Environmental Product Declaration

In accordance with ISO 14025 for:

Double sided microfiber cloth for daily maintenance, sanitizing and cleaning of domestic, hospital and industrial surfaces

Cle.Pr.In. S.r.l.

Programme:	The International EPD® System www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-01204
Publication date:	2018-01-19
Validity date:	2021-01-11
Geographical scope:	*International*

Summary

1. Company's description

Started in 1991, Cle.Pr.In. S.r.l. has its headquarters in Carinola (CE) in the futuristic plant covering more than 10.000m^2. Cle.Pr.In. is an Italian leader in the production of detergents for professional use. Its main target market focuses on Italy, and is now expanding in Europe and North Africa as well. Cle.Pr.In. is a chemical industry that makes use of advanced technologies for the production of detergents, with an operational capacity of more than 200 tons per day.

Cle.Pr.In. consists of:

- An innovative Production Plant managed by following an Industry 4.0 philosophy, which tends to a Circular Economy, and that is constituted by 10 Mixers (with a 25.000kg capacity for large volume manufactures up to 3.000kg for specialized products), packaging lines dedicated for each product family type.
- A modern QC – R&D Lab carrying out regular and accurate checks on the whole formulation range, in accordance with the Quality System certified procedures, and dealing with the development of new formulations, equipped with men and tools able to provide appropriate solutions for each specific requirement.
- A super-equipped Mechanical Workshop, able to support the industrialization demands related to new production processes and to ensure effective interventions of ordinary and extraordinary maintenance.
- An equipped Logistic Warehouse, fitted out with modern and adequate shelving systems, forklift trucks and unloading ramp, run by means of an efficient software able to ensure always on-time delivery.
- Offices of over 300 m^2 which accommodate our commercial and managerial staff.
- A large Training Room which can accommodate 30 people, and where we offered technical, training our clients are offered periodic in-depth meetings, technical courses, training courses intended to the sales force and other topics.

Cle.Pr.In. believes that the client consent can be reached and maintained by ensuring quality products, through the commitment in understanding the users' daily needs, by offering a fair price, which could be affordable and coherent at the same time, providing a good service, a clear and truthful information, using creativity, showing dedication but, above all, expressing the will to experiment with new solutions.

Cle.Pr.In. is supported by important collaborations such as the one held with the University of Salerno, with regard to an ongoing research; and that with the prestigious Aedes Society of Rome, concerning consulting services, chemical and environmental analysis.

The company's quality control makes sure that each single stage of the production process responds to the directives carried in the Quality Control Manual. For this reason, the entire productive process is certified by the Company Quality Management System UNI EN ISO 9001-2008, ISO 14001:2004, BS OHSAS 28002:2007, certificate SA 1503 rev. 00, Legality rating. Table 1 reported below collects all the certificates obtained by the company.

Table 1: Certificates and validity.

Certificate	Validity
UNI EN ISO 9001:2008	28 June 2019
UNI EN ISO 14001:2004	28 June 2019
BS OHSAS 28002:2007	28 June 2019
Certificate SA 1503 rev.00	12 March 2018
Legality rating	-

Cle.Pr.In. recognizes the need to commit itself to protecting the environment and its ecosystems by the use of natural resources (such as surface-active agents, water, etc.) and renewable energy (certificate No 000.330.251/16 released by NWG Energia Srl) in a careful and responsible way in order to minimize or avoid the environmental impacts. In addition, since several years Cle.Pr.In. has started a successful campaign to mitigate its CO_2 emissions by planting threes which can fight climate change and promote a lower carbon industry.

More information can be found at http://www.cleprin.it/en/company/company.asp.

2. Products' description

FAST products are double sided microfiber nonwoven wipes for daily maintenance, sanitizing and cleaning of domestic, hospital and industrial surfaces. They are designed for floors, bathrooms, parquets and other specific surfaces (e.g. glass, mirrors, plastic-rolled, writing desks, benches, steel surfaces, telephones, computers, etc.). Eight products are included in this certificate. All of them have the same CPC code (27922) and function; they may differ in terms of size and detergent composition (it depends on purposes).

The production process starts with the raw materials supplying (e.g. polyester/viscose wipes, all the chemicals auxiliaries and package units) and their storage in the site's warehouse. Then, the formulation of the detergent/sanitizer mixture is carried out by the R&D internal experts. Together with researchers from University of Salerno (Chemistry and Biology Department), the team has developed this innovative and concentrated formulation in order to minimize the environmental burdens and reduce resources consumption. A strong and severe quality control of all the physical and chemical parameters is performed to monitoring pH, refraction, dry weight, viscosity, etc.

Completed all the testing required for commercialization, the deposition of the mixture on wipes is performed. Then, after printing the polypropylene (PP) labels, the assembling procedure is carried out and the final products are packaged and stored in warehouse, ready to be sold. Only renewable electric energy was used by Cle.Pr.In. in its plant for the year of production (certificate No 000.330.251/16 released by NWG Energia Srl). Below, section 3 reports a detailed scheme of the production process for the nonwoven wipes made by Cle.Pr.In. (**Errore. L'origine riferimento non è stata trovata.**).

All products are manufactured in Italy. The 2016 production was carried out in the plant located in Strada Provinciale Campofelice 21, 81030 Casamare Sessa Aurunca (Caserta district). From 2017 the production was started in the new plant located in Strada Statale Appia km 177,700, 81030 Carinola (Caserta district).

As described above, Cle.Pr.In. provides different solutions aimed for the cleaning and sanitization of private, public, hospital and industrial environments.

They are all throwaway products designed for a unique usage. In particular, this aspect is essential in the case of hospital application, since the wipes' characteristics are designed to avoid cross-contamination between different environments (e.g. surgery and ward). In addition, to guarantee a low impact on environment, all the FAST products fit requirements of DM 262/2016 provided by the Italian regulation on Green Public Procurement.

Table 2 reported below collects all the required data suitable for the EPD® certificate.

Table 2: Product's characteristics

Application Area	Wall applications
Products specification COMMERCIAL NAME, average wipes dimension (cm^2), average wipes weight per area (kg/cm^2), average weight (kg/package), average n° of wipes per pack	• FAST SANNY FEN, 540cm^2; 2.5E-5 kg/cm^2, 1.31kg/package, 100; • FAST SANNY, 660cm^2, 5.0E-4 kg/cm^2, 0.77kg/package, 60; • FAST IPO 52, 978cm^2, 7.0E-4 kg/cm^2, 1.02kg/package, 75; • FAST SMART, 660cm^2, 2.4E-4 kg/cm^2, 0.37kg/package, 40; • FAST FLOOR FEN, 1320cm^2, 6.6E-5 kg/cm^2, 2.04kg/package, 50; • FAST FLOOR SANIT HCS, 1320cm^2, 1.1E-3 kg/cm^2, 1.95kg/package, 50; • FAST KALK, 540cm^2, 4.9E-5 kg/cm^2,1.33kg/package, 100; • FAST KALK FEN, 720cm^2, 4.7E-4 kg/cm^2, 1.00kg/package, 75.
Declared unit	1 cm^2 of nonwoven wipe
Functional unit	1 wipe
Time period under review	2016
Geographical Coverage	International

The EPD® declaration was accomplished in accordance with ISO 14025:2006 (Environmental labels and declarations - Type III environmental declarations - Principles and procedures) [1]. The Life Cycle Assessment (LCA) analysis was performed according to the Product Category Rules (PCR) for Nonwoven wipes (UN CPC code 27922 Version 1.0, dated 2016-11-01) [2], developed in the framework of the International EPD® System [3].

In accordance with PCR[2] and General Programme Instructions (GPI) [4], this EPD® certificate is a systematic and comprehensive summary of the project documentation already verified by an external verifier recognized by the International EPD® System [3]. The main goal of this certificate is to provide data for a business-to-business and business-to-consumer communication.

