WHOLE DURUM WHEAT SEMOLINA PASTA

1kg for FoodService

Environmental Product Declaration

1 EPD PROCESS

The first EPD process certified in the Food industries

Barilla

Barilla
The Italian Food Company. Since 1877.

EPD®
ENVIRONMENTAL PRODUCT DECLARATION

REGISTRATION NUMBER
S-P-05324

CPC CODE
2731 Uncooked pasta, not stuffed or otherwise prepared
PCR 2010:01 v. 4.01
20.09.2021

PUBLICATION DATE
2021/12/22

REVISION
1
(1st edition)

VALID UNTIL
2026/12/16

PROGRAMME
The International EPD® System
www.environdec.com

PROGRAMME OPERATOR
EPD International AB

This EPD has been developed in conformity to ISO 14025. An EPD should provide current information and may be updated if conditions change. The stated validity is, therefore, subject to the continued registration and publication at www.environdec.com.

1. Brand and product

THE BRAND BARILLA

The Barilla brand has its roots in a small bread and pasta store opened in Parma in 1877.
Today it is the number one pasta in Italy and around the world. Thanks to the best durum wheat and impressive modern technologies, Barilla supplies millions around the world with pasta that always cooks to a perfect al dente texture, as well as ready-to-eat pasta sauces.

Barilla FoodService is a line of product for professional use designed to make the work of **HoReCa Sector professionals** easier and to enable people to enjoy the quality of Barilla products when they are **eating away from home** too.

Further information on *Barilla FoodService website*.

THE PLANT AND THE PROCESS

This Environmental Product Declaration is about Barilla's whole grain pasta for Food service produced in one Italian plant (Marcianise) and one American plant (Ames) and sold mainly in Europe, USA, Canada.

Whole grain pasta is produced by extrusion or lamination and then a drying process, starting only from water and whole grain durum wheat as ingredients.
The pasta production process does not require additives and preservatives: it is the drying process that guarantees the conservation.

THE PRODUCTS

Whole grain pasta for Foodservice, thanks to **Barilla** experience is made with selected quality whole grain durum wheat semolina to produce a quality pasta for all Chef's best dishes, perfect even in **double cooking**.
Whole grain pasta can offer many advantages both to Chefs and their customers:

- **Perfect firm texture** after cooking, to always serve "al dente" pasta
- **Less starch dispersion**, thanks to a stronger texture
- **Three times the fiber** of traditional pasta

Products included in the analysis are all the whole grain semolina pasta cuts (spaghetti, penne, fusilli, elbows, etc.). Shape is the only feature differentiating these products.

Whole grain pasta is made from only water and whole grain durum wheat, with final moisture content below 13%.
From a nutritional point of view, its main characteristics are (nutritional information referred to Fusilli integrali for Foodservice Italian market):

NUTRITIONAL INFORMATION (per 100 g)		
Energy	kJ kcal	1 466 347
Fats *of which saturated*	grams	2.5 *0.5*
Carbohydrates *of which sugars*	grams	64.0 *3.5*
Fibres	grams	8.0
Proteins	grams	13.0
Salt	grams	0.013

2. Barilla Group

Passion for quality, continuous pursuit of excellent recipes and ability to combine tradition and innovation are the fundamental ingredients that that have allowed a small shop of bread and pasta, opened in 1877 in Parma, to become an international player in the market of pasta, ready-to-eat sauces, baked goods and crispy breads.

The Group operates in over 100 countries through its brands, which have become the icon of excellence in the food sector, and with 30 production sites, which every year contribute to the production of over 2,099,000 tonnes of products.

With its brands - Barilla, Mulino Bianco, Pan di Stelle, Gran Cereale, Harrys, Pavesi, Wasa, Filiz, Yemina e Vesta, Misko, Voiello, Cucina Barilla, Catelli, Lancia, Tolerant and Pasta Evangelists – promotes a tasty, joyful and healthy diet, inspired by the Mediterranean diet and the Italian lifestyle.

Further information on www.barillagroup.com

Good for You, Good for the Planet

In order to make a concrete contribution to global challenges, over the years, Barilla has developed a thought enclosed in the Good for You, Good for the Planet Mission that guides, step by step and offers people good, safe, nutritionally balanced food, coming from responsible supply chains.

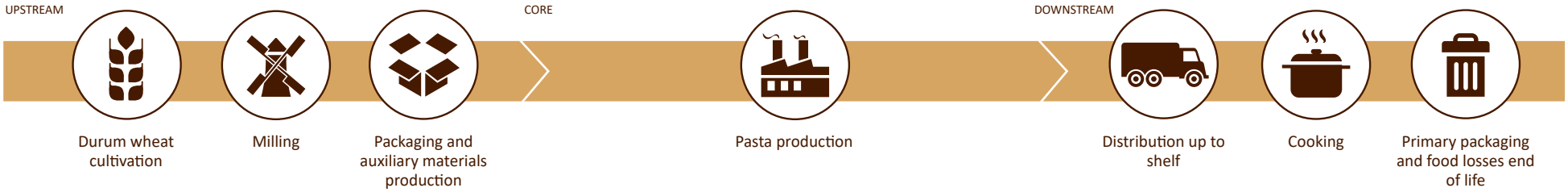
GOOD FOOD means taste, pleasure and a daily gesture of love for the people themselves.

HEALTHY FOOD means selected raw materials and balanced nutritional profiles to support healthy lifestyles.

FOOD SOURCED FROM RESPONSIBLE SUPPLY CHAINS means seeking the best ingredients to guarantee excellent quality, respectful of people, animals and the environment.

A commitment "from field to fork", which has led to the development of initiatives in the various stages of the supply chain and for which all Barilla Group brands contribute through projects aiming to improve the nutritional profile of products, reinforce the sustainability of the production and supply chains and provide transparent communication to consumers.

3. Environmental performance calculation



The environmental performance of pasta was calculated using the **LCA (life cycle analysis) methodology**, including the entire production chain, starting from the cultivation of the raw material until the delivery of the finished product to the retailer.
The study was conducted following the specific product rules published for the **EPD System**: "CPC code 2371 – Uncooked pasta, not stuffed or otherwise prepared".
The contribution to the environmental impacts brought by generic data is less than the 10% in all impact categories.

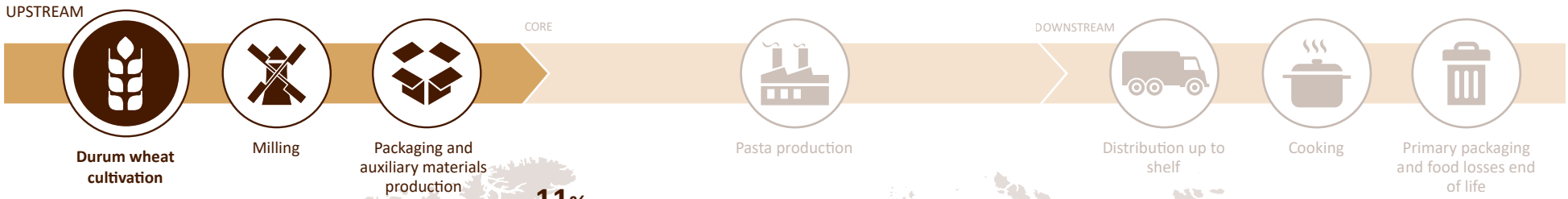
DECLARED UNIT

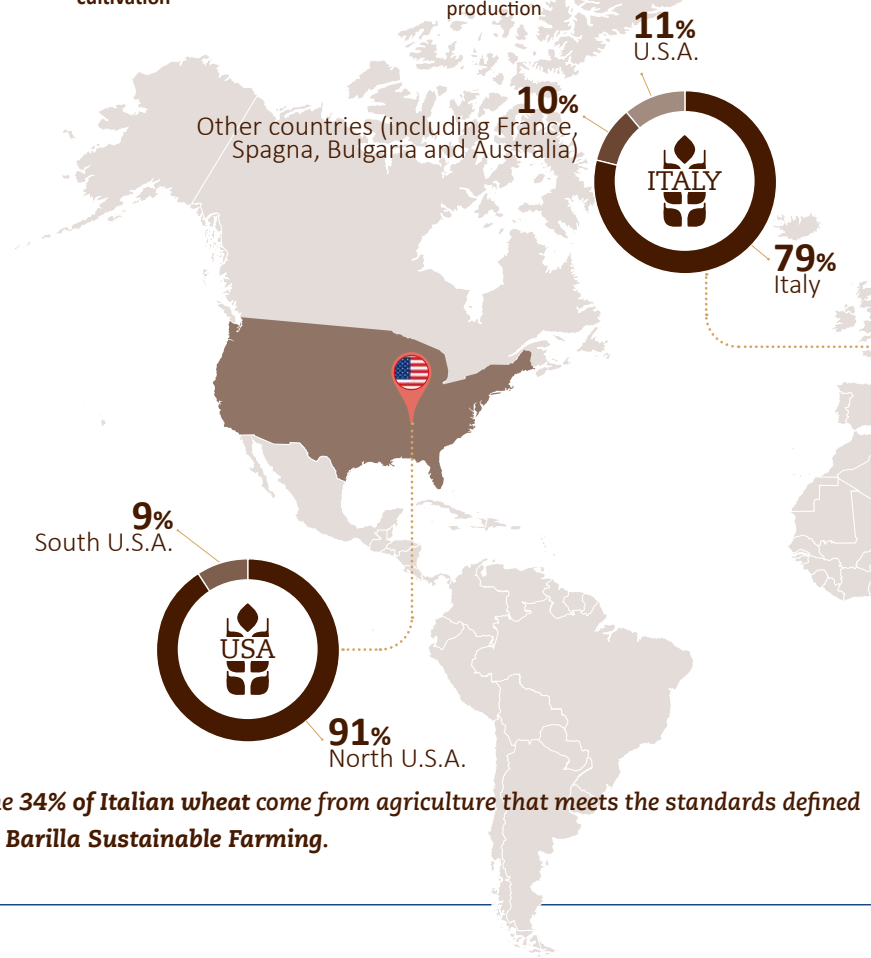
Data are referred to **1 kg** of product plus the related packaging. The packaging is referred to the **1 kg** format.

