PRODUCT CATEGORY RULES
DATE 2012-08-28

CPC 2131
FROZEN VEGETABLES, PULSES AND POTATOES

2012:08
VERSION 1.0

GENERAL INTRODUCTION

The International EPD® System is based on a hierarchic approach following the international standards:

- ISO 9001, Quality management systems
- ISO 14001, Environmental management systems
- ISO 14040, LCA - Principles and procedures
- ISO 14044, LCA - Requirements and guidelines
- ISO 14025, Type III environmental declarations
- ISO 21930, Environmental declaration of building products

The General programme Instructions are based on these standards, as well as instructions for developing Product Category Rules (PCR).

The documentation to The International EPD® System includes three separate parts (www.environdec.com):

- Introduction, intended uses and key programme elements
- General Programme Instructions Supporting annexes
- Supporting annexes

This PCR document specifies further and adds additional minimum requirements on EPDs of the product group defined below complementary to the above mentioned general requirement documents. Principle programme elements concerning the Product Category Rules (PCR) included in The International EPD® System are presented below.

PURPOSE	ELEMENT IDENTIFICATION AND PRINCIPAL APPROACH
Complying with principles set in ISO 14025 on modularity and comparability	1. "Book-keeping LCA approach" 2. A Polluter-Pays (PP), allocation method
Simplifying work to develop Product Category Rules (PCR)	3. PCR Module Initiative (PMI) in order to structure PCR in modules according to international classification 4. PCR moderator for leadership and support of the PCR work
Secure international participation in PCR work	5. Global PCR Forum for open and transparent EPD stakeholder consultation
Facilitating, identification and collection of LCA-based information	6. Selective data quality approach for specific and generic data

Product Category Rules (PCR) are specified for specified information modules “gate-to-gate”, so called core modules. The structure and aggregation level of the core modules are defined by the United Nation Statistics Division - Classification Registry CPC codes (http://unstats.un.org). The PCR also provides rules for which methodology and data to use in the full LCA, i.e. life cycle parts up-streams and down-streams the core module.

The PCR also has requirements on the information given in the EPD, e.g. additional environmental information. A general requirement on the information in the EPD is that all information given in the EPD, mandatory and voluntary, shall be verifiable.

In the EPD, the environmental performance associated with each of the three life-cycle stages mentioned above are reported separately.

TABLE OF CONTENT

1 GENERAL INFORMATION

Date:	2012-08-28
Registration no:	PCR 2012:08
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Valid within the following geographical representativeness:	Global
Valid until:	2017-08-23
More information on this PCR's website:	http://www.environdec.com/en/Product-Category-Rules/Detail/?Pcr=8351

This document provides Product Category Rules (PCR) for the assessment of the environmental performance of UN CPC 2131 (Frozen vegetables, pulses and potatoes) and the declaration of this performance by an EPD.

This PCR is based on the requirements and guidelines given in PCR Basic Module, CPC Division 21: "Meat, fish, fruit, vegetables, oils and fats" version 1.1, dated September 3, 2010.

Any comments to this PCR document may be given on the Global PCR Forum or directly to the PCR moderator during the period of validity.

The PCR document is a living document. If relevant changes in the LCA methodology or in the technology for the product category occur, the document will be revised and any changes will be published on the international website: www.environdec.com.

The EPD shall refer to a specific PCR version number. The production of new PCR versions does not affect the EPD certification period.

2 DEFINITION OF THE PRODUCT GROUP

Included in this product group are frozen vegetables, pulses and potatoes
The product group and CPC code shall be specified in the EPD.

2.1 SPECIFICATION OF MANUFACTURING COMPANY

This section highlights all information related to the producing company that is required in the EPD, separated into mandatory and voluntary items.

Mandatory information:

- Manufacturing company
- Manufacturing sites involved in the production
- Issuer and contact information

Examples of voluntary information:

- ISO 14001 and/or EMAS certificate at the manufacturing site
- Specific aspects regarding the production
- Environmental policy
- Manufacturers logotype

2.2 SPECIFICATION OF THE PRODUCT

The species (and the variety, if relevant) of vegetable shall be declared. The production system shall be specified (i.e. conventional or organic) and whether the cultivation takes place in open field or greenhouse. It shall also be specified the preparation and preservation process.

3 DECLARED UNIT

The declared unit (DU) is 1 kg of packaged product (weight of packaging not included in this 1 kg).

The declared unit shall be declared in the EPD. The environmental impact shall be given per declared unit.

