ENVIRONMENTAL PRODUCT DECLARATION

DURUM WHEAT SEMOLINA PASTA

IN PAPERBOX SOLD IN SWEDEN, NORWAY, FINLAND

The first EPD process certified in the Food industries

REGISTRATION NUMBER
S-P-07704

CPC CODE
2731 Uncooked pasta, not stuffed or otherwise prepared
PCR 2010:01 v. 4.0.3
2022/12/22

PUBLICATION DATE
2023/12/18

REVISION
0
(1st edition)

VALID UNTIL
2028/11/21

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 is born in 1877 as a small bread and pasta shop in Parma. The best durum wheat and cutting-edge technologies make it possible to offer pasta that always remains “al dente” and ready-made sauces to millions of people around the world.

Further information on **Barilla** website.

THE PLANT AND THE PROCESS

This Environmental Product Declaration (EPD) is about Barilla durum wheat semolina pasta sold in paperboard box, produced for North Europe market (Sweden, Norway, Finland) in the Barilla's Italian plants of Pedrignano, Foggia, Marcianise, Muggia.
Durum wheat semolina pasta, 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 the drying process that guarantees the conservation.

THE PRODUCTS

Products included in the analysis are Classic semolina pasta cuts (spaghetti, penne, fusilli, etc.); Piccolini (miniatures of classic semolina cuts).
Shape is the only feature differentiating these products, since they are all produced using water and semolina as only ingredients.

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. Piccolini with Veggies; gluten free pasta made with corn and rice; **whole wheat semolina pasta**. Furthermore durum wheat dry pasta not packed in paperboard boxes 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 12.5%. From a nutritional point of view, its main characteristics are (reference product: spaghetti n.5):

NUTRITIONAL INFORMATION (per 100 g)		
Energy	kJ kcal	1 521 359
Fats *of which saturated*	grams	2 *0.5*
Carbohydrates *of which sugars*	grams	70.9 *3.5*
Fibres	grams	3
Proteins	grams	12.8
Salt	grams	0.013

2. BARILLA GROUP

Our story begins in Parma in 1877, when Pietro Barilla opens a small bakery and pasta shop.

Today, after 145 years, our products are eaten by people throughout the day. We have a presence in over 100 countries thanks to our brands, we have become an icon of excellence in the market for pasta, ready-made sauces, baked goods, and crispbread.

Thanks to the 29 production facilities, each year we provide over 2,109,000 tonnes of products to people.

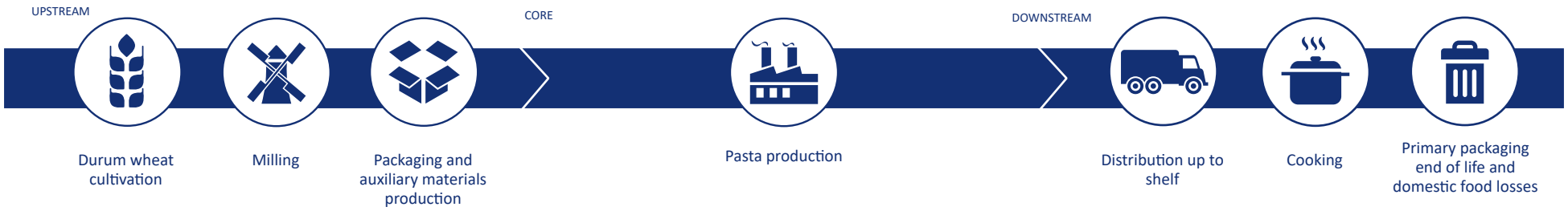
Our Purpose: The joy of food for a better life

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".

It is a commitment from field to fork, to offer people tasty products, made with selected raw materials from responsible supply chains.

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 results are calculated with reference to the **Version 2.0** of the default list of environmental performance indicators, based on **EF 3.1**.
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 **500 g format**, reported to 1 kg of product.

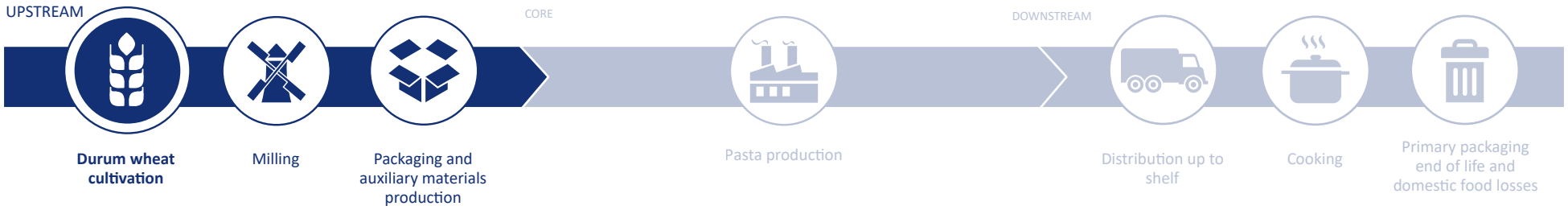
SYSTEM BOUNDARIES

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 corresponds to the distribution area of the product focusing on Northern European markets (Sweden, Norway, Finland).

