



LIFE08 ENV/E/000143



Life HAproWINE

Integrated waste management and life cycle assessment in the wine industry.
From waste to high-value products.

Product Category Rules for wine

Approval: November 2013

CONTACT

Soledad Gómez González
Fundación Patrimonio Natural de Castilla y León
soledad.gomez@patrimonionatural.org

More information

www.haprowine.eu

Product Category Rules for Wine - HAprOWINE

This document outlines the Product Category Rules (PCR) for obtaining Environmental Product Declarations for wine. This document is based on work carried out by the HAprOWINE project partners that includes the development of various Life Cycle Assessment (LCA) studies of wine produced in the Castilla y León Region, as well as data obtained from a comprehensive literature review of international studies and scientific articles. In addition, this document includes contributions made by industry representatives (mainly wineries) during face-to-face meetings held on 18/04/2013 and 4/07/2013 in Valladolid (the PRAE building), as well as during the public consultation period from July 5-23, 2013.

Participants in the development process of this document are listed below:

➤ **Written and edited by (members of the HAprOWINE consortium):**

- Cristina Gazulla – UNESCO Chair in Life Cycle and Climate Change (ESCI-UPF)
- Alexander Liedke – PE International
- Yolanda Núñez – Fundación CTME
- Lorena Pereda – Fundación CTME
- Soledad Gómez – Fundación Patrimonio Natural de Castilla y León

➤ **Participated in the discussion of content during meetings:**

- Amparo Repiso – Bodega M^a Amparo Repiso
- Ana Villalba – Yllera
- Bertrand Erhard – Bodegas y Viñedos Montecastro
- Coro Blanco Huerta - Bodegas Olivara
- Elena Rivilla – Bodegas Pago de Carrovejas
- Fernando Páramo – Bodegas Páramo Arroyo
- Herminio González – Hijos de Antonio Barceló
- Juan Manuel Polentinos – Melgarajo
- Leticia Carrera – Bodegas José Pariente
- María Sevillano – Grupo Matarromera
- Noelia Blanco – Hijos de Antonio Barceló
- Ramón Sánchez – Bodegas y Viñedos Valtravieso
- Raquel de la Cruz – Inzamac
- Roberto Nieto – Bodega Abadía Retuerta
- Rut Villa – Yllera
- Sandra Valdueza – Factor CO₂
- Sara Cabanas González – Pago de Ina



➤ **Additional comments received from:**

- Alberto Tobes – Regulatory Advisor for the Ribera del Duero Region
- Ana María López – Fundación CIRCE
- Jesús de Miguel – Bodegas de Señorío de Valdesneros
- Lola Mainar – Fundación CIRCE
- María Sevillano – Bodega Matarromera
- Marina Acosta – IK Ingeniería



1. Basic Information for the PCR

PCR Title	Product Category Rules for Wine
Panel that approved the PCR	Consultation group for the HAproWINE project
Date and registration date of the PCR	-
PCR version number	1.2
Public consultation period for the PCR	July 5-23, 2013
Approval date for the PCR	-
PCR valid until	-
Programme operator	-

2. Terms and definitions

The definitions set out by the ISO 14025, ISO 14040 and ISO 14044 standards are applied in this document, most notably the following:

a) Programme operator

Body or bodies that conduct a **Type III environmental declaration programme**.

b) Life cycle assessment (LCA)

Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle.

c) Life cycle inventory analysis (LCI)

Phase of life cycle assessment involving the compilation and quantification of inputs and outputs for a product throughout its life cycle.

d) Allocation

Partitioning of the input or output flows of a process or a product system between the product system under study and one or more other product systems.

e) Product category

Group of products that can fulfil equivalent functions.

f) Life cycle



Consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal.

g) Co-product

Any of two or more products coming from the same unit process or product system.

NOTE The concepts of co-product, by-product and product have the same category and are used for the identification of several distinguished flows of products from the same unit process. From co-product, by-product and product, waste is the only output to be distinguished as a non-product.

h) Environmental declaration

Claim which indicates the environmental aspects of a product or service.

