



ENVIRONMENTAL PRODUCT DECLARATION (EPD) CERTIFIED



KRONENBOURG 1664® Beer



International EPD® System

CPC code: 24310 – Beer made from malt (<http://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=9&Lg=1&Co=24310>)

Geographical scope of application: Europe

Environmental Product Declaration Certificated – Registration Number: S-P-00533

Date of Approval: 22.12.2014 - Revision: 4 - Expiry date: 01.12.2017

1. SCOPE OF THE DECLARATION

This document, known as an EPD (Environmental Product Declaration), is aimed at those interested in understanding and verifying the environmental impact generated through the entire life cycle of Kronenbourg 1664® beer. The document provides a reliable quantification and certification of the environmental performance of the product, according to a scientific methodology that contemplates the impacts of the product's life cycle, the Life Cycle Assessment – LIFE CYCLE ASSESSMENT (ISO 14040-14044).

2. COMPANY DESCRIPTION

The story of Carlsberg Italy dates back almost two centuries to 1876, when Angelo Poretti founded the Induno Olona establishment that took the name Poretti Industries.

It was only after the war that Poretti industries, one of the cornerstones of beer production in Italy, attracted the interest of an international group that in the 1970s began to broaden their horizons: the United Breweries Group A/S (which later took the name of the Carlsberg Group), was born from the merger in 1970 of two historical Danish companies, Carlsberg and Tuborg. In 1975 the industries signed with the Danish group the first agreement for the production and marketing of the Tuborg and Carlsberg brands.

This innovative agreement proved decisive for the fortune of Poretti industries, as the Carlsberg Group acquired the company's shares over the years and in 1998 became Carlsberg Italy, and in 2002 became wholly Danish.

Today, Carlsberg Italy manufactures and sells approximately 1 million and 500 thousand hectolitres of beer through the following brands: Carlsberg, Tuborg, BAP 4 Luppoli Originale, BAP 5 Luppoli Bock Chiara and BAP 6 Luppoli Bock Rossa, Kronenbourg 1664 (covered by certified EPDs), Carlsberg Elephant, Carlsberg Special Brew, Tuborg Light, Corona-Extra, Splügen, Holsten, Tucher, Negra Modelo, Modelo Especial, Devil's Kiss, Super Devil's Kiss, Grimbergen and Feldschlösschen.

Carlsberg Italy, moreover, through the acquisition of numerous companies of beverage distributors throughout Italy, has created Carlsberg Ho.Re.Ca, the distribution network dedicated to the Ho.Re.Ca (*Hotellerie-Restaurant-Café*) channel that offers an extensive catalogue of products and services able to meet all the various needs and strategies of sales outlets.

Since February, 9th 2005 the production factory of Induno Olona, in which are produced Carlsberg Italia beers, has incorporated an environmental management system conforming to ISO 14001: 2004, certified by Lloyds's Quality Assurance register (certificate of approval No.: LRC 141249/14).

The environmental management system applies to:

"the production of beer from the receiving of raw materials up to the consignment of the finished product to the pallet".

3. PRODUCT DESCRIPTION

3.1. Characteristics

The characteristics of the product covered by this statement is the beer brand Kronenbourg 1664®, produced by Carlsberg Italy at its plant in Induno Olona and intended for sale at pubs, bars, restaurants and points of sale of mass retail channels.

The identifier of the product according to the classification CPC (Central Product Classification) is: Beer made from malt – CPC 2431.

The same product is evaluated in three different distribution scenarios:

- Draught Master Modular 20 (DM Modular 20) drums of 20 l;
- Draught Master Select 10 (DM Select 10) drums of 10 l;
- Disposable glass bottles of 66 cl.

For the three distribution scenarios, the shelf life of the beer within specific containers was considered as follows:

- 9 months for beer stored in DM Modular 20 and SM Select 10 drums;
- 15 months for beer in glass bottles.

