Durum wheat semolina pasta 5kg for FoodService

Environmental Product Declaration

The first EPD process certified in the Food industries

DAL 1877 Barilla®

Barilla
The Italian Food Company. Since 1877.

EPD®
ENVIRONMENTAL PRODUCT DECLARATION

REGISTRATION NUMBER
S-P-00420

CPC CODE
2731 Uncooked pasta, not stuffed or otherwise prepared
PCR 2010:01 v. 4.02
2022/04/13

PUBLICATION DATE
2013/09/26

REVISION
9 of 2023/02/02

VALID UNTIL
2024/10/27

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

Durum wheat semolina pasta for Foodservice, produced in Barilla's production plants in Italy, Greece, Turkey and USA, made from durum wheat and water, is produced by extrusion or lamination and then a drying process.
The pasta production process does not require additives and preservatives: it is drying process that guarantees the conservation.
The product is distributed worldwide.
This Environmental Product Declaration (EPD) is about Barilla durum wheat semolina pasta for FoodService, produced in three Italian plants (Pedrignano, Foggia, Marcianise, Muggia) for Italian local and Export market, in one Greek plant (Thiva) for Greek local and export market, in one Turkish plant (Bolu) for Turkish local market and in two American plants (Ames and Avon) for USA and Canadian market.

THE PRODUCTS

Products included in the analysis are Classic semolina pasta cuts (spaghetti, penne, fusilli, etc.); Piccolini (minifarfalle, minipenne rigate); Specialità (gnocchetti sardi, cellentani, farfalle).
Shape is the only feature differentiating these products, since they are all produced using as only ingredients water and semolina. The following products are excluded from this declaration since, aside from the use of semolina and water, they are produced with other ingredients: egg pasta in any shape; filled pasta (tortellini, etc.); special varieties of pasta with ingredients different from durum wheat products e.g. Tricolori semolina formats whole wheat semolina pasta. Furthermore durum wheat dry pasta not packed in 5 kg LPDE or sold with other label is excluded.

NUTRITIONAL INFORMATION

The durum wheat semolina pasta concerned by this declaration is made only by durum semolina and water, with final moisture content below 13%.
From a nutritional point of view, its main characteristics are:

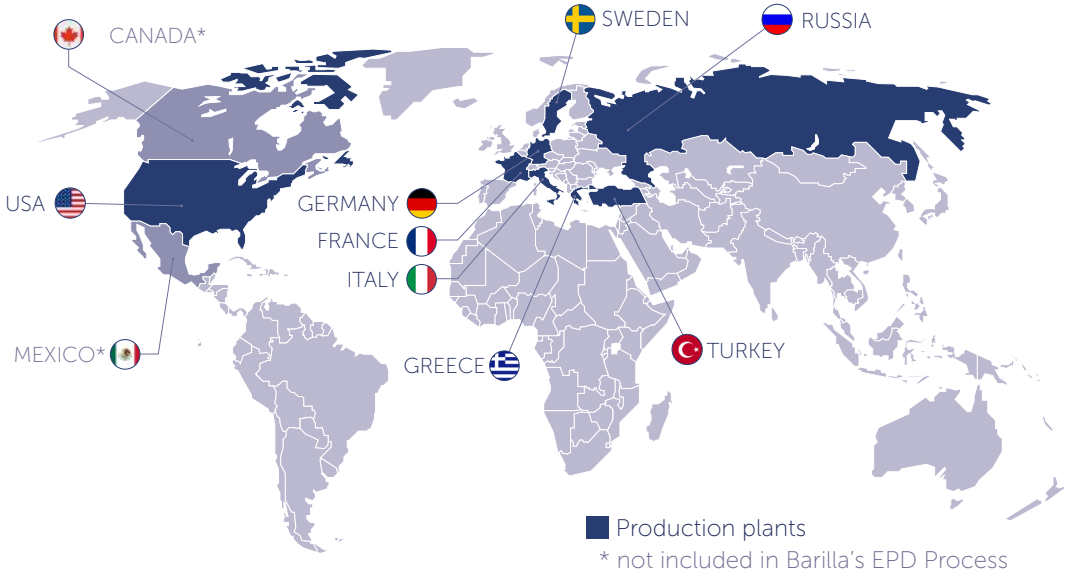
NUTRITIONAL INFORMATION (per 100 g)		
Energy	kJ kcal	1 521 359
Fats *of which saturated*	grams	2 *0.5*
Carbohydrates *of which sugars*	grams	70.2 *3.5*
Fibres	grams	3
Proteins	grams	13.5
Salt	grams	0.013

2. Barilla Group

It is thanks to a path characterised by passion, quality, and attention to people's needs that a small bread and pasta shop, that opened in Parma in 1877, over time became the "Barilla" we know today: a world leader in the market for pasta, ready-made sauces, baked goods, and crispbread.

Barilla is present in over 100 countries with its brands and 30 production sites, which, every year, together produce more than 2,134,000 tonnes of products.

In different ways, on different markets, all of our brands have a common objective: to bring joy and conviviality around everyone's table.



Our Purpose: The joy of food for a better life

In order to make a concrete contribution to global challenges, Barilla has renewed its commitment to society and the planet with a new Purpose containing the "why" of our way of doing business: "The joy of food for a better life".

"Bringing people closer to the joy of good food and making quality the choice for a better life, from each individual to the planet. Because this is how we are nurturing the future, today."

It's a commitment from field to fork, to bring to the world tasty, joyful and wholesome products, made with selected raw materials from responsible supply chains. Because what we eat today can change our tomorrow. Because good food is a joy for the present and a choice for a better future.

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

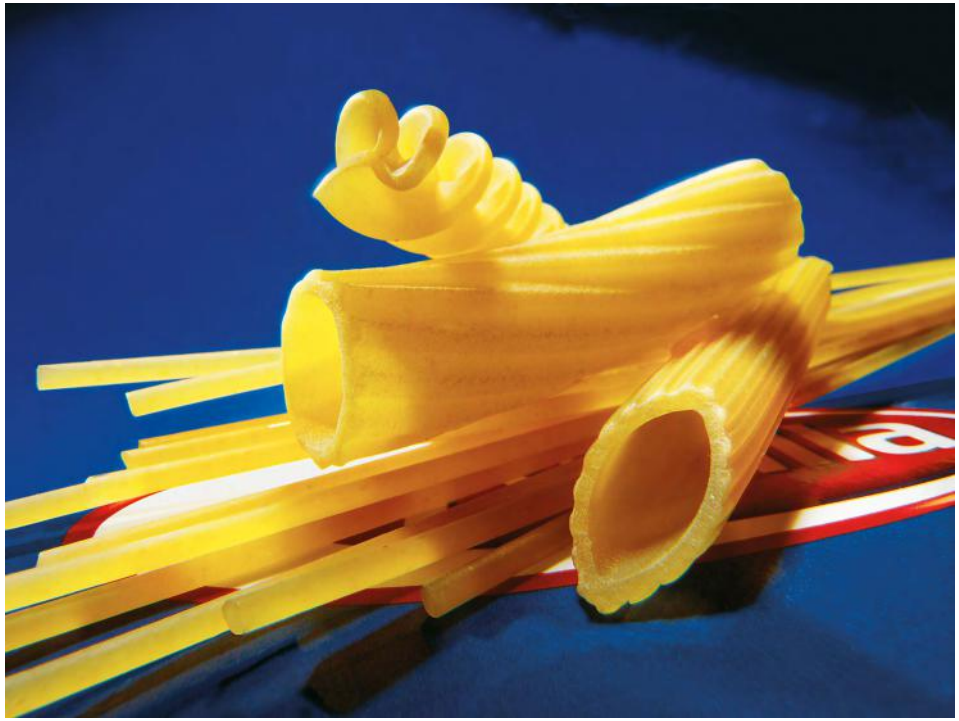
Data are referred to **1 kg** of product plus the related packaging. The packaging is referred to the **5 kg** format, reported to 1 kg of product.

SYSTEM BOUNDARIES

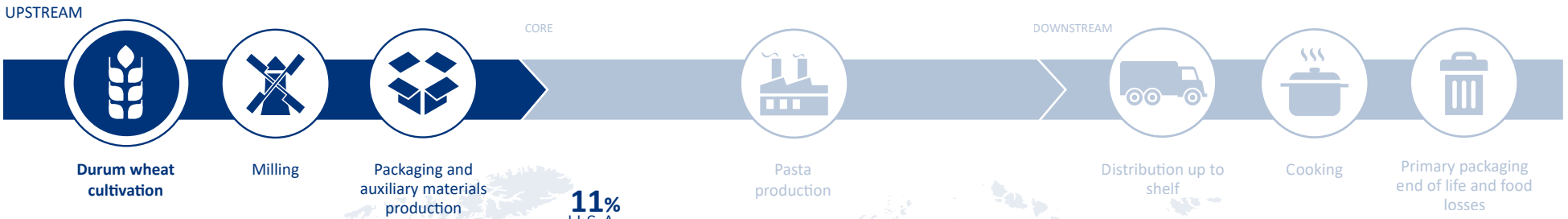
The processes constituting the analyzed system were organized in **three successive phases**, in compliance with the EPD system's requirements.