NOTE An environmental label or declaration may take the form of a statement, symbol or graphic on a product or package label, in product literature, in technical bulletins, in advertising or in publicity, amongst other things.

i) Type III environmental declaration (EPD)

Environmental declaration providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information.

j) Scenario

Collection of assumptions and information concerning an expected sequence of possible future events.

k) Life cycle impact assessment (LCIA)

Phase of life cycle assessment aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts for a product system throughout the life cycle of the product.

l) Reference flow

Measure of the outputs from processes in a given product system required to fulfil the function expressed by the functional unit.

m) Elementary flow

Material or energy entering the system being studied that has been drawn from the environment without previous human transformation, or material or energy leaving the system being studied that is released into the environment without subsequent human transformation.

n) System boundaries

Set of criteria specifying which unit processes are part of a product system.

o) Information module

Compilation of data to be used as a basis for a Type III environmental declaration, covering a unit process or a combination of unit processes that are part of the life cycle of a product.

p) Interested party

Individual or group concerned with or affected by the environmental performance of a product system, or by the results of the life cycle assessment.



q) Unit process

Smallest element considered in the life cycle inventory analysis for which input and output data are quantified.

r) Product category rules (PCR)

Set of specific rules, requirements and guidelines for developing Type III environmental declarations for one or more product categories.

s) Life cycle inventory analysis results

Outcome of a life cycle inventory analysis that catalogues the flows crossing the system boundary and provides the starting point for life cycle impact assessment.

t) Product system

Collection of unit processes with elementary and product flows, performing one or more defined functions, and which models the life cycle of a product.

u) Declared unit

Quantity of a product for use as a reference unit in an EPD for an environmental declaration based on one or more information modules.

Example: mass (kg) or volume (m³).

v) Functional unit

Quantified performance of a product system for use as a reference unit.

3. Harmonization of PCR

As established by ISO 14025, *“Programme operators should facilitate harmonization when developing PCR for a product category by considering the adoption of readily available PCR documents in the same product category and in the appropriate market area. However, there may be valid reasons for developing PCR documents that have a different content from those that are already existing. The justification for differing from existing PCR shall be based on the content of existing PCR documents; and shall not, for example, be based on the origin of any particular PCR. The efforts undertaken to achieve harmonization, the outcome and the explanations for not using readily available PCR shall be reported in the PCR document”*.

In this particular case, other similar PCR were studied, *“Product Category Rules: Wine of fresh grapes, except sparkling wine; grape must 1.0”* (2011) from *The International EPD® System*. These PCR were not directly adapted for the following reasons:

- A functional unit is used that is not appropriate for the Spanish wine market in general or for the Castilla y León Region.
- Clear scenarios for the evaluation of the transport and end-of-life phases are not included.

It should also be noted that the content of the PCR developed in 2011 has not been sufficiently validated in the development of the wine EPD (currently, the programme has no EPD on record in this product category).

4. Product category rules for LCA

4.1. Product category

These product category rules apply to wine from fresh grapes¹, regardless of variety in colour, sugar content or age. Sparkling wine is not included.

This product category includes wine produced in different geographical areas (under protected Designation of Origin – *Denominación de Origen* or D.O. in Spanish - or not) using agricultural practices and/or different production processes and presented with different packaging formats (primary, secondary and tertiary).

4.2. Life cycle phases, corresponding information and module inclusion

The LCA information in the environmental product declarations is structured in phases, which are sub-divided into information modules. The EPD made with these PCR are based on three main phases: production of a bottle of wine, distribution and consumption, and end-of-life. Each of these phases is arranged into different information modules, as seen in Figure 1. In terms of scope, there may be two types of EPD: a) cradle to gate (including only the production phase for a bottle of wine or b) cradle to grave (including all phases).

