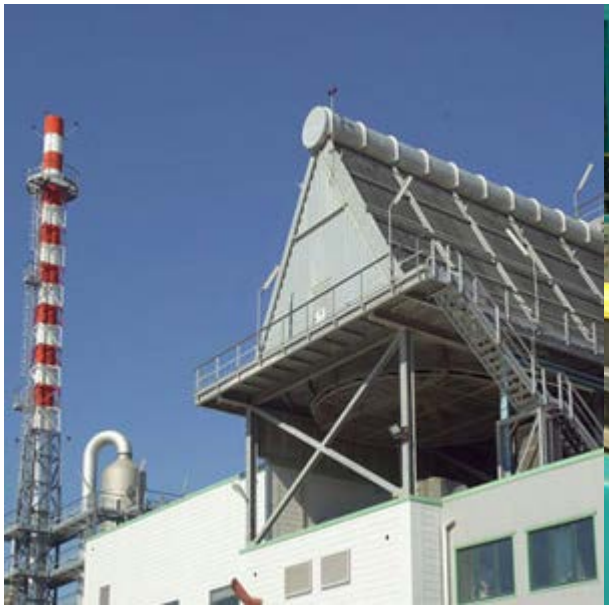
Environmental Product Declaration



Collection of Hazardous, Potentially Infective Sanitary Waste and Disposal through Incineration

Validated Environmental Product Declaration

Registration Number: S-P-00145
Publication Date: 2007/12/03
Revision Date: 2020/08/24
Approval Date: 2020/09/15
Validity Date: 2021/07/24

Review: 16

UN CPC codes 942 & 943 (Solid Waste Disposal Services)
Geographical Scope of Application: Italy

❶ PRESENTATION OF THE COMPANY AND ITS SERVICES

⁂ GENERAL INFORMATION ABOUT THE COMPANY

Name	**Essere S.P.A.**
Headquarters	***Via Zotti, Forlì, Italy***
Waste-to-Energy Plant	***Via Zotti, Forlì, Italy***
Phone	*(+39) 0543 724562*
Fax	*(+39) 0543 721781*
e-mail address	**info.essere@ecoeridania.it**
Website	**www.gruppoecoeridania.it**
Number of employees	***119 (ON DECEMBER 31, 2019), OF WHICH:*** ***104 WITH A PERMANENT CONTRACT AND 15 WITH A TEMPORARY CONTRACT, EMPLOYED IN THE FOLLOWING DEPARTMENTS:*** ***ADMINISTRATION: 27 UNITS;*** ***PRODUCTION DEPARTMENT (FORLI' PLANTS): 92 UNITS***
Number of trucks	***45***
Certifications	***ISO 9001:2015 CERTIFICATE DNV-GL N° 279589-2018-AQ-ITA-ACCREDIA*** ***ISO 14001:2015 CERTIFICATE DNV-GL N° 285876-2019-AE-ITA-ACCREDIA*** ***EPD: CERTIFICATE N. S- P-00145 CERTIFICATE RINA SPA*** ***BS OHSAS 18001:2007 CERTIFICATE DNV-GL N° 285869-2019-AHSO-ITA-ACCREDIA*** ***SA 8000:2014 CERTIFICATE CISE N° 530***
Registration	***EMAS Registration n° IT-000165***