4 CONTENT OF MATERIALS AND CHEMICAL SUBSTANCES

The gross weight of material shall be declared in the EPD at a minimum of 99 % of one product unit.

5 UNITS AND QUANTITIES

“SI units” shall be used in all notations. Exceptions are allowed for:

- land use: could be used hectare (ha) in some data about crops yields. Results shall be reported in square meter (m^2);
- fuel consumption in agricultural activities: data could be reported in litres (l).

A maximum of two decimal units shall be used when reporting LCA results; in any case, it is recommended to provide rounded data in respect of their scientific significance.

6 GENERAL SYSTEM BOUNDARIES

Figure 6.1 shows the general system boundaries. Further information is available in the following sections of this PCR.

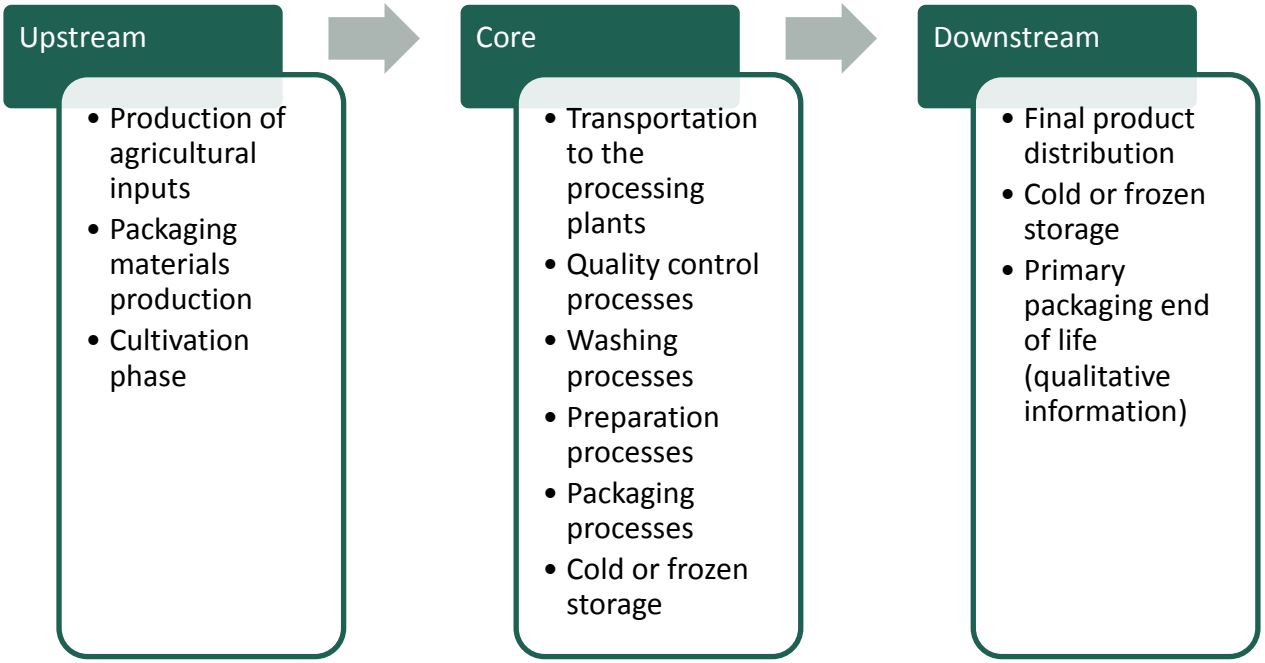

Figure 6.1. Presentation of Core Module (core process) and upstream and downstream processes.

In the EPD, the environmental performances associated with each of the three life-cycle stages above are reported separately.

6.1 UPSTREAM PROCESSES

The upstream processes include the following inflow of raw materials and energy wares needed for the production of the final product:

- the production of seeds, cuttings or plants for the cultivation;
- production of fertilizers and pesticides used in the agriculture;
- the production processes of energy wares used in agriculture, at the farm, and in manufacturing;
- production of auxiliary products used such as detergents for cleaning etc.;
- production of packaging materials.
- cultivation phases;

6.2 CORE PROCESSES

The core processes includes (this list is indicative and it could be completed):

- external transportation to the core process,
- quality control processes;
- washing processes;

- preparation processes;
- freezing processes (if present);
- packaging processes;
- cold or frozen storage.

