs.

### 2. What are the Four Footprints?

The Four Footprints approach was developed by the Sustainable Europe Research Institute (SERI) on behalf of Friends of the Earth<sup>3</sup>. It ensures an overarching assessment of natural resource demands, and can be applied at the level of the product, company or economy.

So far as possible it comprises real-world, rather than modelled, data as to the land, water, material and GHGs required to create or sustain that product, company or economy. It covers total *consumption* of natural resources, wherever they actually occurred in the world or supply chain. This therefore extends beyond commonly reported *territorial* or *production* demands, such as those within national boundaries or relevant only to company offices and immediate suppliers.

The Four Footprints are:

- **Land footprint** – the real area of land used, wherever it is in the world. This can also be referred to as “virtual land”, or “embedded land”.
  - For example, the land needed to produce a meal (including the land used to grow the crops eaten by animals), or the extra land we’d use if we burnt more biofuels;
  - Nearly 60% of the land used to meet the EU’s demand for agriculture & forestry products is imported<sup>4</sup>.
- **Carbon footprint** – the total amount of climate changing gases released, wherever in the world, expressed as carbon dioxide equivalents.
  - Eggs produced from chickens that are fed soya from South America have a higher carbon footprint than if the soya is grown in Europe<sup>5</sup>;
  - The UK has increased its global carbon footprint while appearing to reduce its domestic greenhouse gas emissions, as it imports so many goods from abroad. The UK Committee on Climate Change has published a detailed analysis of the UK’s carbon footprint, available at <http://www.theccc.org.uk/publication/carbon-footprint-and-competitiveness/>.
- **Water footprint** – the total volume of water used, wherever in the world, and including freshwater, rainwater and water required to safely dilute associated pollution.

---

<sup>3</sup> The Four Footprints were developed research and workshops to ensure a balance of communicability statistical rigour. See [http://www.foeeurope.org/publications/2009/seri\\_foee\\_measuring\\_eu\\_resource\\_use\\_final.pdf](http://www.foeeurope.org/publications/2009/seri_foee_measuring_eu_resource_use_final.pdf)

<sup>4</sup> Sustainable Europe Research Institute. (2011). Europe’s global land demand: A study on the actual land embodied in European imports and exports of agriculture and forestry products.

[http://www.foeeurope.org/sites/default/files/publications/Europe\\_Global\\_Land\\_Demand\\_Oct11%5B1%5D.pdf](http://www.foeeurope.org/sites/default/files/publications/Europe_Global_Land_Demand_Oct11%5B1%5D.pdf)

<sup>5</sup> Research for Global 2000 (Friends of the Earth Austria) [http://www.slideshare.net/martin\\_wildenberg/nhp-erscp-2012](http://www.slideshare.net/martin_wildenberg/nhp-erscp-2012)

## The Four Footprints: An FAQ for policy-makers.

- For example, a 725g Italian pizza margherita requires 1,217 litres of water, predominantly in the production of tomatoes & mozzarella cheese<sup>6</sup>;
- Our food supply may be vulnerable to water problems in other countries<sup>7</sup>.
- **Material footprint** – the tonnage of materials extracted, wherever in the world. This includes the ore mined in order to extract metals.
  - Our material footprint can be reduced by maximising reuse & recycling of materials – recycling a can of aluminium cuts out the need to dig up & extract aluminium from ore;
  - See the Friends of the Earth and SERI report 'Overconsumption? Our use of the world's resources' [http://www.foeeurope.org/publications/2009/Overconsumption\\_Sep09.pdf](http://www.foeeurope.org/publications/2009/Overconsumption_Sep09.pdf)

### 3. Are data and methodologies available for calculating the Four Footprints?

The recently revised Accounting Directives require the European Commission to develop guidance for corporate reporting of the Four Footprints<sup>8</sup>. Establishing an EU-wide standard will be globally significant.

Other data and methodologies include:

- All EU countries report material consumption biannually to Eurostat [http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsdp\\_c220&plugin=1"\);](http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsdp_c220&plugin=1)
- The Water Footprint Network has information on the water footprints of many countries (e.g. <http://www.waterfootprint.org/?page=files/UnitedKingdom>) and products <http://www.waterfootprint.org/?page=files/productgallery>;
- Eurostat's Data Centre on Natural Resources and Products covers The Four Footprints [http://epp.eurostat.ec.europa.eu/portal/page/portal/data\\_centre\\_natural\\_resources/introduction](http://epp.eurostat.ec.europa.eu/portal/page/portal/data_centre_natural_resources/introduction);
- EU-funded report on using the Four Footprints to monitor the resource use of countries: [http://ec.europa.eu/environment/enveco/resource\\_efficiency/pdf/FootRev\\_Report.pdf](http://ec.europa.eu/environment/enveco/resource_efficiency/pdf/FootRev_Report.pdf);
- The EU-funded CREEA project draws on the EXIOBASE database, giving the land, water, carbon and materials of 43 countries: <http://creea.eu/index.php/7-project/8-creea-booklet>;
- The Office for National Statistics (ONS) consumption-based material & carbon footprints <http://www.ons.gov.uk/ons/rel/wellbeing/sustainable-development-indicators/july-2014/sustainable-development-indicators.html#tab-Headline-Environment--Indicators-9-to-12->