SYSTEM BOUNDARIES

The processes constituting the analyzed system were organized in three successive phases, in compliance with the EPD system's requirements.

4. Durum wheat cultivation





The 34% of Italian wheat come from agriculture that meets the standards defined by Barilla Sustainable Farming.

DURUM WHEAT CULTIVATION

Durum wheat cultivation environmental performances were analysed considering the specific durum wheat origin; 11 different regions were analysed (North, Middle and South Italy; France; Greece; Australia; North and South USA; Spain; Central East Europa).
Percentages are calculated as average purchased amounts for years 2018, 2019, 2020.
Country specific data were used for fertilizers amount, crop yields and water use. Secondary data (mainly from Ecoinvent database) were used for fertilizers production and diesel production and use.
For every involved country, yield is calculated as average of three years (2018, 2019, 2020).

Barilla purchases only wheat that fulfills its high safety and quality standards. It may occur that the Italian production during one year it is not sufficient to fulfill the quantitative and qualitative demand from Barilla, that's why the percentage of grain purchased from Italy may decrease or increase from year to year.

THE EFFORTS FOR A RESPONSIBLE FARMING

Since 2010, a team of Barilla professionals has been carrying out a study designed to identify the main areas for growing durum wheat in Italy and the cultivation systems with lower environmental impact. The main results of the project have been the publication of the Handbook for sustainable cultivation of durum wheat and the development of Granoduro.net in collaboration with Horta srl, a spin-off of the Università Cattolica di Piacenza. Barilla's commitment to the future is to disseminate these practices to reduce the durum wheat supply chain's environmental impact.

2009

THE LCA OF PASTA

The EPD shows that the 60% of the Global Warming Potential of pasta is due to the cultivation of durum wheat.

2010

THE SUSTAINABLE AGRICOLTURE PROJECT BEGINNING

A multidisciplinary team, composed of agronomists and LCA experts, starts a study on the agricultural systems to individuate how to reduce the environmental impact of durum wheat cultivation on the environment.

2011

THE HANDBOOK FOR SUSTAINABLE CULTIVATION OF DURUM WHEAT

As a result of the project a handbook with suggested agricultural practices for the reduction of cultivation environmental impact was published and given to farmers.

2012

GRANODURO.NET

The web decision support system (DSS) granoduro.net is developed by Horta and given to farmers.
It supports farmers with information about the optimal seeding rate, the nitrogen requirement, the risk of diseases and about the weather forecast.

granoduro.net

2013

CONTRACT WITH FARMERS FOR SUSTAINABLE DURUM WHEAT

Starting from 2013, bonus are given to farmers who cultivate durum wheat adopting the agricultural practices suggested within Barilla's handbook.

2017

NEW HANDBOOKS AND INCREASED BSF APPLICATION

The positive experience with the first Handbook led to the development of four new handbooks for foreing countries.
Compared to 2013, the total area cultivated with BSF (granoduro.net) is more than doubled.

2020

THE DURUM WHEAT MANIFESTO

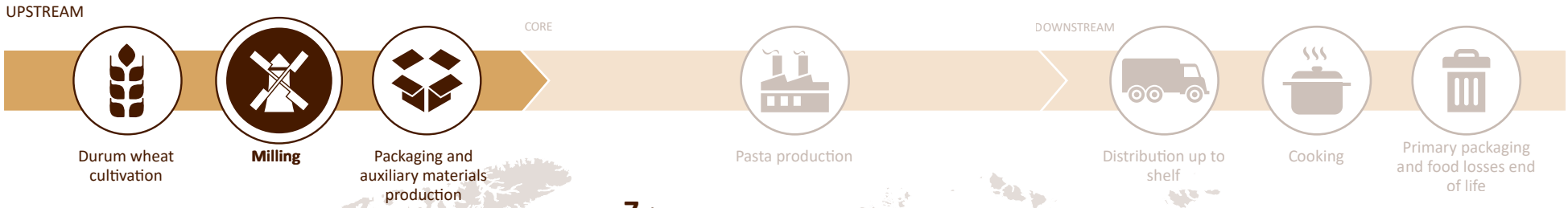
In 2020 Barilla brand launches in Italy its first pasta produced with 100% Italian durum wheat: this result is possible thanks to farmers ' engagement and the increasingly widespread application of responsible agricultural practices.
For more information, visit the dedicated page on Barilla website.

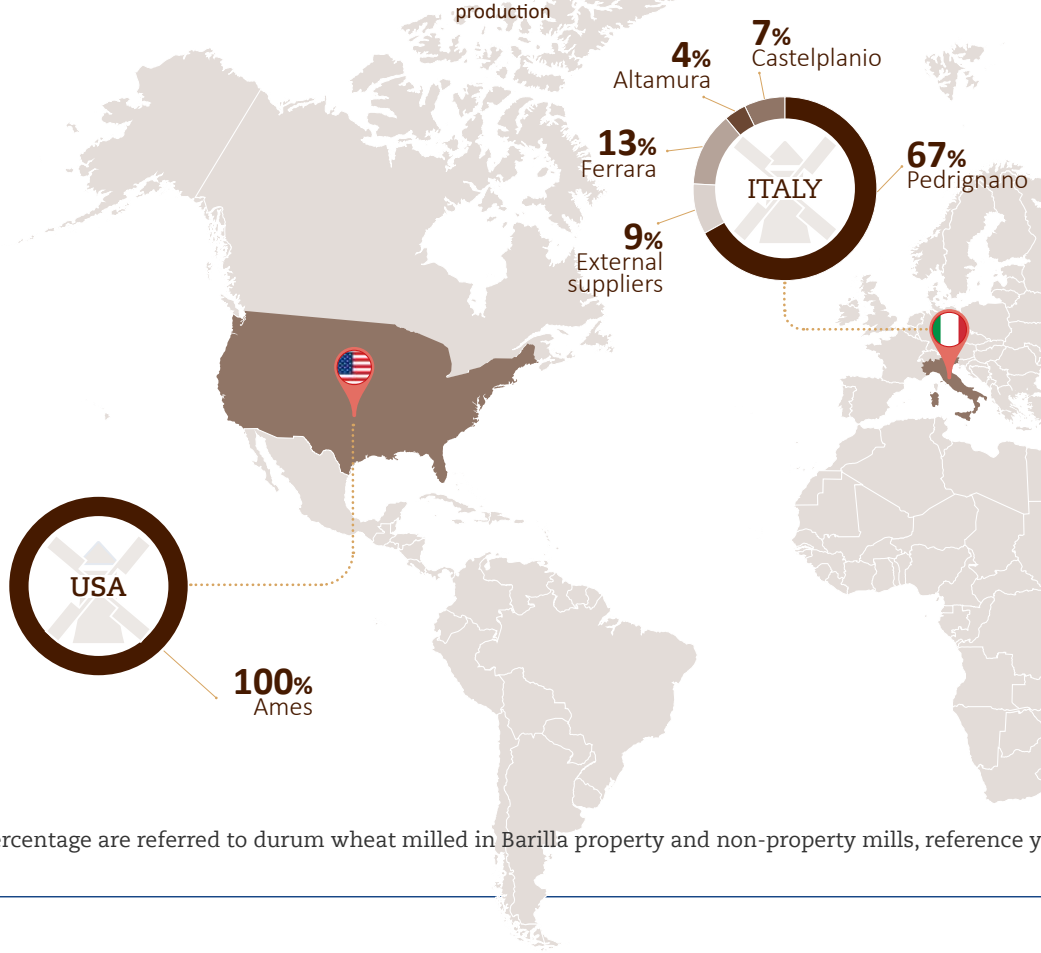
BARILLA SUSTAINABLE FARMING (BSF) PROMOTES MORE EFFICIENT CROPPING SYSTEMS IN ORDER TO HAVE SAFE AND HIGH QUALITY AGRICULTURAL PRODUCTS IN A WAY THAT PROTECTS AND IMPROVES THE NATURAL ENVIRONMENT AND THE SOCIAL AND ECONOMIC CONDITIONS OF FARMERS.