The term EPD® refers to a third-type voluntary label, based on the application of the LCA methodology, aimed to evaluate the environmental performances of products and services subject to certification. It represents an international tool to improve communications among the parts of the entire product chain (producers, suppliers and consumers) and pursue the principles of green e circular economy. In general, EPDs within the same product category but from different programmes may not be comparable.

3. LCA description: methodology, system boundaries, scope and assumptions

LCA is a standardized methodology, according with EN ISO 14040-14044 [5-6], able to predict potential environmental impacts of products, processes and systems in the whole life cycle. It is structured in four conceptual phases, such as the Goal and Scope definition, Life Cycle Inventory (LCI), Life Cycle Impact Assessment (LCIA) and the results Interpretation.

The life cycle thinking is a key concept to assess the environmental sustainability and to identify the main criticalities within the entire production chain. LCA is also considered a valuable tool to analyse the performances of two or more products, and provide a standardized evaluation based on accredited approach and results. For all these reasons, the LCA methodology is required to achieve the EPD® certificate in accordance with ISO [1].

This certificate and the project report (revised by an external verifier) were compiled by EMC Innovation Lab S.r.l. an innovative company working in the fields of the environmental consulting and research. This document collects all the information necessary to achieve the EPD® certification for the selected products.

3.1. System boundaries

The Goal and Scope definition is the first stage of a common LCA, in which the system boundaries and the reference unit should be explicated declared. In this study, a "*cradle-to-gate with options*" approach was applied. The term *cradle-to-gate with options* was used since in line with PCR FOR CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES (EN 15804), MULTIPLE UN CPC CODES, VERSION 2.2, 2012:01 [7]. It refers to LCA studies which boundaries are expanded beyond the company gate by including the End of Life (EoL) stage. In fact, to be more conservative, transportation to the recovery facilities and the requirements in terms of energy and mass are included in the LCA model. **Errore. L'origine riferimento non è stata trovata.** describes in detail the system boundaries considered in the study.

The analysis includes all the stages required by the specific PCR[2]: Upstream processes, *Core processes* and *Downstream processes*. Table 3 shows the life stages included in the LCA evaluation and phases voluntary excluded since not relevant.

In this case, the functional unit is 1 wipe, since it represents the main function of the system (clean surfaces). However, in accordance with PCR[2] and General Programme Instructions (GPI) [4], for EPDs not covering a full life cycle the concept of functional unit is transferred into a so-called declared unit, which is defined as a quantity of a product for use as a reference unit for an environmental declaration based on an information module. In this study was chosen 1cm^2 of wipe as declared unit, to model and analyse the data.

Table 3: Description of the system boundaries

GPI module	Asset life cycle stages	Inclusion in the EPD®
Upstream processes	Extraction and refinement of natural resources (e.g. water)	✓
	Production and extraction of raw material (polymers, fibers, etc.)	✓
	Production of auxiliary products (disinfectant, surfactants, biocides, dyes, fragrances, etc.)	✓
	Production processes for the energy ware used in the upstream processes (e.g. electricity and fuels)	✓
	Manufacturing of primary and secondary packaging	✓
Core processes	External transportation to the core processes	✓
	Conversion of nonwoven in wet wipes (impregnation with detergent and assembling)	✓ no data concerning the energy requirements for the production of wipes were available
	Production processes for the energy ware used in the core processes	✓
	Waste treatment of waste generated during manufacturing	not included since not produced during assembling (conversion of nonwoven in wet wipes)
Downstream processes	Transportation from manufacturing site to an average retailer/distribution platform	✓
	Usage stage	the use phase is not relevant since the products are typical single use
	Transportation after usage to average final disposal treatment	✓
	Waste management of used products	✓
	Waste management of packaging	✓

The LCA analysis was carried out by the use of SimaPro [8], a licensed LCA software, and the Ecoinvent database (v.3.3) [9]. The latter was selected as reference library to fill all the background data concerning the processes (e.g. feedstock and resources extraction, etc.) and services (e.g. transportation, electricity, etc.) of the upstream/core and downstream stages. In accordance with PCR and General Programme Instructions (GPI) [4**Errore. L'origine riferimento non è stata trovata.**], E coinvent database is recognized by the International EPD System as one of the reference libraries to be used to cover the "generic data" for Europe.