Regarding the annual consumption of beer per year, the size of the container, as well as the shelf life have an impact on the quantity of product purchased from outlets, and therefore on the frequency of supply of each store.

The composition of the product as supplied in three different containers is as follows:

DM Modular 20 keg (100 l – 5 kegs)		
Beer ¹	100 kg	95,21%
Keg (70,7% PET, 20% PP, 4,7% nylon, 3,1% ink, 1,5% other <1%)	1,59 kg	1,51%
Packaging (paperboard)	3,44 kg	3,28%

DM Select 10 keg (100 l – 10 kegs)		
Beer ¹	100 kg	94,42%
Keg (70,7% PET, 20% PP, 4,7% nylon, 3,1% ink, 1,5% other <1%)	2,52 kg	2,38%
Packaging (paperboard)	3,39 kg	3,20%

Glass Bottle (100 l – 152 bottles)		
Beer ¹	100 kg	63,86%
Bottle (glass, 82,5% recycled)	53,03 kg	33,86%
Cap POC (aluminium)	0,61 kg	0,19%
Label (paper)	0,25 kg	0,15%
Packaging (paperboard) – 310 g for 15 bottles	3,30 kg	2,00%

¹ Beer density assumed to be 1 kg/l

3.2. Functional Unit

The functional unit is represented by **100 l of beer drummed/bottled and delivered to final consumers** (pubs, bars, restaurants, mass retail channel points of sale).

The functional unit is based on the production during the reference year 2013, and represents the reference unit of all results of this Declaration.

3.3. Declaration of Contents

Kronenbourg 1664: Beer with a unique taste and an elegant bottle; the aromatic notes of Strisselspalt, a variety of hops from Alsace, called the caviar of hops, characterize it in an unmistakable way. Its delicate floral aroma gives a unique pleasure, expertly balanced with a delicate sweet taste, which reveals notes of Mirabella plum, dried apricot, honey and pear.

PRODUCT CHARACTERISTICS		PRODUCT SPECIFICS	
COMMERCIAL CAT.	Premium	ALCOHOL CONTENT	5,0% alc, vol,
LEGAL CAT.	Beer	ATTENUATION	68%
STYLE	Lager	REAL EXTRACT	3,87%
COLOR TYPE	Pale	COLOR	9
FOAM	Thin	BITTER UNITS (BU)	22
ASPECT	Limpid		
COLOR	Golden Blond	NUTRITIONAL INFORMATION PER 100 ml OF PRODUCT	
AROMA INTENSITY	Normal	ENERGY	56 kcal (231 kJ)
AROMA ELEGANCE	Normal	PROTEIN	0,3 g
CARBONATION	Moderate	FAT	0,0 g
BODY	Light	CARBOHYDRATES	5,0 g
BITTERNESS	Moderate		
BALANCED TASTE	Correct		
STRENGTH OF AFTERTASTE	Normal		
DURATION OF AFTERTASTE	Sufficient		
RAW MATERIALS	Water		
	Barley Malt		
	Glucose Syrup		
	Hops		

3.4. Description of the Production Process

Beer production can be divided into three main phases: cooking the wort, fermentation and filtration.

During the first stage, which takes place in the cooking room, the barley malt is milled until a certain type of flour is obtained. This is then mixed with hot water, thereby obtaining the wort (the brew).

The liquid part of the wort is separated from the solid part through filtration and grains, through which a waste product is obtained, recovered and sold on as animal feed. In this respect, the environmental impacts associated with the percentage of barley malt, which contributes to the production of spent grains, have already been allocated and therefore are not borne by the present LCA study. Allocation of environmental impacts of spent grains is based on mass.

The next step is to filter the wort cooking inside appropriate boilers. This is essential for the type of beer to be produced and the sterilization of the wort. It is during this phase that hops are also added. During boiling, insoluble complexes are formed that constitute the so-called trub, that is eliminated through clarification.

The next stage is that of fermentation. The wort is cooled down to temperatures which allow fermentation to occur, oxygen is then injected in the process at an early stage, which takes place under aerobic conditions.