4. DURUM WHEAT CULTIVATION



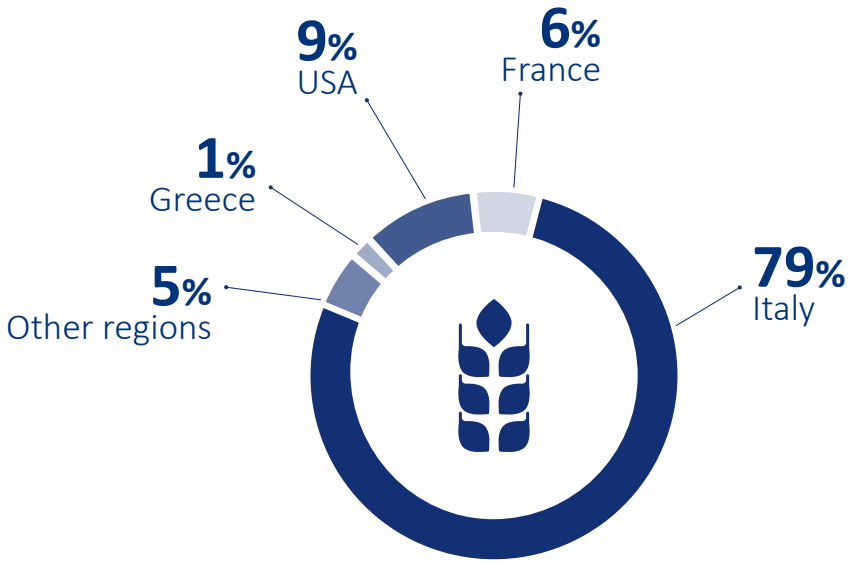
Durum wheat cultivation environmental performances were analysed considering the specific durum wheat origin; 9 different regions were analysed (Italy; France; Greece; Australia; North and South USA; Turkey; Spain; Central East Europa).

Percentages are calculated as average purchased amounts for years 2020, 2021, 2022.

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 (2020, 2021, 2022).

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 57% of Italian wheat** and the **9% of Greek wheat** come from agriculture that meets the standards defined by Barilla Sustainable Farming.*

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

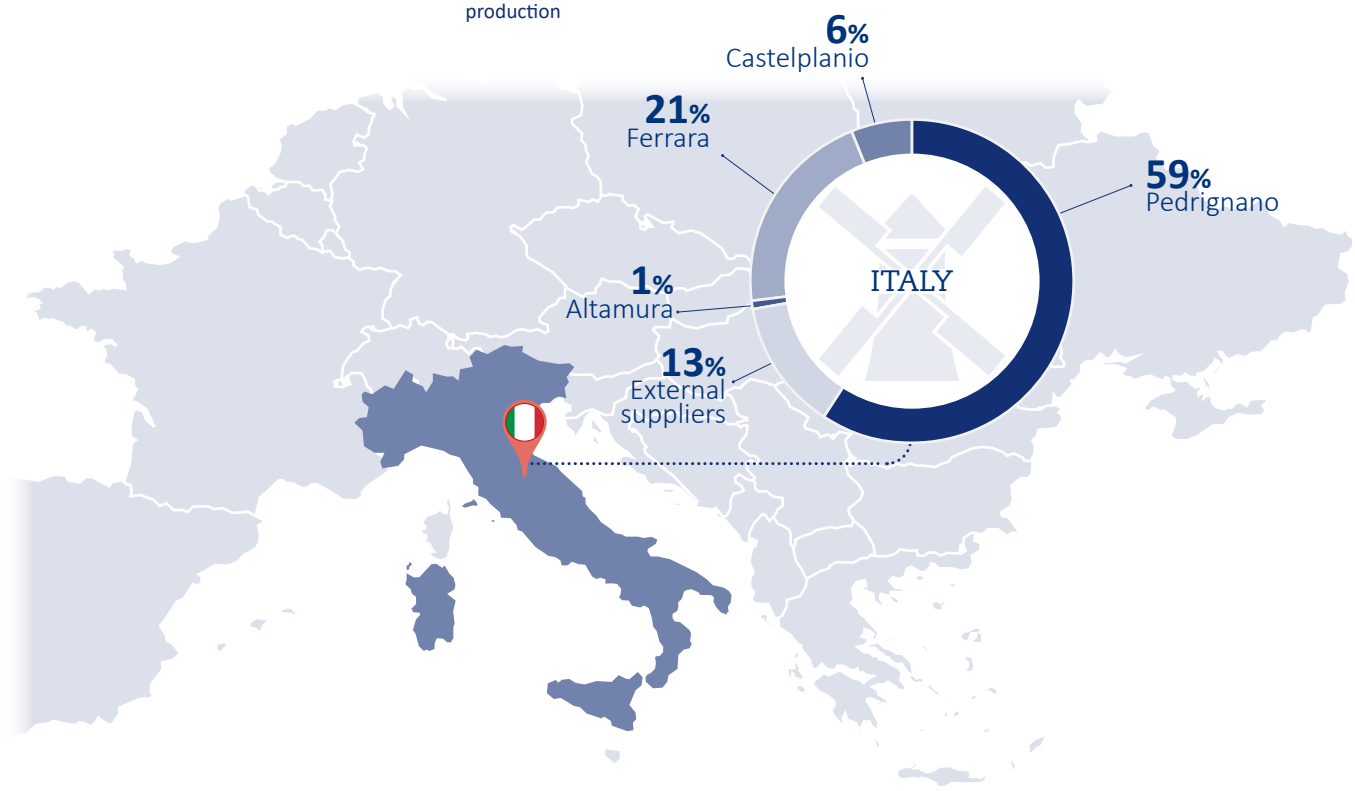
In 2020 Barilla brand launches in Italy its first pasta produced with 100% Italian durum wheat: this result is possible thanks to farmers ' engagement and the increasingly widespread application of responsible agricultural practices.
For more information, visit the dedicated page on Barilla website.