Figure 1: Company system boundaries and manufacturing process for FAST wipes

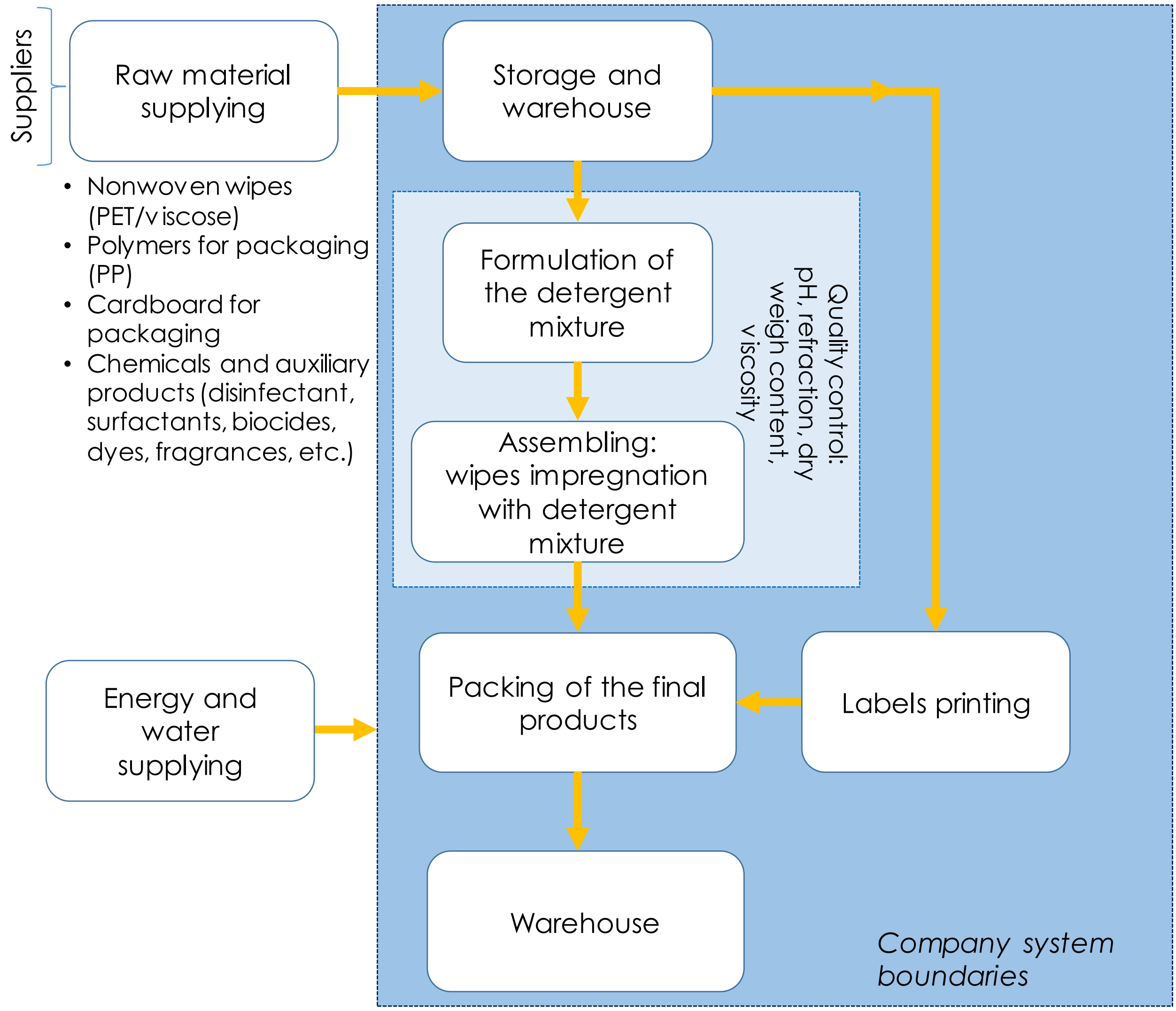
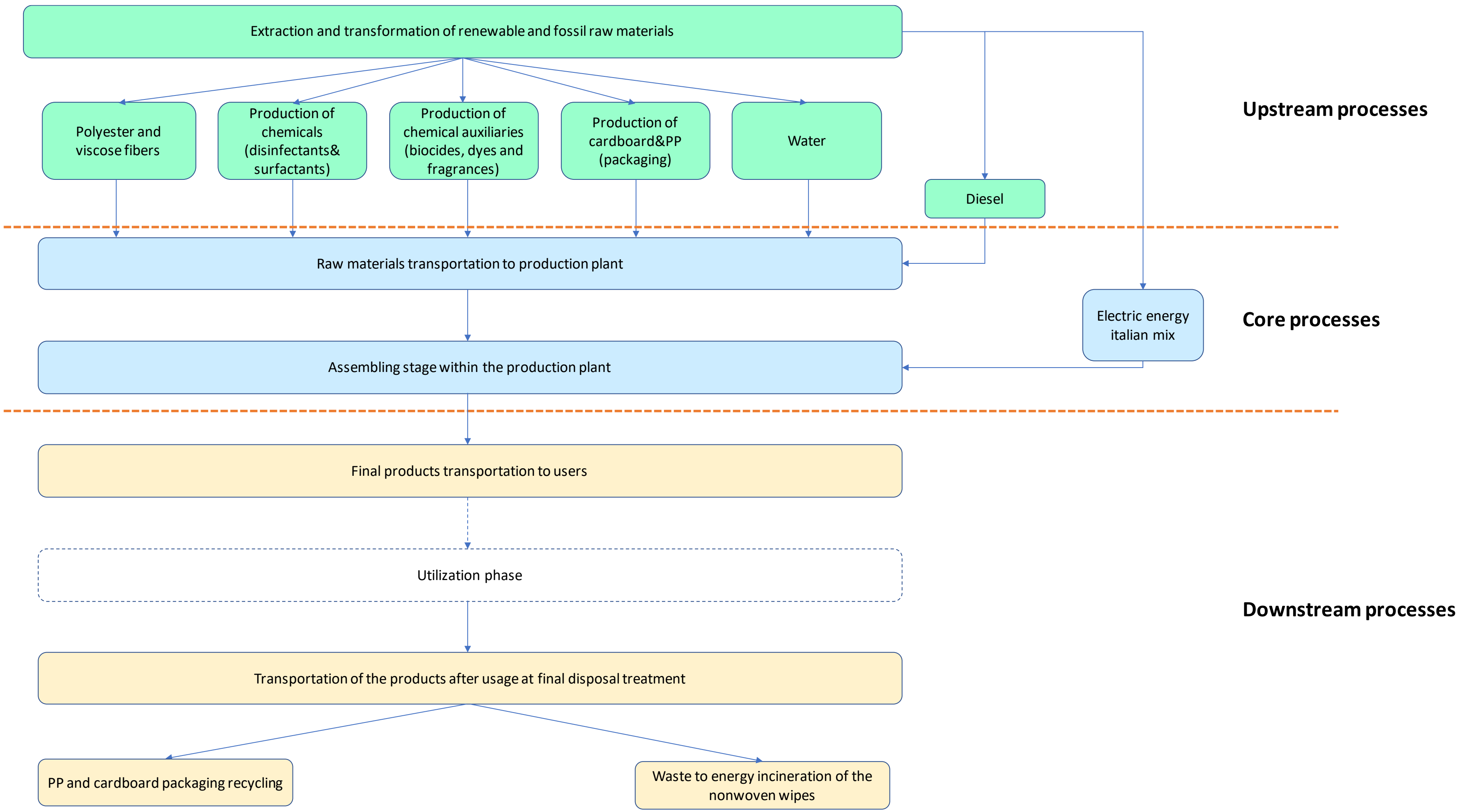


Figure 2: System boundaries of the LCA study as requested by PCR



3.2. Life cycle inventory

In LCI step data should be collected from several sources and then modelled to fit the LCA scenarios. In general, higher is the quality of the input information and more reliable are the final results (LCIA stage). For this reason, only **specific data** (primary data)**,** directly provided by the company for the year 2016, were used in order to simulate the upstream (in terms of quantity and type of raw materials needed) and core processes (manufacturing and assembling phases). They were collected from the actual manufacturing plant. In addition, all the background data taken from library (see above) are less than 5 years old (as requested by PCR[2]). On the other hand, in order to complete all the life cycle stages outside the company **average secondary data** and some assumptions were necessary. For example, in the case of downstream processes, only secondary data and average estimates were adopted to simulate the EoL stage (including transportation).

The whole life cycle inventory (per declared unit of 1cm^2) for all the FAST products analysed is not included in this certificate, due to the degree of confidentiality. However, it was already reported in the project report and could be disposable for consultation. In the next paragraphs a detailed description of each stage will be reported. In line with PCR[2], the three life-cycle stages above mentioned are reported separately.

3.2.1. Upstream processes

As shown above, this step includes all the stages outside the plant boundaries and which occur before the production of wet wipes take place. Among these, all the raw material extraction and refinement to produce the final products ready to be used in the formulation (e.g. polyester, viscose, chemical auxiliaries, disinfectants, surfactants, biocides, dyes, fragrances, fuels, water, etc.). In addition, raw materials for packaging (polypropylene and corrugated cardboard) were also included. Primary data to fill the inventory were extrapolated from a dedicated internal database which tracks the entire manufacturing process: from the resources and utilities acquirement up to commercialization. Unfortunately, no data concerning the energy requirements for the production of wipes were available. Therefore, the model only considers the materials adopted in the final product to obtain the nonwoven wipes (polyester and viscose). Cle.Pr.In. has made available a set of specific reports that mark each input and output flow which enters or leaves the factory boundaries. The LCI stage was completed by EMC operators with the supervision of internal experts. As depicted in **Errore. L'origine riferimento non è stata trovata.**, the core process does not include any particular production step except the formulation of the detergent/disinfectant mixture. Therefore, it could be considered more as an assembling rather than a production process.

The LCIs flows are quite similar from product to product. Some changes are detected in the products and amount per cm^2 since wipes have different final uses (detergent, disinfection) and application (industrial, domestic, sanitary surfaces).

As depicted below, wipes are made for the 70% of mass in polyester (polyethylene terephthalate – PET) and the rest 30% in viscose. They have different size range from 540 up to 1320 cm^2.

The majority of chemicals and auxiliaries used in the formulation are reported in software library [7] and they represent almost 99% of the gross wipes weight (as requested by PCR[2]). However, when the chemical sector is under study it is really hard to simulate each substance flow and some assumptions are necessary. Assumptions are normal in LCA evaluation and necessary to complete the study, since libraries used to fill the inventory could not cover the entire list of products and materials. Nevertheless, EPD certificate as well as each LCA study accept assumptions, provided that they are declared and motivated. In the case of chemical substances, for example, a lot of new formulations are released each year on market. This represents the main criticality. In fact, it is not possible to update libraries with such frequency, due to corporate knowhow and data unavailability. Therefore, in order to not neglect such impacts all the raw material streams (except ink, an antifoam and an emulsion) were included in the simulation by using some assumptions to fill the data gap. In particular, it was necessary to adopt proxy data. Table 4 collects the main assumptions made by using proxy data (information are limited due to the degree of confidentiality). For example, despite the Ecoinvent database is periodically updated with new processes, it does not contain any particular module which describes the production of specific dyes/pigments, fragrances and preservatives. In addition, any information were available in literature.

