CONFEDERATION OF E.U. YEAST PRODUCERS
COFALEC

Carbon Footprint of Yeast produced in the European Union

The Carbon Footprint has been evaluated by PwC (PricewaterhouseCooper) at the request of COFALEC (Confederation of E.U. Yeast Producers).

COFALEC
The E.U. Yeast Industry

YEAST

In the air, in the water, in the soil, as well as on the surface of plants, yeasts are present everywhere in the environment where nutrient levels are high enough and where adequate temperature, pH and humidity promote its growth.

Yeast has been used by mankind for thousands of years. By acquiring the skill to process it, man has learned to use yeast in a refined and controlled manner to produce consistent, high quality foods.

Because of the harmless nature of most yeasts, they are used in a wide range of applications:

- as a 'ferment' for the food industry (bread, standard bread loaves, fancy breads, baguette, organic bread, pizza, soft rolls…) and for the brewing/fermentation industry (alcoholic drinks, bio-ethanol…),

- as a 'food supplement' for nutritional purposes,
- as a 'medicine' for restoring intestinal flora and synthesizing high value-added therapeutic proteins (hormones, vaccines…)
- as a 'laboratory model' for studying the genetic and biological properties of eukaryotic cells.

For large scale production processes, an initial yeast inoculum, obtained from a selected strain, is cultivated in successive batches of increasing volume. By using sugar beet and sugar cane molasses as raw material, yeast producers recycle the thick syrupy co-product of the sugar processing industry. Yeast manufacturers have long been concerned about preserving the environment and protecting natural habitats. Treatments are used to recycle waste water and non-assimilated organic and mineral compounds.

Yeasts are offered under three forms: liquid, compressed and dry.

Liquid yeast (average dry matter 18%) needs very little packaging: it is usually distributed by trucks equipped with tanks.

Compressed yeast (average dry matter 30%) is wrapped in paper: it is usually distributed in cartons.

Dry yeast (average dry matter 95%) is packed in vacuum bags or tins: it is broadly exported around the world in cartons.

The yeast industry has always been very conscious of the necessity to care for the environment. It was one of the first industries to start treating its waste waters as early as in 1935.

When the debate on Carbon Footprint started, the yeast industry participated actively to the think tanks and to the discussions with European and National authorities. And although there is no legal obligation to submit Carbon Footprint data for yeast, COFALEC (Confederation of E.U Yeast Producers) required PwC (PricewaterhouseCoopers) to study the Carbon Footprint of yeast produced in the European Union.

That decision was taken for two reasons:

- to participate to the global effort of EU industries and citizens in mastering CO2 emissions
- to provide a reliable answer to the users of yeasts, bakers, wine makers, brewers, pharmaceutical producers.

COFALEC is proud to submit hereunder the results of that research conducted by PwC, who used the LCA (Life Cycle Assessment) method, which is the most challenging and credible environmental assessment method, as defined by international standards ISO 14040 and 14044 (2006).

METHODOLOGY

The Carbon Footprint of European yeasts has been calculated using the Life Cycle Assessment (LCA) methodology focusing on climate change impact.

LCA is a method aiming at assessing the overall environmental impact of a product or service throughout its life cycle i.e. from the production of the raw materials to the end of its life. The method is framed by the ISO 14040 and 14044 international standards.

LCA is currently the most widely used methodology to assess the impact of a product on the environment. **Using this method ensures the credibility of the assessment.**

The main steps to carry out a Life Cycle Assessment are:

- Defining the objectives and scope of the LCA
- Collecting the most relevant and specific data
- Modeling the processes in a specific software
- Calculating the environmental impacts
- Interpreting the results

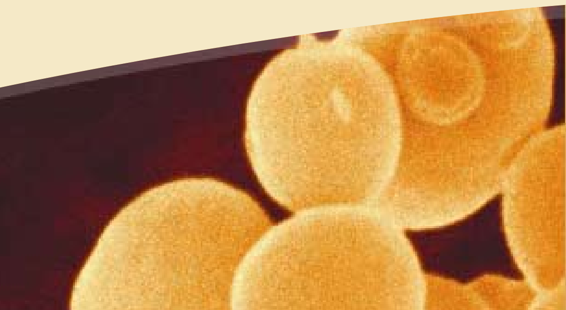
The modeling and the calculation of the climate change impact have been performed with the software Team™. This software was designed by PwC-Ecobilan. It is widely implemented by industrial companies to carry out LCAs.