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 process environmental performances were calculated considering energy and water consumption for each Barilla property mill: Pedrignano, Altamura, Ferrara and Castelplanio in Italy.

Primary data (2022 year) are used for water and energy consumption ad waste production. Secondary data, mainly from Ecoinvent database, are used for water and energy supply.

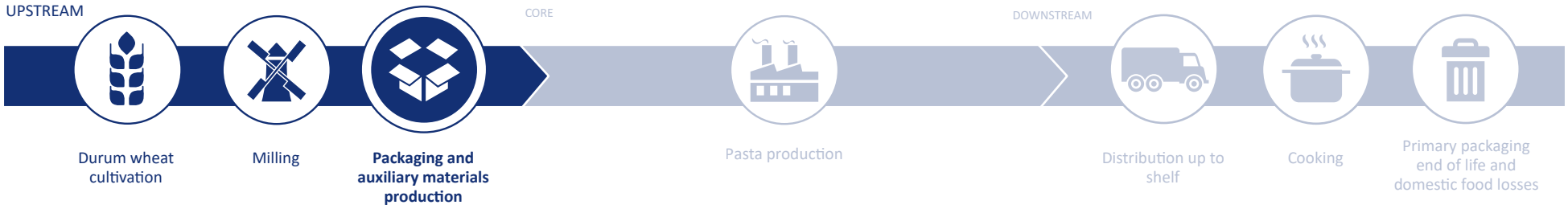
Environmental performance on non property mill were evaluated considering property Barilla mill data average.

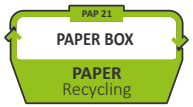
Environmental performances related to durum wheat transport from field to mill were evaluated by means of specific hypothesis for every production area. Secondary data, mainly from Ecoinvent database, are used for transport means.

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 2022.

6. PACKAGING AND AUXILIARY MATERIALS PRODUCTION





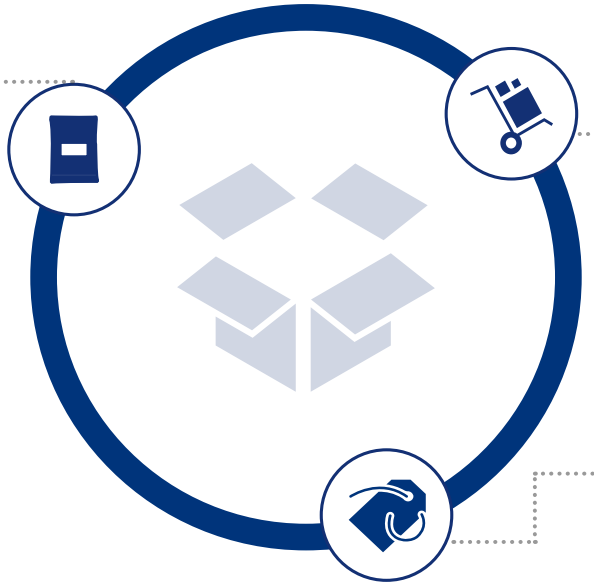
Since 2004, Barilla designs new packaging with the"LCA packaging design tool". It allows the assessment of the environmental impacts of the packaging solutions already during the design phase.

PRIMARY PACKAGING

Packaging environmental performances are calculated considering the 500g format (the most conservative format) and are reported per packaging used for 1 kg of product.

The primary packaging consists in a paperboard box. The window (present in past versions) has been removed.

Primary data (from packaging unit, reference year 2022) 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.