Next is the addition of yeast and the fermentation process itself. From this process we have the production of CO₂, which is almost entirely recovered to be used in other production phases in which it is required.

At the end of fermentation, the beer is left in maturing tanks so that residues of yeast can settle on the bottom.

The final phase is that of filtration, where the beer undergoes a series of operations to remove residues of yeast and other murky substances present, therefore, such a stabilisation process is designed to make the beer unalterable before being drummed or bottled.

3.5. The Boundaries of the Analysed System

The system boundaries analysed in the LCA study include all phases of the life cycle of production of beer, from the cultivation of ingredients to the disposal of drums and bottles after consumption.

In particular, the system includes the following life cycle phases:

- "upstream processes²":
 - the production phase and the transport of kegs and bottles (including all related packaging materials, of all typologies and with the highest degree of detail achievable);
 - the production phase and transport of raw materials and additives for the beer production process;
- "core processes":
 - the beer production phase;
 - the beer kegging and bottling phases;
- "downstream processes":
 - the phases of distribution of the finished product;
 - maintenance activities of plants located at final points of sale;
 - consumption occurring during usage phase of beer lines;
 - the end of life phases (transport to disposal and collection centres, landfill disposal and potential recovery of materials and energy³).

Emissions associated to production of used electricity are ascribed to phases where consumption occurs.

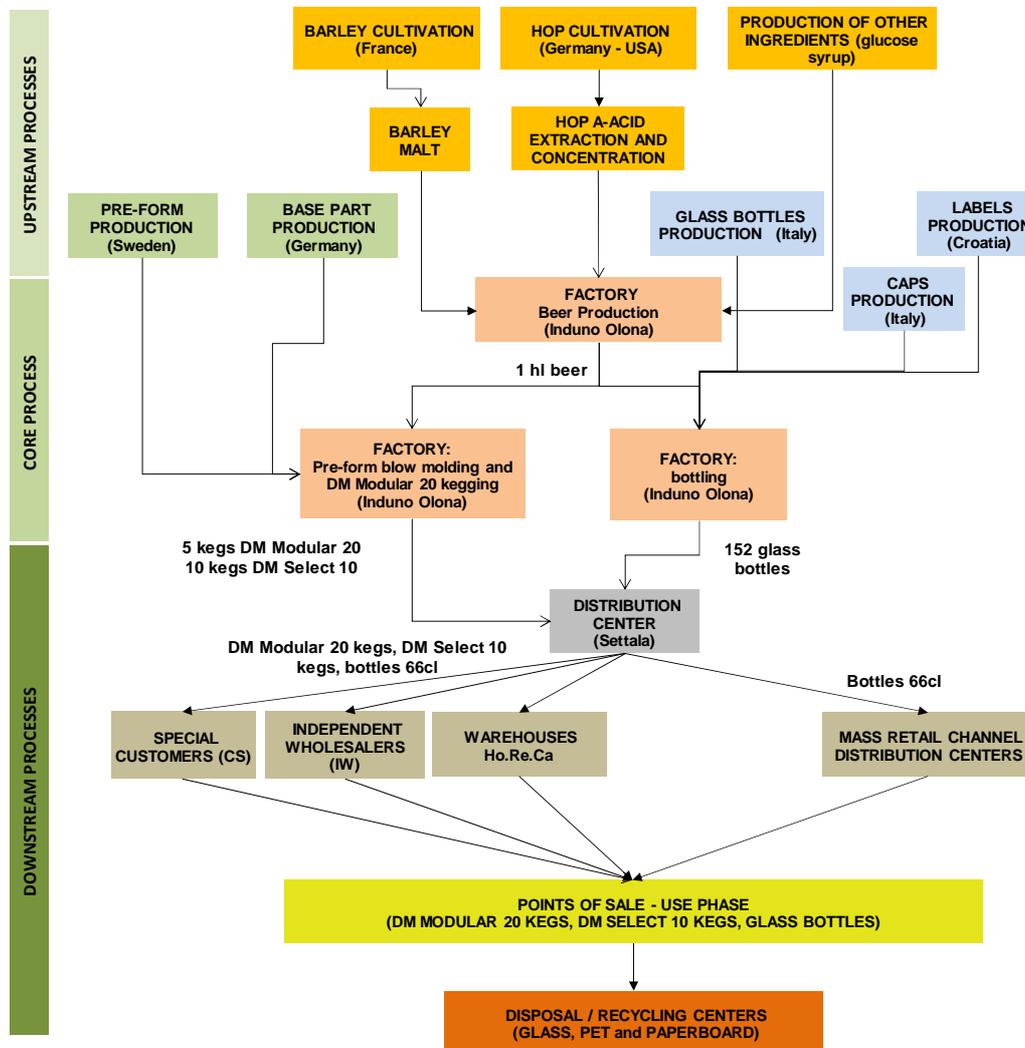
² In the "General Programme Instructions" of the International EPD® System (www.environdec.com) "upstream processes" are considered as those which include the acquisition of raw materials and semi-finished or intermediate components, "core process" those undertaken in the establishment of production of products covered by the EPD, "downstream processes" processes related to the use phase and end of life scenario.

