

Consultant Primer	
Topic	The Carbon Trust's Proposed Methodology for Completing a Lifecycle Assessment of Greenhouse Gas Emissions for Products and Services (PAS 2050)
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Objective

Provide a consistent method for assessing life cycle GHG emissions for goods and services

Scope

The PAS 2050 is aimed at all organisations wishing to measure the GHG emissions attributable to the products or services it offers. It doesn't measure any other impacts.

- Covers both goods and services e.g. a computer or an internet banking service
- Emissions of the following Green House Gases (GHGs)
 - Carbon Dioxide (CO₂)
 - Methane (CH₄)
 - Nitrogen Oxide (N₂O)
 - HFCs
 - PFCs
 - Sulphur HexaFlouride (SF₆)
- Applicable to organisations assessing the lifecycle GHG emissions of goods and services across their lifecycle
- Does not cover any other environmental, social or economic impacts e.g. [acidification](#), [eutrophication](#), or [biodiversity](#).

Philosophy

Aims to measure GHG emissions which is as complete as possible, consistent between studies and where the the level of uncertainty in the data is understood

Completeness

- All relevant GHG emissions to be included
- All relevant information to support these claims should be documented and be readily available

Consistent

- Data should be used and collected in a way which facilitates meaningful comparison between GHG information

Certainty

- Spatially, temporally and technologically specific
- Information should be provided on the reliability and completeness of the data used

System Boundary

The boundary defines what is to be measured and what isn't, guidance on what the system boundary should be, can be found in other BSI/ISO standards. There are statistical thresholds for coverage which must be met and emission sources or "components" which should be included.

Are there any standard definitions for the system boundary?

The boundary conditions for a product are taken from the Product Category Rule developed with ISO14025:2006, if one exists. Where one doesn't exist, use the guidelines below.

How detailed does it need to be?

- GHG emissions from a source should be included in the analysis if it is likely to contribute more than 1% of the lifecycle emissions of the functional unit
- the final analysis should have a coverage of at least 95% of the anticipated lifecycle emissions for the functional unit
- where a single source contributes more than 50% of the total anticipated emissions, the 95% threshold applies to the remaining sources of emissions
- For the Use Phase of a product points 1 and 2 apply.

When less than 100% of the anticipated emissions have been determined, the assessed emissions are to be scaled up to represent 100%

What type of things should I be looking at?

Energy

GHG emissions due to the use and provision of energy during a process are included. Upstream emissions are to be included for example the drilling of oil and its transport to a power station.

Raw Materials

GHG emissions arising from obtaining and transporting the raw materials, from its natural state, to the process that requires it are included.

Capital Goods

Emissions arising from production and transport of capital goods are included. As the contribution of these is expected to be less than 1%, PAS 2050 suggests excluding these from detailed calculations.

Manufacture / Service Delivery

The GHG emissions arising from actually producing the product or delivering the service are to be included. For most organisations this will require the collection of primary data on what they actually do.

Lighting, Heating, Cooling and Ventilation

Any GHG emissions arising from operating any buildings required are included

Transport

Include emissions due to the transport of:

- inputs forming part of the product lifecycle
- waste products or material from the point they become waste to the point of disposal or reprocessing

Storage

Emissions arising from storage are included, including

- storage of any inputs to the product lifecycle
- cooling or heating of a product at any point in the lifecycle
- storage prior to re-use or recycling activities

Use Phase

Emissions due the use phase are included, remember these should be temporally and spatially specific e.g. you should identify in which country a product is being used. The Use Profile of a Use Phase is determined using a hierarchy of definition:

1. Product Category Rules (PCRs) that specify a use phase for the product being assessed
2. published international standards
3. published industry guidelines
4. published national guidelines
5. where none of the above is available, a description of the use profile for the use phase is recorded.

Recycling & Reuse

The GHG emissions arising from the recycling of a product will be attributed to the life cycle of the product to which the recycled product forms an input

Final Disposal

GHG emissions arising from products disposed of permanently are attributed to the lifecycle from which it arose. GHG emissions may arise over time, in this case projected emissions over 100 years from the date of disposal are included.

Exclusions

- Human energy inputs
- Transport of consumers to and from the point of sale
- Animals providing transport services

Data

The general aim is to be as accurate and reliable as possible, using data which is place, time (and possibly technology) specific.