However, despite this limitation, the environmental impacts associated to proxy data do not exceed 10% of the overall environmental impact from the product system as requested by PCR[2]. In addition, in order to complete the inventory, it was necessary to create new processes *ad hoc*, which were simulated from literature data. This was possible by using stoichiometric reaction and methodology developed by Hischier et al. [1010]. Other mixtures are instead simulated starting from the percentage composition reported on technical and safety sheets. No further information are provided due to the degree of confidentiality.

Table 4: Substances simulated by using proxy and generic data.

Name of substance	Proxy process
Perfumes	*SITC-55, essential oils, resinoids, perfume materials, and cleaning preparations, import/kg/CH S*
Biocide	*Biocides, for paper production, unspecified, at plant/RER U*
Dyes	*Pigments, paper production, unspecified, at plant/RER U*

In addition to refined raw materials and auxiliaries, the line requires process water (simulated with *Tap water {Europe without Switzerland}*| *tap water production, conventional treatment* | *Alloc Def, U*). In order to model the entire process and describe the final products ready to be sold, resources to complete the packaging were also included, such as: cardboard and polypropylene labels. As depicted in **Errore. L 'origine riferimento non è stata trovata.**, the amount of package materials is almost the same for all the wipes package because of a similar quantity is requested per cm^2.

3.2.2. Core processes

In line with PCR[2] document, the transportation of the raw materials to the production facility in which the manufacturing process takes place are included in this stage. Distances (in km) were taken from Cle.Pr.In. internal report. On the other hand, no information were available concerning the vehicles used. Therefore, it was assumed to be covered by an average 5.5t lorry (process used in software *Transport, freight, lorry 3.5-7.5 metric ton, EURO4 {GLO}*| *market for* | *Alloc Def, U*). However, this assumption seems not affect the whole results of the LCA. The same simplification was carried out to simulate the distribution of the final products.

In order to complete all the operations, electric energy (EE) is requested by the whole plant. Cle.Pr.In. used only renewable EE for its 2016 production process. However, in order to be more conservative, the model was created assuming that EE requirements were taken from Italian energy mix. The process was modelled for year 2016 using literature data [11]. The EE amount is quite similar from a particular type of wipe to another, since consumptions are in line.

None direct releases into environment were detected from the manufacture of wipes, since no significant residues are produced from assembling. For example, water used to clean all the mixers is used several times before being dumped and, therefore, it was considered negligible. Information are limited due to the degree of confidentiality.

3.2.3. Downstream processes

This life cycle stage includes phases outside the company boundaries, such as transportation from manufacturing to retailers, usage of wipes and the EoL phase (transportation + disposal/recycling). Transportation to average retailers was assumed to be covered by an average 5.5t lorry (process used in software *Transport, freight, lorry 3.5-7.5 metric ton, EURO4 {GLO}| market for | Alloc Def, U*). Average distance of 315km were extrapolated from internal report of the company. This distance was then multiplied for the amount of each type of wipe (kg) to obtain *kg·km* values (input values in SimaPro).

As expected, no information were available concerning the usage and EoL stages. However, given that use phase is not relevant for EPD®, it was not included in the simulation. On the other hand, EoL was simulated according with the polluter-pays principle. However, given that the disposal occurs outside the factory boundaries, no primary information was available at that moment and some assumptions were necessary.

First of all, it was assumed that wipes packaging is 100% recyclable, since made of cardboard and PP. According with Conai data [12], the Italian platform which manage all the municipal and industrial packaging flows, in 2015 the percentage of plastic and cardboard recycled are 40.7% of and 79.7% respectively. The rest (59.3% for plastic and 20.3% for cardboard) was sent into landfill. Therefore, these percentage were used as valuable approximation of the EoL of wipes packaging. In order to simulate the recycling procedures, average recycling processes for PP and cardboard already contained in Ecoinvent library [9] were used (*PP (waste treatment) {GLO}| recycling of PP | Alloc Def, U* and *Core board (waste treatment) {GLO}| recycling of core board | Alloc Def, U*). In the case of cardboard recycling, average energy consumptions for the Italian case study were collected in literature [17] and utilised in the LCA models. Even if the inclusion of energy and material input to perform recycling are not mandatory (see PCR[2]), average data deriving from Ecoinvent library [9] were included to be more conservative and to respect the polluter-pays principle. However, benefits deriving from recycling (e.g. avoided oil extraction to produce virgin plastic) were not included in this certificate. This assumption is in line with PCR[2] in which is stated that "benefits and credits of recovery are outside the system boundaries".

On the other hand, wipes are mainly constituted by thermosetting polymers with higher LHV (Lower Heating Value). Therefore, it was assumed they are sent to municipal solid waste incinerator (MSWI). Treatment in a MSWI plant it is possible since not constituted by hazardous substances.

An already existing database was adopted to simulate the EoL stage. In particular, this dataset was created to assess the environmental performances of an already existing waste to energy (WtE) plant located in Coriano (district of Rimini, Italy)[18]. Only primary data, directly furnished by companies working in the WtE plant in 2011, were used to create the model and simulate the auxiliaries' requirements, all the emissions (air and water) and the disposal of waste produced during the incineration, together with the average electric energy recovered from the operation. The whole inventory for the WtE plant, together with the main results were already collected in a peer-review publication [18]. The average wipes weight was assumed to be incinerated, since 100% treatment efficiency was assumed. As in the previous case for recycling, benefits and credits of recovery shall be considered outside the system boundaries of the study. Therefore, the energy recovery was intentionally excluded from the certificate since not relevant for an EPD®.

Data about transportation of the EoL phase were also not available. Therefore, average 100km were assumed to reach the recycling plant (PP and cardboard transported separately). On the other hand, 459km were assumed to reach the MSWI (this value represent distance between Cle.Pr.In. plant and Coriano). This assumption was done to be more conservative for two main reasons. First, WtE plant located in Coriano represents an excellence in terms of performances: to our knowledge no similar treatment processes are settled within the company' district. Second, as written above, data used to simulate emissions and consumptions of auxiliary fuels of the Coriano's plant were directly furnished by companies working there.

All the distances were multiplied for the amount of each flow (kg of used wipes, kg of PP label, kg of cardboard) to obtain *kg·km* values (input values in SimaPro). Transportations are assumed to be covered by an average municipal waste lorry (simulated using the following process *Municipal waste collection service by 21 metric ton lorry {CH}*| *market for municipal waste collection service by 21 metric ton lorry* | *Alloc Def, U*).

3.2.4. Content declaration

As requested by GPI, the list of substances and materials included in the LCA evaluation is over than 99.9% of the gross wipes weight. The main components used in the detergent mixture are collected in Table 5, together with their information about the environmental and hazardous properties (in accordance with the PCR[2]). Table 6 shows the percentage composition of the products including wipes and packaging. Details are limited due to the degree of confidentiality.

As written, around 100% of the gross wipes weight was included in the LCA study. In fact, less than 0.1% was excluded since not possible to reveal the amount per cm^2 or to simulate it in the LCA. This assumption is in line to what stated by with PCR[2] and it is expected to not affect the final results.
However, in accordance with GPI, these substances are listed in Table 7 together with all the details necessary to identify them.

Table 5: Full list of substances used in the detergent mixture and information on their environmental and hazardous properties.