6.3 DOWNSTREAM PROCESSES

The downstream processes include:

- The cold or frozen chain for the storage (where applicable)
- Recycling or handling of packaging waste/materials after use
- The distribution of the final product from the packing plant to the distribution platform. In this case an average platform shall be considered and the hypothesis shall be presented in the declaration.

7 CORE MODULE

7.1 SYSTEM BOUNDARIES

7.1.1 PROCESSING PHASE

The main activity that has to be included in the core module is processing and packaging of vegetables. Main environmental aspects that have to be considered are:

- energy consumption;
- water consumption;
- waste management;
- water waste management.

Other relevant hypotheses that shall be considered are:

A minimum of 95% of the total weight of the declared product including packaging shall be considered.

- Environmental impacts related to waste deposited in landfills should be included in the system boundaries; wastes must be stated as “kg of waste”. See further information about waste-management in the following paragraphs.
- Products that are not compliant to the quality requirements and are destined to other chains (such us animal food or organic waste treatment) must be considered as waste and reported as indicated in the specific section. Environmental impacts related to their treatment should not be included in the system boundaries.
- Waste water treatment should be included in the system boundaries.
- The manufacturing of production equipment with an expected lifetime over three years, buildings and other capital goods shall not be included. Maintenance activities more frequent than every three years shall be included.
- Business travel and staff commuting should not be included.
- If several production plants/farms are involved in the production chain, an average virtual plant/farm shall be defined by accounting for the annual production (expressed in mass) as the weighting factor.

Any deviations from these rules must be declared in the LCA and in the EPD

7.1.2 COLD OR FROZEN STORAGE

If the product needs a cold storage for preserving its shelf life, the environmental impacts related to this process shall be declared.

Specific data shall be used. If they are not available the following hypotheses shall be adopted in order to calculate the values in a "comparable" way. This hypothesis comes from www.lcafood.dk.

Electric energy due to the cold storage shall be evaluated by the following formula:

$$E_p = E_s \times 100\%/u \times V_p \times t$$

Where

- E_s is the specific energy consumption of the cooling room (kWh per m^3 per day)
- u is the degree of utilization of the storage room (%)
- V_p is the volume of the considered product (m^3).
- t is the time of the storage (days).

Values have to be set as follow:

- E_s = 0,59 kWh per m^3 per day in the product is stored in a **cold place (5°C)**;
  = 0,63 kWh per m^3 per day in the product is stored in a **frozen place (-20°C)**;
- u = 50%
- V_p = 0,004 m^3 (specific weight considered: 250 kg/m^3);
- t = standard storage time of the product in the plant (days).

Different hypotheses could be used but they have to be presented in the EPD.

7.1.3 GEOGRAPHICAL BOUNDARIES.

The data for the core module shall be representative for the actual production processes and representative for the site/region where the respective process is taking place.

7.1.4 TIME BOUNDARIES

The data should be representative of the years/time frame for which the EPD is valid (maximum three years).

7.1.5 BOUNDARIES TO NATURE

Boundaries to nature are defined as flows of material and energy resources from nature into the system. Emissions to air, water and soil cross the system boundary when they are emitted from or leaving the product system.

7.1.6 BOUNDARIES TO OTHER PRODUCT LIFE CYCLES

Should there be any inflow of recycled material into the production system, both the recycling process and the relevant transportation of the material from the recycling process to the site of use shall be included in the calculations.

If there is an outflow of material to recycling, the transportation of the material to the recycling process shall be indicated. The material going to recycling is regarded as an outflow of the production system.

Transportation of waste to landfills or other final treatment plants should be included.

(See Supporting Annex of the EPD programme; A.7.1; www.environdec.com)

7.2 CUT OFF RULES

Life Cycle Inventory data for a minimum of 95 % of total inflows to the core module shall be included. Inflows not included in the LCA shall be documented in the EPD.

7.3 ALLOCATION RULES

If the production plant generates more than one product, the inputs and outputs of the system should be partitioned between these different products or functions.

Partitioning should reflect the underlying physical relationships between them; i.e. they should reflect the manner in which the inputs and outputs are modified by quantitative changes in the products delivered by the system (allocation by mass).

For impacts regarding agricultural operations in a farm, allocation among different products should be avoided by considering the impacts of every single operation. For instance with regard to the fuel consumption it shall be estimated the consumption of every single operation onto a certain surface and then divided by the mass of product.

Any deviation from these rules must be declared in the LCA and in the EPD

7.4 DATA QUALITY RULES

Specific data (often called site-specific data) shall be used for the all core processes.