European CSR Award Scheme

With the project Sustainable Agriculture, Barilla is the winner of the 1st European CSR Award Scheme which is an initiative promoted by the European Commission with the aim to give visibility to the best practices of Corporate Social Responsibility in Europe. The project, in collaboration with HORTA Srl and Life Cycle Engineering, has allowed the definition of the guidelines for the production of durum wheat with agricultural practices with low environmental impact.

5. Milling





MILLING

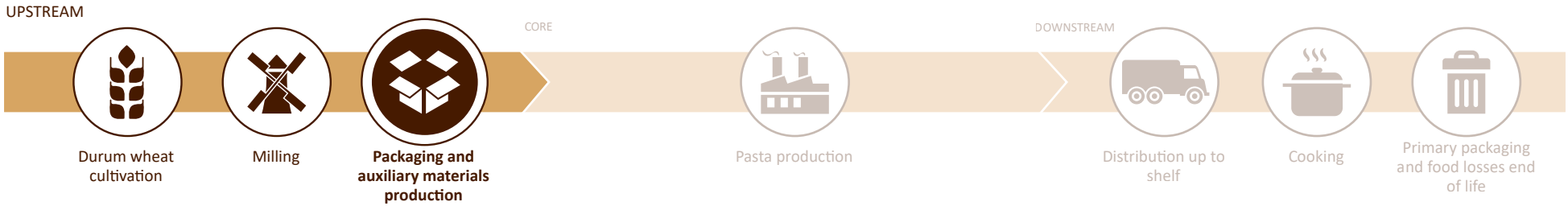
Milling process environmental performances were calculated considering energy and water consumption for each Barilla property mill: 4 in Italy (Pedrignano, Altamura, Ferrara and Castelplanio) and 1 in USA (Ames).
Primary data (2020 year) are used for water and energy consumption ad waste production. Secondary data, mainly from Ecoinvent database, are used for water and energy supply.
Environmental performance on non property mill were evaluated considering property Barilla mill data average.

Environmental performances related to durum wheat transport from field to mill were evaluated by means of specific hypothesis for every production area. Secondary data, mainly from Ecoinvent database, are used for transport means.

Durum wheat does not need any particular storage condition (such as refrigeration).

Percentage are referred to durum wheat milled in Barilla property and non-property mills, reference year 2020.

6. Packaging and auxiliary materials production



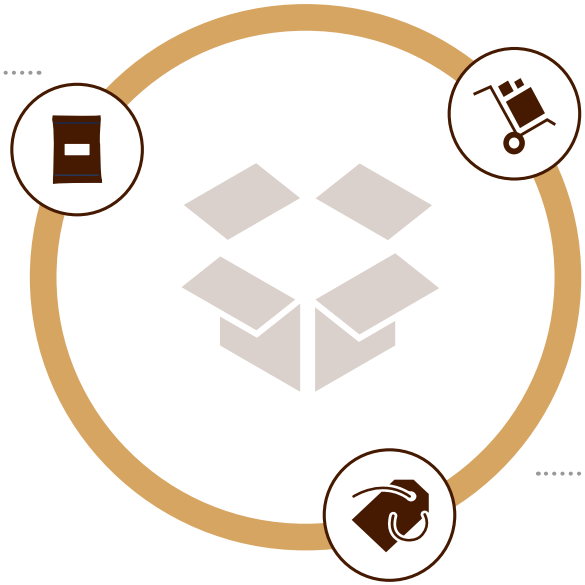
Since 2004, Barilla designs new packaging with the"LCA packaging design tool". It allows the assessment of the environmental impacts of the packaging solutions already during the design phase.

PRIMARY PACKAGING

Packaging environmental performances are calculated considering the 1 kg format of fusilli for products made in Italian plant and 1 kg format of penne for products made in American plant.

The primary packaging consists in a plastic (PP) film.

Primary data (from packaging unit) are used for packaging amount and packaging materials production; data about packaging production process come from Barilla LCA database.



Packaging used for Barilla pasta is designed for recycling

PACKAGING FOR DISTRIBUTION

The packaging for transport consists in cardboard boxes (american box), used for the distribution of the product, and a plastic extensible film. Boxes are made mainly by recycled cardboard carton (pre and post consumer).
The data used have been collected by LCA database (mainly Ecoinvent).

AUXILIARY MATERIALS

Auxiliary materials environmental performances are evaluated by using primary data from plant, during 2020 year.
Secondary data (Ecoinvent) are used for environmental aspects associated to materials production.

7. Pasta production

GENERAL INFORMATION

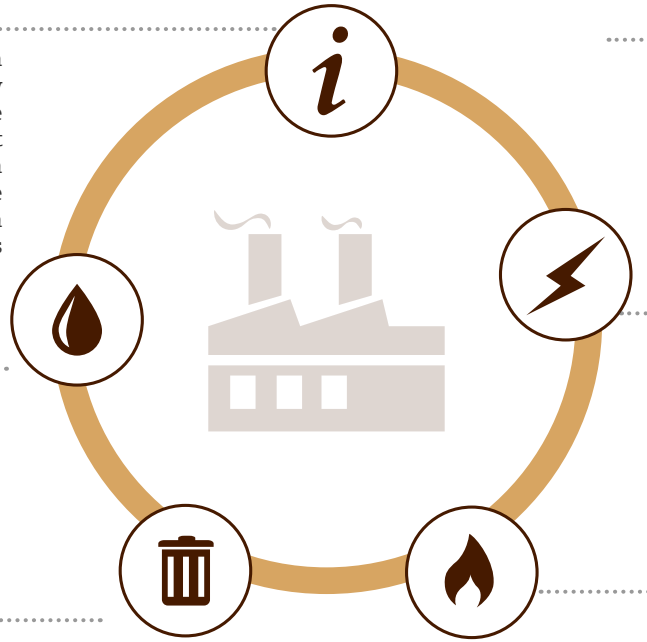
The environmental performances related to the production process are evaluated considering primary data for energy and water consumption and the waste production. The performances are calulated considering the italian plant of Marcianise (for products made in italy and distributed in Europe) and the American plant of Ames for products made in USA and distributed in USA and Canada. Secondary data (mainly Ecoinvent) are used for the environmental aspects related to the production of energy and water.

WATER

The water consumption is evaluated using primary data. The overall value is attributed to the product using the mass allocation procedure.
Data are referred to year 2020.

WASTE

The primary data are collected by the plant registrations.
The overall value is attributed to the product using the mass allocation procedure.
Data are referred to year 2020.



SEMOLA INPUT TRANSPORT

Environmental performances related to semolina transport from mill to plant were evaluated considering road transport (truck) from the national mill mix and the plants, for every nation, using 2020 primary data.
Secondary data, mainly from Ecoinvent database, are used for transport means.

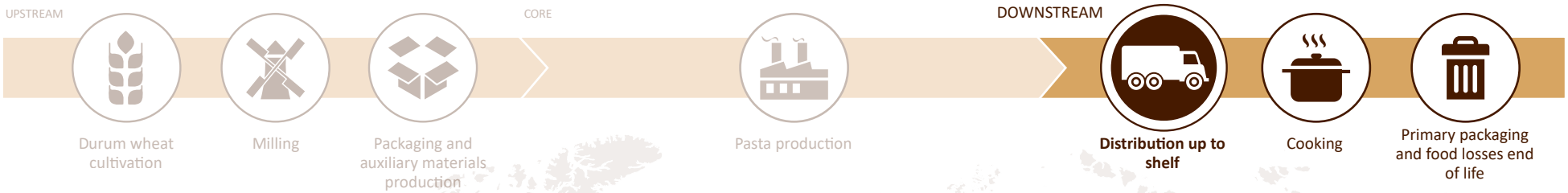
ELECTRICITY

Total plant electricity has been divided using mass allocation (the plant produces other products beyond dry semolina pasta). Electricity production is referred to specific plant energy mix; data are referred to 2020.
Electric energy production is related to specific country mix for year 2020 and to cogenerators, where applied.

NATURAL GAS

The natural gas consumption is evaluated using primary data. The overall value is attributed to the product using the mass allocation procedure.
Data are referred to year 2020.