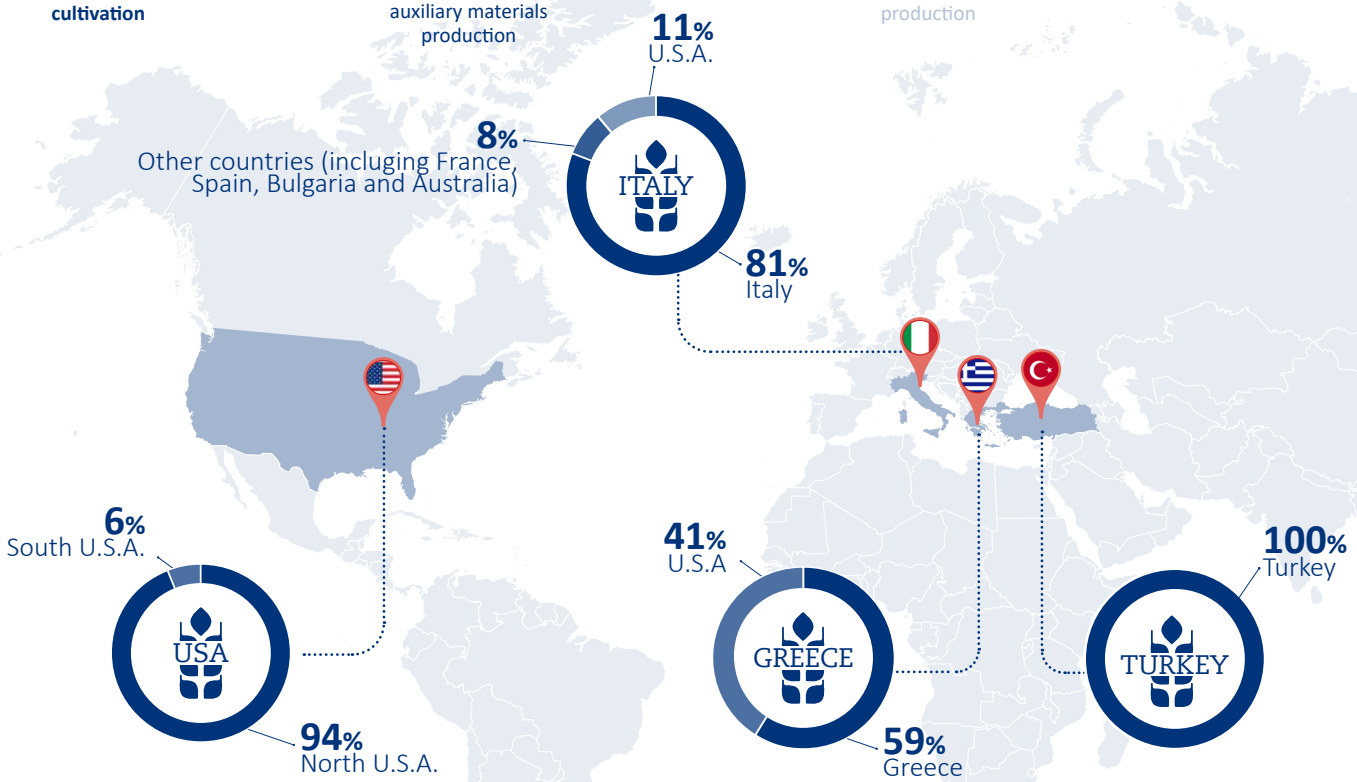
GEOGRAPHICAL SCOPE

The geographical scope of this EPD is global and it corresponds to the distribution area of the product.



4. Durum wheat cultivation





***The 64% of Italian wheat** and the **15% of Greek 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; Turkey; Spain; Central East Europa).

Percentages are calculated as average purchased amounts for years 2019, 2020, 2021.

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 (2019, 2020, 2021).

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

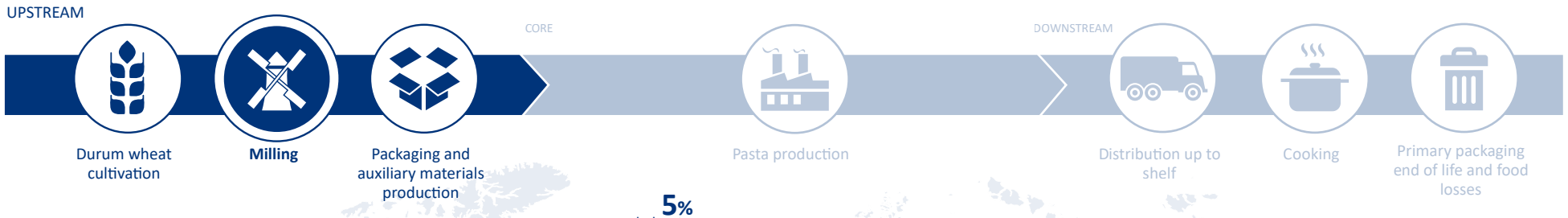
In 2020 Barilla brand launches in Italy its first pasta produced with 100% Italian durum wheat: this result is possible thanks to farmers ' engagement and the increasingly widespread application of responsible agricultural practices.
For more information, visit the dedicated page on Barilla website.

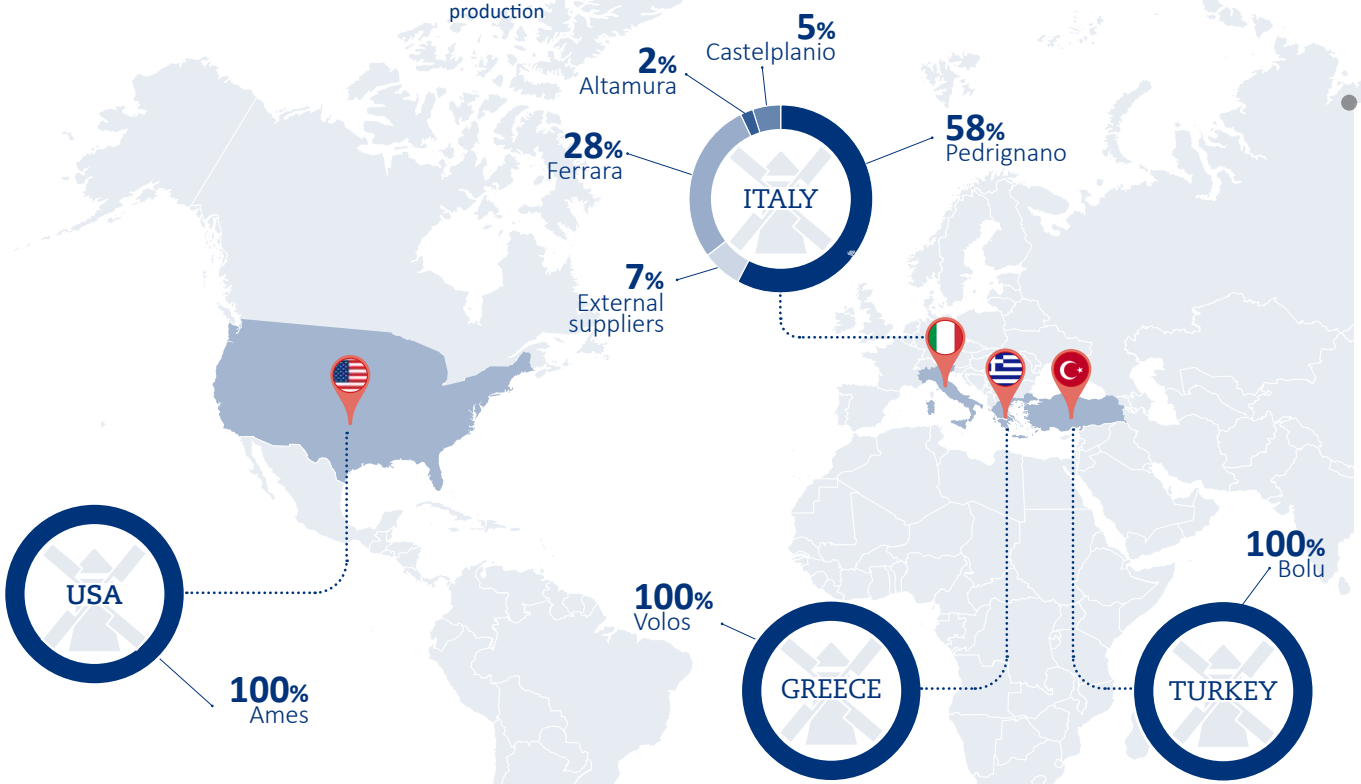
BARILLA SUSTAINABLE FARMING (BSF) PROMOTES MORE EFFICIENT CROPPING SYSTEMS IN ORDER TO HAVE SAFE AND HIGH QUALITY AGRICULTURAL PRODUCTS IN A WAY THAT PROTECTS AND IMPROVES THE NATURAL ENVIRONMENT AND THE SOCIAL AND ECONOMIC CONDITIONS OF FARMERS.

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 lower 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); 1 in USA (Ames); 1 in Turkey (Bolu); 1 in Greece (Volos).

Primary data (2021 year) are used for water and energy consumption ad waste production. Secondary data, mainly from Ecoinvent database, are used for water and energy supply.

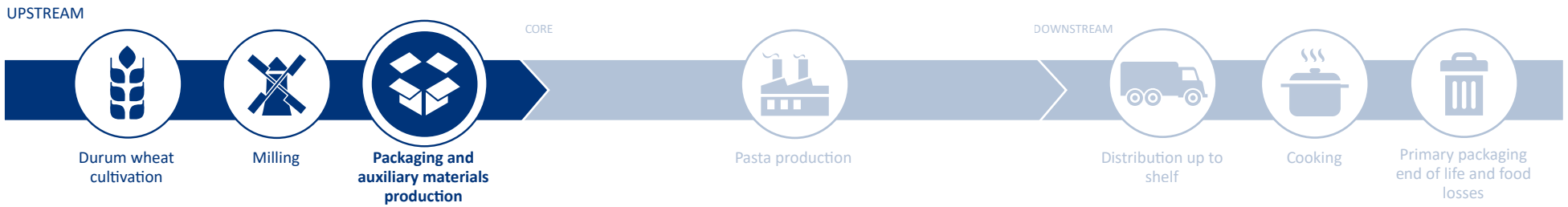
Environmental performance on non property mill were evaluated considering property Barilla mill data average.

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 2021.

6. Packaging and auxiliary materials production



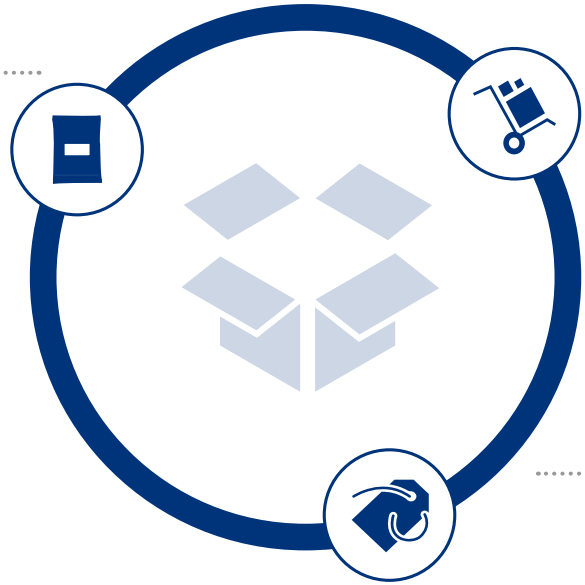
Since 2004, Barilla designs new packaging with the"LCA packaging design tool". It allows the assessment of the environmental impacts of the packaging solutions already during the design phase.

PRIMARY PACKAGING

Packaging environmental performances are calculated considering the 5 kg format, uniqe sales format.

The primary packaging consists in a LDPE plastic film, recyclable with plastic.