Specific data is collected from sites where specific processes are carried out. If many sites are involved in the analysed production system, site-specific data must cover at least 90% of the whole production.

The electricity generation mix shall be given and proved by means of reproducible and verifiable information such as administrative documents (such as invoices) or similar.

If specific data is unavailable or if the electricity procured is not specified for parts of the Core Module, the electricity mix used in such parts shall be approximated as the official electricity mix in the country (or region) of manufacture.

8 UPSTREAM MODULE

For the upstream module please refer to the PCR for CPC 012 (Vegetables).

8.1.1 SYSTEM BOUNDARIES

All elementary flows at resource extraction shall be included, except for the flows that fall under the general 10% cut off rule.

8.1.2 TIME BOUNDARIES

The data should be representative of the years/time frame for which the EPD is valid (maximum three years).

8.2 DATA QUALITY RULES

Selected generic data shall be used for other parts of the LCI, such as the life-cycles of additives or fertilizers, i.e. data from commonly available data sources such as commercial databases and free databases, describing specific raw materials or processes usually referring to the system under study or to other systems equivalent from a technical point of view.

For allowing the use of selected generic data, a number of pre-set characteristics must be fulfilled and demonstrated:

- *Representativeness of the geographical* area should adhere to “Data deriving from areas with the same legislative framework and the same energetic mix”,
- Representativeness of the geographical area for agriculture should adhere to “Data deriving from areas with the same production conditions and the same yield levels”.
- *Technological equivalence* adhere to “Data deriving from the same chemical and physical processes or at least the same technology coverage (nature of the technology mix, e.g. weighted average of the actual process mix, best available technology or worst operating unit)”,
- *Boundaries towards nature* adhere to “Data shall report all the quantitative information (resources, solid, liquid, gaseous emissions; etc.) necessary for the EPD”, and

8.3 RULES FOR GENERIC DATA

If these data sources do not supply the necessary data, other generic data may be used and documented. The environmental impact of the processes where the other generic data are used must not exceed 10% of the overall environmental impact from the product system; if the impact exceeds 10% then more precise data should be used

9 DOWNSTREAM MODULE

9.1 USE PHASE SCENARIO – COLD OR FROZEN STORAGE

If the product needs a cold storage for preserving its shelf life, the environmental impacts related to this process shall be declared.

Specific data shall be used. If they are not available the following hypotheses shall be adopted in order to calculate the values in a “comparable” way. This hypotheses come from www.lcafood.dk.

Electric energy due to the cold storage shall be evaluated by the following formula:

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Values have to be set as follow:

- E_s = 0,59 kWh per m^3 per day in the product is stored in a **cold place (5°C)**;
  = 0,63 kWh per m^3 per day in the product is stored in a **frozen place (-20°C)**;
- u = 50%
- V_p = 0,004 m^3 (specific weight considered: 250 kg/m^3);
- t = shelf life of the product (days).

A country-specific electricity mix shall be used.

Different hypotheses could be used but they have to be presented in the EPD.

9.2 RECYCLING DECLARATION AND WASTE TREATMENT

Recommendations for the responsible and correct recycling of packaging materials, as well as recommendations for other waste treatment of product parts, if relevant, shall be provided. The potential environmental impacts and benefits of recycling of primary packaging shall be illustrated in the EPD.

Impacts could be calculated taking into account a typical scenario of the area in which the product is mainly distributed.

10 ENVIRONMENTAL PERFORMANCE RELATED INFORMATION

10.1 USE OF RESOURCES

The consumption of natural resources and resources per declared unit shall be reported in the EPD, divided into core, upstream and, if relevant, downstream module.

Input parameters, extracted resources:

- Non-renewable resources
  - Material resources
  - Energy resources (used for energy conversion purposes)
- Renewable resources
  - Material resources
  - Energy resources (used for energy conversion purposes)
- Water use
- Electricity consumption (electricity consumption during manufacturing).

10.2 POTENTIAL ENVIRONMENTAL IMPACT

The following environmental impact categories shall be reported in the EPD:

- The emissions of greenhouse gases (expressed in global warming potential, GWP, in 100 year perspective). Information about biogenic CO_2 emissions is optional. If reported, the biogenic CO_2 emissions shall be separated from the other greenhouse gases. CO_2 sequestration shall not be considered. Emissions from land use change should be included.
- Emission of ozone-depleting gases (expressed as the sum of ozone-depleting potential in CFC 11-equivalents, 20 years).
- Emission of acidification gases (expressed as the sum of acidification potential expresses in SO_2- equivalents).
- Emissions of gases that contribute to the creation of ground level ozone (expressed as the sum of ozone-creating potential, ethene-equivalents).
- Emission of substances to water contributing to oxygen depletion (expressed as PO_4^{3-}-equivalents).