			Content declaration - mixture							
Input	Hazard statements and R-phrases	Classification	FAST SANNY FEN	FAST SANNY	FAST IPO 52	FAST SMART	FAST FLOOR FEN	FAST FLOOR SANIT HCS	FAST FEN KALK	FAST KALK
2-Propanol	H 319-225-H336	Flammable Nocive	4.00%	3.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Alkyl polyglycosides mixture (GLUCOPON 215)	H318	Irritating Corrosive	1.60%	1.57%	0.00%	0.00%	0.00%	0.00%	1.20%	1.59%
Dipropylene glycol monomethyl ether	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	4.40%	4.33%	0.00%	5.00%	1.00%	1.00%	2.00%	1.99%
Propylene glycol buthyl ether	H 315-319	Irritating	2.00%	1.97%	0.00%	2.00%	0.20%	0.20%	0.30%	0.30%
Citric acid	H318	Irritating	0.02%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
polyhexamethylene biguanide chlorohydrate	H 318-317-330-332-335-410	Corrosive Nocive Environmental hazard	0.07%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Phosporic acid	R34	Corrosive Nocive Environmental hazard	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.50%	0.00%
Perfume Ecolabel CP1447E	H 319-412	Irritating	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.50%	0.50%
Glycolic acid	R 22-34	Corrosive Nocive	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.50%
Butyldiglycol	H 319 R 36	Nocive	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.50%	2.49%
Ethoxylated ammine	R 36	Irritating	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.50%	0.00%
Brilliant pink dye	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sanity K	R 36-38-41-50	Irritating Nocive	0.50%	0.00%	0.00%	0.00%	0.20%	0.00%	0.50%	0.00%
Sodium hypochlorite	H 314-400	Corrosive Environmental hazard	0.00%	0.00%	3.35%	0.00%	0.00%	0.00%	0.00%	0.00%
Ammonia	H 314-400	Corrosive Environmental hazard	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%
Sodium laureth sulfate	H 315-319 R 36-37-38	Irritating	0.00%	0.00%	0.00%	1.10%	0.00%	0.00%	0.00%	0.00%
Limon perfume	R 43	Irritating	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%
Blue NBL perfume	H 317-411 R 43-51-52-53	Irritating Environmental hazard	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Preservative	H 301-314-315-317-318-330-411-412 R 36-43	Irritating Corrosive	0.00%	0.00%	0.00%	0.10%	0.10%	0.10%	0.10%	0.10%
Ethanol	H 225-319-336	Flammable Nocive	0.00%	0.00%	0.00%	0.00%	4.00%	4.00%	0.00%	0.00%
Alkyl polyglycosides mixture	H 318	Corrosive	0.00%	0.00%	0.00%	0.00%	3.33%	0.20%	0.00%	0.00%
Dipropionate	None risk declare	None risk declare	0.00%	0.00%	0.00%	0.00%	0.20%	0.10%	0.00%	0.00%
Ethoxylated alcohol C11O13	H 302-318	Corrosive Nocive	0.00%	0.00%	0.00%	0.00%	0.20%	0.20%	0.00%	0.00%
Blue colt dye	302-315-317-319-400-410-411	Nocive Environmental hazard	0.00%	0.00%	0.00%	0.00%	0.10%	0.10%	0.00%	0.00%
Green forest dye	R 43-52-53	Nocive	0.00%	0.00%	0.00%	0.00%	0.05%	0.05%	0.00%	0.00%
Brilliant blue dye	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Yellow dye	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
193 Emulsion	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	0.00%	0.00%	0.00%	0.00%	0.05%	0.05%	0.00%	0.00%
Siliconic anti-foam	H 318	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	0.00%	0.00%	0.00%	0.00%	0.02%	0.02%	0.00%	0.00%
Cetyltrimethylammonium chloride	H 290-315-318-400-410	Corrosive Nocive Environmental hazard	0.00%	0.00%	0.00%	0.00%	0.40%	0.40%	0.00%	0.00%
Benzalkonium chloride	H 290-302-314-318-400-410	Corrosive Nocive Environmental hazard	0.00%	0.00%	0.00%	0.00%	0.75%	0.30%	0.00%	0.00%
Sodium citrate	Not classified as dangerous for the (CE) N. 1272/2008 and	Not classified as dangerous for the (CE) N. 1272/2008 and	0.00%	0.00%	0.00%	0.00%	0.20%	0.20%	0.00%	0.13%
GENSOL V	H 314-318-400-411	Corrosive Environmental hazard	0.00%	0.49%	0.00%	0.00%	0.00%	0.20%	0.00%	0.50%
Water	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	Not classified as dangerous for the (CE) N. 1272/2008 and 67/548/CEE	87.41%	87.61%	96.65%	91.76%	89.19%	92.88%	91.90%	91.91%
Check total			***100%***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***

Table 6: Product % content in accordance with PCR[2]

Component	FAST SANNY FEN	FAST SANNY	FAST IPO 52	FAST SMART	FAST FLOOR FEN	FAST FLOOR SANIT HCS	FAST FEN KALK	FAST KALK
Polyester	7.1%	6.8%	4.6%	6.4%	2.8%	2.9%	6.7%	5.8%
Viscose	3.0%	2.9%	2.0%	2.7%	1.2%	1.3%	2.9%	2.5%
Detergents	5.7%	5.5%	1.8%	4.1%	6.4%	3.9%	3.6%	3.9%
Preservatives and auxiliaries	0.2%	0.0%	0.0%	0.0%	0.2%	0.2%	0.2%	0.0%
Perfume	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.3%
Dye	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
Water	39.5%	40.2%	52.2%	46.4%	54.4%	55.2%	44.2%	51.2%
PP white label	0.4%	0.4%	0.4%	0.4%	0.3%	0.2%	0.4%	0.4%
Cardboard	3.4%	3.4%	3.0%	3.1%	2.7%	2.8%	3.2%	2.8%
Aluminum bag	40.6%	40.7%	36.0%	36.9%	31.9%	33.4%	38.5%	33.2%
Total	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***

Table 7: List of substances not included in the LCI

Material component	Substance	CAS number	Weight %	Environmental class	Health class
Antifoam	POLY(OXY-1,2-ETHANEDIYL), a-OCTADECYL-_-HYDROXY-	9005-00-09	<0.1%	XI R41	Eye Dam 1 H318
Emulsion	DIMETHYLSILOXANE	68937-54-2	<0.1%	NO	NO
Ink	Not specified	Not specified	<0.1%	NO	NO

4. Environmental performances

LCIA stage is the phase in which the evaluation of the environmental performances occurs by the usage of standardized analysis methods included within the software. In accordance with PCR for Nonwoven wipes [2], the following impact categories were selected to address sustainability:

- global warming potential (GWP_{100}), which describes the negative effects due to the release of greenhouse gases, expressed in terms of kg CO_2 equivalents, during all the life cycle stages considered;

- acidification of land and water, expressed in kg SO_2 equivalents, evaluate the effect due to the release of acidifying substances. The time span is eternity and the geographical scale varies between local scale and continental scale;
- eutrophication, includes all impacts due to excessive levels of macro-nutrients in the environment caused by emissions of nutrients to air, water and soil. Nutrification potential is expressed in PO_4^{3-} equivalents;
- photochemical ozone creation, is the formation of reactive substances (mainly ozone) which are injurious to human health and ecosystems and which also may damage crops. It is calculated in terms of C_2H_2 (ethylene) equivalents;

These categories were calculated using the EPD (2013) v1.03[12]: an analysis method developed by the Swedish Environmental Management Council (SEMC) and created to support the Environmental Product Declarations. This method is based on CML-IA baseline and non-baseline indicators [14] (v. 3.02/EU 25).

As requested by PCR[2], land use and change indicator was also included in the certificate, since wipes are made of viscose: a semi-artificial fibre. In order to evaluate the land use and change, the ReCiPe 2016 (v1.00)[15] analysis method was selected since just updated and released. This indicator, expressed in m^2crop equivalent per year, includes the direct, local impact of land use on terrestrial species via (1) change of land cover and (2) the actual use of the new land[15].