⁂ The Company

Mengozzi S.p.A., now Essere SpA from 27/07/2020, was founded in 1978 as a hospital service company, at first as cleaning company and after a few years, thanks to its organizational skills, strengthened its presence in the market by investing in a highly-specialized, technological business of the disposal of sanitary waste. In 1987 the company decided to adopt an integrated approach in the field of waste management - the company was in fact one of the very first corporations in the country - to start collecting waste directly at hospitals and offering a comprehensive service which would include the supply, transportation and collection of reusable containers produced by the company itself. At the beginning of the Nineties, as a completion of the integrated cycle, the company designed and built its first waste-to-energy facility.
From November 2016 the company has joined the Eco Eridania Group S.p.A. and from 1 May 2017 has lease to the Parent Company the branch of services for the waste collection and transport, including the area responsible for the washing and maintenance of company vehicles.
The company asset since his debut is the stainless steel container, aimed at total safety of the operators and environmental protection, which once emptied of its contents, it was washed, disinfected and sterilized at the company to be reintroduced into new waste collection cycles, with the following advantages in addition to economic return: protection of the environment, less waste produced, less consumption of raw materials, less emissions of pollutants.
Safety and quality are not always in tune with the economy, the company sensitive and always alert to the needs of its customers, thought to make a plastic container with the same qualities as safety, hygiene and practicality of the stainless steel container, and that has represented an opportunity to improve internal efficiency organization.
Today the company produces a wide range of models and dimensions specially designed to optimize the flow and management of the different types of medical waste. They are made of high density polyethylene or polypropylene are robust, easily maneuverable, completely sealed, and unalterable by chemicals or ultraviolet rays.
But above all they are "intelligent" containers as they are recognizable by systems automatic "bar code" that are able to identify their cycle of use and to send them, at the end of their employment, in a department of production within them, without them ever becoming waste. In fact here the shredded and ground plastic returns to be raw material giving life to always new containers, limiting the environmental impact with the reduction of the waste products.

⁂ Services and Processes

Essere S.p.A offers a disposal service through a complete and integrated system for the destruction of health waste; to the management of sanitary waste could be added the management of the containers, which are supplied to its customers for waste collection at health facilities.

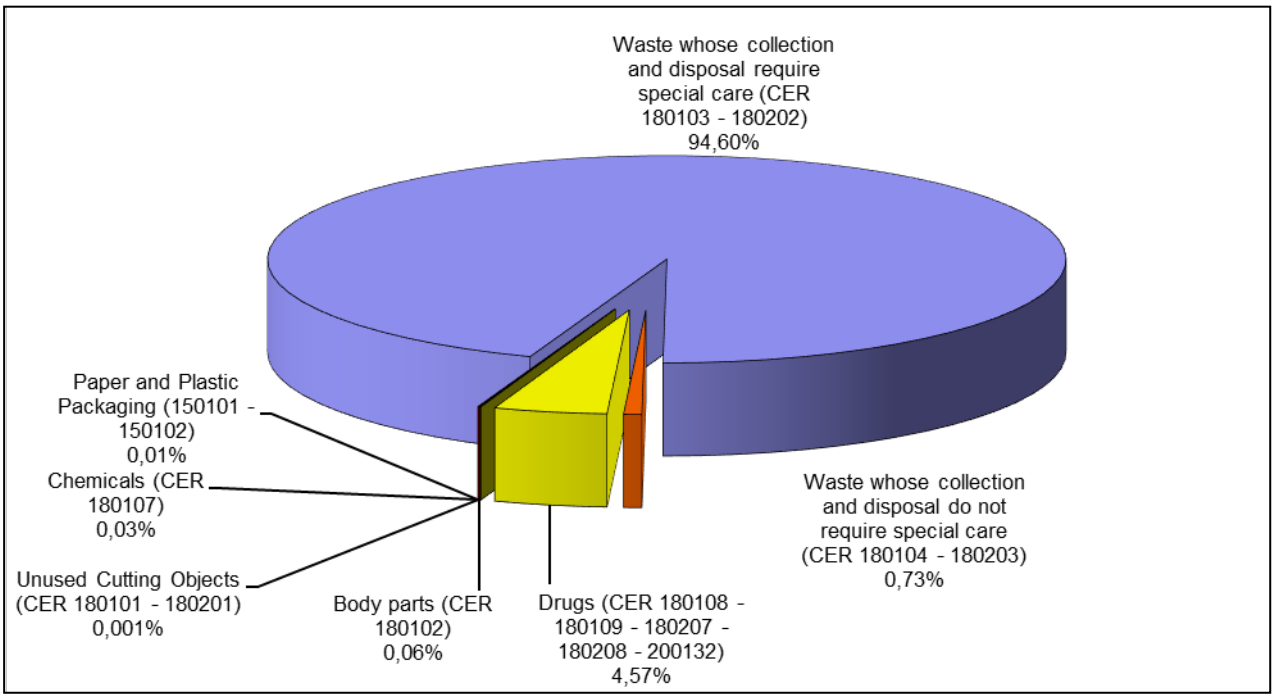
Thanks to a tested reuse system of the same containers, the company contributes to saving raw materials and reducing the volume of waste destined for disposal.
The production activity of Essere SpA it develops through two cycles parallels: container management and waste-to-energy treatment.
They are flanked by complementary preparatory or necessary activities to management, which take place at the same site of the waste-to-energy plant, in via Zotti.

