ITC Guide for product carbon footprinting: meeting carbon standards

Katharina Plassmann

Johann Heinrich von Thünen-Institute
Institute for Agricultural Climate Research

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_2O, CH_4, other GHGs

- expressed as CO_2 equivalents per unit of product ('functional unit'):

  carbon dioxide (CO_2) = 1 kg CO_2e

  nitrous oxide (N_2O): 1 kg = 296 kg CO_2e
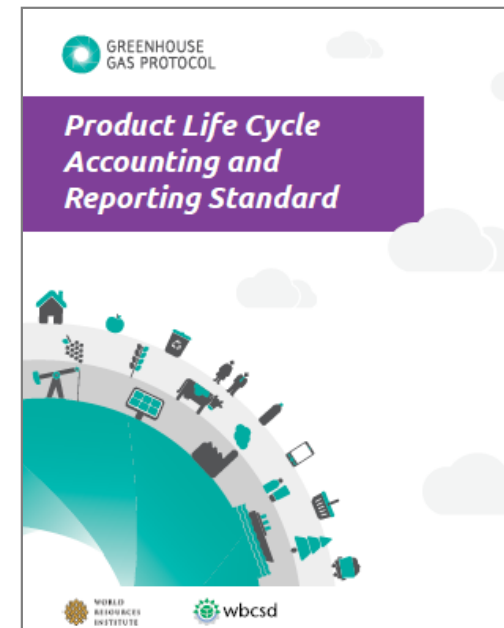
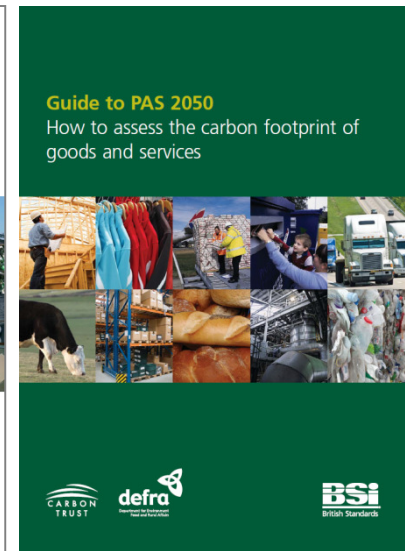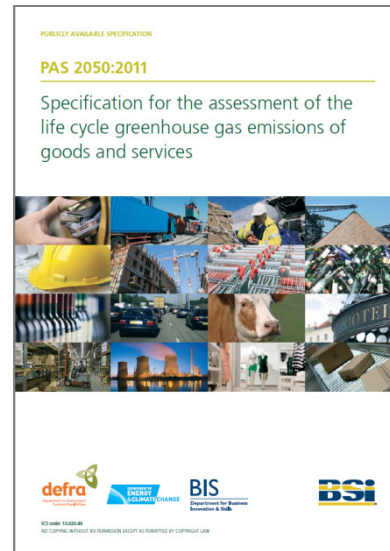 methane (CH_4): 1 kg = 23 kg CO_2e

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

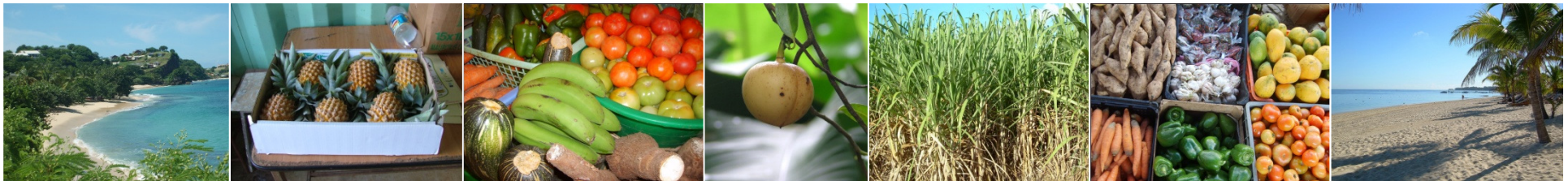System boundary = the extent of processes included in the analysis
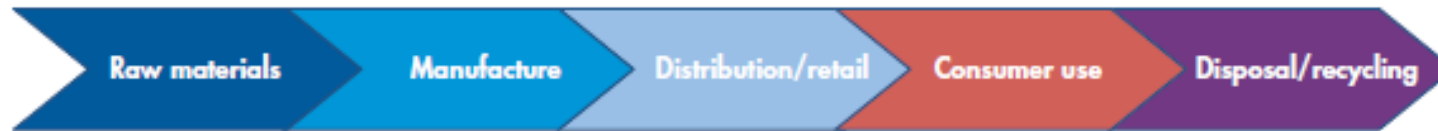
Process map steps for business-to-consumer goods