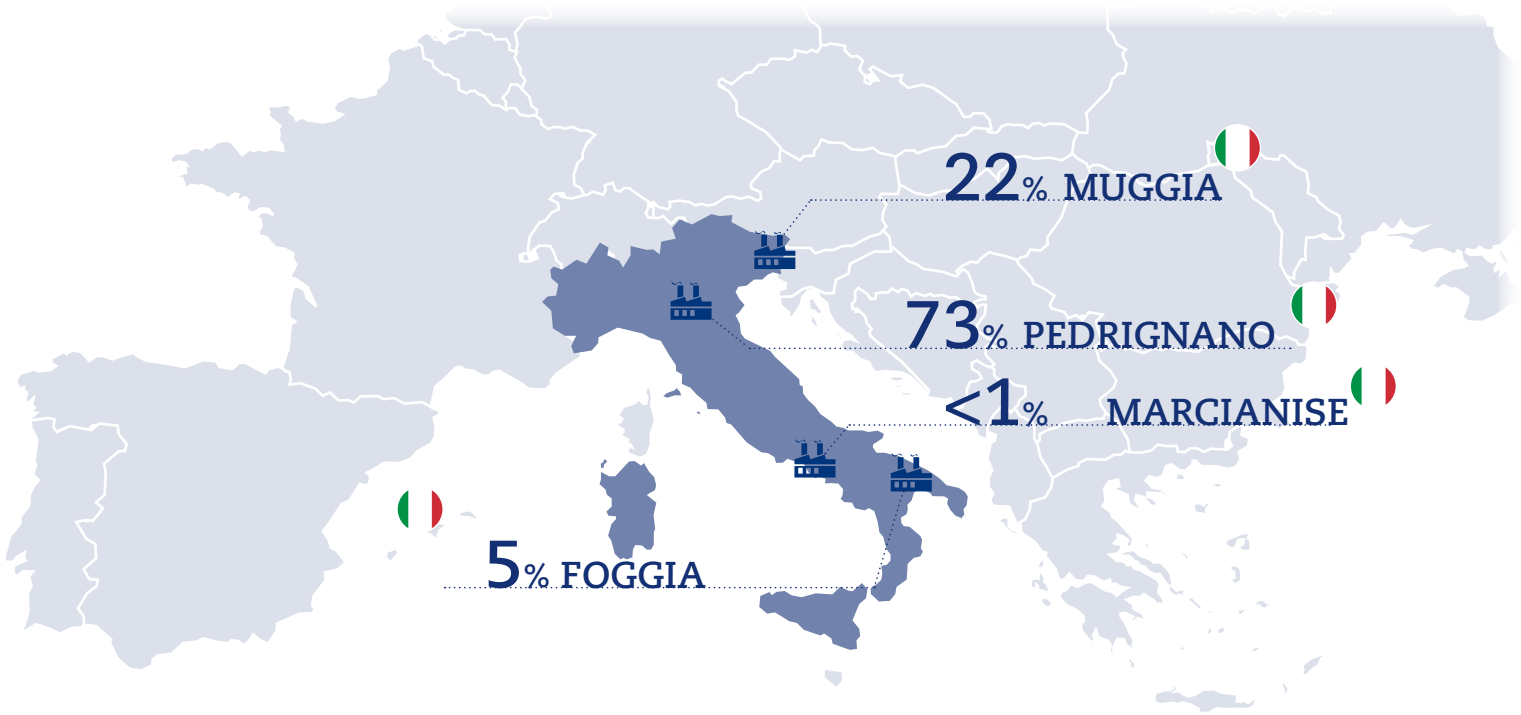
PACKAGING FOR DISTRIBUTION

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 cardboard carton.
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 2022 year.
Secodary 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 plants owned by Barilla where durum wheat pasta for Norther European countries is produced: Pedrignano, Marcianise, Foggia and Muggia in Italy.

Performances are calculated weighting each plant on the pasta production basis.

Data refer to 2022 year.

7. PASTA PRODUCTION

GENERAL INFORMATION

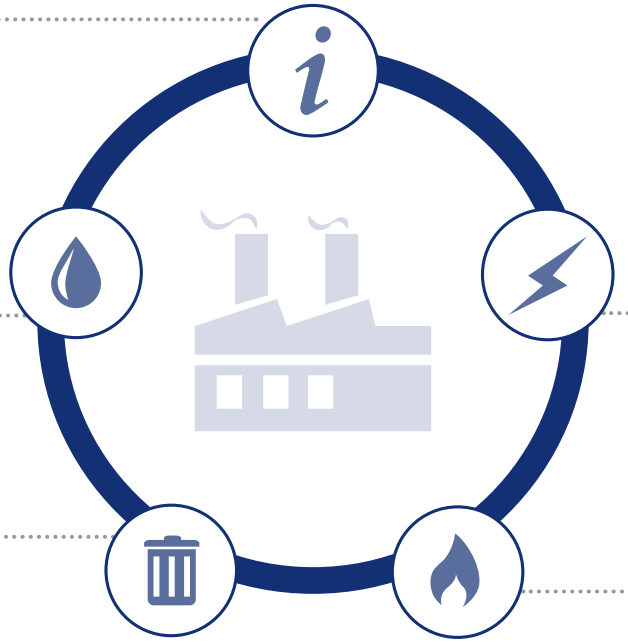
The environmental performances related to the production process are evaluated considering primary data for energy and water consumption and the waste production. Secondary data (mainly Ecoinvent) are used for the environmental aspects related to the production of energy and water.
Data are referred to year 2022.

WATER

The water consumption is evaluated using primary data. The overall value is attributed to the product using the mass allocation procedure.