This study aimed at calculating the **Carbon Footprint** of 3 types of yeast, **cradle to gate**, i.e.:

- The LCA performed has been limited to the greenhouse gas emissions assessment only.
- The scope of the LCA has been limited to the production phase only ("Craddle to gate").

Those LCA's limits are relevant as:

- The demand of the yeast producers' clients on environmental impacts is today mainly focused on greenhouse gas emissions.
- The clients of the yeast industry need the yeast data in order to assess the Carbon Footprint of their own products (breads, wines, beers...): in this survey yeast figures are calculated till the gate of the factory, the downstream steps being managed by the clients.



The Carbon Footprint of yeast is calculated for 3 functional units: liquid, compressed and dry yeasts. Therefore the Carbon Footprint is assessed for:

1. *Producing 1kg of liquid yeast (18% dry matter)*

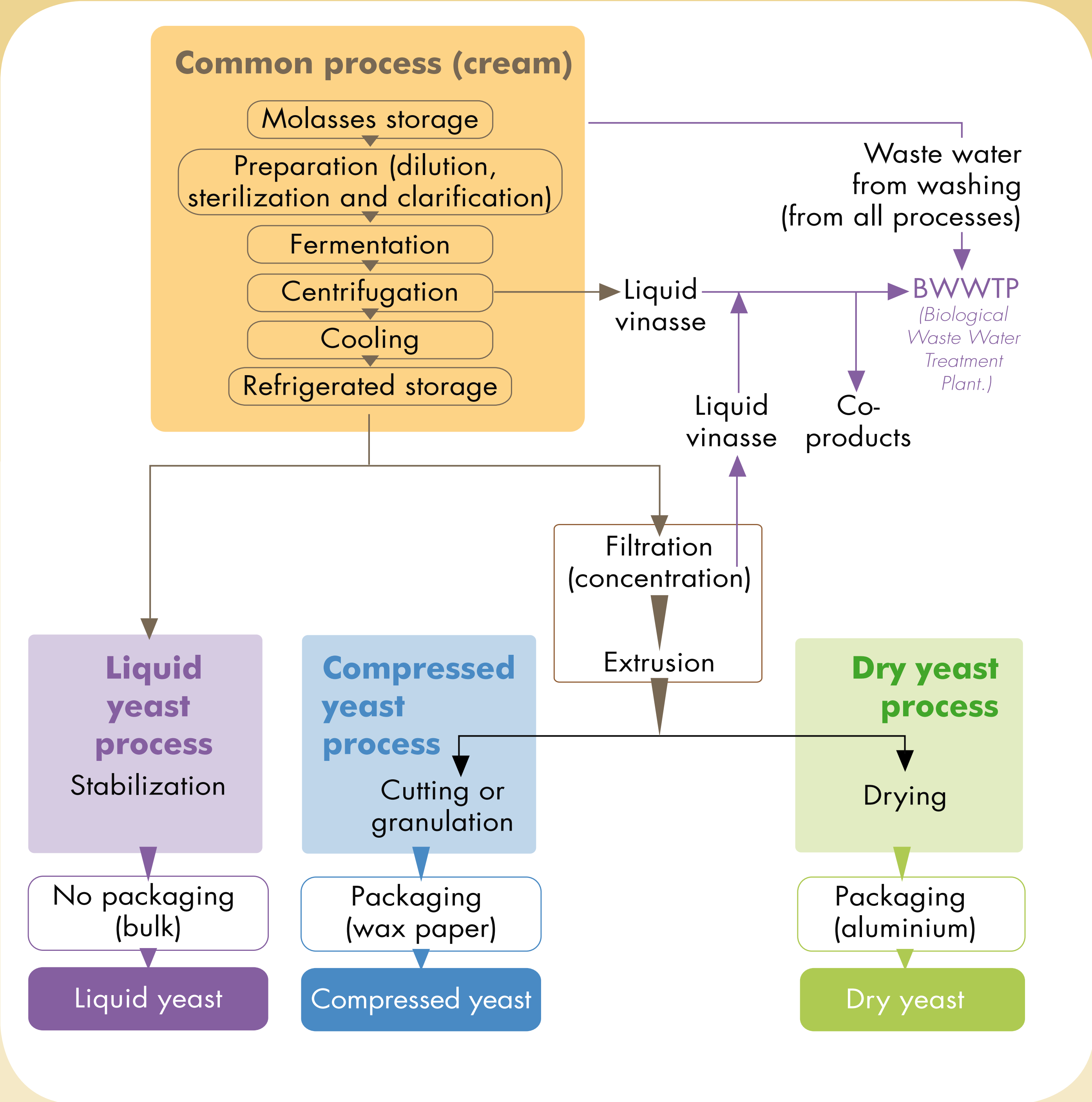
2. *Producing 1kg of compressed yeast (packaged, 30% dry matter)*