Process map steps for business-to-business goods
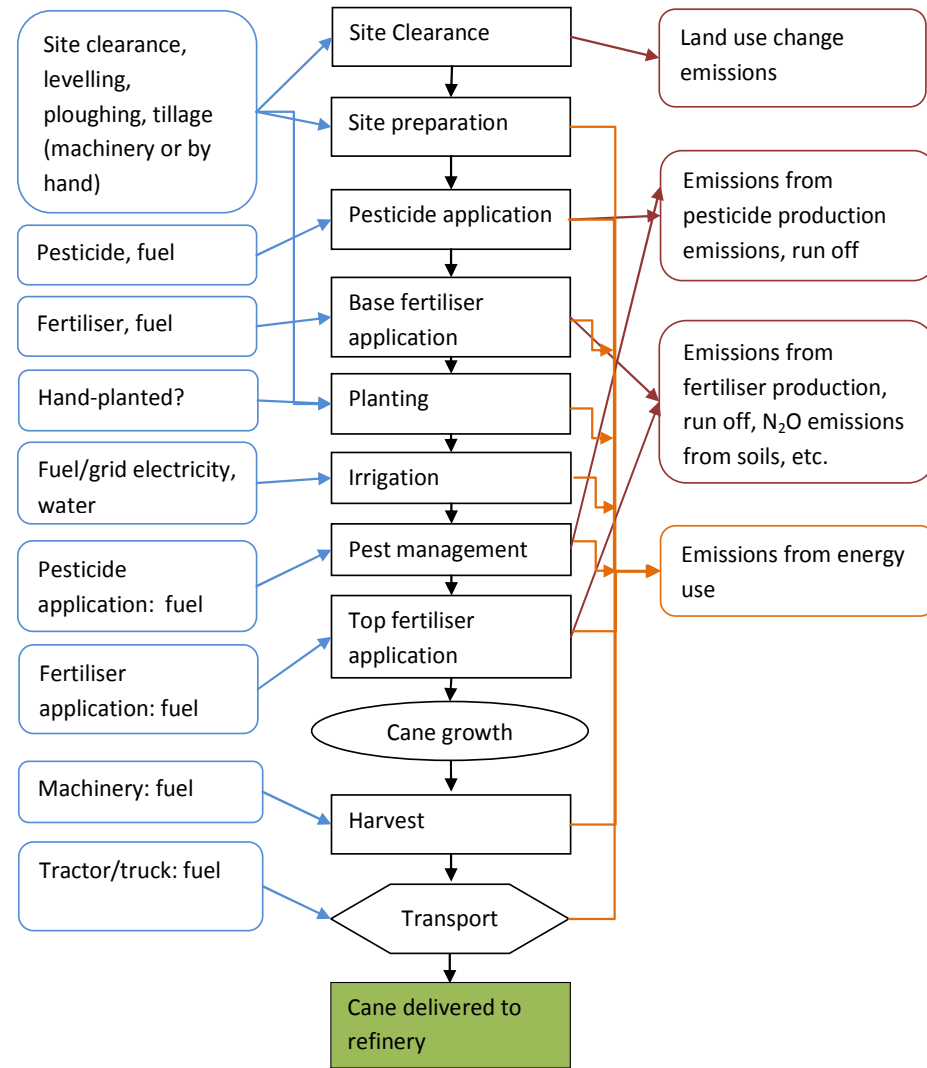
System boundary