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. The data used are referred to 2021

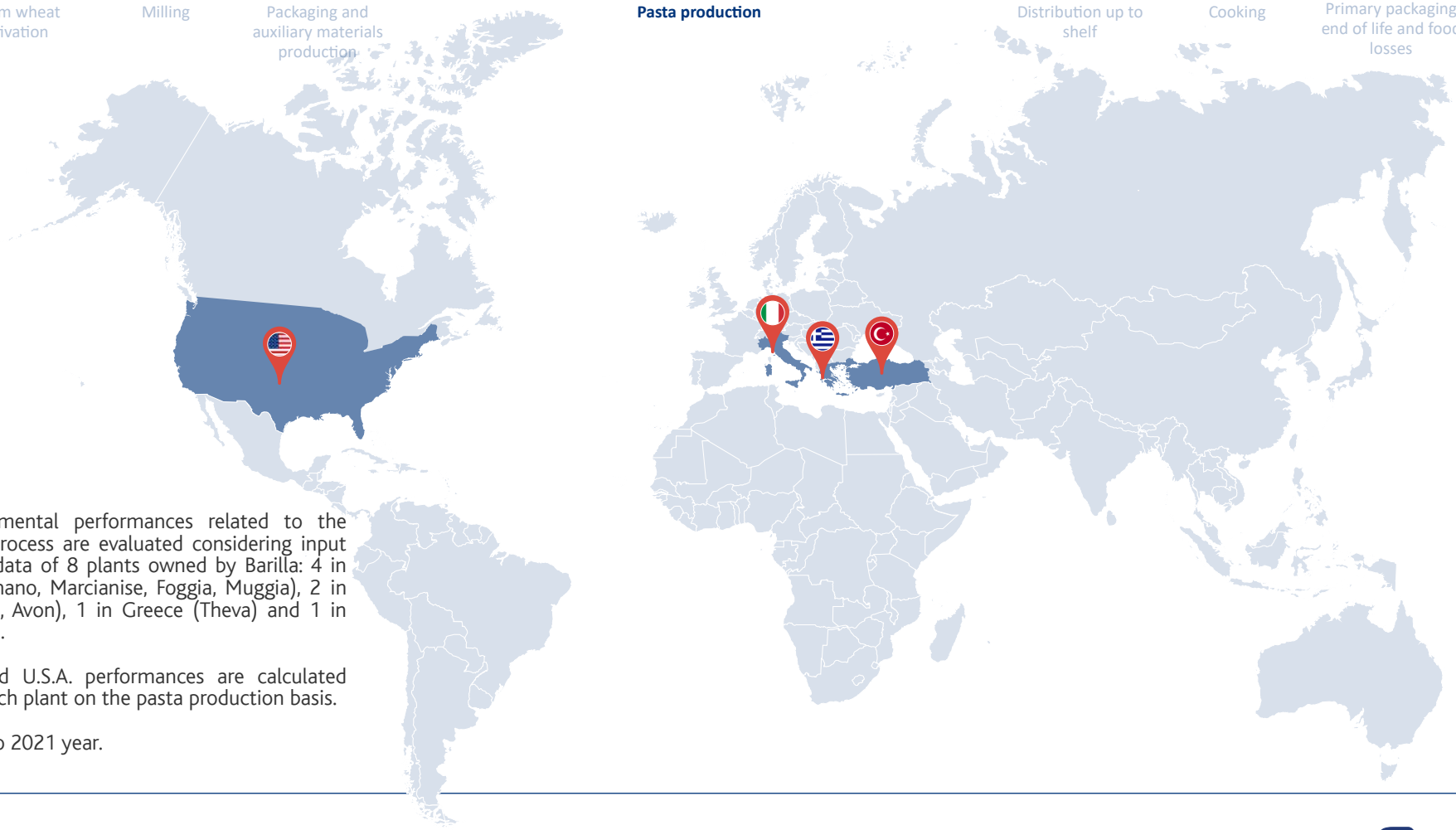
PACKAGING FOR DISTRIBUTION

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 2021 year.
Secondary data (Ecoinvent) are used for environmental aspects associated to materials production.

7. Pasta production



The environmental performances related to the production process are evaluated considering input and output data of 8 plants owned by Barilla: 4 in Italy (Pedrignano, Marcianise, Foggia, Muggia), 2 in U.S.A. (Ames, Avon), 1 in Greece (Theva) and 1 in Turkey (Bolu).

For Italy and U.S.A. performances are calculated weighting each plant on the pasta production basis.

Data refers to 2021 year.

7. Pasta production

GENERAL INFORMATION

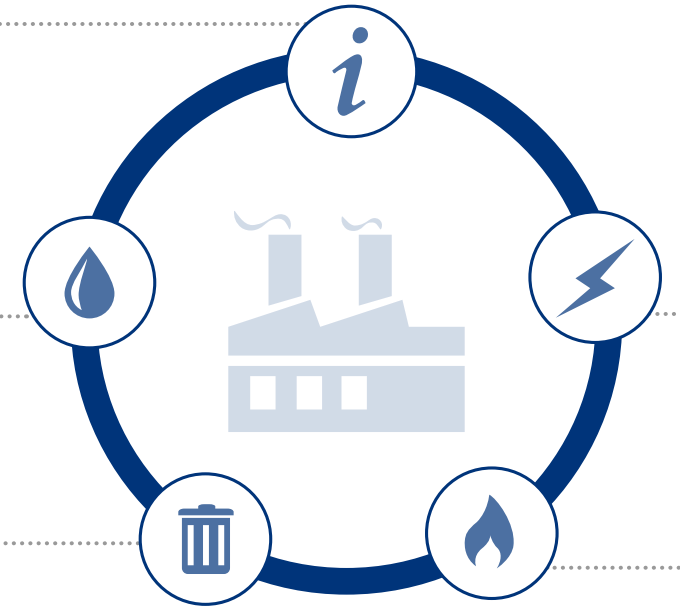
The environmental performances related to the production process are evaluated considering primary data for energy and water consumption and the waste production. Secondary data (mainly Ecoinvent) are used for the environmental aspects related to the production of energy and water.

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 2021.

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 2021.



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 2021 primary data.
Secondary data, mainly from Ecoinvent database, are used for transport means.

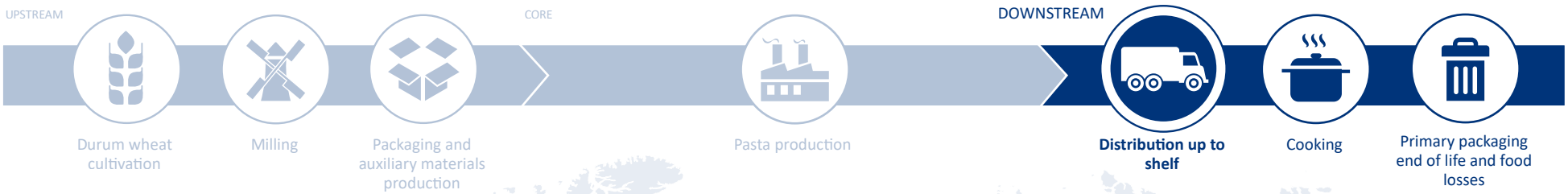
ELECTRICITY

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 2021. Electric energy production is related to specific country mix for year 2021 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 2021.

8. Distribution



DISTRIBUTION

Distribution environmental performances are calculated using specific hypotheses for each area. Data refers to 2019 data, except for Italian pasta production: in this case 2021 data are reported since they're significantly different from 2019, due to the introduction of Muggia production plant.

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

The impacts related to the disposal of the packaging for transport have been calculated considering the average scenario for paperboard and plastic within the most relevant distribution countries (reference: Eurostat 2018).

Italian production for local consumption

490 km | 120 km | 24 km

Italian production for export

1474 km | 5 813 km | 17 km

Greek production for local consumption

476 km | 163 km

Greek production for export

811 km | 196 km

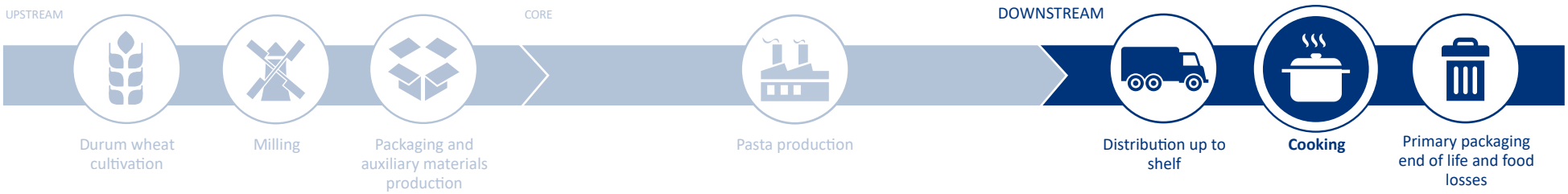
USA production for local consumption and export

1 495 km | 41km | 165 km

Turkish production for local consumption and export

500 km

9. Cooking

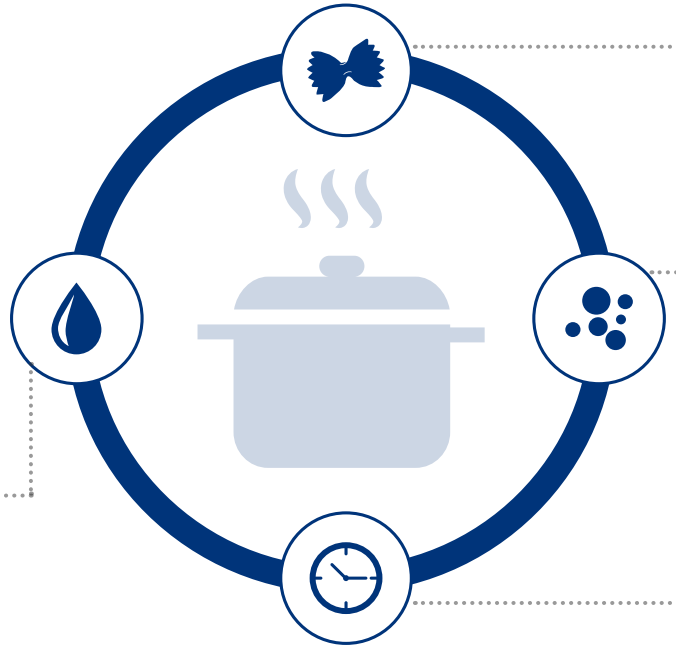


COOKING PHASE

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.



