ITC Guide for product carbon footprinting: meeting carbon standards

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Naivasha, 9 December 2011
INTRODUCTION
Carbon footprinting & labelling

- A product carbon footprint (PCF) is the sum of all greenhouse gases (GHGs) released during the life cycle of a good or service.
- GHGs included: CO$_2$, N$_2$O, CH$_4$, other GHGs.
- Expressed as CO$_2$ equivalents per unit of product (‘functional unit’):
  - Carbon dioxide (CO$_2$) = 1 kg CO$_2$e
  - Nitrous oxide (N$_2$O): 1 kg = 296 kg CO$_2$e
  - Methane (CH$_4$): 1 kg = 23 kg CO$_2$e
Introduction

PAS 2050
(first published in 2008, revised in 2011)

GHG Protocol Product Life Cycle Accounting and Reporting Standard
(published in October 2011)
CALCULATING PRODUCT CARBON FOOTPRINTS: 6 STEPS
Step 1:
Setting objectives and defining the product

Aims of the analysis: to identify emissions hotspots and guide decisions on where reductions can be achieved
- internal GHG management
- to communicate the results externally (e.g. to the consumer or to a supply chain partner)

Factors to consider when choosing the product to be analysed:
- GHG intensity of the product
- quantities produced
- strategic value and importance to the company
- expected growth
Step 2: **Identify the system boundary and map the system**

System boundary = the extent of processes included in the analysis

*Source: PAS 2050 Guide*
System boundary

- PCF methodologies specify which activities have to be included or excluded

- PAS 2050 excludes the following:
  - capital inputs (machinery, equipment, buildings)
  - human energy inputs (e.g., manual harvesting)
  - transport of consumers to and from the retail outlet
  - transport of employees to/from their workplace
  - animals providing transport services
Develop a process map

Sugar cane cultivation, planting year

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**KEY:**

**INPUT**  
**PROCESS**  
**OUTPUT**
Step 3: Collect the data

- Collect *activity data* on the type and amount of all inputs, including materials, energy and relevant processes

- Collect data specific to the supply chain or product analysed, e.g. fuel use
Step 4: Calculate the GHG emissions

- *Emission factors* provide the amount of GHGs emitted during the manufacture and/or use of an input or activity, e.g. fertiliser

- Emission factors are available from commercial and non-commercial databases, scientific and government publications, industry reports, IPCC, ....
Calculation of GHG emissions

Activity data = e.g. amount used per hectare
Emission factor = provides CO$_2$e per unit input
Step 5: Scale to a functional unit

- Emissions for agricultural products are usually calculated on a per hectare basis up to the farm gate.
- To express per unit of product leaving the farm:

\[
\text{Diesel use: } 846 \text{ l/ha} \times \text{EF: } 2.63 \text{ kg CO}_2\text{e/l diesel} = \frac{2226 \text{ kg CO}_2\text{e/ha}}{\text{Yield: } 38.5 \text{ t/ha}} = 57.8 \text{ kg CO}_2\text{e/t}
\]
Step 6: Reporting and assurance

If the results are communicated externally, public reporting and verification of the calculations may be required.

Source: GHG Protocol
Example: Pineapple cultivation

- **Diesel**: 26%
- **Electricity**: 3%
- **Plastic mulching**: 7%
- **Fertiliser: N**: 15%
- **Fertiliser: NPK**: 23%
- **Fertiliser: P**: 5%
- **Agro-chemicals**: 2%
- **Nitrous oxide from soils**: 18%
- **Fertiliser: K**: 1%
- **Agro-chemicals**: 2%
- **Electricity**: 3%
- **Plastic mulching**: 7%
- **Fertiliser: N**: 15%
- **Fertiliser: NPK**: 23%
DATA ISSUES AND UNCERTAINTY
Data issues and uncertainty

- data choices and assumption made during the analysis impact the result and lead to uncertainties
- schemes vary greatly in approach and methodology applied
  => difficulties in comparing PCFs between products

Data choices and emission factors (representativeness of samples, lack of emission factors, different value in different databases,...)
Assumptions (data gaps, consumer use, ...)
Uncertainty of emissions from agricultural production
ISSUES PARTICULARLY RELEVANT TO DEVELOPING COUNTRIES
Land use change

- emissions can dominate carbon footprints
- more likely to be an issue for developing countries than industrialised countries
- potential difficulties in choosing the correct pre-conversion vegetation type
- large ranges of major input variables
Other issues

- Lack of relevant data and emission factors
- Numerous carbon footprinting methodologies
- Lack of involvement of stakeholders in defining the methods
- Often low in capital inputs but this is not reflected in current methodologies
- Storage of carbon in soils and agroforestry systems cannot claim benefits under current methodologies
- Long-distance transportation
Particular challenges for smallholder farmers

- Costs of data collection (time, training, development of recording systems, ...)
- Low economies of scale
- Limited access to information on standards and markets, training, extension services, technologies and certification bodies
- Proliferation of standards
The way forward

- research and technological development:
  - develop easily accessible databases for tropical regions
  - develop regional land use change databases
  - research and consider soil carbon losses (organic soils) and sequestration/storage in agroforestry systems
  - development of low carbon modes of transport
- develop low cost approaches to calculation and certification
- capacity building, awareness raising, extension services
- have retailers and industry declare their calculations
- active involvement in further development of methods
ACKNOWLEDGEMENTS AND THANKS TO:

International Trade Centre and COLEACP-PIP
The World Bank

THANK YOU!

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