- 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

Process map (right side):

Inputs → Processes → Outputs

Input	Process
Site clearance, levelling, ploughing, tillage (machinery or by hand)	Site Clearance → Land use change emissions
	Site preparation
Pesticide, fuel	Pesticide application → Emissions from pesticide production emissions, run off
Fertiliser, fuel	Base fertiliser application
Hand-planted?	Planting
Fuel/grid electricity, water	Irrigation
Pesticide application: fuel	Pest management
Fertiliser application: fuel	Top fertiliser application → Emissions from fertiliser production, run off, N_2O emissions from soils, etc.
	Cane growth
Machinery: fuel	Harvest → Emissions from energy use
Tractor/truck: fuel	Transport
	Cane delivered to refinery

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_2e per unit input

Activity data per ha $\times$ Emission factor $=$ kg CO_2e/ha
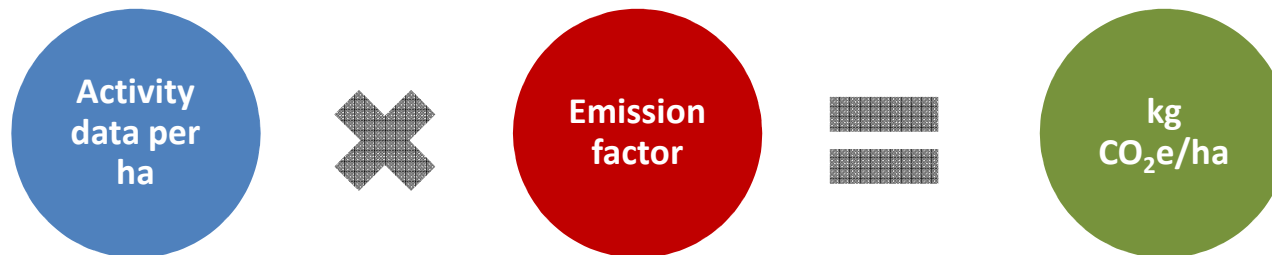
Step 5:
Scale to a functional unit

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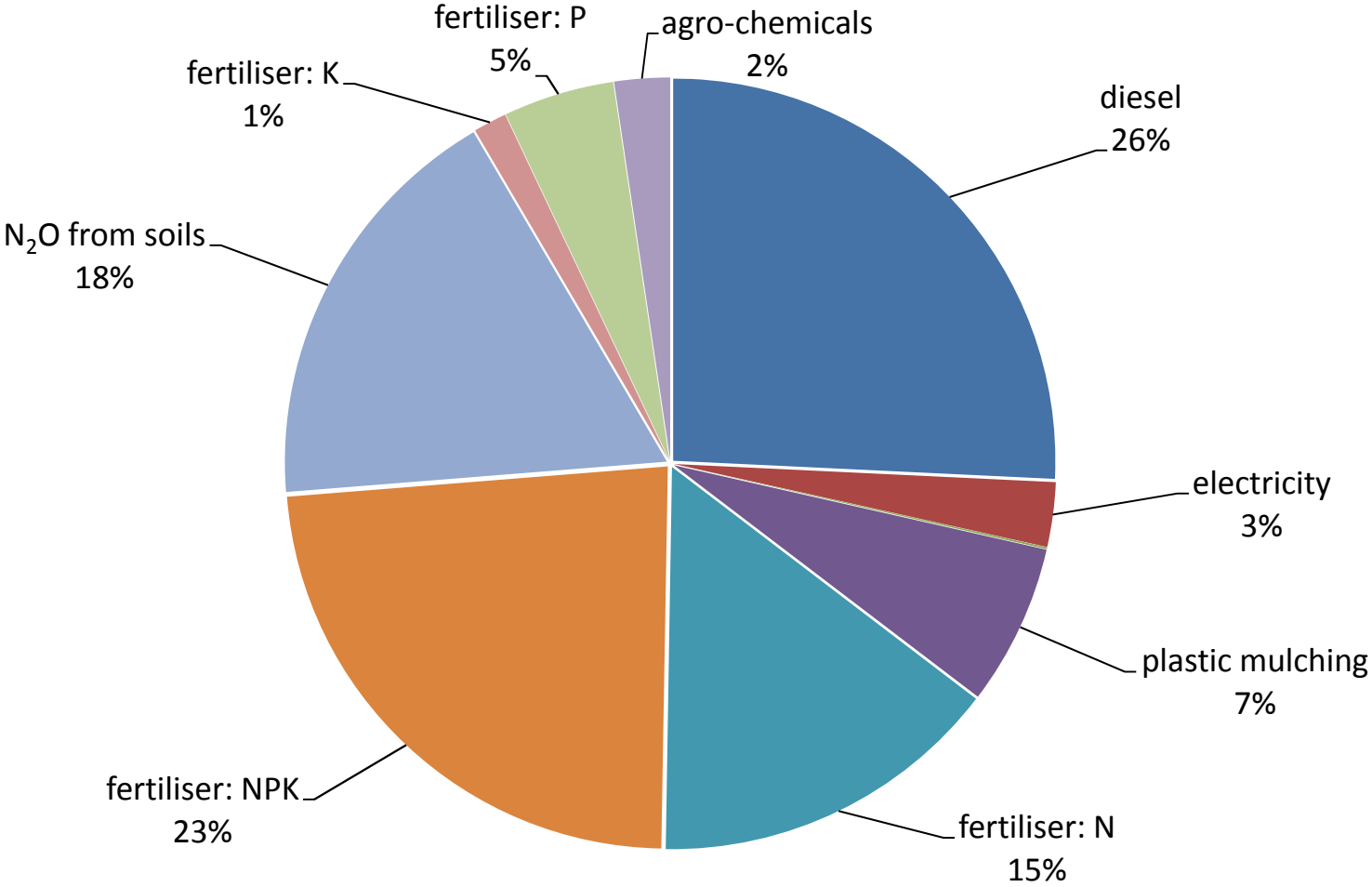
- To express per unit of product leaving the farm:

Diesel use: 846 l/ha $\times$ EF: 2.63 kg CO_2e/l diesel $=$ 2226 kg CO_2e/ha $\div$ Yield: 38.5 t/ha $=$ 57.8 kg CO_2e/t

Step 6:
Reporting and assurance

If the results are communicated externally, public reporting and verification of the calculations may be required
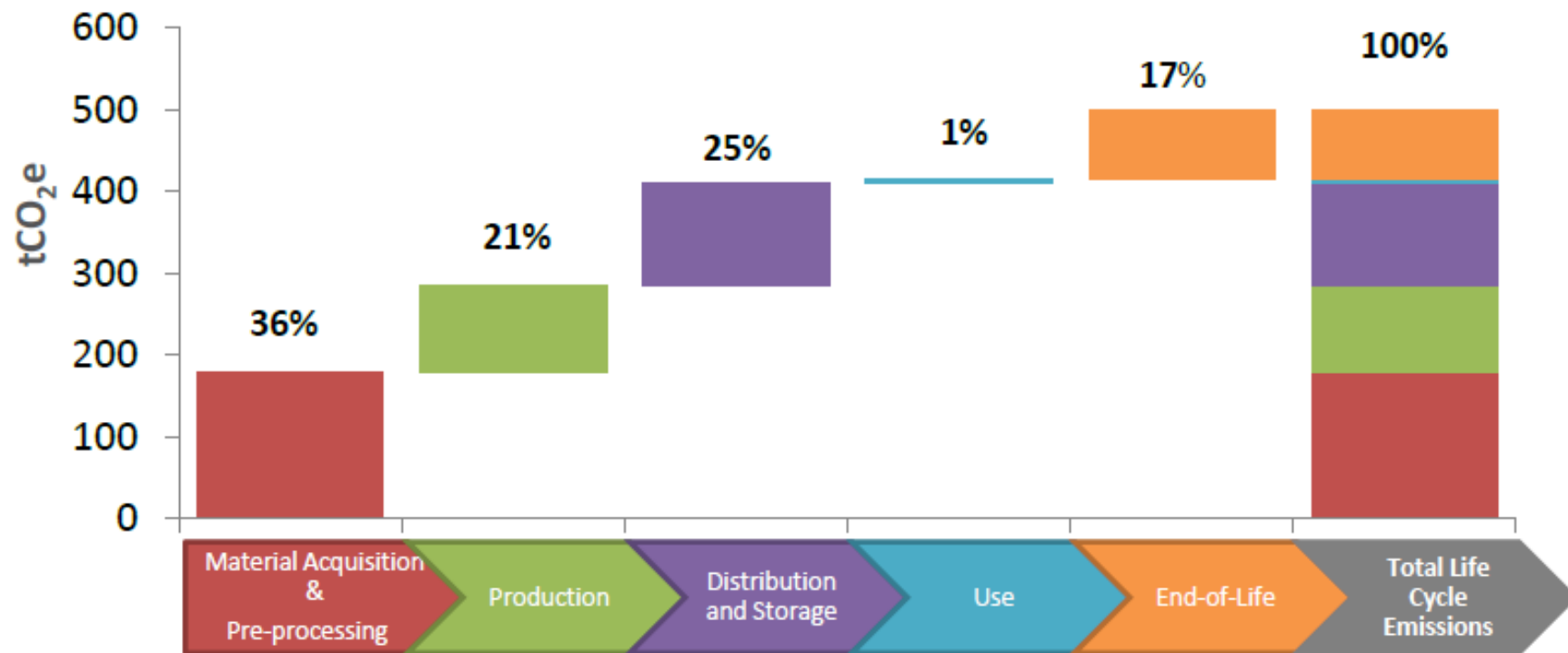
Example: Pineapple cultivation