The containers

Essere S.p.A supplies its customers with containers for the collection of waste materials. Containers come in a variety of sizes and models, so as to meet the specific requirements of each customer. Each container is conveniently equipped with an internal bag, which can be easily sealed by sanitary operators before waste is picked up to be transported to the plant. The operators of our client companies will in fact collect full containers in each department (or single collection point) within the customer's premises, and replace them with empty ones. Containers are emptied of their contents at the company's main plant, then washed out with biocides. After being checked for safety with high-precision systems, they are re-used in new collection cycles. Should containers fail a safety check, they are ground, recycled and relabeled before entering a new collection cycle. During the recycling process, a variable amount of pure material (about 7%) is added to the recycled plastic, so as to guarantee that the final product maintains its original mechanical features. In short, the plastic container system allows the company to cut down on the quantity of raw materials being used, while at the same time reducing the amount of waste to be incinerated. There are different types of containers for each need for use.

The disposal

Waste processed by the organization is considered infectious, as established by directive 2008/98/CE and Regulation 1357/2014/UE on waste. Legislation considers hazardous and infectious waste (HP9) the material containing pathogens or their toxins, which, if exposed, can cause diseases in humans and in other living organisms.
The types of waste gathered are represented below:



The data are obtained from the transportation forms filled in and gathered on delivery of waste in the plant.
In 2019, 31.991.720 kg of waste has been delivered to the company for the disposal.
The waste can arrive at the plant with vehicles of third-party authorized customers to this transport.
At the entrance of the plant, documents and weight of the collected materials are inspected, while the waste is checked for suitability and for potential radioactive materials. Whenever traces of radioactive substances are found in the waste, the truck is handed over to a specialized external company, so as to prevent contaminated materials from entering the premises. Sanitary waste is unloaded from our trucks in different ways and areas, depending on the type of container in use. The Essere S.p.A system has been designed so as to limit accidental operations, environmental pollution hazard and contact with waste material. Manual procedures for our staff are in fact limited to transferring containers from the truck to a conveyor belt, which is part of a fully automatic transportation system. However, the system is not only designed to move containers from one place to the other: as a matter of fact, it also opens them and empties their content out into shuttles, which in turn transfer waste to the loading hopper of the incinerator.
Shuttles are part of an automatic system which allows waste to be loaded onto the hopper only when ideal operating conditions for the combustion chamber are met. The combustion phase produces aeriform waste and emissions, while the continuous computerized monitoring of the system checks that each part of the system is working in proper conditions. Chimney emissions are also checked to ensure they comply with specific parameters, and are later recorded from a sophisticated control room, where operators can conveniently manage the whole process. This also allows control authorities to perform direct safety checks of the plant's emissions via the Internet. Combustion waste includes heavy ashes, filtration residue and boiler dusts. Heavy ashes

are stored in sealed containers and then picked up by companies specialized in the transportation of waste to authorized disposal plants.
On the other hand, a pneumatic system collects and transfers filtration residues and boiler dusts to a storage bunker, from which they will be collected by a second group of companies specialized in the transportation of waste to authorized disposal plants. Our waste- to-energy plant features an energy recovery section where energy is transformed into electric power, in accordance with Title III – bis of legislative decree 152/2006 and s.m.i. Most of the produced electric power is then distributed among the plant staff.
In 2006, the plant has obtained the Environmental Integrated Authorization n.298 of 25/07/2006, issued by Forlì-Cesena Province, valid until 25/07/2022 due to the provisions of article 29 *octies* of Law n. 152/2006 and s.m.i. renewed with DET-AMB-2016-506 of 07.03.2016, attached to the Resolution of G.R. n. 2357/2016 of 21.12.2016, updated with DET-AMB-2017-440 of 30.01.2017, and effective from 24.01.2017- maturity 24/1/2033 (16 years from 24.1.2017).
Lifetime of the plant is almost 30 years.
Electric power of the plant is 2,8 MW.
Energy efficiency of the plant is 30%.
The maximum load of the system in 2019 is 3.700 kg/hour.
The 2019 operation hours were 8.592.