1 kg of pasta

1.8 kWh
per kg of pasta
(boiling phase)

0.05 kWh
per minute of cooking

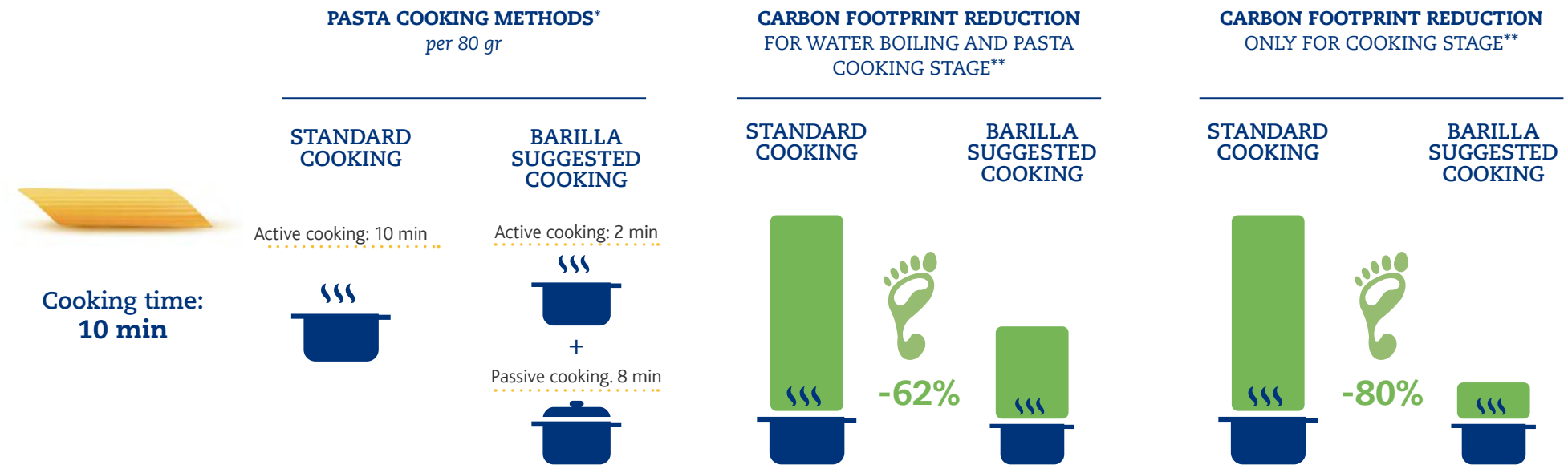
10 liters of water
per kg of pasta

Cooking environmental performances are provided only for local consumption; for export average or main market have been used, due to the high number of involved countries.

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:

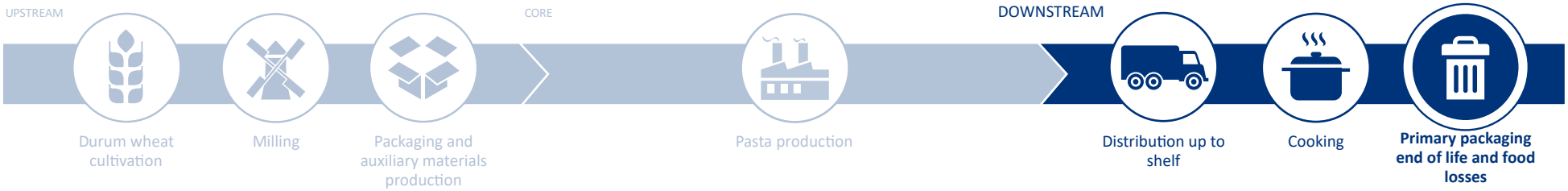


Barilla-suggested cooking method does not affect the organoleptic properties of the product but it requires more attention during the cooking phase: pay attention that pasta is completely submerged into water and mix it regularly during cooking.

*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 2018

13%	RECYCLE	Avoiding the production of virgin material.
71%	ENERGY RECOVERY	Recovering packaging energy content.
16%	DISPOSAL	In Italy, 19% of waste sent to disposal are burned without energy recovery, the others are sent to landfill.

USA

Reference: EPA report 2014

15%	RECYCLE	Avoiding the production of virgin material.
17%	ENERGY RECOVERY	Recovering packaging energy content.
68%	DISPOSAL	In USA, waste sent to disposal goes to landfill.

TURKEY

Reference: Eurostat database 2015

	Avoiding the production of virgin material.	RECYCLE 55%
	In Turkey, waste sent to disposal goes to landfill.	DISPOSAL 45%

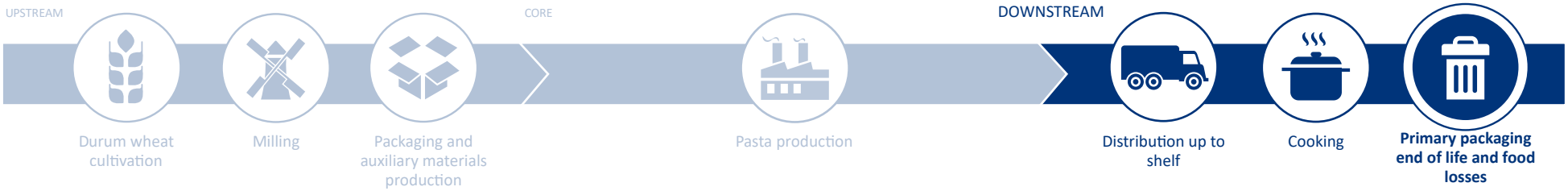
GREECE

Reference: Eurostat database 2015

	Avoiding the production of virgin material.	RECYCLE 41%
	Recovering packaging energy content.	ENERGY RECOVERY 7%
	In Greece, waste sent to disposal goes to landfill.	DISPOSAL 52%

Environmental performances of packaging end of life, for local market, are calculated by means of distribution countries end of life scenarios.

10. Primary packaging end of life and food losses



ITALIAN PRODUCTION FOR EXPORT

40,5% RECYCLE	Avoiding the production of virgin material.
33,5% ENERGY RECOVERY	Recovering packaging energy content.
26% DISPOSAL	For the average scenario, waste sent to disposal goes to landfill.

GREEK PRODUCTION FOR EXPORT

Avoiding the production of virgin material.	RECYCLE 58%
ecovering packaging energy content.	ENERGY RECOVERY 9%
For the average scenario, waste sent to disposal goes to landfill.	DISPOSAL 33%

For the export markets environmental performances are elaborated considering the end of life scenarios of the most representative distribution countries (France, Germany, Australia and United Kingdom); the remaining countries are assimilated to an average European scenario (Europe volumes are higher than extra-europe countries).

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	7.14E-02	4.20E-02	1.83E-01	3.93E-02	3.42E-03	**3.39E-01**	1.06E-04	4.90E-02	1.49E+00
	Used as raw materials*	0.00E+00	0.00E+00	1.05E-01	0.00E+00	0.00E+00	**1.05E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**7.14E-02**	**4.20E-02**	**2.87E-01**	**3.93E-02**	**3.42E-03**	**4.43E-01**	**1.06E-04**	**4.90E-02**	**1.49E+00**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	4.57E+00	4.67E-01	8.98E-01	3.55E+00	1.06E+00	**1.05E+01**	4.76E-03	1.09E+01	2.29E+01
	Used as raw materials	0.00E+00	1.35E-05	3.02E-01	0.00E+00	0.00E+00	**3.02E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**4.57E+00**	**4.67E-01**	**1.20E+00**	**3.55E+00**	**1.06E+00**	**1.08E+01**	**4.76E-03**	**1.09E+01**	**2.29E+01**
Secondary Material (g)		0.00E+00	0.00E+00	3.57E+01	0.00E+00	0.00E+00	**3.57E+01**	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels (MJ. net calorific power)		0.00E+00	0.00E+00	2.13E-02	0.00E+00	0.00E+00	**2.13E-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)		1.72E+00	1.08E-01	6.19E-01	1.86E+00	4.96E-02	**4.35E+00**	9.04E-03	1.08E+01	1.46E+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	1.20E+01	0.00E+00	**1.20E+01**	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	3.93E-01	5.96E+00	8.95E+00	2.66E+01	**4.19E+01**	5.91E+00	0.00E+00	0.00E+00
Materials for energy recovery (g)	0.00E+00	0.00E+00	0.00E+00	5.97E-01	2.67E+00	**3.26E+00**	5.00E+00	0.00E+00	0.00E+00
Exported energy. electricity (MJ)	0.00E+00	0.00E+00	0.00E+00	2.71E-01	0.00E+00	**2.71E-01**	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.*

11. Environmental results - Italy for local consumption

POTENTIAL ENVIRONMENTAL IMPACTS 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*
GLOBAL WARMING POTENTIAL - GWP ($g\ CO_2$ eq)	Fossil	4.78E+02	2.68E+01	5.06E+01	2.12E+02	7.54E+01	**8.43E+02**	8.88E+00	6.48E+02	1.26E+03
	Biogenic	8.57E-02	1.07E-02	1.23E-01	1.05E+00	4.59E+00	**5.86E+00**	2.90E+00	3.08E-01	4.43E-01
	Land use and land transformation	2.56E-01	7.56E-04	8.85E-01	3.55E-03	1.81E-03	**1.15E+00**	1.08E-04	4.75E-02	1.07E-01
	Total	**4.78E+02**	**2.69E+01**	**5.16E+01**	**2.13E+02**	**8.00E+01**	**8.50E+02**	**1.18E+01**	**6.48E+02**	**1.26E+03**
Acidification Potential - $g\ SO_2$ eq		1.19E+01	4.75E-02	1.78E-01	3.23E-01	4.06E-01	**1.28E+01**	3.26E-03	6.95E-01	4.25E+00
Eutrophication Potential - $g\ PO_4^{3-}$ eq		6.17E+00	4.26E-03	4.99E-02	4.05E-02	6.38E-02	**6.33E+00**	3.53E-03	1.85E-01	4.86E-01
Photochemical Oxidant Formation Potential - g NMVOC eq		2.06E+00	2.98E-02	1.69E-01	2.67E-01	4.81E-01	**3.01E+00**	4.67E-03	5.30E-01	2.31E+00
Abiotic Depletion Potential, elements - g Sb eq		1.21E-03	1.52E-07	1.54E-05	1.22E-06	3.36E-06	**1.23E-03**	1.01E-07	8.18E-06	2.61E-05
Abiotic Depletion Potential, fossil fuels - MJ. net calorific value		4.45E+00	4.48E-01	1.10E+00	3.49E+00	1.05E+00	**1.05E+01**	4.61E-03	1.09E+01	2.06E+01
Water scarcity potential - m^3 eq		1.76E-01	1.23E-02	1.88E-02	7.42E-02	3.04E-05	**2.82E-01**	2.16E-04	1.07E-01	2.19E-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)*	1.30E-05	0.00E+00	5.50E-04	0.00E+00	0.00E+00	**5.63E-04**	0.00E+00	0.00E+00	0.00E+00
Non-Hazardous waste disposed (g)*	4.99E-01	0.00E+00	4.71E+00	0.00E+00	0.00E+00	**5.21E+00**	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed (g)	2.22E-02	3.99E-03	1.70E-02	1.17E-02	1.54E-03	**5.64E-02**	4.00E-05	1.28E-02	5.08E-01

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO2 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.*

11. Environmental performance - Italy for local consumption

Durum wheat semolina pasta Food Service 5kg - Italy for local consumption

	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	6.6	<0.1	0.2	0.5	0.2	7.6 global m²/kg	<0.1	1.7	3.6
CARBON FOOTPRINT	478	27	52	213	80	850 gCO_2eq/kg	12	648	1 258
WATER SCARCITY	176	12	19	74	<1	282 litres eq/kg	<1	107	219

Cooking environmental performances are referred to pasta consumption in Italy.