The tables from General Programme Instructions, Annex B shall be used except for GWP calculation for which the last version of conversion factors (IPCC 2007) shall be used.

10.3 OTHER INDICATORS

The following additional indicators shall be reported in the EPD:

- Material addressed to recycling
- Hazardous waste
- Other waste
- Co-products that are destined to other chains (such as animal feed industry).

10.4 ADDITIONAL ENVIRONMENTAL INFORMATION

Some additional optional indicators that could be included in the LCA report and in the EPD include the ecological footprint and the virtual water content, as described hereafter.

10.4.1 ECOLOGICAL FOOTPRINT

This indicator is to be expressed as "global m^2" (square meter) per DU. Further information about the calculation procedure is available in Annex 1.

10.4.2 VIRTUAL WATER CONTENT

This value shall be calculated according to the indications presented by the "Water footprint network" in the specific accounting protocol. The indicators shall be expresses in litres of water per DU. Further information is presented in Annex 2.

11 CONTENT OF THE EPD

11.1 PROGRAMME RELATED INFORMATION

The programme related part of the EPD shall include:

- Name of the programme and programme operator
- The reference PCR document
- Registration number
- Date of publication and validity
- Geographical scope of application of EPD
- Information about the year or reference period of the underlying data to the EPD
- Reference to the homepage – www.environdec.com – for more information.

11.2 PRODUCT RELATED INFORMATION

11.2.1 SPECIFICATION OF THE PRODUCTION COMPANY

See 2.1.

11.2.2 SPECIFICATION OF THE PRODUCT

See 2.2.

11.2.3 DECLARED UNIT

See 3.

11.2.4 CONTENT OF MATERIALS AND CHEMICAL SUBSTANCES

See 4.

11.2.5 COMPARISONS OF EPDS WITHIN THIS PRODUCT CATEGORY

Only EPDs based on this specific PCR may be compared within this product category. The user of the EPD information should be made aware of this by the inclusion of the following statement in the EPD:

"EPDs from different programmes may not be comparable"

11.2.6 VALIDITY OF THE EPD

The validity of the EPD shall be reported in the EPD.

11.3 ENVIRONMENTAL PERFORMANCE-RELATED INFORMATION

11.3.1 ENVIRONMENTAL PERFORMANCE DECLARATION - MINIMUM SET OF PARAMETERS FROM THE LCA STUDY, REPORTED PER DECLARED UNIT

Upstream and core modules shall be reported separately for resource use, potential environmental impact and other indicators such as waste.

Downstream module results may be presented in a more "communicative and qualitative" way.

11.3.2 USE OF RESOURCES

The consumption of natural resources per declared unit shall be reported in this category.

See 10.1

11.3.3 POTENTIAL ENVIRONMENTAL IMPACT

The potential environmental impact per declared unit shall be reported in this category.

See 10.2

11.3.4 OTHER INDICATORS

The relevant indicators per functional unit shall be reported in this category.

See 10.3

11.3.5 ADDITIONAL ENVIRONMENTAL INFORMATION

See 10.4

11.4 DIFFERENCES VERSUS PREVIOUS VERSIONS OF THE EPD

The main causes for any changes in environmental performance in comparison with previous EPD versions shall be described shortly.

11.5 VERIFICATION

The EPD shall give the following information about the verification process:

PCR review, was conducted by:	Technical Committee of the International EPD® System
Independent verification of the declaration and data, according to ISO 14025:	EPD process certificate or EPD verification, name of the third party verifier
Accredited or approved by (if relevant):	Name of the organisation

11.6 REFERENCES

The EPD shall, if relevant, refer to:

- The underlying LCA
- The PCRs used
- Other documents that verify and complement the EPD
- Programme instructions
- Sources of additional information

12 VALIDITY OF THE EPD

If changes in any of the environmental impacts are larger than +- 5% the EPD shall be adjusted. Regardless, the EPD shall be reviewed every three years.

ANNEX 1 – ECOLOGICAL FOOTPRINT

The “Ecological Footprint” (EF) is a measure of the quantity of biologically productive land and water any individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates using prevailing technology and resource management practices.