Emission Factor

The multiplication of an emission factor (EF) for a particular input to a process by usage data for the that input generates the GHG emission resulting from the use of the input. For example the emission factor for mains electricity in the UK is 0.43 kg of CO₂ per kWh of power used. A process which uses 23 kWh of grid electricity to produce a widget, has 9.89 kg (23 x 0.43) of CO₂ attributed to it.

Primary Data

Primary data is used for processes owned or operated by the organisation undertaking the analysis. For each of these processes, 60% of the GHG emissions will be calculated from emission factors which have been derived from primary data for previous processes in the supply chain. This process continues until the input to a process step becomes a commonly available commodity such as cooking oil or diesel (which have published emission factors e.g. in the ELCD). When collecting primary data care should be taken to ensure it is representative.

Secondary Data

Where primary data is unavailable, secondary sources for emission factors can be used, in the following order of preference.

1. those calculated in accordance with PAS 2050
2. reported in the ELCD
3. reported in ELCD compliant databases
4. reported in national (government) produced publication
5. published national and industry guidelines
6. reported in peer review research

Fuel, Electricity and Heat Emission Specifics

The GHG emissions will be calculated using the amount of energy used and the average emission factor for the energy source.

Emission factors for onsite generation are calculated using the method described in PAS2050 for offsite generation use the emission factor provided by the supplier or another reliable secondary data source e.g. tables published by DEFRA.

The emission factor for biofuels will be based upon GHG emissions due to the production of the fuel and excludes CO₂ emissions from the biogenic carbon component of the fuel. When associating renewable energy to a process it must be clearly demonstrated the process consumed the energy generated or it consumed the same amount and type produced renewably and no other process consumed the energy and claimed it as renewable.

How do I allocate emission in a variety of situations?

Between Co Products

When a process results in a co-product, the GHG emissions up to that point in the lifecycle are allocated according to their relative economic value (economic allocation)

Waste Emissions

- Carbon Dioxide emissions
 - No GHG emissions are attributed if the CO₂ arises from the biogenic carbon fraction of the waste but they are attributed if they arise from the fossil carbon fraction.
- Methane emissions
 - All methane emissions are attributed to the lifecycle unless the methane is combusted (producing carbon dioxide and water). If the methane results from a fossil component of waste, the GHG emissions are attributed, if it is from a biogenic component then none is attributable.

Transport

Where more than one product is being transported, emissions arising from transport are allocated on the basis of mass or volume, whichever is the limiting factor.

Certification

An organisation can claim three levels of conformity PAS 2050

1. Results certified by an independent third party certification body who is able to demonstrate compliance to ISO 17021 with PAS in it's scope
2. Results validated by an independent third party
3. Self Validation

Reference

Emission Factor	The average emission rate per unit used / employed for a particular input to a process
Acidification	The decrease in pH of a substance (e.g. fresh water, oceans or air) due to the action of pollutants
Eutrophication	Excess nutrients in a body of water causing a dense growth of plant life leading to death of animal life due to a lack of oxygen. Can be due to run off of agrichemicals from cultivated land
Product Category Rule	Standardised and published rules for completing the GHG lifecycle assessment for a particular product type
Global Warming Potential (GWP)	<p>An estimate of how much a particular mass of atmospheric gas contributes to global warming. Measured using a relative scale with the GWP of CO₂ taken to 1. The GWP of the six GHGs are shown below:</p> <p>Carbon Dioxide - 1 Methane (CH₄) - 25 Nitrous Oxide (N₂O) - 298 Sulfur Hexafluoride (SF₆) - 22,800 Hydrofluorocarbons - specific to gas Perfluorocarbons - specific to gas</p>
CO ₂ equivalent	See GWP, for example Methane has a CO _{2e} of 25
ELCD	<p>European Reference Life Cycle Data System (ELCD)</p> <p>life cycle assessment dataset compiled by the European Platform on Life Cycle Assessment containing secondary emission factors for selected materials and processes</p>
DEFRA	Department for Environment Food and Rural Affairs
Co Product	Two or more products of the same process which cannot be produced independently of each other
Biogenic	Produced or brought about by a living organism

Business, Sustainability and Engineering Expertise

383ppm is a specialised team of consultants with backgrounds in environmental engineering, sustainable construction, agriculture and management consultancy. Working with clients these skills enable 383ppm to evaluate GHG emissions, design solutions and implement them.

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