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	7.14E-02	4.20E-02	1.83E-01	3.93E-02	6.75E-03	**3.42E-01**	1.05E-04	4.51E-02	9.74E-02
	Used as raw materials*	0.00E+00	0.00E+00	1.05E-01	0.00E+00	0.00E+00	**1.05E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**7.14E-02**	**4.20E-02**	**2.87E-01**	**3.93E-02**	**6.75E-03**	**4.47E-01**	**1.05E-04**	**4.51E-02**	**9.74E-02**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	4.57E+00	4.67E-01	8.98E-01	3.55E+00	3.63E+00	**1.31E+01**	4.63E-03	1.16E+01	3.73E+01
	Used as raw materials	0.00E+00	1.35E-05	3.02E-01	0.00E+00	0.00E+00	**3.02E-01**	0.00E+00	0.00E+00	0.00E+00
	Total	**4.57E+00**	**4.67E-01**	**1.20E+00**	**3.55E+00**	**3.63E+00**	1.34E+01	**4.63E-03**	**1.16E+01**	**3.73E+01**
Secondary Material (g)		0.00E+00	0.00E+00	3.57E+01	0.00E+00	0.00E+00	**3.57E+01**	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels (MJ. net calorific power)		0.00E+00	0.00E+00	2.13E-02	0.00E+00	0.00E+00	**2.13E-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)		1.72E+00	1.08E-01	6.19E-01	1.86E+00	1.52E-01	**4.45E+00**	8.63E-03	1.09E+01	1.71E+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	1.20E+01	0.00E+00	**1.20E+01**	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	3.93E-01	5.96E+00	8.95E+00	2.85E+01	**4.38E+01**	7.57E+00	0.00E+00	0.00E+00
Materials for energy recovery (g)	0.00E+00	0.00E+00	0.00E+00	5.97E-01	2.26E+00	**2.86E+00**	7.05E+00	0.00E+00	0.00E+00
Exported energy. electricity (MJ)	0.00E+00	0.00E+00	0.00E+00	2.71E-01	1.38E-03	**2.72E-01**	1.36E-03	0.00E+00	0.00E+00
Exported energy. thermal (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-03	**2.88E-03**	2.85E-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.*

12. Environmental results - Italy for export

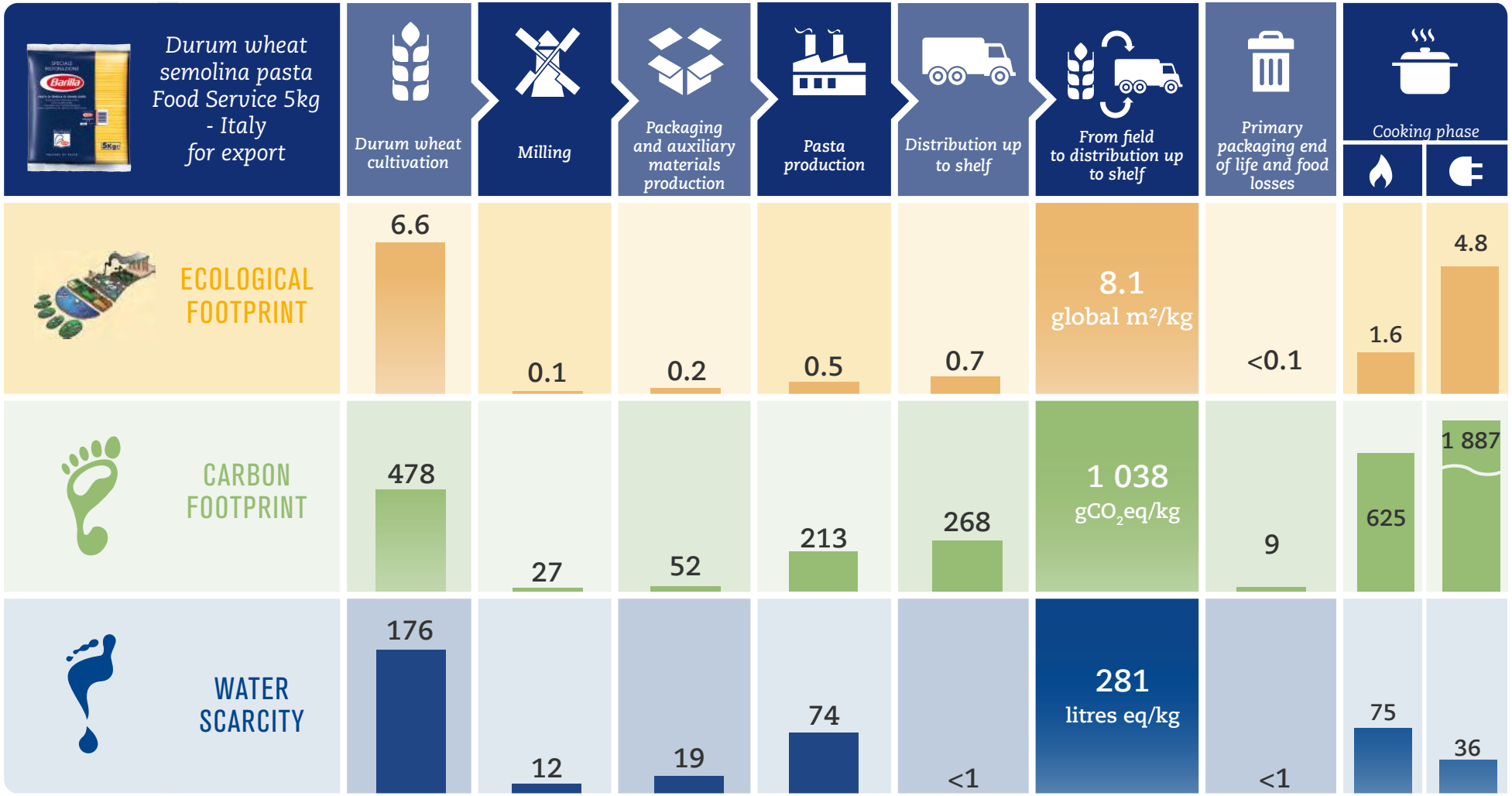
POTENTIAL ENVIRONMENTAL IMPACTS data referred to 1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking. if gas	Pasta cooking. if electric
GLOBAL WARMING POTENTIAL - GWP ($g\ CO_2$ eq)	Fossil	4.78E+02	2.68E+01	5.06E+01	2.12E+02	2.65E+02	**1.03E+03**	7.05E+00	6.25E+02	1.89E+03
	Biogenic	8.57E-02	1.07E-02	1.23E-01	1.05E+00	3.32E+00	**4.58E+00**	2.90E+00	3.04E-01	5.36E-01
	Land use and land transformation	2.56E-01	7.56E-04	8.85E-01	3.55E-03	3.11E-03	**1.15E+00**	1.08E-04	5.00E-02	1.43E-01
	Total	**4.78E+02**	**2.69E+01**	**5.16E+01**	**2.13E+02**	**2.68E+02**	**1.04E+03**	**9.95E+00**	**6.25E+02**	**1.89E+03**
Acidification Potential - g SO_2 eq		1.19E+01	4.75E-02	1.78E-01	3.23E-01	2.03E+00	**1.44E+01**	3.06E-03	6.48E-01	3.77E+00
Eutrophication Potential - g PO_4^{3-} eq		6.17E+00	4.26E-03	4.99E-02	4.05E-02	1.99E-01	**6.46E+00**	3.49E-03	1.82E-01	7.38E-01
Photochemical Oxidant Formation Potential - g NMVOC eq		2.06E+00	2.98E-02	1.69E-01	2.67E-01	1.61E+00	**4.14E+00**	4.43E-03	4.73E-01	2.61E+00
Abiotic Depletion Potential, elements - g Sb eq		1.21E-03	1.52E-07	1.54E-05	1.22E-06	9.78E-06	**1.24E-03**	8.99E-08	8.97E-06	5.42E-05
Abiotic Depletion Potential, fossil fuels - MJ. net calorific value		4.45E+00	4.48E-01	1.10E+00	3.49E+00	3.62E+00	**1.31E+01**	4.48E-03	1.15E+01	3.08E+01
Water scarcity potential - m^3 eq		1.76E-01	1.23E-02	1.88E-02	7.42E-02	-5.29E-04 [1]	**2.81E-01**	2.18E-04	7.49E-02	3.55E-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) [2]	1.30E-05	0.00E+00	5.50E-04	0.00E+00	0.00E+00	**5.63E-04**	0.00E+00	0.00E+00	0.00E+00
Non-Hazardous waste disposed (g) [2]	4.99E-01	0.00E+00	4.71E+00	0.00E+00	0.00E+00	**5.21E+00**	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed (g)	2.22E-02	3.99E-03	1.70E-02	1.17E-02	2.29E-03	**5.71E-02**	3.98E-05	1.30E-02	1.39E+00

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO2 within the reference 100 years period.