In line with PCR[2], the whole resources consumption was also estimated and included in the certificate. This means the quantity of renewable and non-renewable resources used within the entire cradle to gate chain. The non-renewables were expressed in mass (kg); on the contrary all the renewables were reported using the energy content (MJ eq.). This evaluation was carried out with the support of the Cumulative Energy Demand (CED) [16] method (v. 2.0), which is able to translate the potential consumption in terms of MJ net calorific value.

Finally, the quantity of *direct water resource use* (i.e. process water inlet the factory) and the amount of embodied water (total water resource use) were also included as a result of the analysis. As written in the PCR[2], this indicator should not be considered as a water footprint. This evaluation was carried out with the support of the ReCiPe 2016 (v1.00)[15] analysis method.

No secondary materials derived from recycle and none renewable secondary flues are directly used in the plant by the company. However, the LCA model could be include a small part of secondary materials. In fact, default processes contained within the Ecoinvent library could use a small percentage of such materials in some processes (for example cardboard packaging). If included it results out of the scope of the study, since does not used directly by Cle.Pr.In.

5. Results interpretation

Table 8 and Table 9 collect (respectively) the full resources list and the results from the impact assessment resulting from the LCA analysis. They are expressed per cm^2 of nonwoven wipes (declared unit) and, as expected, the trend seems quite constant. This is a further confirmation of the fact that wipe families have similar functions and composition. Some differences are instead detected. For example, the usage of propanol (UPSTREAM PROCESSES) in the case of FAST SANNY FEN and FAST SANNY contributes to enhance the photochemical oxidation indicator (kg of C_2H_2 eq.) if compared with results achieve for the other wipes. Same trend is depicted for the renewable resource *hydropower*, category for which the cradle to gate default process for propanol has a contribution of 12-13%.

Other difference was detected in the case of the impact categories for the FAST FLOOR SANIT HCS CORE PROCESSES. In fact, lower values were detected and the reason is the smaller contribute of transportation (the main process in this stage) to the overall impact (per line). FAST FLOOR SANIT HCS wipes have a greater area (1320 cm^2 / wipe) and, given that FAST FLOOR SANIT HCS is the first family in terms of cm^2 produced in 2016 (+40% rather than the second), the results are lower.

Other interesting thing to notice is the trend between the several stages of production among different impact categories. In general, impacts associated with the UPSTREAM PROCESSES are higher than the burdens of the CORE and lower if compared with those achieved by the DOWNSTREAM. For example, if the GWP is taken into account sensible reduction is detected between UPSTREAM and CORE. This is quite normal in a company in which the manufacturing process is mainly an assembling procedure (no direct emissions and releases are detected). In addition, all the input data concerning both modules are primary information directly furnished by Cle.Pr.In. Therefore, results achieved for these stages should be considered a valuable approximation of the real case.

On the other hand, if comparison is made between UPSTREAM vs DOWNSTREAM, results of the second are higher. However, in this case a further consideration is necessary: DOWNSTREAM PROCESSES were entirely simulated using assumption. No primary information were available and they were not mandatory. However, it was decided to give these information to readers, since considered helpful to have a 360° vision of the potential impact per stage. As declared above, no EE recovery from waste incineration and potential benefits from recycling were considered in this certificate. In general, a higher quantity of scraps recovered (by incineration and/or recycling) leads to great potential benefits for the community. However, this should not be considered an exhortation to produce higher quantity of wastes, which should be always minimized. Since it is not mandatory and given that this could be misunderstood by not expert readers, all the potential benefits were voluntary excluded from the declaration.

As written in the 3.2.1 section, some substances (such as: dyes/pigments, fragrances and preservatives) were simulated using proxy data (since not available in literature). However, despite this limitation, the environmental impacts associated to proxy data do not exceed 10% of the overall environmental impact from the product system as requested by PCR[2].

Nevertheless the interpretation section is not mandatory in the EPD® certificate, it should be considered by the company as the first attempt to study its production process through a life cycle perspective. In general, this could be helpful to identify potential criticalities or weak points which could be subjected to improvements (for example a raw material replacement with more sustainable auxiliaries, a reduction of the transportation, the usage of renewable energy, etc.).

In conclusion, it should be highlighted that all the LCIA results presented above are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

6. Waste production and other environmental indicators

As described above, none waste flows are produced during the manufacturing, since it is more an assembling procedure rather than a production process. However, as requested by PCR the amount of waste produced along the whole life cycle was calculated by the use of EDIP2003 analysis method[19] and expressed in terms of hazardous, non-hazardous (bulk) and radioactive waste. Results are collected below in Table 10. Readers should consider that the amounts shown per product and life cycle stage do not represent a direct production of waste by the company, but an embodied quantity for all the background processes used to simulate the whole life cycle (e.g. the amount of radioactive waste deriving from the share of nuclear energy used in the Italian energy mix).

Concerning other environmental information, no other relevant indicators were identified.

Table 8: Full resources list per declared unit (1cm²) for the wipes

		Assessment of FAST products: Resources consumption per declared unit 1cm²							
	Type	FAST SANNY FEN	FAST SANNY	FAST IPO 52	FAST SMART	FAST FLOOR FEN	FAST FLOOR SANIT HCS	FAST FEN KALK	FAST KALK
									