Additional services
The company also manages a chemical and physical purification plant for the treatment of wastewater. This allows water to be reintroduced into the system and be used in a number of operations, like washing containers, trucks, or service areas. Purified water is also used to flush out condensation waters from compressors and to help with the last phase of particulate matter removal.

❷ DECLARATION OF ENVIRONMENTAL PERFORMANCE

⁂ Method

In order to identify and evaluate our system's environmental performance, our company has adopted a Life Cycle Assessment Method (LCA), regulated by the ISO 14040 standard series. The goal of this assessment procedure is to study and evaluate the environmental load resulting from the collection and disposal through incineration of hazardous, potentially infective sanitary waste. The identified functional unit is the following: Disposal through incineration of 1.000 kg of Sanitary Waste. The data used in the present study have been divided between specific, selected generic and proxy data and are derived from direct research on the field or from databases. The data have been collected directly at Essere S.p.A or have been obtained from the database Ecoinvent V3.5 and SimaPro 9.0.0.33 software has been used. Data collected on site refers to year 2019 The total contribution of the proxy data is less than 10%.

⁂ System boundaries

The system boundaries include the following processes of the life cycle:
UPSTREAM PROCESSES undertake manufacturing and regeneration activities of high-density polyethylene and polypropylene containers, manufacturing of plastic bags for the collection of hazardous and infectious hospital waste. They also include transport of the containers and hospital waste.
MAIN PHASE OR OPERATIVE PROCESSES (core module) involve disposal through thermal destruction of hospital waste, as well as slag management and transport. In this phase, other complementary activities are also included, such as fume extraction, cleaning and disinfecting of containers, heaters functioning and steam production for the electric power generation, and so on.
DOWN-STREAM PROCESSES consist of manufacturing activities of sub-products, in particular electric power generation and other recovery materials.

In particular, the following activities are included in the system and divided into groups:
UPSTREAM PROCESSES
• Manufacturing and regeneration of containers (including grinding containers to recycle and addition of virgin plastic).
• Manufacturing of plastic bags.
• Container transport and delivery, and transport of hospital waste (including manufacturing, maintenance and disinfecting of the vehicles used).
OPERATIVE PROCESSES
• Emptying and treating containers.
• Thermal destruction of hospital waste (including fume extraction).
• Steam production
• Transport and management of slag and fuel related waste produced by plants of thermal destruction and disinfecting plants (comprising neutralization of part of the slag and fuel related waste).
DOWN-STREAM PROCESSES
• Production of sub-products (electric energy and other recovery materials).

The following chart illustrates the system boundaries:

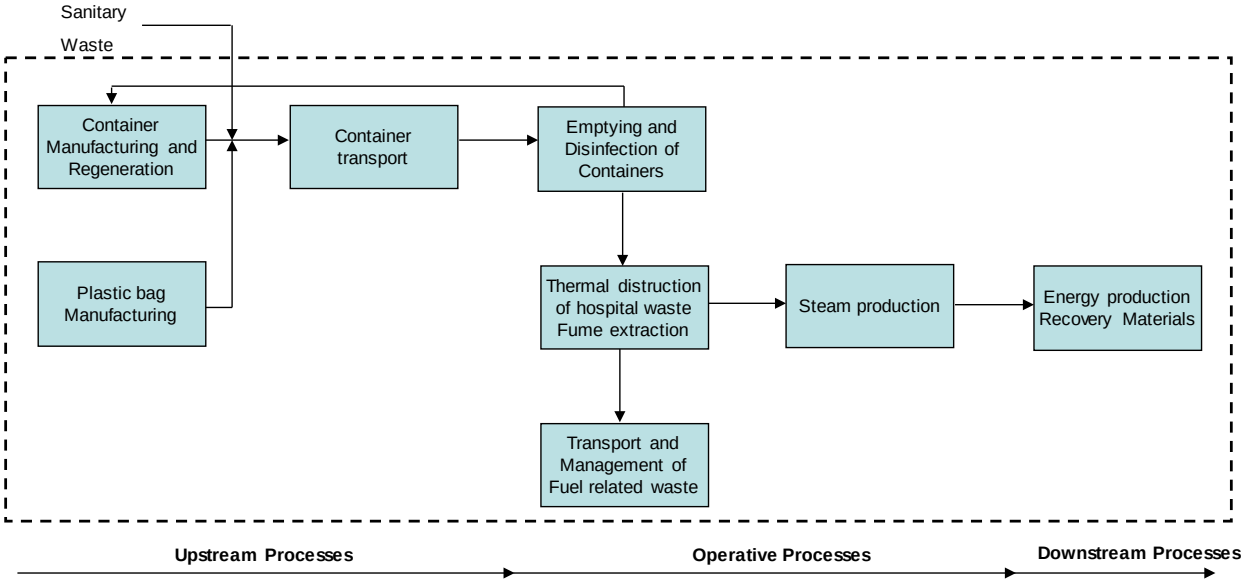


Figure 1 – System Boundaries

It should be noted that the operations related to the construction and demolition of the plant have been excluded from the boundaries of the system as the impacts generated by these operations are less than 1% (cut-off).

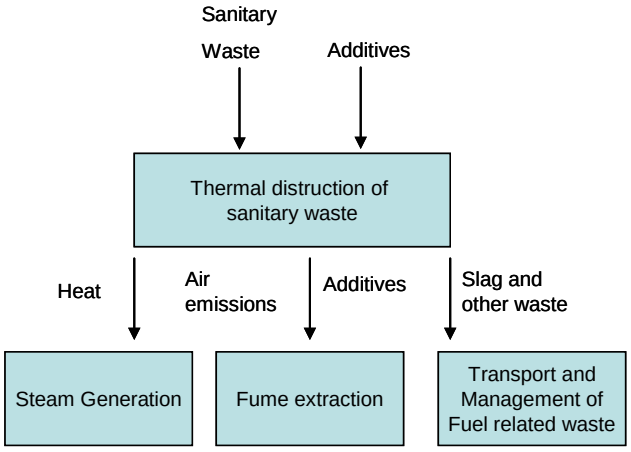


Figure 2 – Incineration of waste scheme

The additives used within the phases of thermal destruction of sanitary waste, fume extraction and steam generation are urea, lime, active carbon, soda, sulphuric acid and sulphaminic acid

⁂ Resource consumption

The following table illustrates the resources during life cycle for the disposal of 1.000 kg of hazardous, potentially infective sanitary waste.

Impact Category	Upstream Processes			Operative processes				Total	Unit of measurement
	Production of Container	Production of Plastic bag	Transportation and Sanitization	Incineration of Waste	Sanitization of Container	Steam Production	Management of fuel related waste		
Non-Renewable Material Resources	0,07	0,07	1,47	0,59	0,25	0,01	0,07	2,53	kg
Iron	*0,06*	*0,05*	*1,40*	*0,40*	*0,16*	*0,00*	*0,06*	*2,12*	*kg*
Aluminium	*0,01*	*0,00*	*0,03*	*0,15*	*0,05*	*0,00*	*0,01*	*0,25*	*kg*
Other	*0,01*	*0,02*	*0,04*	*0,04*	*0,04*	*0,00*	*0,01*	*0,16*	*kg*
Non-Renewable Energetic Resources	45,91	20,83	14,60	24,98	7,15	0,08	4,86	118,41	kg
Coal	*5,90*	*5,02*	*2,61*	*10,22*	*5,14*	*0,06*	*2,99*	*31,94*	*kg*
Oil	*40,01*	*15,82*	*11,99*	*14,76*	*2,01*	*0,02*	*1,86*	*86,48*	*kg*
Other	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*kg*
Renewable Material Resources	0,26	1,88	0,13	18,30	0,42	0,01	0,07	21,07	kg
Wood	*0,26*	*1,88*	*0,13*	*18,30*	*0,42*	*0,01*	*0,07*	*21,07*	*kg*