8. Distribution



DISTRIBUTION

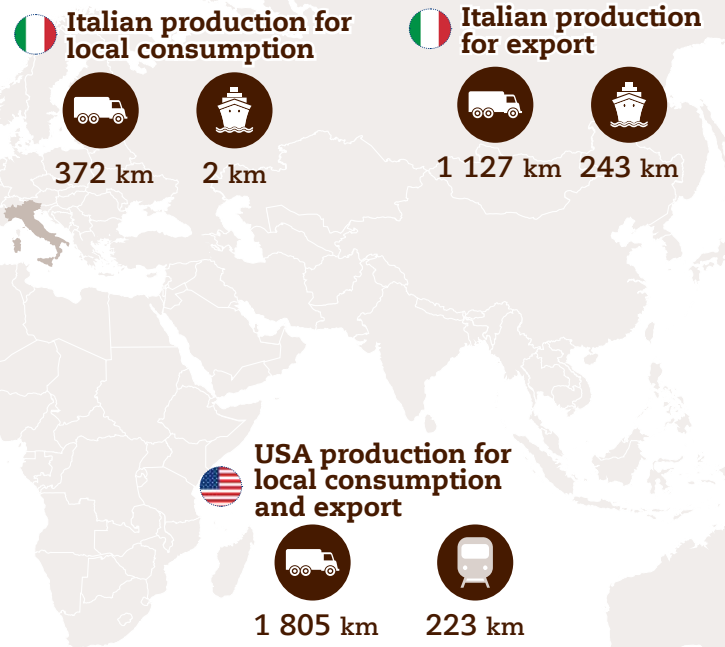
Distribution environmental performances are calculated using specific hypotheses for each area and using the following hypotheses on distances:

- Transports from Italy for local market are covered:
  - 372 km by road;
  - 2 km by ship.
- Transports from Italy for export are covered:
  - 1 127 km by road;
  - 243 km by ship.
- Transports from USA for local market and export are covered:
  - 1 805 km by road;
  - 223 km by train.

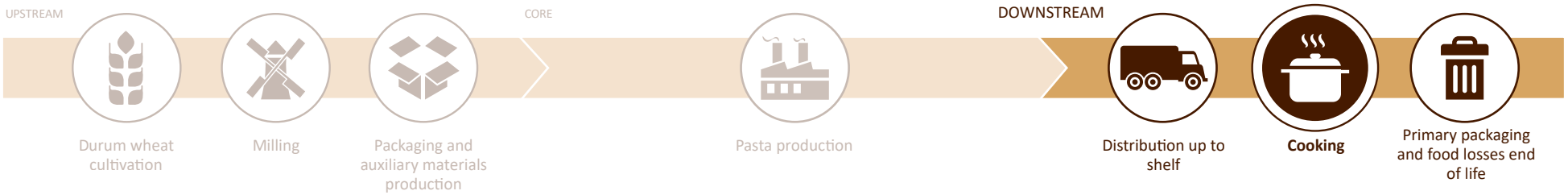
Data are referred to year 2020.

Primary data were used for distances covered by truck, train an ship; secondary data (Ecoinvent database) were used for transport means.
The product does not need any particular storage condition (such as refrigeration).

Impacts related to transport packaging end of life are calculated considering the average end of life scenario for paper, paperboard and plastic within the most relevant distribution countries (reference: Eurostat 2018, EPA 2014).



9. Cooking

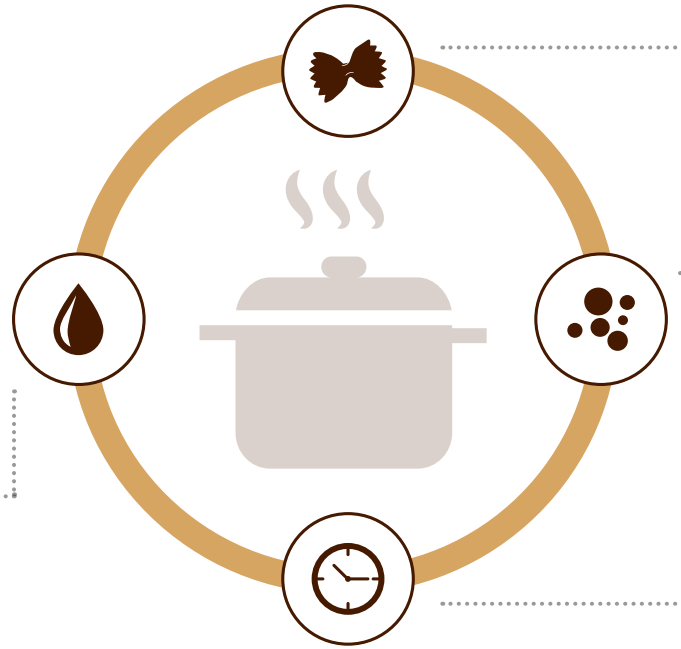


COOKING PHASE

The cooking phase is strictly correlated to consumer behaviour and the related impacts could be estimated taking into account the "cooking indications" that are usually provided by the company on packaging.

The impacts related to the cooking phase could be estimated considering the cooking of 1 kg of pasta and the hypothesis reported on the PCR:

- Boiling phase: 0.18 kWh per kg of water;
- Cooking phase: 0.05 kWh per minute of cooking.

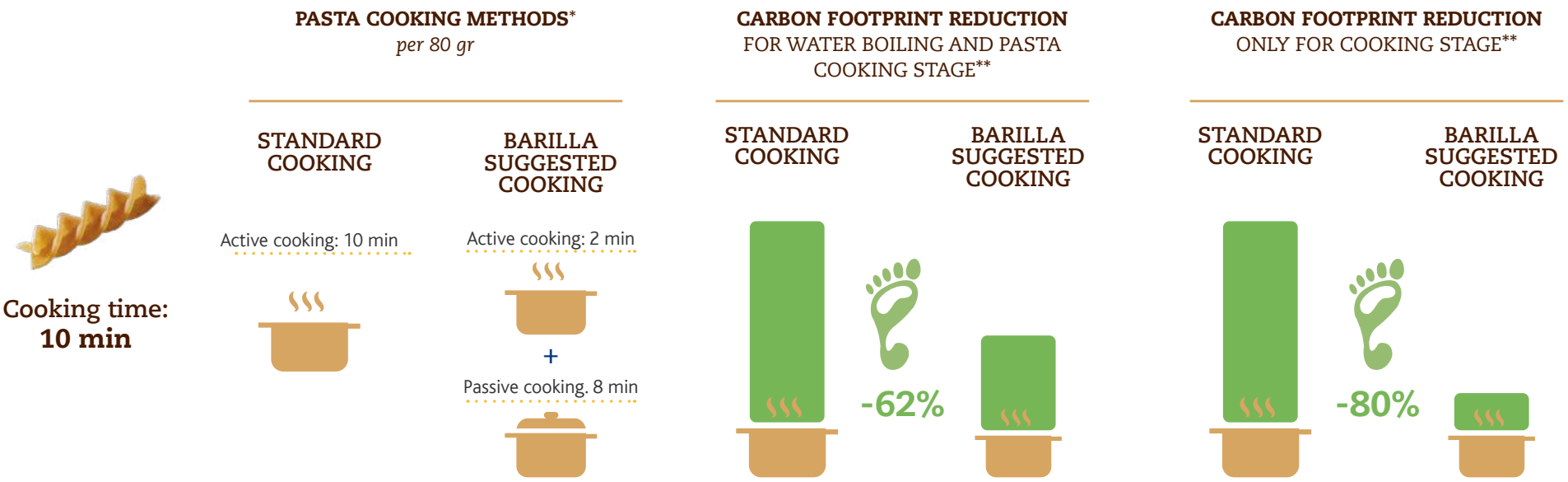


Cooking environmental performances are provided for local consumption and export; for export only one representative Country was chosen on the basis of volumes distributed.

Barilla suggested cooking method

The energy necessary for the cooking stage has a significant impact. By choosing a cooking method that uses less energy, it is possible to sensibly reduce the carbon footprint of this stage. Pasta cooking time can be divided in two parts: the time needed to boil water and the one necessary to cook pasta. Usually, after boiling water, pasta is cooked by keeping the heat on for the entire suggested cooking time, e.g. for 10 minutes *(active cooking)*. However, pasta can be cooked in a more efficient way by keeping the heat on only for the first 2 minutes of cooking and then, for the remaining suggested time, the heat can be turned off while keeping the lid on the pot (*passive cooking*).

Passive cooking can reduce the carbon footprint, due to the savings of GHG emissions related to energy use, without affecting the product quality.
Considering the cooking process of a 10-minutes-cooking 80 gr portion of pasta, cooked with gas and electric stoves, these are the possible savings:

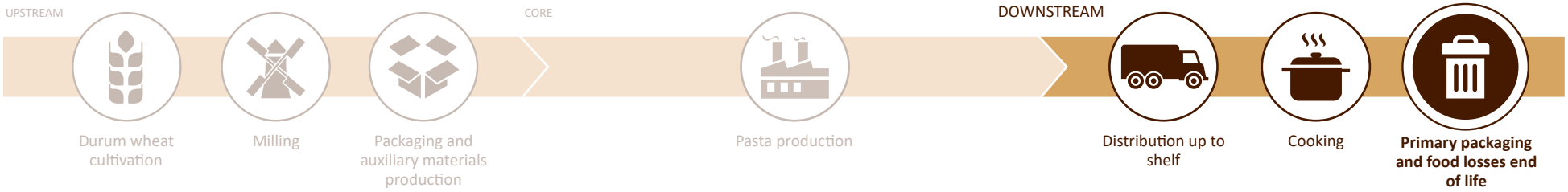


Barilla-suggested cooking method does not affect the organoleptic properties of the product but it requires more attention during the cooking phase: pay attention that pasta is completely submerged into water and mix it regularly during cooking.

*Cooking proportion is the following: 1l water x 100gr of pasta.