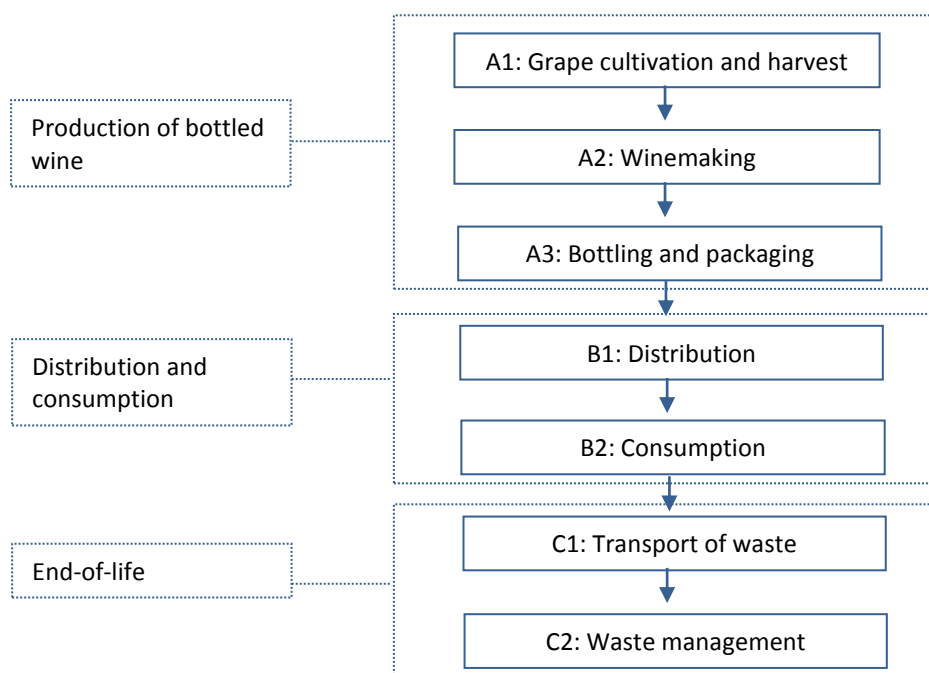


Figure 1. Phases and information modules for the assessment of wine.

¹ Corresponding to Heading 2204 of the Combined Nomenclature 2013 of the European Commission.



4.3. Calculation rules for LCA

4.3.1. Functional unit

The functional unit applied will be “1 bottle with 0.75 litres of wine, including the primary packaging (bottle and capsule) and secondary packaging (distribution box and pallet)”.

4.3.2. Reference useful life of reference product

In most cases, wine is sold within days to a few months of being available at the point of sale (supermarket, specialty shops, etc.). Therefore, from a temporal point of view, it may be considered a product with a high market turnover. Consequently, the effect that carbon storage may have related to global warming is negligible. Therefore, this effect will be excluded from the LCA study.

On the other hand, CO₂ fixation in the vine will also be excluded from the LCA study due to uncertainty concerning its calculation; a sufficient consensus in the scientific community does not yet exist. In future revisions of these PCR, the possibility of including this effect based on the methodological advances should be further addressed.

4.3.3. System boundaries

This section sets out what is considered to be the system under study using the processes included in the different information modules. System boundaries are defined according to the following principles:

- Modularity principle: the processes (and their environmental impacts and aspects) are allocated to the module during which they are produced.
- "Polluter pays principle": waste treatment processes are allocated to the product system that generates the waste, until the final waste condition is reached (waste end-state).
- The recycling waste processes are allocated to the system that will use the derived raw materials. Therefore, if the system uses recycled materials, the collection and processing of such materials should be included. Consequently, waste from the studied system that will be recycled will form part of a different product system, without the allocation of environmental credits to the evaluated product system (however, information about the fact that the system is capable of generating recyclable waste will be included in the EPD).

For these PCR, the following stages have been considered:

a) Wine Production Phase (MODULES A1-A3)

In this phase, information concerning the following modules will be included regardless of where they are developed or the entities that are involved:

a.1) Cultivation and harvest of grapes necessary for the production of 0.75 litres of bottled wine.

All of the applicable operations for the preparation of the vine shall be included (pruning, tillage, fertilization, phytosanitary treatment, irrigation, etc.), as well as the harvest (manual or mechanical) and the transport of the grapes to the winery.



For each of these processes, the material and energy inputs, as well as the waste and emissions generated (including fertilizer application) will be included.

a.2) Winemaking necessary for the production of 0.75 litres of bottled wine.

This module will consider all the processes that occur after the receipt of the grapes at the winery until the production of wine suitable for bottling. The following processes will be included, where applicable, for the wine assessed: destemming and crushing, sulphiting, primary fermentation, pressing, secondary (malolactic) fermentation, clarification, stabilization, filtration and bulk aging.

Each of these processes will consider the auxiliary products and materials used (sugar, water, cleaning detergent, etc.), as well as the energy necessary for the process, and waste generation.

a.3) Bottle and packaging for 0.75 litres of wine.

In this module the raw materials and the energy needed for bottling of 0.75 litres of wine are included, together with the proportional part of the secondary packaging (boxes, pallets, etc.). Waste generated will also be included.

b) Distribution and consumption phase (MODULES B1-B2)

This phase consists of two modules:

b.1) Distribution of a bottle of 0.75 litres of wine

This module will take into account the energy use and the emissions and waste generated from the distribution of the bottled wine. By default, it will be assumed that the bottle is transported by road (in truck) an average distance of 100 km to the point of sale. Additional scenarios can be included in cases where exact information about the real transport distance of the product is available, whether it is more or less than the default scenario. In this phase, waste management for secondary packaging (boxes, pallets, etc.) will be included using a scenario that is representative of the region in question.

b.2) Consumption of a bottle of 0.75 litres of wine

The consumption phase is only relevant, from an environmental perspective, in cases where the wine requires refrigeration. However, the energy necessary to cool the wine from room temperature to the recommended temperature for consumption is negligible in the context of the life cycle of the product, and as such can be excluded from the LCA study.