Waste feedstock	-	-	-	4.699,15	-	-	-	4.699,15	MJ
Renewable Energetic Resources	41,94	38,49	13,37	267,86	40,53	0,24	10,63	413,08	MJ
Hydroelectric	*29,59*	*11,10*	*10,16*	*44,14*	*16,66*	*0,10*	*9,54*	*121,30*	*MJ*
Biomass	*11,67*	*26,40*	*2,83*	*220,74*	*22,43*	*0,13*	*0,97*	*285,16*	*MJ*
Other	*0,69*	*0,99*	*0,39*	*2,98*	*1,44*	*0,01*	*0,12*	*6,62*	*MJ*
Secondary Material Resources[1]	13,29	-	-	-	-	-	-	13,29	kg
Energy Recovery Flows	-	-	-	-	-	1.859,33	-	1.859,33	MJ
Total Water Consumption	2.215,20	3.188,32	377,17	11.059,97	3.313,89	342,55	173,04	20.670,14	kg
Direct Water Consumption	-	-	15,29	8173,83	1533,40	284,35	-	10.006,87	kg
Direct Electricity Consumption	21,12	-	0,00	38,70	12,40	-	-	72,23	kWh

Table 1 – Consumption of natural resources with relation to the disposal of sanitary waste

[1] Plastic reused in the recycling of containers of produced waste.

⁂ Emissions to Air and Water

The following table shows the emissions (expressed as potential environmental impacts) generated in the **Essere S.p.A.** system during a life cycle based on the disposal of 1.000 kg of hazardous, potentially infective sanitary waste.

Impact Category	Value							Total	Unit of measurement
	Upstream Processes			Operative processes					
	Production of Container	Production of Plastic bag	Transportation and Sanitization	Incineration of Waste	Sanitization of Container	Steam Production	Management of fuel related waste		
Climate changes GWP100 (Non Biologic Resources)	92,36	44,23	42,15	45,89	21,04	0,16	43,38	289,22	kg CO_2 equivalent
	178,74			110,48					
Climate changes GWP100 (Biologic Resources)	-			1.508,90				1.508,90	
Acidification - AP	0,31	0,14	0,19	0,61	0,17	0,01	0,09	1,50	kg SO_2 equivalent
	0,64			0,86					
Eutrophication - EP	0,04	0,03	0,04	0,16	0,09	0,00	0,02	0,38	kg PO_4 equivalent
	0,11			0,27					
Photochemical Ozone Creation Potential - POCP	0,02	0,01	0,01	0,01	0,01	0,00	0,00	0,06	kg C_2H_4 equivalent
	0,04			0,02					

Table 2 – Potential impacts of pollutant emissions related to the disposal of sanitary waste

⁂ Waste Production

The following table illustrates the waste (classified as “hazardous” and “other waste”) produced during the performance of our processes.

kg/1.000 Kg of treated waste								
Waste production	Upstream Processes			Operative processes				Total
	Production of Container	Production of Plastic bag	Transportation and Sanitization	Incineration of Waste	Sanitization of Container	Steam Production	Management of fuel related waste	
Hazardous Waste	4,28	0,00	0,40	170,39	0,09	0,02	0,00	175,18
Other Waste	4,78	0,76	3,95	11,44	4,08	0,10	0,46	25,58
Total	14,16			186,59				200,75

Table 3 – Total production of waste with relation to the disposal of sanitary waste

In 2019 the slag and fuel related waste produced by incineration and sewage treatment were 5.554.670 kg, 1.754.030 kg of which have been inertized. On the other hand, the remaining 3.800.640 kg have been disposed in landfill systems for special non-hazardous wastes and/or recovered.

kg of fuel related waste/1.000 kg treated waste	
Fuel Related Waste	Operative Processes Management of fuel related waste
CER 190112 - slag	103,66
CER 190105 – filtration waste	63,47
CER 190814 – mud from water treatment	3,77
CER 190813 – mud from water treatment	2,73

Table 4 – Fuel related waste produced with relation to the disposal of sanitary waste

⁂ Other Information

Production of electric power

Essere S.p.A. produces electricity by means of thermal valorization of hazardous and infectious hospital waste, which is in part used for self-supply. In 2019 the company produced and self-supplied a total of 16.523.068 kWh.

MJ produced/1.000 kg of treated waste	
	Downstream Processes By-products generation
Electric Power generation	1.859,33

Table 5 – Electric power generation with relation to the disposal of sanitary waste

The produced and self-supplied electricity is approximately 88% of the whole electricity requirement of the organisation[2].

Ash recovery, slag and filter cakes

The amount of ash, slag and filtration residue sent for recovery (R13) in 2019 was 3.713.420 kg.

The recovery of such materials in 2019 compared to the functional unit was thus 116,07 kg / 1,000 kg of hazardous medical waste treated.