[1] *negative value due water flows accounting in the AWARE method used to calculate water scarcity potential. An input of marine salt water is used in the production of fuels for transport process, along with an output of freshwater. However, the former is not considered in the AWARE method, hence highlighting a credit for returning freshwater to nature, but not the impact of withdrawing it in the first place.*
[2] *Zero values indicate that – even if some waste are produced and disposed – their impact is evaluated within the system boundaries.*

12. Environmental performance - Italy for export



Cooking environmental performances are referred to Germany energy mix. Germany is the second relevant export country after China on the basis of distributed volumes)

13. Environmental results - Greece 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	7,08E-02	6,02E-02	2,70E-01	2,78E-01	1,66E-03	**6,80E-01**	1,07E-04	4,38E-02	2,76E+00
	Used as raw materials*	0,00E+00	0,00E+00	1,05E-01	0,00E+00	0,00E+00	**1,05E-01**	0,00E+00	0,00E+00	0,00E+00
	Total	**7,08E-02**	**6,02E-02**	**3,74E-01**	**2,78E-01**	**1,66E-03**	**7,85E-01**	**1,07E-04**	**4,38E-02**	**2,76E+00**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	6,73E+00	6,09E-01	1,22E+00	4,51E+00	1,05E+00	**1,41E+01**	4,82E-03	1,24E+01	2,80E+01
	Used as raw materials	0,00E+00	5,82E-05	3,02E-01	0,00E+00	0,00E+00	**3,02E-01**	0,00E+00	0,00E+00	0,00E+00
	Total	**6,73E+00**	**6,09E-01**	**1,52E+00**	**4,51E+00**	**1,05E+00**	1,44E+01	**4,82E-03**	**1,24E+01**	**2,80E+01**
Secondary Material (g)		0,00E+00	0,00E+00	5,84E+01	0,00E+00	0,00E+00	**5,84E+01**	0,00E+00	0,00E+00	0,00E+00
Renewable secondary fuels (MJ. net calorific power)		0,00E+00	0,00E+00	3,48E-02	0,00E+00	0,00E+00	**3,48E-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)		2,07E+00	1,76E-01	9,47E-01	1,14E+00	4,47E-02	**4,39E+00**	9,15E-03	1,09E+01	1,63E+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	2,95E+01	0,00E+00	**2,95E+01**	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	1,86E-01	9,07E+00	9,10E+00	5,24E+01	**7,08E+01**	7,69E+00	0,00E+00	0,00E+00
Materials for energy recovery (g)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	5,00E+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.*

13. Environmental results - Greece for local consumption

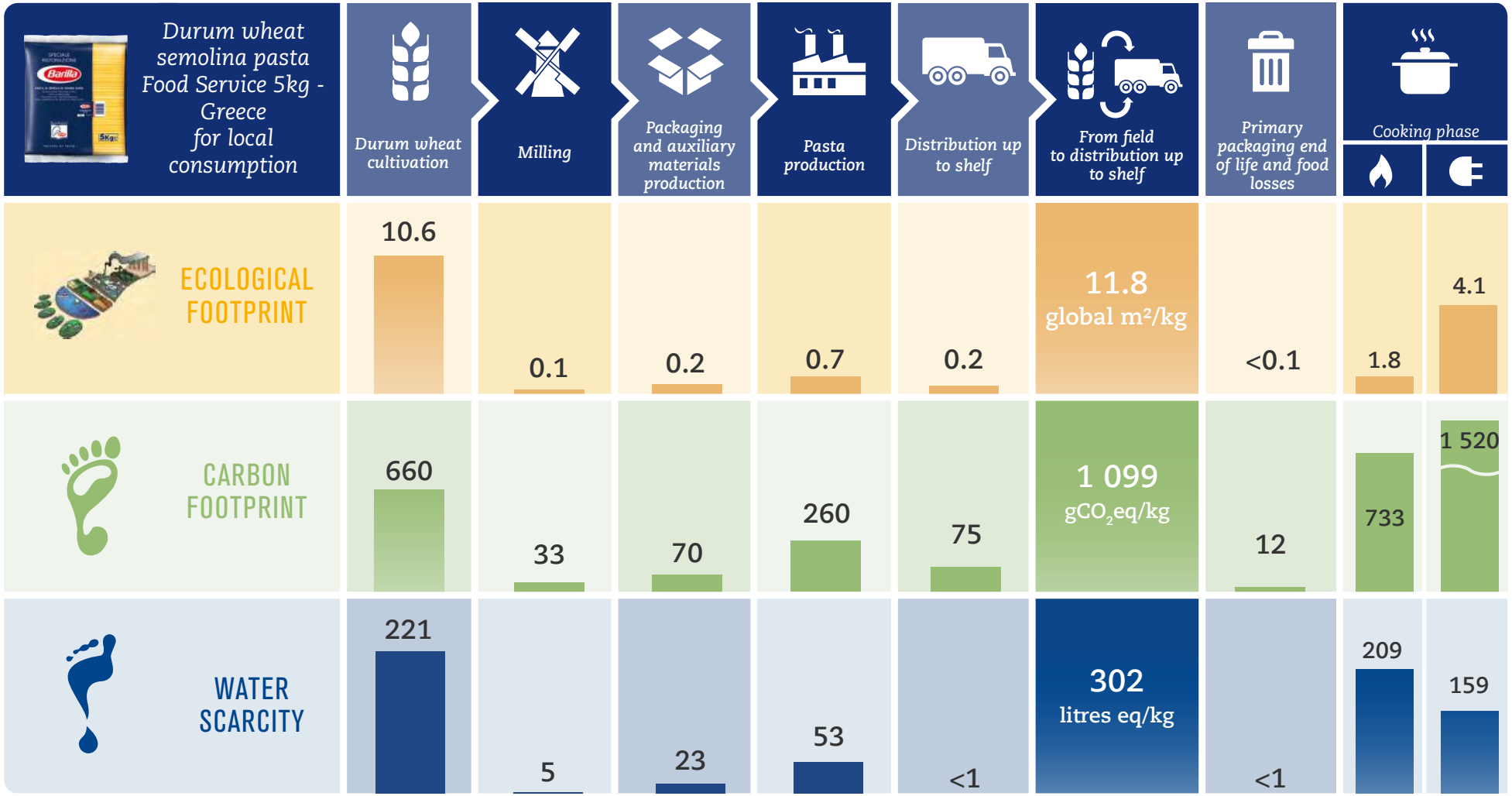
POTENTIAL ENVIRONMENTAL IMPACTS data referred to 1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	Milling	Packaging and auxiliary materials production	Pasta production	Distribution up to shelf		Packaging end of life and food losses	Pasta cooking. if gas	Pasta cooking. if electric
GLOBAL WARMING POTENTIAL - GWP ($g\ CO_2$ eq)	Fossil	6,60E+02	3,33E+01	6,90E+01	2,59E+02	7,54E+01	**1,10E+03**	9,47E+00	7,32E+02	1,52E+03
	Biogenic	1,02E-01	7,38E-02	1,64E-01	5,46E-01	3,71E-03	**8,89E-01**	2,89E+00	3,44E-01	4,47E-01
	Land use and land transformation	2,30E-01	1,97E-03	1,07E+00	6,91E-03	6,54E-04	**1,31E+00**	1,09E-04	5,15E-02	9,69E-02
	Total	**6,60E+02**	**3,33E+01**	**7,02E+01**	**2,60E+02**	**7,54E+01**	**1,10E+03**	**1,24E+01**	**7,33E+02**	**1,52E+03**
Acidification Potential - g SO_2 eq		1,62E+01	1,27E-01	2,51E-01	7,82E-01	3,57E-01	**1,77E+01**	3,33E-03	1,08E+00	5,89E+00
Eutrophication Potential - g PO_4^{3-} eq		8,22E+00	1,59E-02	6,83E-02	9,60E-02	5,24E-02	**8,45E+00**	3,54E-03	2,15E-01	8,51E-01
Photochemical Oxidant Formation Potential - g NMVOC eq		3,93E+00	5,25E-02	2,29E-01	4,13E-01	4,10E-01	**5,03E+00**	4,76E-03	6,95E-01	2,46E+00
Abiotic Depletion Potential, elements - g Sb eq		1,46E-03	3,33E-07	1,91E-05	3,13E-06	3,32E-06	**1,49E-03**	1,05E-07	8,19E-06	2,27E-05
Abiotic Depletion Potential, fossil fuels - MJ. net calorific value		6,60E+00	5,80E-01	1,39E+00	4,37E+00	1,05E+00	**1,40E+01**	4,67E-03	1,24E+01	2,66E+01
Water scarcity potential - m^3 eq		2,21E-01	4,96E-03	2,31E-02	5,31E-02	-1,51E-04 [1]	**3,02E-01**	2,16E-04	2,09E-01	1,59E-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) [2]	4,09E-05	0,00E+00	5,69E-04	0,00E+00	0,00E+00	**6,10E-04**	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste disposed (g) [2]	1,20E+00	0,00E+00	7,70E+00	0,00E+00	0,00E+00	**8,90E+00**	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed (g)	2,72E-02	5,53E-03	2,38E-02	2,57E-02	4,84E-04	**8,27E-02**	4,02E-05	1,20E-02	2,59E-01

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO2 within the reference 100 years period.

[1] *negative value due water flows accounting in the AWARE method used to calculate water scarcity potential. An input of marine salt water is used in the production of fuels for transport process, along with an output of freshwater. However, the former is not considered in the AWARE method, hence highlighting a credit for returning freshwater to nature, but not the impact of withdrawing it in the first place.*
[2] *Zero values indicate that – even if some waste are produced and disposed – their impact is evaluated within the system boundaries.*

13. Environmental performance - Greece for local consumption



Cooking environmental performances are referred to pasta consumption in Greece.