**The results are valid for gas and electric stove cooking.

10. Primary packaging end of life and food losses



ITALY

Reference: COREPLA report 2020

28.5% RECYCLE	Avoiding the production of virgin material.
61% ENERGY RECOVERY	Recovering packaging energy content.
10.5% DISPOSAL	In Italy, 19% of waste sent to disposal are burned without energy recovery, the others are sent to landfill.

ITALIAN PRODUCTION FOR EXPORT

40% RECYCLE	Avoiding the production of virgin material.
46% ENERGY RECOVERY	Recovering packaging energy content.
14% DISPOSAL	In average export scenario, 1% of waste sent to disposal are burned without energy recovery, the others are sent to landfill.

Reference: EUROSTAT 2018

USA

Avoiding the production of virgin material.	RECYCLE 15%
Recovering packaging energy content.	ENERGY RECOVERY 16.5%
In USA, waste sent to disposal goes to landfill.	DISPOSAL 68.5%

Reference: EPA report 2014

Environmental performances of packaging end of life, for local market, are calculated by means of distribution countries end of life scenarios.
For the export markets environmental performances are elaborated considering the end of life scenarios of the most representative distribution countries (mainly Germany, Portugal, Norway, France); the remaining countries are assimilated to an average European scenario.

FOOD LOSSES

The impacts related to food waste in use phase are estimated assuming that 2% of the pasta is not consumed and is disposed of as waste, sent to the following destinations: 50% disposal (25% landfill + 25% incineration without energy recovery), 25% composting, 25% anaerobic digestion, following the indications of the PCR document.

11. Environmental results - Italy for local consumption

USE OF RESOURCES data referred to 1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	*Milling*	*Packaging and auxiliary materials production*	*Pasta production*	*Distribution up to shelf*		*Packaging end of life and food losses*	*Pasta cooking, if gas*	*Pasta cooking, if electric*
PRIMARY ENERGY RESOURCES - RENEWABLE data in MJ	Used as energy carrier	1.23E-01	4.14E-02	2.64E-01	1.60E-02	1.38E-03	**4.46E-01**	1.08E-04	4.99E-02	1.63E+00
	Used as raw materials*	0.00E+00	0.00E+00	1.03E-01	0.00E+00	0.00E+00	**1.03E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**1.23E-01**	**4.14E-02**	**3.67E-01**	**1.60E-02**	**1.38E-03**	**5.49E-01**	**1.08E-04**	**4.99E-02**	**1.63E+00**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	5.12E+00	6.71E-01	1.67E+00	4.13E+00	7.75E-01	**1.24E+01**	5.03E-03	1.32E+01	3.89E+01
	Used as raw materials	0.00E+00	1.27E-05	3.46E-01	0.00E+00	0.00E+00	**3.46E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**5.12E+00**	**6.71E-01**	**2.02E+00**	**4.13E+00**	**7.75E-01**	**1.27E+01**	**5.03E-03**	**1.32E+01**	**3.89E+01**
Secondary Material (g)		0.00E+00	0.00E+00	5.96E+01	0.00E+00	0.00E+00	**5.96E+01**	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels (MJ. net calorific power)		0.00E+00	0.00E+00	3.55E-02	0.00E+00	0.00E+00	**3.55E-02**	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels (MJ. net calorific power)		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (liters)		1.08E+01	1.48E-01	1.02E+00	1.90E+00	3.84E-02	**1.39E+01**	9.75E-03	1.08E+01	1.75E+01

OUTPUT FLOWS data referred to 1 kg of product	UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
	Durum wheat cultivation	*Milling*	*Packaging and auxiliary materials production*	*Pasta production*	*Distribution up to shelf*		*Packaging end of life and food losses*	*Pasta cooking, if gas*	*Pasta cooking, if electric*
Waste to animal feed or similar (g)	0.00E+00	0.00E+00	0.00E+00	7.44E-02	0.00E+00	**7.44E-02**	0.00E+00	0.00E+00	0.00E+00
Components for reuse (g)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (g)	0.00E+00	1.75E-01	1.01E+01	6.57E+00	4.53E+01	**6.21E+01**	8.21E+00	0.00E+00	0.00E+00
Materials for energy recovery (g)	0.00E+00	0.00E+00	0.00E+00	1.08E-01	4.28E+00	**4.39E+00**	1.18E+01	0.00E+00	0.00E+00
Exported energy. electricity (MJ)	0.00E+00	0.00E+00	0.00E+00	1.41E-01	1.89E-03	**1.43E-01**	6.60E-04	0.00E+00	0.00E+00
Exported energy. thermal (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E-03	**3.95E-03**	1.38E-03	0.00E+00	0.00E+00

Secondary energy resources and recovered energy flows do not show relevant contributions.

**The biomasses transformed into the product are not considered.*

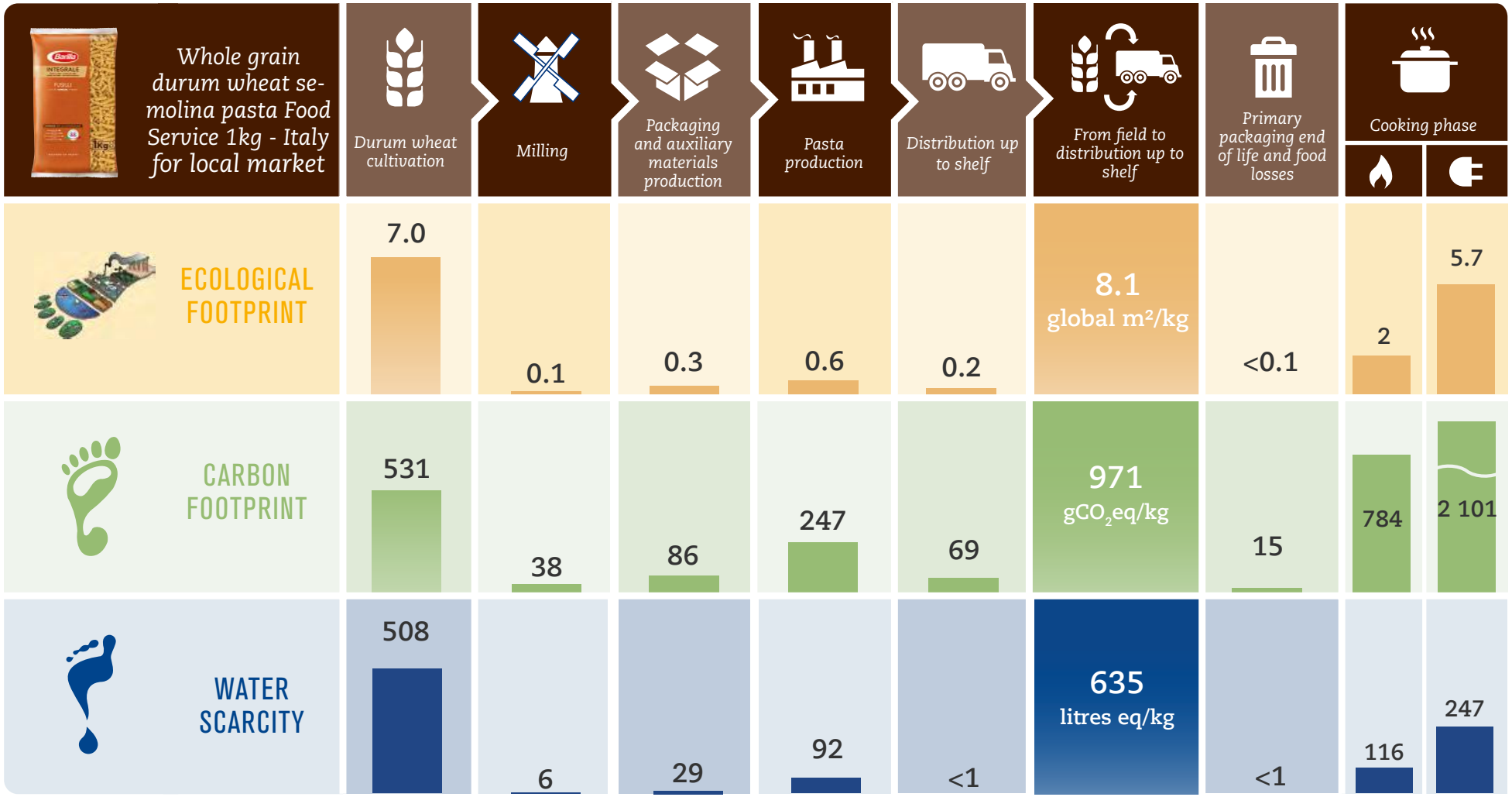
POTENTIAL ENVIRONMENTAL IMPACTS data referred to1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	*Milling*	*Packaging and auxiliary materials production*	*Pasta production*	*Distribution up to shelf*		*Packaging end of life and food losses*	*Pasta cooking, if gas*	*Pasta cooking, if electric*
GLOBAL WARMING POTENTIAL - GWP ($g\ CO_2$ eq)	Fossil	5.30E+02	3.77E+01	8.47E+01	2.47E+02	5.56E+01	**9.55E+02**	1.22E+01	7.84E+02	2.10E+03
	Biogenic	9.09E-02	1.25E-02	1.82E-01	2.27E-01	1.38E+01	**1.43E+01**	2.89E+00	3.26E-01	5.36E-01
	Land use and land transformation	4.14E-01	1.40E-03	1.38E+00	3.02E-03	7.25E-04	**1.79E+00**	1.10E-04	3.42E-02	1.13E-01
	Total	**5.31E+02**	**3.77E+01**	**8.63E+01**	**2.47E+02**	**6.94E+01**	**9.71E+02**	**1.51E+01**	**7.84E+02**	**2.10E+03**
Acidification Potential - g SO_2 eq		1.28E+01	7.96E-02	3.05E-01	2.95E-01	2.93E-01	**1.38E+01**	3.65E-03	8.17E-01	6.52E+00
Eutrophication Potential - g PO_4^{---} eq		7.20E+00	7.32E-03	8.15E-02	3.65E-02	5.38E-02	**7.38E+00**	3.63E-03	1.96E-01	7.15E-01
Photochemical Oxidant Formation Potential - gNMVOC eq		2.50E+00	5.72E-02	2.82E-01	3.27E-01	3.76E-01	**3.54E+00**	5.32E-03	8.20E-01	4.14E+00
Abiotic Depletion Potential - Elements g Sb eq		1.36E-03	2.59E-07	2.42E-05	7.61E-07	2.41E-06	**1.39E-03**	6.50E-08	7.08E-06	3.17E-05
Abiotic Depletion Potential - Fossil fuels - MJ. net calorific value		4.96E+00	6.20E-01	1.87E+00	4.10E+00	7.73E-01	**1.23E+01**	4.88E-03	1.31E+01	3.39E+01
Water scarcity potential. m^3 eq		5.08E-01	6.49E-03	2.87E-02	9.19E-02	3.96E-06	**6.35E-01**	2.19E-04	1.16E-01	2.47E-01