³ For plastic, glass, paper and aluminium end of life scenarios, national percentages published in annual reports of Consorzio Nazionale Imballaggi (CONAI) ("Relazione sulla Gestione", 2013) have been used.

Excluded from the system boundaries are the environmental loads associated with construction and maintenance of production facilities.

To assure the homogeneity of the results, a unique distribution scenario of finished product has been adopted, defined on the base of weighted average distances for each route on all distribution channels actually used during the reference year.

The boundaries of the system are schematically represented in the figure below:



3.6. Time Periods and Data Sources

The comparability between EPDs of different products must also be ensured on the basis of time. To this end, it is clarified that the LCA study that gave rise to this EPD refers to the production of beer Kronenbourg 1664® in the establishment in Induno Olona in one calendar year. The base year for the data and indicators presented in this EPD is 2013.

The data used for the LCA were directly measured at the establishment of Induno Olona and supplied directly by the main suppliers of the plant. According to the *General Programme Instructions* "other generic" data do not exceed 3%.

Excluded from the system, due to their contribution lower than 1% on total impacts, are:

- The supply of yeast;
- Additives of the beer recipe;

4. DECLARATION OF ENVIRONMENTAL PERFORMANCE

All data quantities below relate to the functional unit chosen for the EPD: 100L of beer bottled/barrelled and delivered to final consumers (at pubs, bars, restaurants).

✓ RESOURCES USE⁴

		DM Modular 20 kegs	DM Select 10 Kegs	Glass Bottles
NON RENEWABLE RESOURCES				
Material Resources	kg	7,27	7,73	33,59
Of which:				
Gravel	kg	5,14	5,48	23,00
Calcite (CaCO ₃)	kg	1,04	1,09	3,59
Resources for Energy Conversion Purposes	kg	11,78	13,56	32,49
Of which:				
Oil	kg	5,76	6,53	14,99
Gas	kg	3,40	3,97	10,87
Coal	kg	2,59	3,03	6,58
RENEWABLE RESOURCES				
Material Resources	kg	0,10	0,13	0,22
Of which:				
Wood	Kg	0,10	0,13	0,20
Resources for Energy Conversion Purposes	MJ	17,97	19,83	36,28
Of which:				
Hydroelectric	MJ	17,31	19,04	34,97
OTHER INDICATORS				
Secondary resources, material	kg	0,00	0,00	44,28
Secondary resources, energetic	MJ	0,00	0,00	0,00
Recovered energy flows	MJ	0,00	0,00	0,00
GER (Gross energy requirement)	MJ	641,68	726,21	1 555,54
Water	l	607,79	627,10	994,00
Of which, direct in "core"	l	145,00	145,00	214,00

NOTE: the table shows individually the resources that contribute at least 5% of the total for each **subcategory**. Difference between total value of subcategory and the sum of single resources is due to resources that individually contribute for less than 5%. Secondary resources completely refer to "upstream" processes.