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
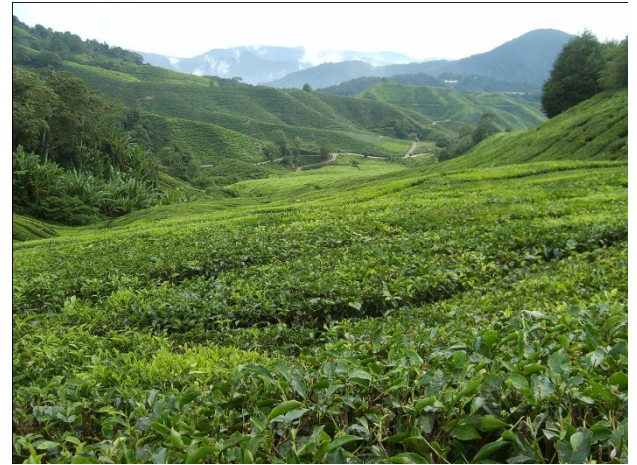
ISSUES PARTICULARLY RELEVANT TO DEVELOPING COUNTRIES

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
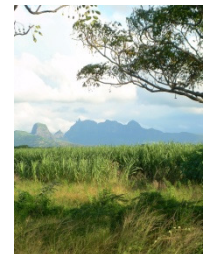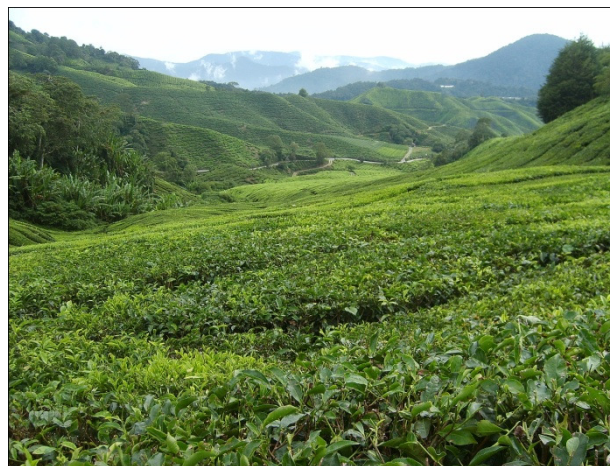
ACKNOWLEDGEMENTS AND THANKS TO:

THANK YOU!

Contact: katharina.plassmann@vti.bund.de
             katrinplassmann@web.de