14. Environmental results - Greece 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	7,08E-02	6,02E-02	2,70E-01	2,78E-01	2,75E-03	**6,81E-01**	1,03E-04	5,00E-02	3,65E+00
	Used as raw materials*	0,00E+00	0,00E+00	1,05E-01	0,00E+00	0,00E+00	**1,05E-01**	0,00E+00	0,00E+00	0,00E+00
	Total	**7,08E-02**	**6,02E-02**	**3,74E-01**	**2,78E-01**	**2,75E-03**	7,86E-01	**1,03E-04**	**5,00E-02**	**3,65E+00**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	6,73E+00	6,09E-01	1,22E+00	4,51E+00	1,68E+00	**1,48E+01**	4,43E-03	1,10E+01	4,90E+01
	Used as raw materials	0,00E+00	5,82E-05	3,02E-01	0,00E+00	0,00E+00	**3,02E-01**	0,00E+00	0,00E+00	0,00E+00
	Total	**6,73E+00**	**6,09E-01**	**1,52E+00**	**4,51E+00**	**1,68E+00**	1,51E+01	**4,43E-03**	**1,10E+01**	**4,90E+01**
Secondary Material (g)		0,00E+00	0,00E+00	5,84E+01	0,00E+00	0,00E+00	**5,84E+01**	0,00E+00	0,00E+00	0,00E+00
Renewable secondary fuels (MJ. net calorific power)		0,00E+00	0,00E+00	3,48E-02	0,00E+00	0,00E+00	**3,48E-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)		2,07E+00	1,76E-01	9,47E-01	1,14E+00	7,11E-02	**4,41E+00**	8,02E-03	1,09E+01	1,97E+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	2,95E+01	0,00E+00	**2,95E+01**	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	1,86E-01	9,07E+00	9,10E+00	4,61E+01	**6,45E+01**	8,74E+00	0,00E+00	0,00E+00
Materials for energy recovery (g)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	5,00E+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.*

14. Environmental results - Greece for export

POTENTIAL ENVIRONMENTAL IMPACTS 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
GLOBAL WARMING POTENTIAL - GWP ($g\ CO_2$ eq)	Fossil	6,60E+02	3,33E+01	6,90E+01	2,59E+02	1,20E+02	**1,14E+03**	4,29E+00	5,98E+02	2,13E+03
	Biogenic	1,02E-01	7,38E-02	1,64E-01	5,46E-01	1,03E+01	**1,12E+01**	2,91E+00	2,51E-01	5,29E-01
	Land use and land transformation	2,30E-01	1,97E-03	1,07E+00	6,91E-03	1,18E-03	**1,31E+00**	1,06E-04	5,00E-02	2,65E-01
	Total	**6,60E+02**	**3,33E+01**	**7,02E+01**	**2,60E+02**	**1,30E+02**	**1,15E+03**	**7,20E+00**	**5,98E+02**	**2,13E+03**
Acidification Potential - g SO_2 eq		1,62E+01	1,27E-01	2,51E-01	7,82E-01	5,45E-01	**1,79E+01**	2,77E-03	5,26E-01	1,15E+01
Eutrophication Potential - g PO_4^{3-} eq		8,22E+00	1,59E-02	6,83E-02	9,60E-02	7,94E-02	**8,48E+00**	3,42E-03	1,76E-01	1,25E+00
Photochemical Oxidant Formation Potential - g NMVOC eq		3,93E+00	5,25E-02	2,29E-01	4,13E-01	5,90E-01	**5,21E+00**	4,04E-03	4,29E-01	6,01E+00
Abiotic Depletion Potential, elements - g Sb eq		1,46E-03	3,33E-07	1,91E-05	3,13E-06	5,24E-06	**1,49E-03**	7,28E-08	9,18E-06	9,50E-05
Abiotic Depletion Potential, fossil fuels - MJ. net calorific value		6,60E+00	5,80E-01	1,39E+00	4,37E+00	1,68E+00	**1,46E+01**	4,28E-03	1,09E+01	3,44E+01
Water scarcity potential - m^3 eq		2,21E-01	4,96E-03	2,31E-02	5,31E-02	-2,48E-04 [1]	**3,02E-01**	2,09E-04	1,01E-01	3,41E-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) [2]	4,09E-05	0,00E+00	5,69E-04	0,00E+00	0,00E+00	**6,10E-04**	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste disposed (g) [2]	1,20E+00	0,00E+00	7,70E+00	0,00E+00	0,00E+00	**8,90E+00**	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed (g)	2,72E-02	5,53E-03	2,38E-02	2,57E-02	8,11E-04	**8,30E-02**	3,92E-05	1,58E-02	2,76E+00

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO2 within the reference 100 years period.

[1] *negative value due water flows accounting in the AWARE method used to calculate water scarcity potential. An input of marine salt water is used in the production of fuels for transport process, along with an output of freshwater. However, the former is not considered in the AWARE method, hence highlighting a credit for returning freshwater to nature, but not the impact of withdrawing it in the first place.*
[2] *Zero values indicate that – even if some waste are produced and disposed – their impact is evaluated within the system boundaries.*

14. Environmental performance - Greece for export

Durum wheat semolina pasta Food Service 5kg - Greece 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	10.6	0.1	0.2	0.7	0.3	11.9 global m²/kg	<0.1	1.6	6.4
CARBON FOOTPRINT	660	33	70	260	130	1 154 gCO_2eq/kg	7	598	2 128
WATER SCARCITY	221	5	23	53	<1	302 litres eq/kg	<1	101	341

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

15. Environmental results - Turkey 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	1,10E+00	9,93E-02	2,69E-01	2,48E-01	1,91E-03	**1,72E+00**	1,03E-04	5,01E-02	4,44E+00
	Used as raw materials*	0,00E+00	0,00E+00	1,05E-01	0,00E+00	0,00E+00	**1,05E-01**	0,00E+00	0,00E+00	0,00E+00
	Total	**1,10E+00**	**9,93E-02**	**3,73E-01**	**2,48E-01**	**1,91E-03**	**1,82E+00**	**1,03E-04**	**5,01E-02**	**4,44E+00**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	6,63E+00	4,48E-01	1,22E+00	2,66E+00	1,03E+00	**1,20E+01**	4,41E-03	1,10E+01	2,02E+01
	Used as raw materials	0,00E+00	6,07E-05	3,04E-01	0,00E+00	0,00E+00	**3,04E-01**	0,00E+00	0,00E+00	0,00E+00
	Total	**6,63E+00**	**4,48E-01**	**1,52E+00**	**2,66E+00**	**1,03E+00**	**1,23E+01**	**4,41E-03**	**1,10E+01**	**2,02E+01**
Secondary Material (g)		0,00E+00	0,00E+00	5,84E+01	0,00E+00	0,00E+00	**5,84E+01**	0,00E+00	0,00E+00	0,00E+00
Renewable secondary fuels (MJ. net calorific power)		0,00E+00	0,00E+00	3,48E-02	0,00E+00	0,00E+00	**3,48E-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)		1,44E+02	1,54E-01	9,41E-01	8,49E-01	4,34E-02	**1,46E+02**	7,77E-03	1,09E+01	1,48E+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	1,11E+01	0,00E+00	**1,11E+01**	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	9,07E+00	3,06E+00	3,59E+01	**4,81E+01**	8,50E+00	0,00E+00	0,00E+00
Materials for energy recovery (g)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	5,00E+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.*

15. Environmental results - Turkey for local consumption + export

POTENTIAL ENVIRONMENTAL IMPACTS 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
GLOBAL WARMING POTENTIAL - GWP ($g CO_2$ eq)	Fossil	6,26E+02	2,88E+01	6,89E+01	1,56E+02	7,30E+01	**9,53E+02**	3,20E+00	5,99E+02	1,30E+03
	Biogenic	1,76E-01	1,17E-01	1,61E-01	8,26E-01	2,84E+01	**2,97E+01**	2,95E+00	2,50E-01	4,31E+00
	Land use and land transformation	3,16E+00	2,49E-03	1,04E+00	5,24E-03	1,02E-03	**4,21E+00**	1,07E-04	7,37E-02	1,43E-01
	Total	**6,29E+02**	**2,89E+01**	**7,01E+01**	**1,57E+02**	**1,01E+02**	**9,86E+02**	**6,15E+00**	**6,00E+02**	**1,30E+03**
Acidification Potential - g SO_2 eq		1,26E+01	1,14E-01	2,51E-01	3,51E-01	3,10E-01	**1,36E+01**	2,69E-03	5,37E-01	5,22E+00
Eutrophication Potential - g PO_4^{3-} eq		9,55E+00	1,60E-02	6,76E-02	5,25E-02	5,79E-02	**9,74E+00**	3,42E-03	1,77E-01	8,13E-01
Photochemical Oxidant Formation Potential - g NMVOC eq		3,35E+00	8,39E-02	2,28E-01	2,70E-01	3,53E-01	**4,29E+00**	3,96E-03	4,34E-01	3,81E+00
Abiotic Depletion Potential, elements - g Sb eq		9,98E-04	1,72E-06	1,90E-05	4,57E-06	3,22E-06	**1,03E-03**	6,58E-08	9,15E-06	8,41E-05
Abiotic Depletion Potential, fossil fuels - MJ. net calorific value		6,48E+00	4,46E-01	1,38E+00	2,65E+00	1,02E+00	**1,20E+01**	4,26E-03	1,09E+01	2,01E+01
Water scarcity potential - m^3 eq		7,13E+00	2,28E-03	2,31E-02	2,00E-02	-1,44E-04 [1]	**7,17E+00**	2,08E-04	1,48E-01	1,50E-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) [2]	1,22E-08	0,00E+00	5,69E-04	0,00E+00	0,00E+00	**5,69E-04**	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste disposed (g) [2]	1,65E-02	0,00E+00	7,70E+00	0,00E+00	0,00E+00	**7,71E+00**	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed (g)	2,61E-02	3,87E-04	2,38E-02	1,23E-03	5,90E-04	**5,21E-02**	3,97E-05	1,04E-02	2,58E-02

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO2 within the reference 100 years period.

[1] *negative value due water flows accounting in the AWARE method used to calculate water scarcity potential. An input of marine salt water is used in the production of fuels for transport process, along with an output of freshwater. However, the former is not considered in the AWARE method, hence highlighting a credit for returning freshwater to nature, but not the impact of withdrawing it in the first place.*
[2] *Zero values indicate that – even if some waste are produced and disposed – their impact is evaluated within the system boundaries.*

15. Environmental performance - Turkey for local consumption + export

Durum wheat semolina pasta Food Service 5kg - Turkey for local consumption and 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	10.1	0.1	0.2	0.4	0.2	11.1 global m²/kg	<0.1	1.6	3.5
CARBON FOOTPRINT	629	29	70	157	101	986 gCO_2eq/kg	6	600	1 305
WATER SCARCITY	7 126	2	23	20	<1	7 172 litres eq/kg	<1	148	150

Cooking environmental performances are referred to pasta consumption in Turkey.