⁴ Resources use data unbundled in *upstream processes*, *core process* and *downstream processes* are reported in **Annex 1**

✓ **POTENTIAL IMPACTS**

BEER IN DM MODULAR 20 KEG				
Impact Categories	Total Life Cycle	Upstream processes	Core process	Downstream Processes
Global Warming Potential (kg CO₂ eq.)	35,54	15,81	8,36	11,37
Acidification Potential (kg SO₂ eq.)	0,20	0,12	0,03	0,05
Photochemical Ozone Creation Potential (kg C₂H₄ eq.)	0,043	0,031	0,004	0,008
Eutrophication potential (kg PO₄⁻³ eq.)	0,123	0,091	0,020	0,012

BEER IN DM SELECT 10 KEG				
Impact Categories	Total Life Cycle	Upstream processes	Core process	Downstream Processes
Global Warming Potential (kg CO₂ eq.)	38,82	18,90	8,36	11,56
Acidification Potential (kg SO₂ eq.)	0,21	0,13	0,03	0,05
Photochemical Ozone Creation Potential (kg C₂H₄ eq.)	0,047	0,035	0,004	0,008
Eutrophication potential (kg PO₄⁻³ eq.)	0,126	0,094	0,020	0,012

BEER IN GLASS BOTTLE				
Impact Categories	Total Life Cycle	Upstream processes	Core process	Downstream Processes
Global Warming Potential (kg CO₂ eq.)	96,69	69,64	10,23	16,81
Acidification Potential (kg SO₂ eq.)	0,65	0,54	0,03	0,08
Photochemical Ozone Creation Potential (kg C₂H₄ eq.)	0,095	0,070	0,004	0,021
Eutrophication potential (kg PO₄⁻³ eq.)	0,178	0,141	0,022	0,015

✓ **OTHER INDICATORS**

WASTE PRODUCTION

BEER IN DM MODULAR 20 KEG	Total Life Cycle	Upstream Processes	Core Process	Downstream Processes
Total (kg)	4,75	1,21	2,83	0,71
of which non dangerous (kg)	4,75	1,21	2,83	0,71
of which dangerous (kg)	0,00091	0,00057	0,00030	0,00004

BEER IN DM SELECT 10 KEG	Total Life Cycle	Upstream Processes	Core Process	Downstream Processes
Total (kg)	5,04	1,33	2,78	0,92
of which non dangerous (kg)	5,04	1,33	2,78	0,92
of which dangerous (kg)	0,00110	0,00076	0,00030	0,00004

BEER IN GLASS BOTTLE	Total Life Cycle	Upstream Processes	Core Process	Downstream Processes
Total (kg)	23,66	4,88	3,79	14,99
of which non dangerous (kg)	23,65	4,88	3,79	14,99
of which dangerous (kg)	0,00424	0,00386	0,00031	0,00007