WASTE

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



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

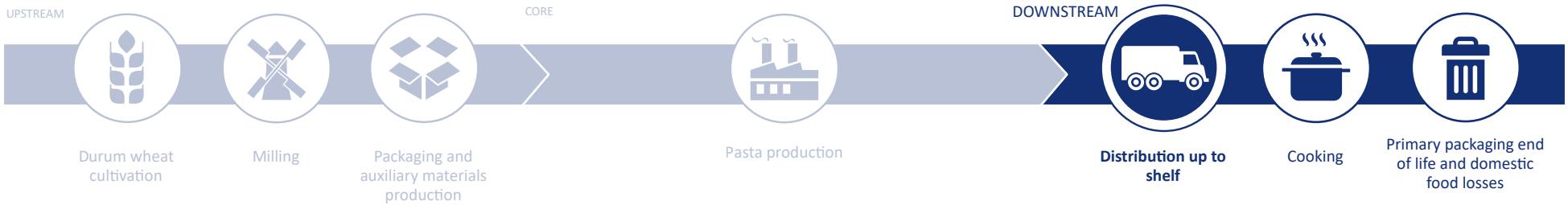
ELECTRICITY

Total plant electricity has been divided using mass allocation. Electricity production is referred to specific plant energy mix. Electric energy production is related to specific country mix for year 2022 and to trigenerators and cogenerators, where present.

NATURAL GAS

The natural gas consumption is evaluated using primary data. The overall value is attributed to the product using the mass allocation procedure.

8. DISTRIBUTION



Distribution in NORTHERN EUROPEAN COUNTRIES

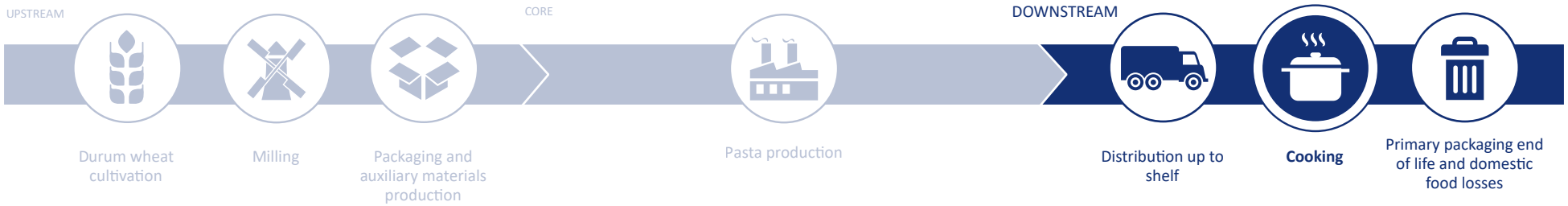
2 242 km

Distribution environmental performances are calculated using primary data for distances, covered almost totally by truck.
Data refer to 2022.

Secondary data (Ecoinvent database) were used for transport means. Pasta does not need any particular storage condition (such as refrigeration) during distribution.

Impacts related to transport packaging end of life are calculated considering the end of life scenario for paper, paperboard and plastic in the three analysed countries (reference: Eurostat 2022).

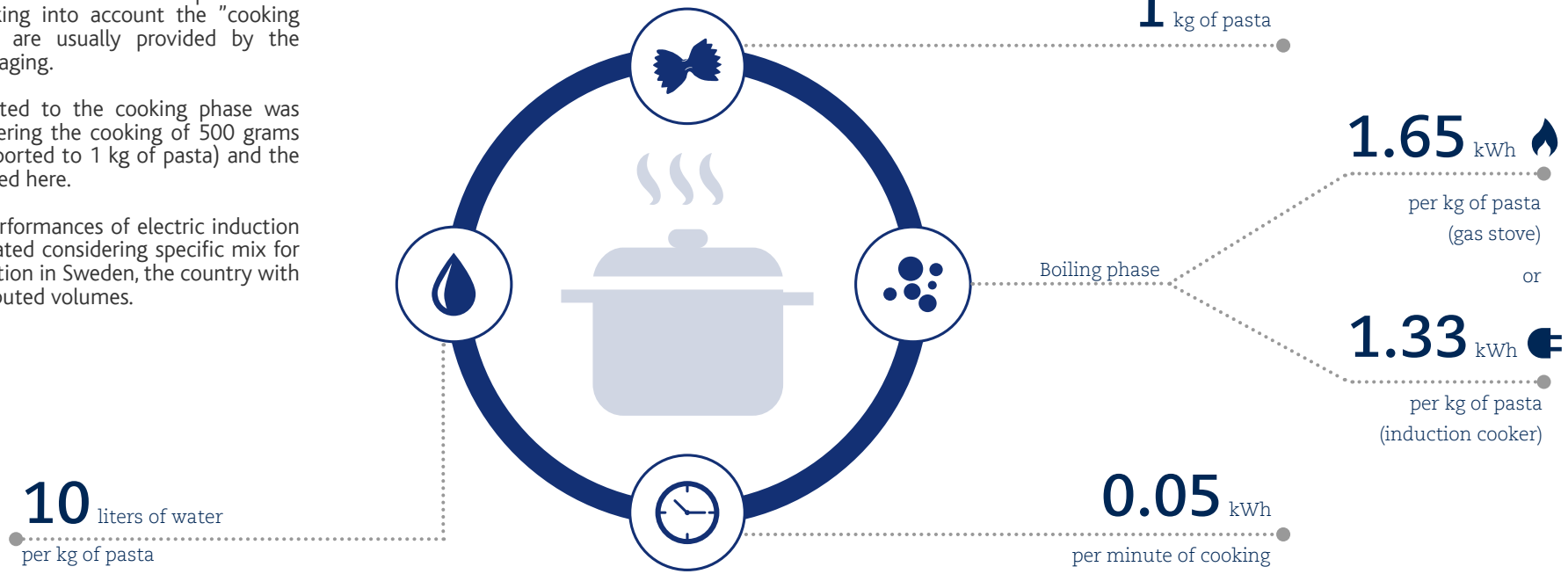
9. COOKING



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 was estimated considering the cooking of 500 grams of pasta (then reported to 1 kg of pasta) and the hypothesis reported here.