16. 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	7,88E-02	1,99E-01	3,59E-01	5,79E-01	5,33E-03	**1,22E+00**	1,10E-04	4,59E-02	4,79E+00
	Used as raw materials*	0,00E+00	0,00E+00	1,05E-01	0,00E+00	0,00E+00	**1,05E-01**	0,00E+00	0,00E+00	0,00E+00
	Total	**7,88E-02**	**1,99E-01**	**4,64E-01**	**5,79E-01**	**5,33E-03**	**1,33E+00**	**1,10E-04**	**4,59E-02**	**4,79E+00**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	8,93E+00	7,28E-01	1,64E+00	5,38E+00	3,22E+00	**1,99E+01**	4,87E-03	1,10E+01	1,74E+01
	Used as raw materials	0,00E+00	6,07E-05	3,04E-01	0,00E+00	0,00E+00	**3,04E-01**	0,00E+00	0,00E+00	0,00E+00
	Total	**8,93E+00**	**7,28E-01**	**1,95E+00**	**5,38E+00**	**3,22E+00**	**2,02E+01**	**4,87E-03**	**1,10E+01**	**1,74E+01**
Secondary Material (g)		0,00E+00	0,00E+00	8,14E+01	0,00E+00	0,00E+00	**8,14E+01**	0,00E+00	0,00E+00	0,00E+00
Renewable secondary fuels (MJ. net calorific power)		0,00E+00	0,00E+00	4,85E-02	0,00E+00	0,00E+00	**4,85E-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)		4,85E+01	1,17E-01	1,27E+00	1,22E+00	1,43E-01	**5,12E+01**	8,79E-03	1,09E+01	1,37E+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	1,11E+01	0,00E+00	**1,11E+01**	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	4,12E-01	1,24E+01	7,52E+00	5,64E+01	**7,67E+01**	6,14E+00	0,00E+00	0,00E+00
Materials for energy recovery (g)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	5,00E+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.*

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

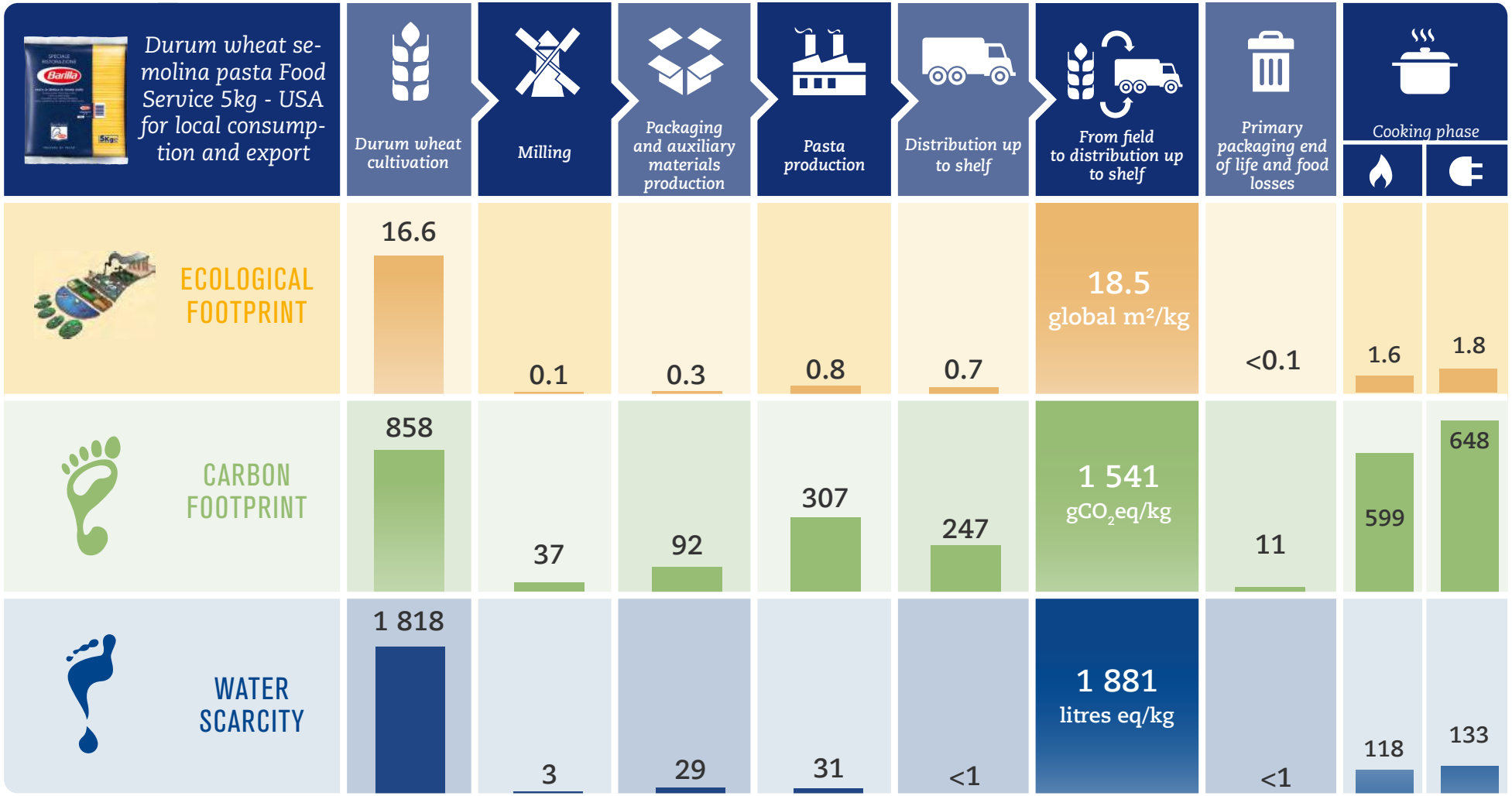
POTENTIAL ENVIRONMENTAL IMPACTS data referred to 1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	USE STAGE		
		Durum wheat cultivation	*Milling*	*Packaging and auxiliary materials production*	*Pasta production*	*Distribution up to shelf*		*Packaging end of life and food losses*	*Pasta cooking. if gas*	*Pasta cooking. if electric*
GLOBAL WARMING POTENTIAL - GWP ($g\ CO_2$ eq)	Fossil	8,58E+02	3,71E+01	9,04E+01	3,07E+02	2,30E+02	**1,52E+03**	7,87E+00	5,98E+02	6,47E+02
	Biogenic	1,13E-01	4,04E-02	2,01E-01	2,88E-01	1,68E+01	**1,75E+01**	2,92E+00	2,42E-01	6,32E-01
	Land use and land transformation	1,07E-01	1,07E-03	1,23E+00	6,55E-03	2,23E-03	**1,35E+00**	1,14E-04	4,56E-02	6,82E-02
	Total	**8,58E+02**	**3,71E+01**	**9,18E+01**	**3,07E+02**	**2,47E+02**	**1,54E+03**	**1,08E+01**	**5,99E+02**	**6,48E+02**
Acidification Potential - g SO_2 eq		1,99E+01	1,11E-01	3,34E-01	6,52E-01	1,02E+00	**2,20E+01**	3,25E-03	5,24E-01	2,07E+00
Eutrophication Potential - g PO_4^{3-} eq		9,45E+00	1,20E-02	8,79E-02	8,45E-02	1,56E-01	**9,79E+00**	3,56E-03	1,76E-01	3,42E-01
Photochemical Oxidant Formation Potential - g NMVOC eq		5,20E+00	5,58E-02	2,99E-01	5,74E-01	1,18E+00	**7,30E+00**	4,72E-03	4,28E-01	1,08E+00
Abiotic Depletion Potential, elements - g Sb eq		2,65E-03	3,43E-06	2,38E-05	2,19E-05	9,99E-06	**2,71E-03**	9,44E-08	1,08E-05	7,69E-05
Abiotic Depletion Potential, fossil fuels - MJ. net calorific value		8,75E+00	6,32E-01	1,77E+00	4,77E+00	3,21E+00	**1,91E+01**	4,72E-03	1,09E+01	1,08E+01
Water scarcity potential - m^3 eq		1,82E+00	3,30E-03	2,90E-02	3,06E-02	-2,63E-04 [1]	**1,88E+00**	2,15E-04	1,18E-01	1,33E-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) [2]	9,96E-05	0,00E+00	6,49E-04	0,00E+00	0,00E+00	**7,48E-04**	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste disposed (g) [2]	2,46E+00	0,00E+00	1,07E+01	0,00E+00	0,00E+00	**1,32E+01**	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed (g)	3,63E-02	6,99E-02	3,17E-02	1,11E-01	1,55E-03	**2,50E-01**	4,19E-05	1,42E-02	2,20E+00

The biogenic contribution to Global Warming Potential refers only to biogenic methane.
The contribution given by biogenic CO2 is equal to zero, since the absorbed amount is equal to the emitted biogenic CO2 within the reference 100 years period.

[1] *negative value due water flows accounting in the AWARE method used to calculate water scarcity potential. An input of marine salt water is used in the production of fuels for transport process, along with an output of freshwater. However, the former is not considered in the AWARE method, hence highlighting a credit for returning freshwater to nature, but not the impact of withdrawing it in the first place.*
[2] *Zero values indicate that – even if some waste are produced and disposed – their impact is evaluated within the system boundaries.*

16. Environmental performance - U.S.A. for local consumption + export



Cooking environmental performances are referred to pasta consumption in USA.

16. Environmental performance - U.S.A. for local consumption + export

ANGLO-SAXON UNIT OF MEASUREMENT

Durum wheat semolina pasta Food Service 5kg - USA for local consumption and 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	81.2	0.5	1.6	4.0	3.2	90.4 global ft²/lb	0.2	7.7	8.9
CARBON FOOTPRINT	13.7	0.6	1.5	4.9	3.9	24.6 oz CO_2eq/lb	0.2	9.6	10.4
WATER SCARCITY	825	1	13	14	<1	853 litres eq/lb	<1	54	60

Cooking environmental performances are referred to pasta consumption in USA.

17. Differeces versus previous versions of EPD

The differences versus previous EPD versions are due mainly to: updated yields for durum wheat cultivation and updated emission factors for the specific energy mixes.

Moreover, italian production now involves also Muggia pasta plant, so it was included in the analysis.

18. Additional information

REFERENCES

- International EPD Consortium, General Programme Instructions (EPD), ver. 3.01 of 18/09/2019;
- WWF, Global Footprint Network, Zoological Society of London, Living Planet Report 2008, WWF (2008);
- PCR 2010:01; CPC 2371 - PCR for uncooked pasta, not stuffed or otherwise prepared; v. 4.02 2022/04/13;
- 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:

- [x] Yes
- [ ] No

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

BUREAU VERITAS

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

STUDIOFIESCHI & SOCI

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Barilla
The Italian Food Company. Since 1877.

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

LCE

19. 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).