Where this optional information is included, only the energy used to cool the wine should be included, and not the energy necessary to maintain the recommended temperature, given that the time that it remains in cooling conditions depends on the habits of the consumer and not the characteristics of the product.

c) End-of-life phase (MODULES C1-C2)

The end-of-life phase includes the following two modules:



c.1) Transportation of container waste

This module will include the impact associated with the collection and transport of the primary packaging (bottle, cork and capsule) from the container to the treatment plant. By default, the transportation considered will be carried out by road over a distance of 300 km.

c.2) Management of container waste

This module will include the processes necessary for the final disposal of waste derived from the wine bottle (bottle, cork and capsule) that is not recycled. As such, the waste management scenario that is defined and applied should be statistically representative for the country in which the waste is generated. As previously mentioned, the transport of waste that will be recycled will not be included, given that it forms part of another system.

4.3.4. Criteria for the exclusion of inputs and outputs

The following general cut-off rule will be applied: those energy and material flows that represent less than 1% of the total energy or mass, respectively, that enter or leave each of the modules of the life cycle may be excluded from the study. The sum of the excluded flows may not exceed 5% of the energy and the total materials used in the entire life cycle of the product.

This cut-off rule may not be used to exclude input or output flows that are dangerous to human health or ecosystems according to legislation, regulations or existing scientific evidence or that cause relevant environmental impacts.

During the application of these cut-off rules in the LCA studies in which these PCR are based, it was found that the following transport processes for wine production may be excluded due to the negligible impact in the context of the life cycle:

- Internal transportation, with the exception of that related to cultivation and tillage operations.
- Transport of raw materials to the winery, with the exception of packaging materials.
- Transport of waste generated in the winery to the treatment plant.

The production of infrastructure (such as power or waste treatment plants, the construction of the winery and the machinery used, etc.) may also be excluded.

Following the recommendations of the *Intergovernmental Panel on Climate Change* (IPCC), CO₂ emissions from biological sources are considered neutral. For example, the atmospheric C that is fixed during the growth of the grape (through photosynthesis) or the CO₂ emissions from fermentation or biological decomposition of organic waste, will not be included in the inventory. CO₂ emissions from fossil fuels will be included in the inventory.

4.3.5. Data selection

Wherever possible, specific data from the studied system will be used, especially in the wine production phase. Generic data may be used for processes that are common to different product, such as:

- Production of electricity and fuels,
- Transportation by road, sea or air,
- Packaging production,
- Landfill, recycling and energy recovery from waste.



In any case, the technological, geographical and temporal representativeness of the generic data used should be documented.

4.3.6. Data quality requirements

Data sources used should be documented and the following should be clearly specified:

- Uncertainty (for example, if the data comes from a compilation, a model, or an assumption)
- Integrity (percentage that are average or estimated).
- Representativeness: qualitative assessment of the degree to which the data reflect the actual situation (geographic coverage, time period and technological coverage)
- Coherence: qualitative assessment of whether the study methodology is applied uniformly to the different parts of the analysis.
- Reproducibility: qualitative assessment of whether the extent of the information provided is sufficient so that an independent professional could reproduce the reported results.

The data used to develop the environmental declaration should meet the following requirements:

- Should be the most recent possible and not be older than 10 years.
- The data collected should refer to a one-year time period, with the exception of models related to the cultivation of grapes where average calculations based on at least 3 consecutive years are recommended to minimize the effects of climate on the results. The consideration of different time periods should be justified.
- Technological coverage should reflect the physical reality of the product or the declared product category.
- Geographic coverage should represent average or general data for the region in which the production facility is located.
- The accuracy of specific data should not exceed a variation of 10%.

4.3.7. Units

International system (IS) units should be used for the environmental product declarations. For power, kW will be used and kWh (or MJ) will be used for electricity.

4.4. Inventory Analysis

4.4.1. Data collection

Inventory data shall be collected for each process included in the system limits. Data sources for data used should be documented (including the reference year).