The *Global Footprint Network*[1] has developed the “**Ecological Footprint Accounting**” (EFA) method. It is usually measured in global hectares (gha): by conversions and equivalence factors for different land use (*Energy up take land, Crop land, Grazing land, Forest, Built-up land, Fishing ground*) translated into a single unit.

Even if the EF have been designed for the calculation of the regions impacts rather than the products impacts, it is quite interesting and common to use this indicator to represent the “land use” due to the agricultural chain. For this reason, the life cycle assessment of vegetables could be integrated with a calculation of the ecological footprint based on the same system boundaries considered for the LCA. In order to have an EF estimation aligned to LCA results as much as possible, the environmental aspects used for the EF calculation must originate from the same sources used for the LCA inventory.

While LCA data usually refers to a physical unit (such as mass of products), the EF indicator is refers to a specific period. In other words, the EF indicates the quantity of land used during one year by the system under analysis.

Total EF is calculated as the sum of the single 6 EF contributors (crop, forest, etc) that for the purpose of this PCR could be calculated by multiplying the specific impact for the equivalence factors (Table A1.1) as indicated in the following specifications.

Component	**Unit**	**Equivalence factor**
Carbon up take land (energy land)	gha/ha	1,26
Cropland	gha/ha	2,51
Grazing Land	gha/ha	0,46
Forest	gha/ha	1,26
Built-up land	gha/ha	2,51
Fishing Ground	gha/ha	0,37

Table A1.1. Equivalence Factors used for the calculation – Source: Global Footprint Network

Note that for the vegetable production system forest land, fishing ground and grazing land are not applicable. Built-up land could be negligible.

In details, for the each kind of land, the following hypotheses have been considered.

A1.1 CARBON UP TAKE LAND (ENERGY LAND)

Carbon up take land represents the land needed to sequestrate the CO_2 (not CO_2 equivalent) generated by the system. The methodology does not take into account the emission of other greenhouse gases because only CO_2 undergoes a natural process of forest sequestration.

These figures shall be calculated by multiplying the specific CO_2 emissions related to each environmental aspect of the considered system by the EF conversion factors, which is 0,208 global hectares (per year) per t of CO_2, by the energy land equivalence factor. An example of this calculation is shown in Table A1.2.

[1] www.footprintnetwork.org

Environmental aspect	Unit	g of CO_2 per unit	Land for CO_2 sequestration (Gha/t CO_2)	EF energy land equivalence factor (Gha/ha)	Global m^2 per unit
Electricity (in Italy)	MJ	174,0	0,208	1,26	0,456
Natural gas (in Italy)	MJ	57,8			0,015
Oil (in Italy)	MJ	77,0			0,020
Transport by truck	t-km	55,3			0,014

Table A1.2. Calculation of the energy land for the main environmental aspects related to the operations included in the system boundaries.

A1.2 CROP LAND

This component shall be calculated by multiplying the inverses of specific yields considered for the fruit cultivation by the EF equivalence factor of cropland. Source of this information could be the FAOSTAT web site (http://faostat.fao.org/).

An example is shown in Table A1.3.

Region	Yield in t per ha	EF cropland equivalence factor gha/ha	Global ha per t
Banana	23,3	2,51	0,108
Apple	36,7		0,068
Peach	17,7		0,142

Table A1.3. Example of the calculation of the cropland related to the fruit cultivation

ANNEX 2 – VIRTUAL WATER CONTENT

The indicator “virtual water content” measures the water consumption in terms of water volumes consumed (directly, indirectly and evaporated) and/or polluted per unit of time. Main reference for the methodology is the Water Footprint Network[2], founded by Twente University, UNESCO-IHE Institute for Water Education e World Business Council for Sustainable Development.

The total virtual water content breaks down into three components:

- the blue water footprint is the volume of freshwater evaporated from the global blue water resources (surface water and ground water) to produce the goods and services consumed by the individual or community;
- the green water footprint is the volume of water evaporated from the global green water resources (rainwater stored in the soil as soil moisture);
- the grey water footprint is the volume of polluted water that is associated with the production of all goods and services for the individual or community. The latter was calculated as the volume of water required to dilute pollutants to an extent that the quality of the water remains above established water quality standards.

As in the typical LCA approach, the virtual water content should take into account two components: direct water use by the producer (for producing/manufacturing or for supporting activities) and the indirect water use (the water use in the producer’s supply chain).

[2] www.waterfootprint.org

The use of data regarding virtual water content available at http://www.waterfootprint.org/?page=files/WaterStat-ProductWaterFootprints is suggested.