3. *Producing 1kg of dry yeast (packaged, 95% dry matter)*

The Carbon Footprint of yeast was calculated using the data collected in five European sites, which are typical of the European yeast industry. This guarantees a good representativeness of the yeast production processes used the European Union and it covers geographical specificities in terms of raw material supply.

Upstream data for the Carbon Footprint of molasses are bibliographical data extracted from the Swiss LCA database Ecoinvent and adapted by PwC.

Yeast production process



The production process has been modeled as follows: the figures are expressed in grams equivalent CO2 per functional unit. This means that they take into account the different greenhouse gases (CO2, methane, N2O…) and their respective global warming potential* (GWP).

The calculation used is the IPCC 2007 (100 years) methodology.

This calculation methodology is widely recognized and used for most of the LCAs or Carbon Footprints.

** Global-warming potential (GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It differs according to the greenhouse gases (CO2, CH4, N2O…).*

Liquid yeast

1 kg of liquid yeast = 363 g eq. CO_2

Producing 1kg of liquid yeast (18% dry matter)

Compressed yeast

1 kg of compressed yeast = 734 g eq. CO_2

Producing 1kg of compressed yeast (packaged, 30% dry matter)

Dry yeast

1 kg of dry yeast = 3204 g eq. CO_2

Producing 1kg of dry yeast (packaged, 95% dry matter)

RESULTS

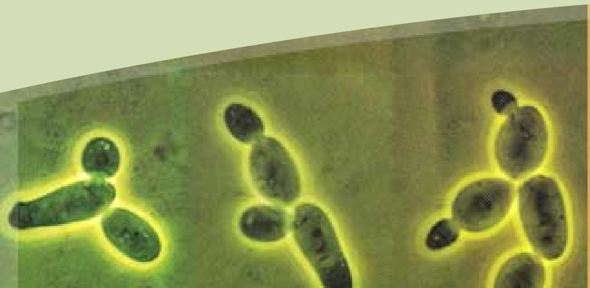
For each type of yeast (liquid, compressed, dry), the global impact is presented in grams equivalent CO_2 per functional unit. The figures are expressed "as such".