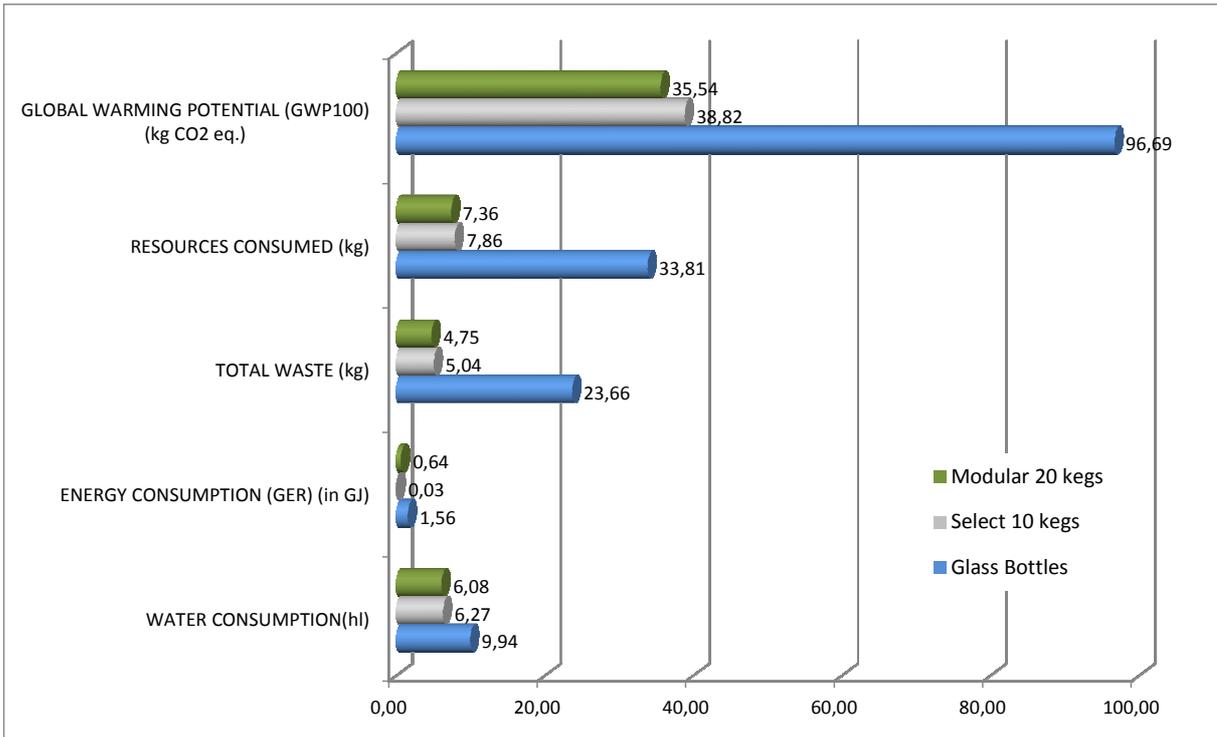
MATERIALS SUBJECT TO RECYCLING

BEER IN DM MODULAR 20 KEG	Plastic materials (PET and PE) (kg)	0,50
BEER IN SELECT 10 KEG	Plastic materials (PET and PE) (kg)	0,55
BEER IN GLASS BOTTLE	Glass (kg)	53,03

5. RESULTS INTERPRETATION

The chart and graph shown below are useful to understand the environmental performance related to the life cycle of the beer brand Kronenbourg 1664® in the three distribution scenarios. It should be remembered that, for a strict comparison of environmental performance, indicators noted above should be compared with those related to competing products referring to the same functional unit.

	Glass Bottle	DM M20 Keg	DM Select 10 keg	DM M20 Keg
Resources Consumed (kg)	33,81	7,36	7,86	7,36
		-359,00%		-6,71%
Water Consumption (litres)	994	607,79	627,1	607,79
		-63,50%		-3,18%
Energy Consumption (MJ)	1 555,54	641,68	26,21	641,68
		-142,40%		-13,17%
Global Warming Potential (Gwp100) (Kg CO₂ Eq)	96,69	35,54	38,82	35,54
		-172,00%		-9,23%
Total Waste (Kg)	23,66	4,75	5,04	4,75
		-398,50%		-6,15%



6. INFORMATION FROM THE ORGANISATION

The distribution technology in DM Modular 20 and DM Select 10 kegs in PET is associated with new dispensing equipment developed by Carlsberg Italy that replaces that traditionally used. Whilst the latest drums dispense beer through applying CO₂ pressure inside the drums, DM Modular 20 and DM Select 10 technology provides for the application of air pressure outside the body, thereby eliminating the use of CO₂ cylinders.