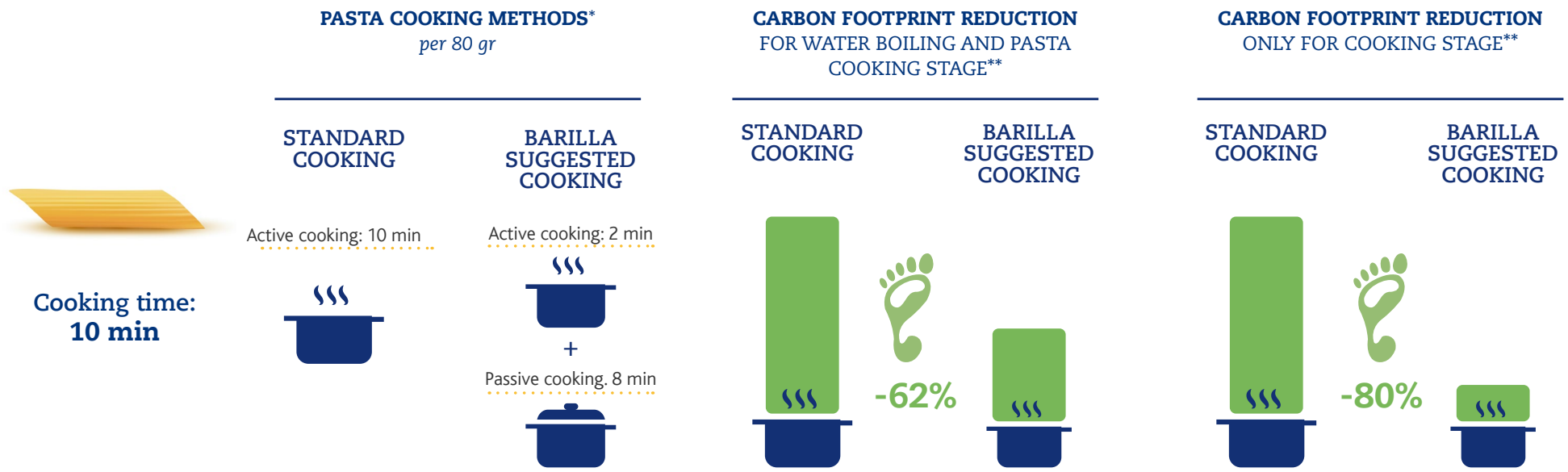
Environmental performances of electric induction cooker are calculated considering specific mix for electricity production in Sweden, the country with the highest distributed volumes.



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:

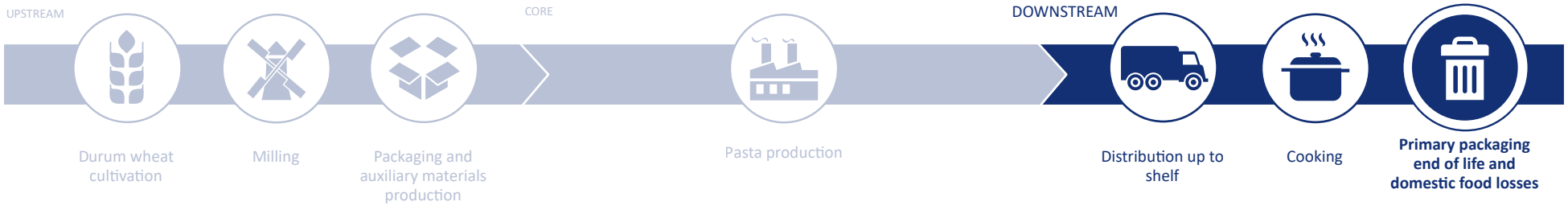


Barilla-suggested cooking method does not affect the organoleptic properties of the product but it requires more attention during the cooking phase: pay attention that pasta is completely submerged into water and mix it regularly during cooking.

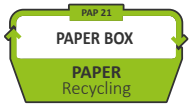
*Cooking proportion is the following: 1l water x 100gr of pasta.

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

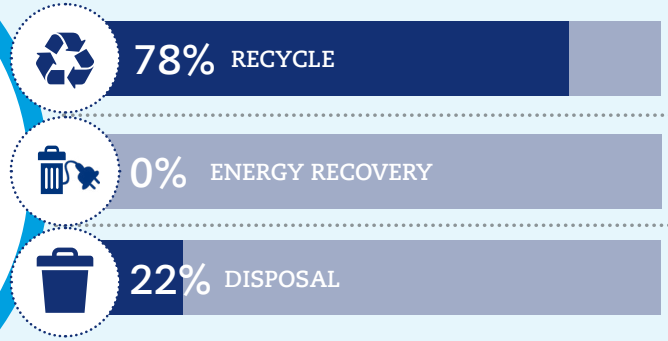
10. PRIMARY PACKAGING END OF LIFE AND DOMESTIC FOOD LOSSES



Impacts related to primary packaging end of life are calculated considering the end of life scenario for paper and paperboard in the three analysed countries.
Data reported here are referred to packaging end of life scenario in Sweden because here was distributed 75% of product volumes in 2022. However the scenario considered in calculation included also data about Norway and Finland (Reference: Eurostat database 2021).