Data can be classified into the following categories:

- Inputs: energy, raw materials, auxiliary and other physical inputs.
- Products, co-products and waste.
- Emissions to air, waste to water and soil.
- Other environmental aspects.

Whether data is specific or average should be documented. In general, the following rules should be applied:

- Raw material production: specific or general average data shall be used.
- Crop harvesting processes, wine aging and production of the wine in the winery: specific data shall be used. In cases where the winery uses grapes acquired from other producers, and obtaining production data is not feasible, generic data from literature may be used.
- Electricity profile: the official energy profile for the country in which the processes are carried out shall be used, when no other site-specific data can be obtained.

4.4.2. Calculation procedures

All calculation procedures should be documented and explained. The principle assumptions adopted should be specified. The same calculation procedures should be applied consistently throughout the study.

4.4.3. Allocation of energy inputs and emission outputs

Wherever possible, the allocation of inputs and outputs should be avoided for processes that generate more than one type of product, either by dividing the unit process into two or more sub-processes or by expanding the product system to include the additional functions related to the co-products.

When allocation cannot be avoided, the inputs and outputs should be allocated to the different products in accordance with a clearly specified procedure that should be documented and explained. As well, allocation may be based on product mass or on other physical characteristics such as their market value, depending on which procedure best describes the end-purpose of the production process.

As previously stated, waste recycling processes will be considered as open cycles after their useful life, as such the recycling processes will be allocated to the product produced from the secondary raw materials. Similarly, in cases where recycled materials are used in the production of a bottle of wine, only the environmental impact associated with the collection and processing of waste to convert it to secondary primary materials will be considered.

6.4. Impact assessment

In these product category rules, the following impact categories are used according to the latest available version of the CML 2011² method for impact assessment:

- Global warming potential (100 year time horizon), expressed in kg de CO₂ eq.
- Ozone layer depletion, in kg of CFC11 eq.
- Soil and water acidification, in kg of SO₂ eq.
- Eutrophication, in kg of PO₄³⁻ eq.
- Photochemical ozone creation, in kg ethane eq.

Additionally, values for the following indicators should be stated:

² Characterization factors for this methodology are published in: <http://cml.leiden.edu/software/data-cmlia.html>



- Primary renewable energy use, in MJ.
- Primary non-renewable energy use, in MJ.
- Freshwater use, in m³
- Total waste, in kg.
- Recyclable waste, in kg.

5. Contents of the EPD

The EPD shall include the minimum content requirements as established by the ISO 14025 norm, including:

- Identification and description of the organization making the declaration.
- Description of the product, a simple visual representation and the functional unit applied.
- Description of the principle production processes in accordance with the scope of the declaration.
- PCR identification.
- Date of publication and period of validity.
- Data from LCA, life cycle inventory or information modules.
- Additional environmental information.
- Contents of the declaration including materials and substances to be declared. This description should specify the substances and materials that can adversely affect human health and the environment in all life cycle phases.
- Information regarding the phases that are not included.
- Statement that environmental declarations from different programmes may not be comparable.
- Information indicating where explanatory material may be obtained.
- An express declaration that the declaration represents the average behaviour of a number of products (as well as, information about the degree of deviation of the behaviour of the products in relation to the average).
- Reference to the production facility and the producer that are representative of the LCA results.

6. Project Report

The EPD that are developed using these PCR will be accompanied by an LCA report that will be structured using the following sections:

- General information: who carried out the LCA and the date of publication.
- Objectives of the study and the intended application.
- Scope of the study:
 - o Functional unit.
 - o System boundaries, including: phases, processes or data not included; quantification of material and energy inputs; hypothesis about electricity production and other relevant basic data.
 - o Cut-off rules for the inclusion of inputs and outputs, including the list of excluded processes.
- Life cycle inventory analysis (LCIA):
 - o Qualitative and quantitative description of the processes included in the evaluated life cycle phases.



- Data sources and bibliography.
- Evaluation of the quality of data used.
- Allocation rules, including a justification for their application.
- Life cycle impact assessment (LCIA):
 - Methods, calculations and study results.
 - Relationship between the results of the LCIA and LCI.
 - References for characterization models, characterization factors and the methods applied. A statement that the LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks;
- Life cycle interpretation:
 - Results.
 - Assumptions and limitations associated with the results.
 - Data quality assessment.
 - Value choices, reasoning or expert statements.

7. Validity of the EPD

EPDs carried out according to this set of PCR are valid for three years.