WASTE PRODUCTION data referred to 1 kg of product	UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
	Durum wheat cultivation	*Milling*	*Packaging and auxiliary materials production*	*Pasta production*	*Distribution up to shelf*		*Packaging end of life and food losses*	*Pasta cooking, if gas*	*Pasta cooking, if electric*
Hazardous waste disposed (g)*	6.06E-05	0.00E+00	3.43E-02	0.00E+00	0.00E+00	**3.43E-02**	0.00E+00	0.00E+00	0.00E+00
Non-Hazardous waste disposed (g)*	1.05E+00	0.00E+00	7.93E+00	0.00E+00	0.00E+00	**8.98E+00**	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed (g)	2.31E-01	6.49E-02	1.52E-01	2.71E-02	2.55E-02	**5.00E-01**	2.72E-04	7.08E-02	6.40E+00

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO_2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO_2 within the reference 100 years period.

**Zero values indicate that – even if some waste are produced and disposed – their impact is evaluated within the system boundaries.*

PRODUCT ENVIRONMENTAL PERFORMANCES



12. Environmental results - Italy for export

USE OF RESOURCES data referred to 1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking, if gas	Pasta cooking, if electric
PRIMARY ENERGY RESOURCES - RENEWABLE data in MJ	Used as energy carrier	1.23E-01	4.14E-02	2.64E-01	1.60E-02	3.87E-03	**4.49E-01**	1.06E-04	4.68E-02	2.10E-01
	Used as raw materials*	0.00E+00	0.00E+00	1.03E-01	0.00E+00	0.00E+00	**1.03E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**1.23E-01**	**4.14E-02**	**3.67E-01**	**1.60E-02**	**3.87E-03**	**5.51E-01**	**1.06E-04**	**4.68E-02**	**2.10E-01**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	5.12E+00	6.71E-01	1.67E+00	4.13E+00	2.44E+00	**1.40E+01**	4.86E-03	1.40E+01	4.42E+01
	Used as raw materials	0.00E+00	1.27E-05	3.46E-01	0.00E+00	0.00E+00	**3.46E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**5.12E+00**	**6.71E-01**	**2.02E+00**	**4.13E+00**	**2.44E+00**	**1.44E+01**	**4.86E-03**	**1.40E+01**	**4.42E+01**
Secondary Material (g)		0.00E+00	0.00E+00	5.96E+01	0.00E+00	0.00E+00	**5.96E+01**	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels (MJ. net calorific power)		0.00E+00	0.00E+00	3.55E-02	0.00E+00	0.00E+00	**3.55E-02**	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels (MJ. net calorific power)		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (liters)		1.08E+01	1.48E-01	1.02E+00	1.90E+00	1.09E-01	**1.40E+01**	9.21E-03	1.09E+01	1.83E+01

OUTPUT FLOWS data referred to 1 kg of product	UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
	Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking, if gas	Pasta cooking, if electric
Waste to animal feed or similar (g)	0.00E+00	0.00E+00	0.00E+00	7.44E-02	0.00E+00	**7.44E-02**	0.00E+00	0.00E+00	0.00E+00
Components for reuse (g)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (g)	0.00E+00	1.75E-01	1.01E+01	6.57E+00	4.61E+01	**6.30E+01**	9.47E+00	0.00E+00	0.00E+00
Materials for energy recovery (g)	0.00E+00	0.00E+00	0.00E+00	1.08E-01	6.17E+00	**6.28E+00**	1.02E+01	0.00E+00	0.00E+00
Exported energy. electricity (MJ)	0.00E+00	0.00E+00	0.00E+00	1.41E-01	0.00E+00	**1.41E-01**	1.10E-04	0.00E+00	0.00E+00
Exported energy. thermal (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	2.30E-04	0.00E+00	0.00E+00

Secondary energy resources and recovered energy flows do not show relevant contributions.

**The biomasses transformed into the product are not considered.*

POTENTIAL ENVIRONMENTAL IMPACTS data referred to1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking, if gas	Pasta cooking, if electric
GLOBAL WARMING POTENTIAL - GWP ($g\ CO_2$ eq)	Fossil	5.30E+02	3.77E+01	8.47E+01	2.47E+02	1.75E+02	**1.07E+03**	9.73E+00	7.55E+02	2.21E+03
	Biogenic	9.09E-02	1.25E-02	1.82E-01	2.27E-01	1.13E+01	**1.18E+01**	2.89E+00	3.20E-01	5.79E-01
	Land use and land transformation	4.14E-01	1.40E-03	1.38E+00	3.02E-03	1.66E-03	**1.80E+00**	1.09E-04	3.62E-02	1.28E-01
	Total	**5.31E+02**	**3.77E+01**	**8.63E+01**	**2.47E+02**	**1.86E+02**	**1.09E+03**	**1.26E+01**	**7.56E+02**	**2.21E+03**
Acidification Potential - g SO_2 eq		1.28E+01	7.96E-02	3.05E-01	2.95E-01	7.93E-01	**1.43E+01**	3.38E-03	7.57E-01	4.30E+00
Eutrophication Potential - g PO_4^{---} eq		7.20E+00	7.32E-03	8.15E-02	3.65E-02	1.24E-01	**7.45E+00**	3.56E-03	1.93E-01	8.15E-01
Photochemical Oxidant Formation Potential - gNMVOC eq		2.50E+00	5.72E-02	2.82E-01	3.27E-01	9.62E-01	**4.13E+00**	4.98E-03	7.67E-01	3.32E+00
Abiotic Depletion Potential - Elements g Sb eq		1.36E-03	2.59E-07	2.42E-05	7.61E-07	7.52E-06	**1.40E-03**	5.65E-08	7.61E-06	4.45E-05
Abiotic Depletion Potential - Fossil fuels - MJ. net calorific value		4.96E+00	6.20E-01	1.87E+00	4.10E+00	2.44E+00	**1.40E+01**	4.70E-03	1.39E+01	3.63E+01
Water scarcity potential. m^3 eq		5.08E-01	6.49E-03	2.87E-02	9.19E-02	-3.71E-04	**6.34E-01**	2.16E-04	8.78E-02	3.77E-02

WASTE PRODUCTION data referred to 1 kg of product	UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
	Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking, if gas	Pasta cooking, if electric
Hazardous waste disposed (g)*	6.06E-05	0.00E+00	3.43E-02	0.00E+00	0.00E+00	**3.43E-02**	0.00E+00	0.00E+00	0.00E+00
Non-Hazardous waste disposed (g)*	1.05E+00	0.00E+00	7.93E+00	0.00E+00	0.00E+00	**8.98E+00**	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed (g)	2.31E-01	6.49E-02	1.52E-01	2.71E-02	7.96E-02	**5.54E-01**	2.71E-04	1.14E-01	1.00E+01

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO_2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO_2 within the reference 100 years period.