SWEDEN



DOMESTIC FOOD LOSSES

The impacts related to domestic food waste 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

USE OF RESOURCES data referred to 1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	UTILISATION		
		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	1,00E-01	3,67E-02	4,04E+00	3,00E-02	1,39E-02	**4,22E+00**	3,56E-04	1,02E-01	3,41E+00
	Used as raw materials[1]	0,00E+00	0,00E+00	1,18E+00	0,00E+00	0,00E+00	**1,18E+00**	0,00E+00	0,00E+00	0,00E+00
	Total	**1,00E-01**	**3,67E-02**	**5,22E+00**	**3,00E-02**	**1,39E-02**	**5,40E+00**	**3,56E-04**	**1,02E-01**	**3,41E+00**
PRIMARY ENERGY RESOURCES - NON RENEWABLE data in MJ	Used as energy carrier	5,40E+00	6,54E-01	2,25E+00	4,07E+00	5,22E+00	**1,76E+01**	7,80E-03	1,13E+01	2,79E+01
	Used as raw materials	0,00E+00	1,03E-03	3,45E-02	0,00E+00	0,00E+00	**3,55E-02**	0,00E+00	0,00E+00	0,00E+00
	Total	**5,40E+00**	**6,55E-01**	**2,29E+00**	**4,07E+00**	**5,22E+00**	**1,76E+01**	**7,80E-03**	**1,13E+01**	**2,79E+01**

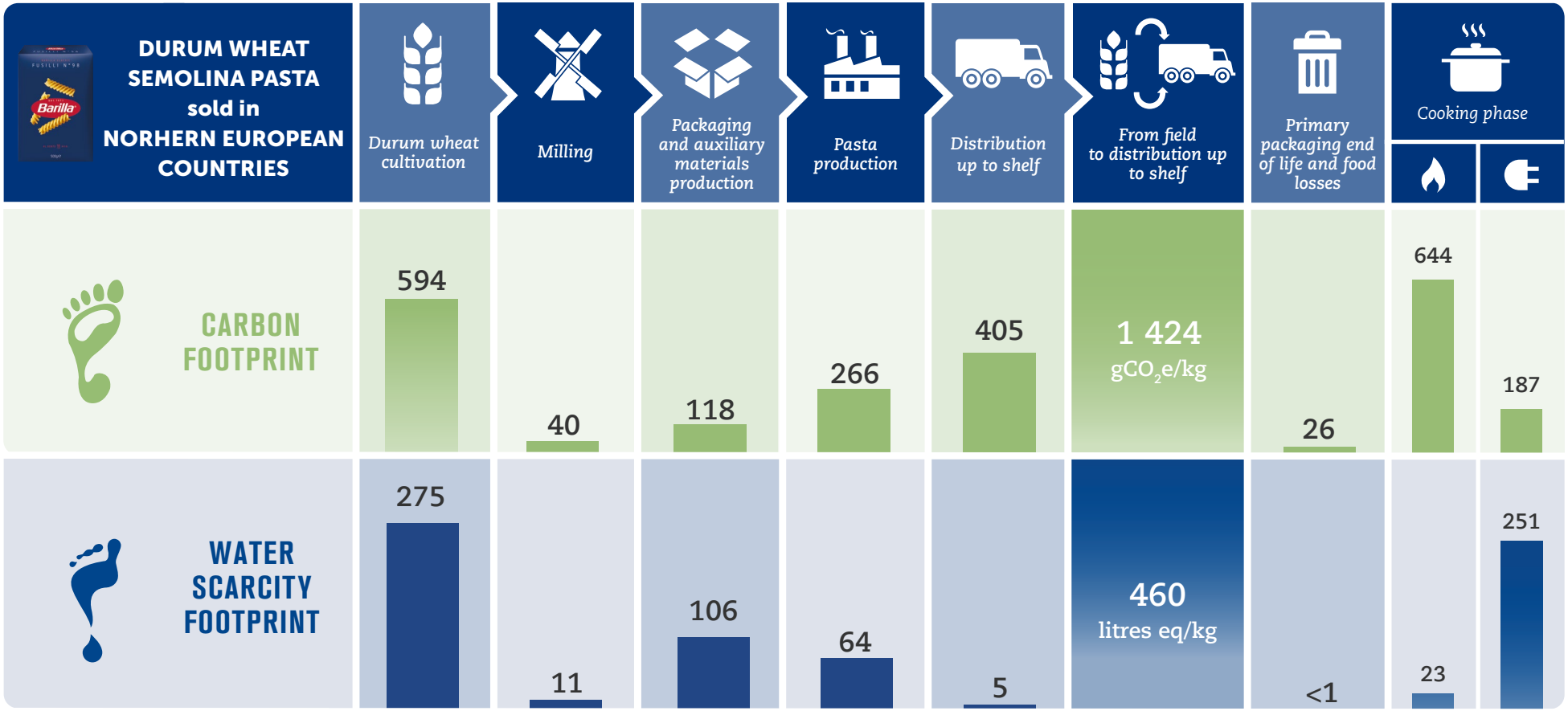
(1)The biomasses transformed into the product are not considered.