	Type of resource	**UPSTREAM PROCESSES**							
Non-renewable resources - kg	Calcite	6.18E-07	5.21E-07	3.92E-07	5.08E-07	9.83E-07	8.96E-07	5.54E-07	4.29E-07
	Clay, unspecified	4.14E-07	3.46E-07	2.48E-07	3.32E-07	2.22E-07	1.87E-07	3.38E-07	2.88E-07
	Coal, brown	2.15E-06	1.81E-06	1.23E-06	1.71E-06	1.19E-06	9.70E-07	2.12E-06	1.35E-06
	Coal, hard	5.27E-06	4.40E-06	2.87E-06	3.91E-06	2.82E-06	2.21E-06	8.33E-06	3.44E-06
	Gangue, bauxite, in ground	5.93E-07	5.06E-07	4.36E-07	4.77E-07	4.25E-07	4.09E-07	7.15E-06	4.41E-07
	Gravel	3.08E-06	2.59E-06	1.92E-06	2.43E-06	2.04E-06	1.80E-06	2.47E-06	2.43E-06
	Iron	4.10E-07	3.48E-07	2.64E-07	3.12E-07	2.83E-07	2.63E-07	2.11E-07	3.04E-07
	Oil, crude	4.94E-06	4.12E-06	2.52E-06	3.64E-06	3.06E-06	1.99E-06	4.24E-06	3.33E-06
	Sodium chloride	2.95E-06	2.49E-06	2.03E-06	3.03E-06	1.33E-06	1.11E-06	1.76E-06	1.55E-06
	Other	4.52E-07	3.85E-07	2.55E-07	2.91E-07	4.34E-07	3.71E-07	1.21E-06	4.36E-07
Renewable resources - MJ	Biomass	1.01E-04	8.44E-05	4.18E-05	5.38E-05	7.51E-05	7.05E-05	1.02E-04	9.09E-05
	Geothermal	3.52E-07	2.95E-07	2.01E-07	2.85E-07	1.47E-07	1.36E-07	2.63E-07	2.21E-07
	Hydropower	1.72E-05	1.45E-05	1.10E-05	1.40E-05	9.95E-06	9.05E-06	1.61E-05	1.16E-05
	Solar	3.61E-08	2.98E-08	2.05E-08	2.77E-08	2.93E-08	2.71E-08	3.51E-08	2.76E-08
	Wind	2.37E-06	1.99E-06	1.35E-06	1.88E-06	1.22E-06	1.08E-06	1.67E-06	1.46E-06
Water resource - liters	Total water resource use	1.19E-03	1.01E-03	3.43E-04	4.91E-04	6.56E-03	2.82E-03	1.21E-03	1.18E-03
	Direct water resource use	-	-	-	-	-	-	-	-
	Type of resource	**CORE PROCESSES**							
Non-renewable resources - kg	Calcite	3.47E-08	2.82E-08	2.45E-08	2.64E-08	1.77E-08	1.56E-08	3.52E-08	2.73E-08
	Coal, brown	3.03E-08	2.46E-08	2.14E-08	2.31E-08	1.56E-08	1.36E-08	3.07E-08	2.38E-08
	Coal, hard	1.12E-07	9.12E-08	7.95E-08	8.55E-08	6.29E-08	5.06E-08	1.14E-07	8.83E-08
	Gravel	1.12E-06	1.44E-08	7.90E-07	8.52E-07	5.63E-07	5.02E-07	1.13E-06	8.79E-07
	Iron	5.68E-08	9.09E-07	4.01E-08	4.33E-08	2.87E-08	2.55E-08	5.77E-08	4.47E-08
	Oil, crude	6.17E-07	4.62E-08	4.36E-07	4.70E-07	3.11E-07	2.77E-07	6.26E-07	4.85E-07
	Other	3.68E-08	1.35E-08	2.60E-08	2.80E-08	1.87E-08	1.65E-08	3.73E-08	2.89E-08
Renewable resources - MJ	Biomass	2.21E-07	1.78E-07	1.56E-07	1.67E-07	1.32E-07	9.92E-08	2.23E-07	1.73E-07
	Geothermal	6.70E-09	4.86E-09	4.78E-09	4.72E-09	1.71E-08	3.13E-09	6.10E-09	4.93E-09
	Hydropower	2.52E-07	2.02E-07	1.78E-07	1.90E-07	1.84E-07	1.13E-07	2.52E-07	1.96E-07
	Solar	4.45E-09	2.43E-09	3.23E-09	2.62E-09	2.97E-08	2.23E-09	3.11E-09	2.81E-09
	Wind	3.09E-08	2.41E-08	2.19E-08	2.29E-08	3.80E-08	1.41E-08	3.02E-08	2.37E-08
Water resource - liters	Total water resource use	6.97E-06	5.61E-06	4.92E-06	5.27E-06	4.84E-06	3.14E-06	7.00E-06	5.44E-06
	Direct water resource use	1.80E-05	1.57E-05	2.22E-05	1.93E-05	2.58E-05	2.51E-05	2.13E-05	2.15E-05
	Type of resource	**DOWNSTREAM PROCESSES**							
Non-renewable resources - kg	Calcite	3.31E-07	5.01E-06	6.96E-06	2.46E-06	7.40E-07	1.08E-05	5.74E-07	4.71E-06
	Coal, brown	1.45E-07	1.36E-06	1.88E-06	6.99E-07	2.59E-07	2.91E-06	2.13E-07	1.29E-06
	Coal, hard	6.50E-07	4.02E-06	5.47E-06	2.16E-06	9.49E-07	8.33E-06	8.48E-07	3.81E-06
	Gravel	5.49E-06	6.08E-05	8.42E-05	3.07E-05	1.06E-05	1.30E-04	8.52E-06	5.75E-05
	Iron	2.06E-07	1.73E-06	2.39E-06	9.04E-07	3.59E-07	3.68E-06	2.95E-07	1.65E-06
	Oil, crude	5.65E-06	8.68E-05	1.21E-04	4.25E-05	1.28E-05	1.88E-04	9.88E-06	8.16E-05
	Other	2.46E-07	3.29E-06	4.57E-06	1.63E-06	5.18E-07	7.10E-06	4.08E-07	3.10E-06
Renewable resources - MJ	Biomass	1.60E-06	7.70E-06	1.04E-05	4.31E-06	2.09E-06	1.56E-05	1.97E-06	7.28E-06
	Geothermal	5.15E-07	5.83E-07	6.25E-07	4.97E-07	4.52E-07	7.33E-07	5.30E-07	5.21E-07
	Hydropower	3.37E-06	1.63E-05	2.18E-05	9.04E-06	4.26E-06	3.28E-05	4.12E-06	1.53E-05
	Solar	9.98E-07	8.90E-07	8.71E-07	8.49E-07	8.46E-07	8.82E-07	1.01E-06	7.80E-07
	Wind	9.27E-07	1.84E-06	2.25E-06	1.26E-06	8.99E-07	3.10E-06	9.95E-07	1.69E-06
Water resource - liters	Total water resource use	1.24E-03	2.35E-02	3.28E-02	1.13E-02	3.12E-03	5.12E-02	2.36E-03	2.20E-02
	Direct water resource use	-	-	-	-	-	-	-	-

Table 9: LCIA results per declared unit (1cm^2) for the wipes

		Assessment of FAST products: Impact indicators per declared unit 1cm^2							
	Type	FAST SANNY FEN	FAST SANNY	FAST IPO 52	FAST SMART	FAST FLOOR FEN	FAST FLOOR SANIT HCS	FAST FEN KALK	FAST KALK
									
	Unit	UPSTREAM PROCESSES							
Acidification	kg SO_2 eq.	1.58E-07	1.32E-07	8.56E-08	1.25E-07	1.00E-07	8.04E-08	1.97E-07	1.12E-07
Eutrophication	kg PO_4^{-3} eq.	5.69E-08	4.79E-08	3.00E-08	4.09E-08	4.43E-08	3.81E-08	5.73E-08	4.72E-08
Global warming (GWP100 years)	kg CO_2 eq.	2.87E-05	2.40E-05	1.58E-05	2.17E-05	1.64E-05	1.35E-05	3.68E-05	1.99E-05
Photochemical oxidation	kg C_2H_4 eq.	2.71E-08	2.30E-08	6.24E-09	8.95E-09	6.46E-09	5.21E-09	1.22E-08	7.46E-09
Land use and change	m^2·yr crop eq.	4.62E-06	3.90E-06	1.81E-06	2.30E-06	6.05E-06	5.65E-06	4.88E-06	4.21E-06
	Unit	CORE PROCESSES							
Acidification	kg SO_2 eq.	9.23E-09	7.50E-09	6.52E-09	7.03E-09	4.76E-09	4.15E-09	9.36E-09	7.26E-09
Eutrophication	kg PO_4^{-3} eq.	1.94E-09	1.58E-09	1.37E-09	1.48E-09	1.00E-09	8.73E-10	1.97E-09	1.53E-09
Global warming (GWP100 years)	kg CO_2 eq.	2.13E-06	1.73E-06	1.50E-06	1.62E-06	1.10E-06	9.56E-07	2.16E-06	1.67E-06
Photochemical oxidation	kg C_2H_4 eq.	3.76E-10	3.05E-10	2.65E-10	2.86E-10	1.95E-10	1.69E-10	3.81E-10	2.95E-10
Land use and change	m^2·yr crop eq.	6.31E-08	5.13E-08	4.46E-08	4.81E-08	3.29E-08	2.83E-08	6.40E-08	4.96E-08
	Unit	DOWNSTREAM PROCESSES							
Acidification	kg SO_2 eq.	1.18E-07	1.88E-06	2.62E-06	9.19E-07	2.71E-07	4.08E-06	2.09E-07	1.77E-06
Eutrophication	kg PO_4^{-3} eq.	3.79E-08	6.32E-07	8.79E-07	3.07E-07	8.86E-08	1.37E-06	6.83E-08	5.93E-07
Global warming (GWP100 years)	kg CO_2 eq.	4.55E-05	7.88E-04	1.10E-03	3.83E-04	1.09E-04	1.71E-03	8.35E-05	7.39E-04
Photochemical oxidation	kg C_2H_4 eq.	3.87E-09	5.52E-08	7.67E-08	2.72E-08	8.32E-09	1.19E-07	6.55E-09	5.19E-08
Land use and change	m^2·yr crop eq.	2.92E-07	2.44E-06	3.35E-06	1.27E-06	4.94E-07	5.16E-06	4.14E-07	2.31E-06