**Zero values indicate that – even if some waste are produced and disposed – their impact is evaluated within the system boundaries.*

PRODUCT ENVIRONMENTAL PERFORMANCES

	Whole grain durum wheat semolina pasta Food Service 1kg - Italy for export	Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf	From field to distribution up to shelf	Primary packaging end of life and food losses	Cooking phase	
ECOLOGICAL FOOTPRINT		7.0	0.1	0.3	0.6	0.5	8.5 global m²/kg	<0.1	2	5.7
CARBON FOOTPRINT		531	38	86	247	186	1 087 gCO_2eq/kg	13	756	2 206
WATER SCARCITY		508	6	29	92	<1	634 litres eq/kg	<1	88	38

Cooking environmental performances are referred to the export country with the highest distributed volumes (Germany).

13. Environmental results - U.S.A. for local consumption + export

USE OF RESOURCES data referred to 1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking, if gas	Pasta cooking, if electric
PRIMARY ENERGY RESOURCES - RENEWABLE data in MJ	Used as energy carrier	7.24E-02	1.94E-01	3.23E-01	7.20E-01	1.56E-02	**1.32E+00**	1.06E-04	4.88E-02	5.83E+00
	Used as raw materials*	0.00E+00	0.00E+00	1.39E-01	0.00E+00	0.00E+00	**1.39E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**7.24E-02**	**1.94E-01**	**4.62E-01**	**7.20E-01**	**1.56E-02**	**1.46E+00**	**1.06E-04**	**4.88E-02**	**5.83E+00**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	8.02E+00	7.12E-01	1.51E+00	5.78E+00	3.84E+00	**1.99E+01**	4.68E-03	1.33E+01	2.11E+01
	Used as raw materials	0.00E+00	1.30E-04	2.36E-01	0.00E+00	0.00E+00	**2.37E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**8.02E+00**	**7.12E-01**	**1.75E+00**	**5.78E+00**	**3.84E+00**	**2.01E+01**	**4.68E-03**	**1.33E+01**	**2.11E+01**
Secondary Material (g)		0.00E+00	0.00E+00	8.10E+01	0.00E+00	0.00E+00	**8.10E+01**	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels (MJ. net calorific power)		0.00E+00	0.00E+00	4.83E-02	0.00E+00	0.00E+00	**4.83E-02**	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels (MJ. net calorific power)		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (liters)		6.89E+01	8.33E-02	1.22E+00	1.07E+00	1.96E-01	**7.14E+01**	8.13E-03	1.09E+01	1.43E+01

OUTPUT FLOWS data referred to 1 kg of product	UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
	Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking, if gas	Pasta cooking, if electric
Waste to animal feed or similar (g)	0.00E+00	0.00E+00	0.00E+00	2.61E-02	0.00E+00	**2.61E-02**	0.00E+00	0.00E+00	0.00E+00
Components for reuse (g)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (g)	0.00E+00	0.00E+00	1.10E+01	8.62E+00	5.74E+01	**7.70E+01**	6.07E+00	0.00E+00	0.00E+00
Materials for energy recovery (g)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E+00	**3.70E+00**	6.20E+00	0.00E+00	0.00E+00
Exported energy. electricity (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00
Exported energy. thermal (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00

Secondary energy resources and recovered energy flows do not show relevant contributions.

**The biomasses transformed into the product are not considered.*

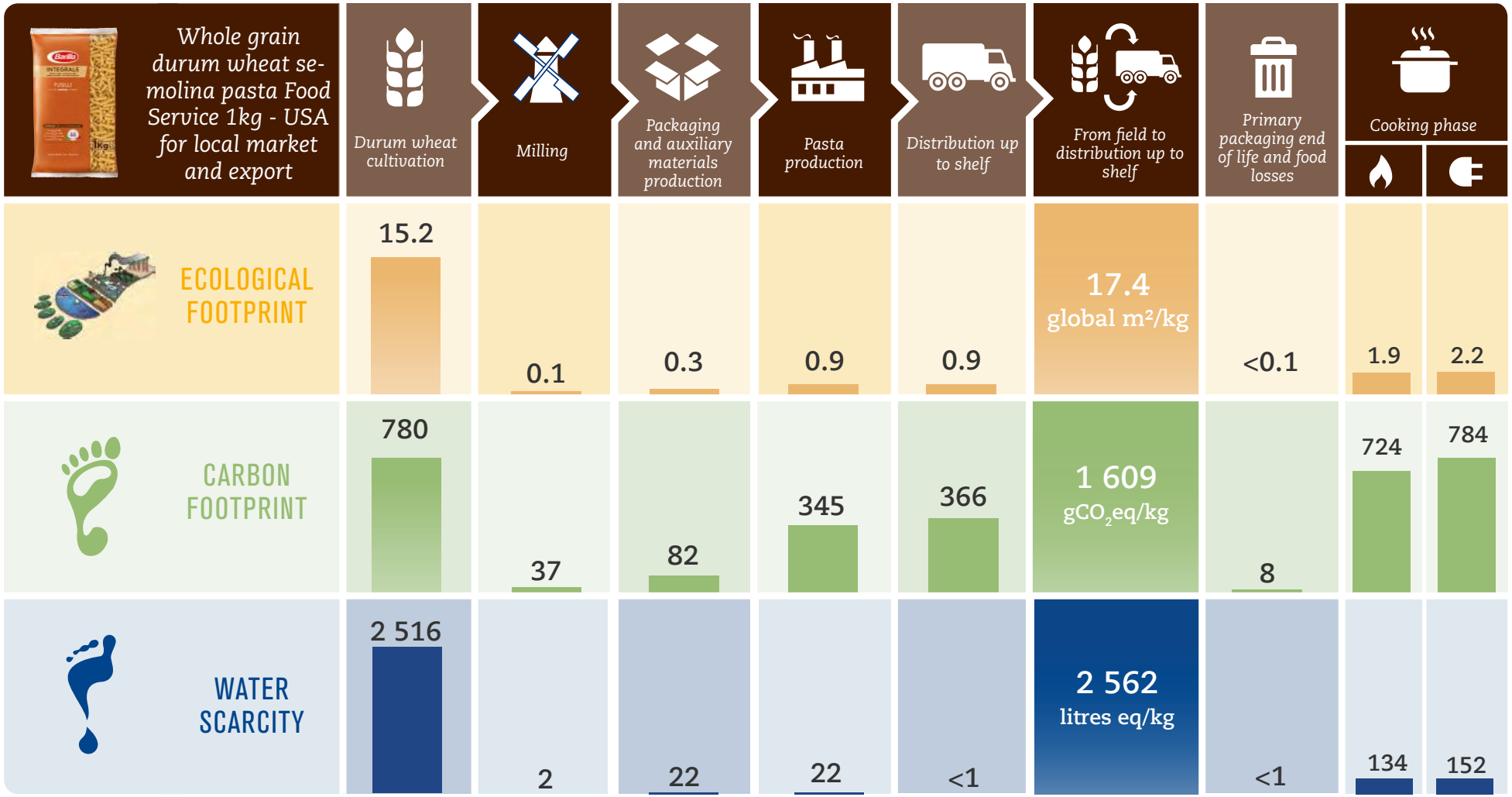
POTENTIAL ENVIRONMENTAL IMPACTS data referred to1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking, if gas	Pasta cooking, if electric
GLOBAL WARMING POTENTIAL - GWP ($g\ CO_2$ eq)	Fossil	7.80E+02	3.63E+01	8.09E+01	3.45E+02	3.37E+02	**1.58E+03**	4.94E+00	7.24E+02	7.83E+02
	Biogenic	9.32E-02	4.05E-01	1.62E-01	2.90E-01	2.86E+01	**2.96E+01**	2.89E+00	2.53E-01	7.27E-01
	Land use and land transformation	9.74E-02	1.05E-03	6.70E-01	6.66E-03	1.46E-02	**7.90E-01**	1.12E-04	3.17E-02	5.95E-02
	Total	**7.80E+02**	**3.67E+01**	**8.17E+01**	**3.45E+02**	**3.66E+02**	**1.61E+03**	**7.83E+00**	**7.24E+02**	**7.84E+02**
Acidification Potential - g SO_2 eq		1.82E+01	1.09E-01	3.13E-01	8.73E-01	1.16E+00	**2.06E+01**	2.95E-03	6.09E-01	2.49E+00
Eutrophication Potential - g PO_4^{---} eq		8.76E+00	1.21E-02	8.00E-02	1.05E-01	1.83E-01	**9.14E+00**	3.48E-03	1.85E-01	3.88E-01
Photochemical Oxidant Formation Potential - gNMVOC eq		4.89E+00	6.02E-02	2.80E-01	7.29E-01	1.38E+00	**7.33E+00**	4.49E-03	6.30E-01	1.43E+00
Abiotic Depletion Potential - Elements g Sb eq		2.42E-03	2.30E-06	1.08E-05	1.95E-05	1.18E-05	**2.47E-03**	3.96E-08	8.13E-06	6.05E-05
Abiotic Depletion Potential - Fossil fuels - MJ. net calorific value		7.84E+00	6.19E-01	1.59E+00	5.30E+00	3.82E+00	**1.92E+01**	4.52E-03	1.32E+01	1.31E+01
Water scarcity potential. m^3 eq		2.52E+00	2.21E-03	2.17E-02	2.18E-02	2.78E-04	**2.56E+00**	2.10E-04	1.34E-01	1.52E-01

WASTE PRODUCTION data referred to 1 kg of product	UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
	Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking, if gas	Pasta cooking, if electric
Hazardous waste disposed (g)*	9.09E-05	0.00E+00	5.74E-09	0.00E+00	0.00E+00	**9.09E-05**	0.00E+00	0.00E+00	0.00E+00
Non-Hazardous waste disposed (g)*	2.25E+00	0.00E+00	1.07E+01	0.00E+00	0.00E+00	**1.29E+01**	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed (g)	3.48E-01	1.17E-01	1.72E-01	4.94E-01	1.40E-01	**1.27E+00**	2.81E-04	1.58E-01	9.97E+00

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO_2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO_2 within the reference 100 years period.