11. ENVIRONMENTAL RESULTS

POTENTIAL ENVIRONMENTAL IMPACTS data referred to 1 kg of product		UPSTREAM			CORE	DOWNSTREAM	TOTAL	UTILISATION		
		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 ($g\ CO_2\ e$)	Fossil	5,94E+02	3,97E+01	1,17E+02	2,64E+02	3,86E+02	**1,40E+03**	3,35E+00	6,44E+02	1,87E+02
	Biogenic [2]	1,07E-01	1,37E-02	1,26E-01	1,86E+00	1,88E+01	**2,09E+01**	2,27E+01	2,36E-01	3,99E-01
	Land use and land use change	3,54E-01	1,84E-03	1,57E+00	4,65E-03	7,96E-03	**1,94E+00**	4,00E-04	6,16E-02	2,02E-01
	Total	**5,94E+02**	**3,97E+01**	**1,18E+02**	**2,66E+02**	**4,05E+02**	**1,42E+03**	**2,60E+01**	**6,44E+02**	**1,87E+02**
Acidification potential - mol H+ eq.		5,97E+00	7,00E-02	4,66E-01	2,89E-01	1,42E+00	**8,22E+00**	5,86E-03	4,06E-01	1,13E+00
Eutrophication potential. aquatic freshwater - g P eq.		3,82E-01	3,19E-04	2,89E-02	8,82E-04	3,65E-04	**4,12E-01**	4,39E-05	1,12E-02	1,62E-02
Eutrophication potential. aquatic marine - g N eq.		1,06E+01	1,40E-02	8,80E-02	1,04E-01	6,37E-01	**1,14E+01**	2,89E-02	3,41E-01	4,82E-01
Eutrophication potential. terrestrial - mol N eq.		2,12E+01	1,55E-01	8,04E-01	1,01E+00	6,55E+00	**2,97E+01**	1,95E-02	1,62E+00	3,69E+00
Photochemical ozone creation potential - g NMVOC eq.		4,09E+00	9,52E-02	2,73E-01	6,46E-01	2,18E+00	**7,28E+00**	1,31E-02	4,85E-01	9,08E-01
Ozone depletion potential - g CFC 11 eq.		2,43E-05	9,55E-07	2,06E-06	6,75E-06	8,39E-06	**4,25E-05**	1,60E-08	7,64E-05	5,54E-06
Abiotic depletion potential for minerals and metals [3] - g Sb eq.		8,09E-05	3,61E-07	1,48E-05	2,42E-06	1,34E-05	**1,12E-04**	9,48E-08	1,35E-05	9,27E-05
Abiotic depletion potential for fossil resources [3] - MJ net calorific value		5,07E+00	5,72E-01	2,09E+00	3,60E+00	5,16E+00	**1,65E+01**	6,86E-03	1,00E+01	2,77E+01
Water deprivation potential [3] - m^3 world eq. deprived		2,75E-01	1,09E-02	1,06E-01	6,39E-02	4,84E-03	**4,60E-01**	3,66E-04	2,27E-02	2,51E-01

(2) 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.
(3) The results of this environmental impact indicator shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.

11. ENVIRONMENTAL RESULTS



The results of indicator "Water Deprivation Potential" are reported here as "Water Scarcity Footprint"

12. REFERENCES

- International EPD Consortium, General Programme Instructions (EPD), ver. 3.01 of 18/09/2019;
- PCR 2010:01; CPC 2371 - PCR for uncooked pasta, not stuffed or otherwise prepared; v. 4.0.3 22/12/2022;
- Eurostat database for waste management, latest version (2021).

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: **CCPB SRL Viale Masini 36, 40126 Bologna. Accredited by: Accredia**

ccpb Controllo e Certificazione

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

STUDIOFIESCHI & SOCI

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:
Luca Ruini - luca.ruini@barilla.com

Barilla
The Italian Food Company. Since 1877.

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

LCE

Barilla
The Italian Food Company. Since 1877.

13. GLOSSARY

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_2e). In agriculture a significant contribution is given by the emission of nitrous oxide (N_2O) due to the fertilizers use. It is also known as Global Warming Potential (GWP).

www.ipcc.ch

WATER DEPRIVATION POTENTIAL

Water deprivation 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 POTENTIAL (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.

EUTROPHICATION POTENTIAL (EP)

It is an abnormal proliferation of vegetation in the aquatic ecosystems caused by the addition of nutrients into rivers, lakes or marine water, which determinates a lack of oxygen. The eutrophication potential is mainly influenced by emission into water of phosphates and nitrates.

OZONE DEPLETION POTENTIAL (ODP)

Degradation of the stratospheric layer of the ozone involved in blocking the UV component of sunrays. Depletion is due to particularly reactive components that originate from chlorofluorocarbon (CFC) or chlorofluoromethanes (CFM). The substance employed as benchmark measure for OPD is trichlorofluoromethane, or CFC-11.

PHOTOCHEMICAL OZONE CREATION POTENTIAL (POCP)

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 VOCs equivalent (g NMVOC - equivalent).