Table 10: Waste generated along the whole life cycle per declared unit (1cm^2) for the wipes

		Assessment of FAST products: Waste generated along the whole life cycle per declared unit (1cm^2) for the wipes							
		FAST SANNY FEN	FAST SANNY	FAST IPO 52	FAST SMART	FAST FLOOR FEN	FAST FLOOR SANIT HCS	FAST FEN KALK	FAST KALK
	Type								
Type of waste	**Unit**	**UPSTREAM PROCESSES**							
Hazardous	kg	2.58E-09	2.17E-09	1.80E-09	2.15E-09	1.55E-09	1.51E-09	1.82E-09	1.87E-09
Non-hazardous	kg	2.09E-06	1.76E-06	1.25E-06	1.67E-06	1.46E-06	1.27E-06	2.76E-06	1.75E-06
Radioactive	kg	1.03E-09	8.60E-10	5.16E-10	7.21E-10	5.39E-10	4.53E-10	8.08E-10	6.15E-10

Type of waste	**Unit**	**CORE PROCESSES**							
Hazardous	kg	2.35E-11	1.90E-11	1.66E-11	1.79E-11	1.35E-11	1.06E-11	2.38E-11	1.84E-11
Non-hazardous	kg	9.40E-07	7.64E-07	6.64E-07	7.16E-07	4.73E-07	4.22E-07	9.53E-07	7.39E-07
Radioactive	kg	2.08E-10	1.69E-10	1.47E-10	1.59E-10	1.05E-10	9.35E-11	2.11E-10	1.64E-10

Type of waste	**Unit**	**DOWNSTREAM PROCESSES**							
Hazardous	kg	2.14E-10	2.17E-09	3.00E-09	1.10E-09	3.81E-10	4.63E-09	3.19E-10	2.04E-09
Non-hazardous	kg	1.21E-05	1.84E-04	2.56E-04	9.02E-05	2.69E-05	3.99E-04	2.10E-05	1.73E-04
Radioactive	kg	1.85E-09	2.81E-08	3.90E-08	1.38E-08	4.16E-09	6.08E-08	3.22E-09	2.64E-08

Programme-related information and verification

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com
EPD registration number:	S-P-01204
Published:	2018-01-19
Valid until:	2021-01-11
Date of verification:	2018-01-11
Product Category Rules:	PCR for Nonwoven wipes UN CPC code 27922 Version 1.0, dated 2016-11-01
Product group classification:	UN CPC VER. 2 CODE 27922
Reference year for data:	2016
Geographical scope:	*International*

Product category rules (PCR): Nonwoven wipes*, PCR 2016:06 version 1.0,* 2016-11-01
Product Category Rules (PCR) review was conducted by: The Technical Committee of the International EPD® System. Review chair: Lars-Gunnar Lindfors. Contact via info@environdec.com.
Independent verification of the declaration and data, according to ISO 14025:2006: ☐ EPD Process Certification (internal) ☒ EPD Verification (external)
Third party verifier*: Ing. Valentina Fantin* *Address: Via Pablo Neruda 5, I-40139 Bologna, Italy* Accredited by: *"Approved by the International EPD System"*

Contact information:

EPD owner:	**Cle.Pr.In. S.r.l.** Strada Statale Appia km 177,700 81030 Carinola – Italy Web: http://www.cleprin.it/index.html Tel. +39 0823 706543 Fax +39 0823 706928 Dr. Concetta Pironti e-mail: laboratorio@cleprin.it
LCA author:	**EMC Innovation Lab s.r.l.** Via Nabucco 58 - 47921 Rimini Italy Web: http://www.emcinnovation.it/ Tel: +39 0541 1835510 Dr. Daniele Cespi e-mail: dcespi@emcinnovation.it
Programme operator:	EPD International AB info@environdec.com

Abbreviation

CED	Cumulative Energy Demand
EE	Electric Energy
EoL	End of Life
EPD	Environmental Product Declaration
GPI	General Programme Instructions
GWP_{100}	Global Warming Potential with a 100-years' perspective
kg C_2H_2 eq.	kilogram of equivalent ethylene
kg CO_2 eq.	kilogram of equivalent carbon dioxide
kg PO_4^{3-} eq.	kilogram of equivalent phosphates
kg SO_2 eq.	kilogram of equivalent sulfur dioxide
LCA	Life Cycle Assessment
LCI	Life Cycle Inventory
LCIA	Life Cycle Impact Assessment
LHV	Lower Heating Value
MJ	Mega Joule
MSWI	Municipal Solid Waste Incinerator
PCR	Product Category Rules
WtE	Waste to Energy

References

1. ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
2. Product Category Rules (PCR) for Nonwoven wipes, UN CPC code 27922, Version 1.0, dated 2016-11-01.
3. The International EPD® System, http://www.environdec.com/en/.
4. General Programme Instructions of the International EPD® System. Version 2.5, dated 2013-09-18.
5. EN ISO 14040 Environmental Management, Life Cycle Assessment, Principles and Framework, International Organization for Standardization, Geneva, Switzerland, 2006.
6. EN ISO 14044 Environmental Management, Life Cycle Assessment, Requirements and Guidelines, International Organization for Standardization, Geneva, Switzerland, 2006.
7. Product Category Rules (PCR) for Construction products and construction services (EN 15804), multiple UN CPC codes, Version 2.2, 2012:01.
8. PRé Consultants, SimaPro, Amersfoort, The Netherlands, 2017.
9. Ecoinvent Centre (formerly Swiss Centre for Life Cycle Inventories) (2016) Ecoinvent 3.1 Database.
10. R. Hischier, S. Hellweg, C. Capello and A. Primas, Establishing Life Cycle Inventories of Chemicals Based on Differing Data Availability, Int. J. Life Cycle Assess., 2005, 10, 59–67.
11. Terna 2016, Statistiche di produzione, https://www.terna.it/it-it/sistemaelettrico/statisticheeprevisioni/datistatistici.aspx.
12. Conai 2016, Programma Generale di Prevenzione e di Gestione degli imballaggi e dei rifiuti di imballaggio, available at http://www.conai.org/notizie/pubblicato-il-nuovo-programma-generale-di-prevenzione/.
13. EPD (2013) v1.03 developed by the Swedish Environmental Management Council (SEMC).
14. https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors.
15. ReCiPe 2016. A harmonized life cycle impact assessment method at midpoint and endpoint level Report I: Characterization. RIVM Report 2016-0104 M.A.J. Huijbregts et al.
16. R. Frischknecht, N. Jungbluth, H.-J. Althaus, C. Bauer, G. Doka, R. Dones, R. Hischier, S. Hellweg, S. Humbert, T. Köllner, Y. Loerincik, M. Margni and T. Nemecek, *Implementation of Life Cycle Impact Assessment Methods*, ecoinvent report No. 3, v2.0, Swiss Centre for Life Cycle Inventories, Dübendorf, 2007.
17. http://www.pinocchiofaladifferenza.it/pinocchio-fa-la-differenza/manuale-raccolta-differenziata/carta-e-cartone/.
18. F. Passarini, M. Nicoletti, L. Ciacci, I. Vassura, L. Morselli, Environmental impact assessment of a WtE plant after structural upgrade measures, *Waste Manag.*, 2014, 34, 753-762, http://dx.doi.org/10.1016/j.wasman.2013.12.022.
19. Hauschild, M.; Potting, J. 2003. Spatial differentiation in Life Cycle impact assessment - The EDIP2003 methodology. Institute for Product Development Technical University of Denmark.