Managers of final sales outlets must dispose of the DM Modular 20 and DM Select 10 kegs, once exhausted, in the differentiated recycling of plastics, according to the directions of the local authorities. There is currently no system for returnable glass bottles, which must be disposed of in separate glass recycling as indicated by the local authorities.

Carlsberg Italy s.p.a., in accordance with the commitments set out in its environmental policy, approved under the environmental management system certificate ISO 14001, aimed at pursuing pollution prevention, minimization of environmental impacts linked to production processes, optimizing the use of natural resources and continuous improvement of its environmental performance, has extended the use of the innovative solution DM Modular 20 and DM Select 10 to all produced and marketed brands, thus enhancing the environmental performance, as demonstrated by data presented in this EPD.

At present Carlsberg Italy s.p.a. has undergoing studies on new distribution opportunities of finished product through PET kegs of different dimension, subjected to Life Cycle Design studies, to limit environmental impacts of product life cycle.

7. CHANGES COMPARED TO PREVIOUS EPD ISSUE

This issue of the EPD, unlike previous EPD, reports environmental impacts of beer distributed through new PET kegs DM Select 10 technology.

8. INFORMATION FROM THE CERTIFICATION BODY

This EPD was approved by the certification body RINA Services S.p.a. (www.rina.org), accredited from ACCREDIA (Registration Number 001H), in compliance with the requirements of the standard "General Programme Instructions" of the International EPD® System (www.environdec.com) and of PCR 2011:21 v.1.01.

RINA Services S.p.a is member of international certification network IQNet (www.iqnet-certification.com).

PCR Review conducted by:

Technical Committee of the International EPD System

e-mail: info@environdec.com

Independent audit of declaration and data, in compliance with standard ISO 14025:2006

EPD process certification EPD verification

Third party auditor:

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Fax: +39 010 5351000, www.rina.org

ACCREDIA Registration number: 001H

It should be remembered that EPD developed according to different programmes may not be comparable.

This EPD and all regarding information are available on website: www.environdec.com.

9. REFERENCES

For LCA study and EPD declaration fulfilment the following documents were used:

- General Programme Instructions (GPI) for Environmental Products Declarations (Version 2.01);
- PCR 2011:21 (Version 1.01);
- LCA Analysis and Comparison between Distribution Scenario of Carlsberg, Tuborg, BAP 4 Luppoli Originale, BAP 5 Luppoli Bock Chiara and BAP 6 Luppoli Bock Rossa Beers, Kronenbourg (04/12/2014, Rev. 2);
- Databases required from reference PCR;
- ELCD Database - *European Life Cycle Database* (Version 2.0) (<http://lca.jrc.ec.europa.eu>);
- *Ecoinvent 2.2 Database* (<http://www.ecoinvent.ch>);
- *"The Carbon Footprint of Fat Tire® Amber Ale", THE CLIMATE CO₂NSERVANCY.*

For disposal of kegs and bottles within differentiated waste collection, managers of final sales outlets must refer to directions of local authorities. Contacts for environmental product declaration:

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In realizing this EPD and the LCA study, which forms the scientific basis, Carlsberg Italia S.p.a. avails itself of technical and methodological support of a research team of **IEFE – Università Bocconi of Milan**, coordinated by **Prof. Fabio Iraldo** and composed by **Matteo Donelli** and **Andrea Fontanella**.

10. GLOSSARY

LCA: Life Cycle Assessment is a methodology governed by the ISO 14040 series that aims to quantify the energy and environmental load of the life cycle of a product or activity, through the quantification of energy and waste materials and emissions (solid, liquid and gaseous) released into the environment from the extraction of raw materials to final waste disposal.

FUNCTIONAL UNIT: is the measurement unit to which all results listed in the EPD refer. That measurement serves as the basis for comparison to compare the data presented in two or more EPD's for products belonging to a specific category of homogeneous goods/services, i.e. the same PCR.