As the concentrations of the different types of yeast are different, the comparison between the three types should be made on the basis of the dry matter content of each yeast type. Using the dry matter content as the correcting factor, we obtain the following figures:

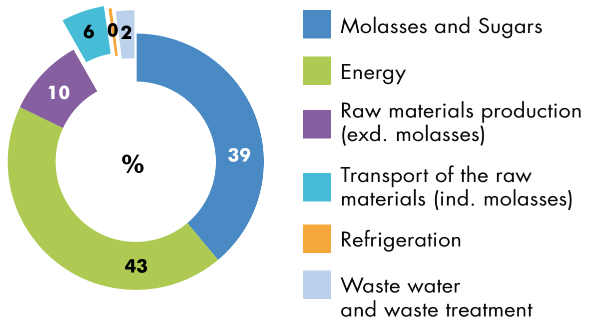
	Liquid yeast	Compressed yeast	Dry yeast
Grams equivalent CO_2 for 100% dry matter	2019 g/ kg	2448 g/ kg	3373 g/ kg

Results are based solely on facts, circumstances and hypotheses (allocation rules, scope etc..) that are used for this study.

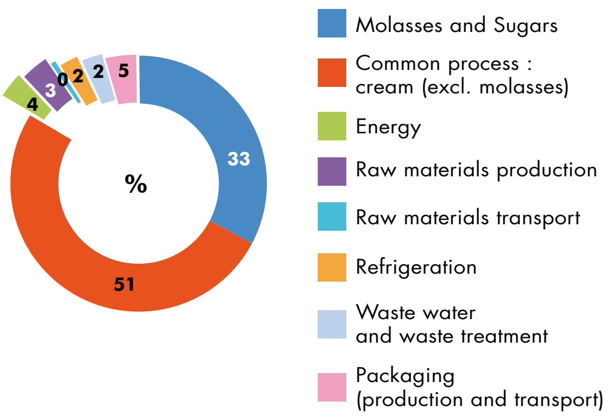
Therefore comparison with Carbon Footprints of other products shall be considered with caution.



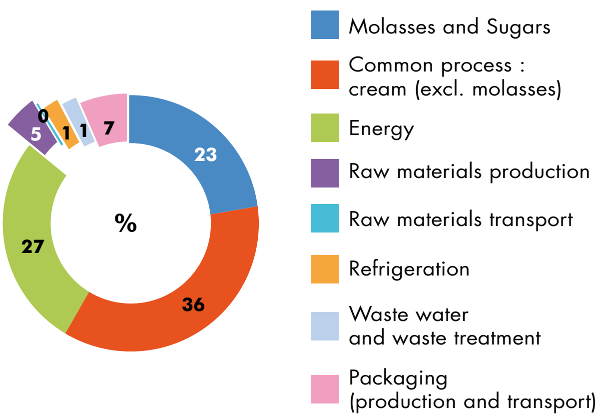
1 kg of liquid yeast = 363 g eq. CO_2



1 kg of compressed yeast = 734 g eq. CO_2



1 kg of dry yeast = 3204 g eq. CO_2



The contribution of the different steps of the production process is detailed below:

The CO_2 contributions of the different steps of the production process, as well as the different sources of raw materials, differ according to the types of yeast.

The following graphs show the detailed constituents of the Carbon Footprint for each type of yeast.

The impact of molasses is important for the liquid yeast production.

For compressed and dry yeasts the contribution of molasses decreases whereas the operations of dehydration, drying and packaging reach a significant level.

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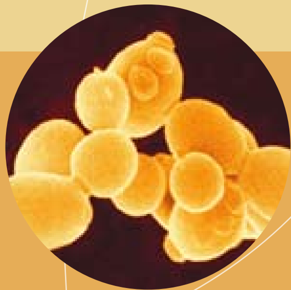
COFALEC
E.U. YEAST PRODUCERS

COFALEC
14, rue de Turbigo
75001 PARIS - FRANCE
T +33.1.45.08.54.82
www.cofalec.com



With the determination of the Carbon Footprint of yeast, COFALEC adds a new contribution to its long term commitment to environmental issues that impact the future of our planet.

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