**Zero values indicate that – even if some waste are produced and disposed – their impact is evaluated within the system boundaries.*

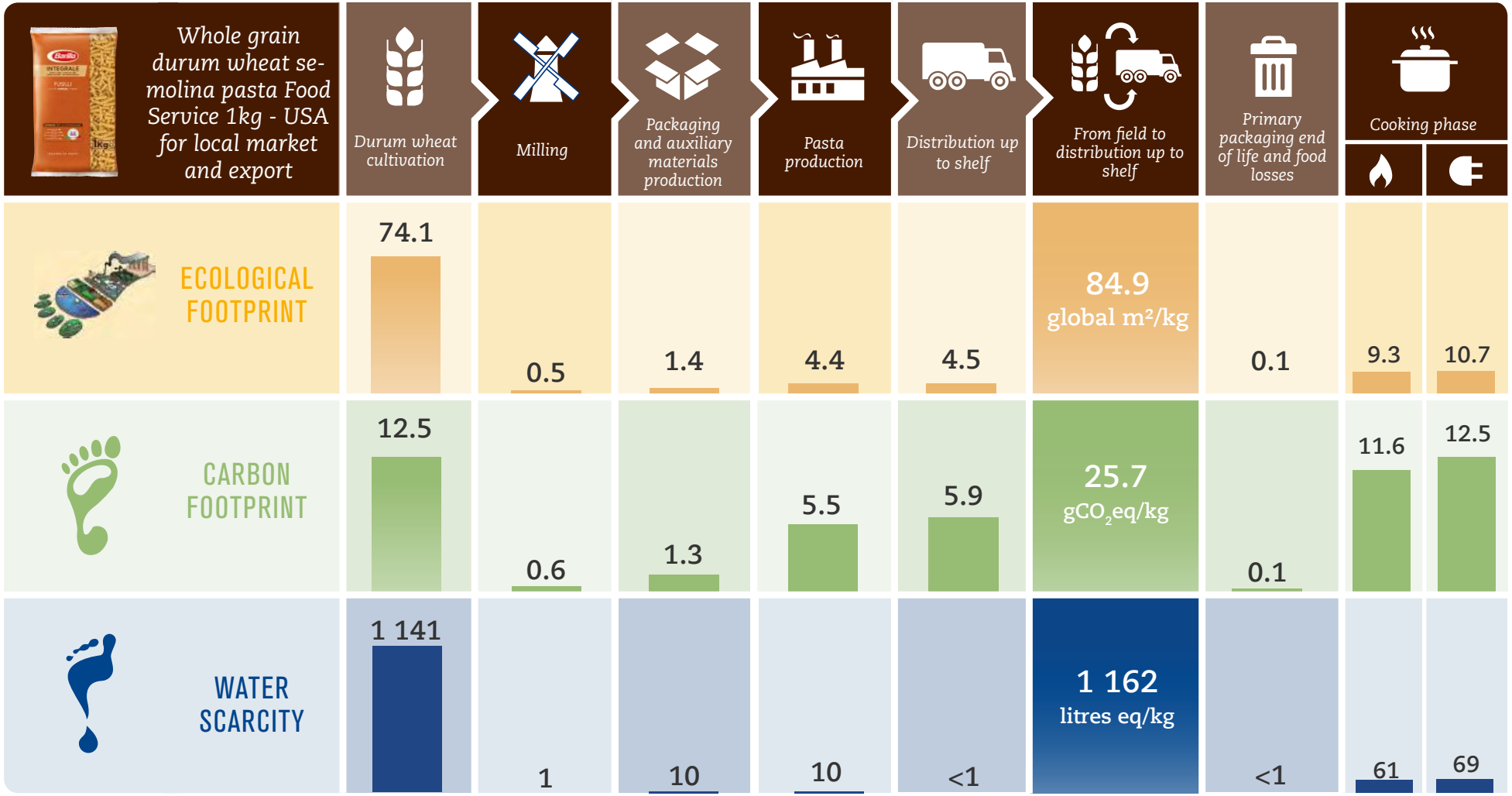
PRODUCT ENVIRONMENTAL PERFORMANCES



Cooking environmental performances are referred to the local market (USA).

ANGLO-SAXON UNIT OF MEASUREMENT

PRODUCT ENVIRONMENTAL PERFORMANCES



Cooking environmental performances are referred to the local market (USA).

14. Additional information

REFERENCES

- International EPD Consortium, General Programme Instructions (EPD), ver. 3.01 of 18/09/2019;
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- Arjen Y. Hoekstra, Ashok K. Chapagain, Maite M. Aldaya, Mesfin M. Mekonnen; Water Footprint The Water Footprint Manual 2011, Waterfootprint Network;
- PCR 2010:01; CPC 2371 - PCR for uncooked pasta, not stuffed or otherwise prepared; v. 4.01 20/09/2021
- COMIECO Raccolta, Riciclo e Recupero di carta e cartone 2018;
- COREPLA relazione sulla gestione 2018;
- Eurostat database for waste management, latest version (2018).

Environmental declarations published within the same product category, though originating from different programs. may not be comparable. This declaration and further information in regards are available at www.environdec.com

As EPD owner, Barilla has the sole ownership, liability and responsibility for the EPD.

EPD PROCESS CERTIFICATION

Product category Rules (PCR) review conducted by:
Technical Committee of the International EPD® system.
Chair Filippo Sessa
Contact via info@environdec.com

Program operator:
EPD International AB
Box 210 60, SE-100 31 Stockholm, Sweden
info@environdec.com

EPD®
ENVIRONMENTAL PRODUCT DECLARATION

EPD PROCESS CERTIFICATION

Independent verification of the declaration and data, according to ISO 14025:

- [x] EPD process verification
- [ ] EPD verification- Third party verifier

PROCESS INTERNAL VERIFICATION

Procedure for follow-up of data during EPD validity involves third part verifier:

- [ ] Yes
- [x] No

Third party verifier: **Bureau Veritas Certification Sweden AB,** Accredited by: **SWEDAC**

Process internal verifier: **Ugo Pretato,** Approved by: **The International EPD® System**

CONTACTS

Barilla G. e R. Fratelli- Società per Azioni, via Mantova 166, 43122, Parma, Italy. www.barillagroup.com
For additional information relative to the activities of the Barilla Group or in regards to this environmental declaration, please contact:
Laura Marchelli - laura.marchelli@barilla.com

Technical support and grafic design: **Life Cycle Engineering SpA - Italy www.lcengineering.eu**

15. Glossary

ECOLOGICAL FOOTPRINT

The ecological footprint measures the area of biologically productive land and water required to provide the resources used and absorb the carbon dioxide waste generated along the entire life cycle. It is measured in standard units called global hectares (gha).

www.globalfootprint.org

CARBON FOOTPRINT

A product carbon footprint is the total amount of greenhouse gases produced along the entire life cycle. It is expressed in equivalent mass of carbon dioxide (CO_2-eq).
In agriculture a significant contribution is given by the emission of nitrous oxide (N2O) due to the fertilizers use. It is also known as Global Warming Potential (GWP).

www.ipcc.ch

WATER SCARCITY

Water scarcity measures the available water remaining per unit of surface in a given watershed relative to the world average, after human and aquatic ecosystem demands have been met. This method builds on the assumption that the potential to deprive another user of water is directly proportional to the amount of water consumed and inversely proportional to the available water remaining per unit of surface and time in a region (watershed).

www.wulca-waterlca.org

ACIDIFICATION (AP)

It is a phenomenon for which precipitation is unusually acidic, meaning that it has substandard levels of pH. It can have harmful effects on plants, aquatic animals and infrastructure. Acid rain is caused by emissions of SO_2. NO_x and NH_3.
The acidification potential is measured in mass of sulphur dioxide equivalent (SO2-eq).

EUTROPHICATION (EP)

It is an abnormal proliferation of vegetation in the aquatic ecosystems caused by the addition of nutrients into rivers. lakes or ocean. which determinates a lack of oxygen.
The eutrophication potential is mainly influenced by emission into water of phosphates and nitrates. It is expressed in mass of PO_4^{---}equivalent.

PHOTOCHEMICAL OXIDANT FORMATION POTENTIAL (POFP)

Production of compounds that, under the light effect, are able to promote an oxidation reaction leading to ozone production in the troposphere.
The indicator is mainly influenced by VOCs (Volatile organic compounds) is usually expressed in mass of ethylene equivalent (g NMVOC - equivalent).