GREENHOUSE EFFECT: atmosphere global warming phenomenon, calculated for the next 100 years, due to the emission into the atmosphere of greenhouse gases such as carbon dioxide (CO₂), methane (CH₄), nitrogen protoxide (N₂O), etc.

ACIDIFICATION: lowering the pH of the soil, lakes, forests, due to the release of acidic substances into the atmosphere, with harmful effects on living organisms (e.g. "acid rain")

EUTROPHICATION: the reduction of required oxygen in water bodies and ecosystems due to the excessive intake of nutrients such as nitrogen and phosphorus

PHOTOCHEMICAL OZONE CREATION POTENTIAL: formation of ozone in the earth's surface due to the release into the atmosphere of unburnt hydrocarbons and nitrogen oxides in the presence of solar radiation. This phenomenon is harmful to living organisms, and is often found in large urban centres

GROSS ENERGY REQUIREMENT (GER): is an indicator, expressed in MJ or kWh, of the total energy extracted from the environment throughout the entire life cycle of a functional unit of a product/service. Contributing to this indicator are dimensions of energy consumed for manufacturing processes to produce fuels used in processes, for the phases of transport, in addition to the share of energy contained and "frozen" in potentially combustible materials.

SHELF LIFE: The length of time a food product can be preserved, that is the time, after packaging, a product, remains safe in pre-defined environmental conditions.

ANNEX 1 – Resources Use in three distribution scenarios unbundled in *Upstream Processes*, *Core Process* and *Downstream Processes*

		BEER IN DM MODULAR 20 KEG				BEER IN DM SELECT 10 KEG				BEER IN 66cl GLASS BOTTLE			
		Full Life Cycle	Upstream Processes	Core Process	Downstream Processes	Full Life Cycle	Upstream Processes	Core Process	Downstream Processes	Full Life Cycle	Upstream Processes	Core Process	Downstream Processes
NON RENEWABLE RESOURCES													
Material Resources	Kg	7,27	5,06	1,72	0,49	7,73	5,50	1,71	0,53	33,59	29,29	1,85	2,45
Of which:													
Gravel	Kg	5,14	3,55	1,20	0,39	5,48	3,87	1,19	0,43	23,00	19,37	1,33	2,30
Calcite (CaCO ₃)	Kg	1,04	0,86	0,15	0,03	1,09	0,90	0,15	0,04	3,59	3,39	0,15	0,05
Resources for Energy Conversion Purposes	Kg	11,78	5,57	3,05	3,15	13,56	7,54	3,05	2,97	32,49	23,69	3,48	5,33
Of which:													
Oil	Kg	5,76	2,50	0,41	2,85	6,53	3,44	0,40	2,68	14,99	9,80	0,38	4,82
Gas	Kg	3,40	1,63	1,60	0,16	3,97	2,22	1,60	0,15	10,87	8,50	2,11	0,27
Coal	kg	2,59	1,42	1,03	0,14	3,03	1,86	1,03	0,14	6,58	5,36	0,99	0,24
RENEWABLE RESOURCES													
Material Resources	Kg	0,10	0,08	0,00	0,00	0,13	0,11	0,00	0,00	0,22	0,20	0,02	0,00
Of which:													
Wood	Kg	0,09	0,08	0,01	0,00	0,12	0,11	0,01	0,00	0,20	0,19	0,01	0,00
Resources for Energy Conversion Purposes	MJ	17,97	10,46	7,18	0,33	19,83	12,33	7,17	0,33	36,28	28,92	6,75	0,61
Of which:													
Hydroelectric	MJ	17,31	10,11	6,90	0,30	19,04	11,84	6,90	0,30	34,97	27,91	6,49	0,56
WATER													
Water	l	607,79	407,02	187,71	13,06	627,10	426,55	187,69	12,87	994,00	719,48	251,38	23,14

Note: possible inconsistencies in decimal numbers between the total use of resources in column "Full Life Cycle" and the sum of the three disaggregated values "upstream processes", "core processes" and "downstream processes" are due to rounding of values to second decimal place.