Europe's land trade. Germany and the UK have the world's 3<sup>rd</sup> and 4<sup>th</sup> highest dependence on overseas land. Friends of the Earth/SERI.

Further information on each footprint is available in the Friends of the Earth briefing <https://www.foe.co.uk/sites/default/files/downloads/four-footprints-45569.pdf>

<sup>6</sup> Aldaya, M. M., & Hoekstra, A. Y. (2010). The water needed for Italians to eat pasta and pizza. *Agricultural Systems*, 103(6), 351-360.

<sup>7</sup> Hunt, A. S. P., Wilby, R. L., Dale, N., Sura, K., & Watkiss, P. (2014). Embodied water imports to the UK under climate change. *Clim. Res.*, 59(2), 89-101

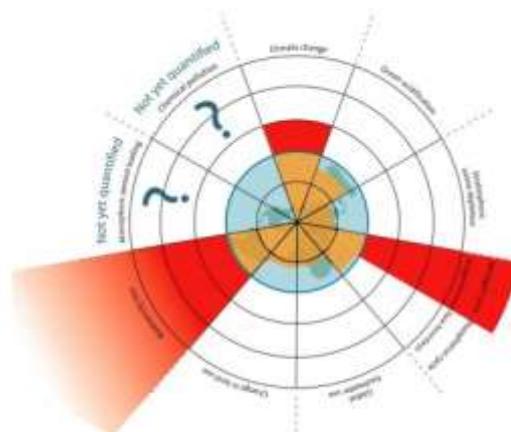
<sup>8</sup> [http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL\\_2014\\_330\\_R\\_0001](http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2014_330_R_0001) – for example, see Clause (17).

## The Four Footprints: An FAQ for policy-makers.

### 4. Why land, water, materials and GHGs, but not other environmental indicators?

The Four Footprints measure the overall scale of consumption, focusing on amounts of resources used instead of specific environmental impacts. However together they also reflect other environmental, social and development issues, as well as flagging company and economy exposure to resource insecurity.

Sufficient data and methodologies either already exist or will shortly be developed to enable a Four Footprints approach to measuring resource use. In due course The Four Footprints should also be accompanied by indicators as to pollution and biodiversity impacts, as well as indicators of human rights, wellbeing and development.



The Four Footprints provide a way of making day-to-day sense of planetary boundaries.

Credit: Christine Clifstock/Stockholm Resilience Centre

### 5. Why not use a single 'aggregated' indicator?

The best known example of a single, aggregated consumption indicator is the Ecological Footprint, which has proved to be an excellent tool for communicating the concept of global resource consumption. However in practice the Ecological Footprint suffers from aggregating different categories of resource consumption into one unit:

- Some resource categories cannot be measured, or are only measured indirectly. For example GHG emissions other than CO<sub>2</sub> are currently not accounted in the Footprint.
- Important information is lost in the data transformation procedure. For example, actual land demand of a product or country cannot be analysed with the Ecological Footprint.
- Strong assumptions have to be applied, in order to transform different types of primary data (e.g. material flows, land use, CO<sub>2</sub> emissions) into one common unit of calculation. For example, CO<sub>2</sub> emissions are transformed into the hypothetical forest area which would be required to sequester these emissions.

The Four Footprints approach involves using the original units to measure and illustrate the different aspects of resource use, rather than transforming them into a single artificial unit of measurement. So, whilst lacking the simple communicability of a single indicator such as the Ecological Footprint, a set of indicators like the Four Footprints delivers more robust and useful information.

It is also important to cover all relevant categories of resource use in order to monitor shifts of environmental pressure, and provide a well-founded basis for policy making and target setting. These criteria can be better fulfilled by applying a set of indicators instead of only one indicator (e.g. Carbon Footprint). A set of indicators covers resource use in a complementary manner and allows setting resource-specific targets and evaluating specific resource policies.

### For more information

For more information, including links to more reports and briefings, please see the Friends of the Earth Four Footprints web page here <http://www.foe.co.uk/page/four-footprints>.

Contact: Julian Kirby, Friends of the Earth Resource Use campaigner: [julian.kirby@foe.co.uk](mailto:julian.kirby@foe.co.uk)