Other pollutants

Every quarter, the company measures the amount of some environmental pollutants generated by the productive process, such as dioxins/furans (PCDDs/PCDFs) as well as polycyclic aromatic hydrocarbons (PAHs).

kg produced/1.000 kg of treated waste	
Other Pollutants production	Operative Processes Incineration of waste
PCDD and PCDF	0,0000000000359
PAH	0,0000001375

Table 6 – Other pollutants production with relation to the disposal of sanitary waste

In the incineration plant of Via Zotti waste containing radioactive elements is not treated.

Land Use

The indicator regards the occupied surface of the organization's buildings divided into the years of their lifetime. This indicator has been measured as occupied square meters each year.

Essere SpA uses an area of 36.000 m^2, 30.000 m^2 used by the productive plant and 6.000 m^2 used by the administrative offices.

The area is considered as 1.2.1 category – Industrial or Commercial units on the basis of the Corine Land Cover Classes.

For the calculation of the indicator is considered an average lifetime of 100 years and a disposal average of about 30,000 tons of hazardous medical waste / year.

[2] Within the LCA model only the 12% of electricity not produced by the organisation and picked up from the public electrical line (Italian energetic mix) has been considered.

m^2year	
Land Use	**Total**
	1,20

Table 7 – Land use

Smells

Smells in our company are undetectable given that the waste is gathered in plastic bags closed in high-density polyethylene containers. Smell emissions are controlled also because these containers are opened and emptied only shortly before that waste is disposed of through thermal destruction.

Noise

According to the acoustic zoning performed by the Municipality of Forlì, the plant is located in a zone in class VI with an acoustic limit of 70dB(A). The latest acoustic analyses carried out by our company show that all the surveys are within the limits of the law.

⁂ Additional Information

Impacts on Biodiversity

The area occupied by Essere SpA is considered as an industrial area and of no environmental importance, so the generated impacts don't affect biodiversity.
The productive plant is located within the Industrial Area of Coriano (Forlì); this is an anthropised area where industrial plants, agricultural areas and other buildings are located.
The waste treatment plant borders on agricultural areas and on urban waste and water treatment plants of Forlì.

Moreover, there are no risks associated to *soil pollution* because the ground is covered by the concrete floor of the industrial building where the facilities are located and the industrial yards are all paved.
In case of pollutant substance leak, it would be conveyed to the sewer through shafts and then to the water treatment plant of Essere SpA.

Differences versus previous versions of EPD

Variation in results between 2018 and 2019 can be attributed to self-production of electricity. In 2019, was produced and consumed more electricity than 2018.

Impact Category	Percentage Change 2017/2018
Climate changes - GWP100	-21,13%
Biogenic	+9,55%
Acidification - AP	-14,33%
Eutrophication - EP	-19,19%
Formation of Photochemical Oxidants - POCP	-17,83%

❸ INFORMATION AND REFERENCES

Registration Number: S-P-00145
Document valid until: 24.07.2021

EPD Verified by Rina Services S.p.A (www.rina.org)

⁂ Essere S.p.A. Contact

Environment Department Manager: Giorgio Damonte
Phone: +39 0543 724562
Fax: +39 0543 721781
E-mail address: info.essere@ecoeridania.it
Website: www.gruppoecoeridania.it

⁂ Information

This Environmental Product Declaration and further information are available on the website of IEC**:** www.environdec.com

⁂ References

- PCR 2008:02 – Solid Waste Disposal Services, version 3.0, 2015/04/07
- General Programme Instructions for EPD, V.2.5, 11/05/2015.
- Database Ecoinvent 3.4.
- Life cycle analysis related to collection and disposal services by means of thermal destruction of hazardous and infectious hospital waste carried out by Essere S.p.A., Review 20 of 24/08/2020
- Application of the Life Cycle Analysis to Buildings, European Commission, Directorate General XII, Regener Project, January 1997.
- Ecoinvent 2000 – Landfills – underground deposits – Landfarming, Gabor Doka, Doka Life Cycle Assessements.

PCR Review conducted by: Massimo Marino	The Technical Committee of the International EPD® System, Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:2006:	✓ EPD Verified
Third Part Verifier: Accredited or approved by:	RINA Services S.p.A. Via Corsica 12, I-16128 Genova (Italy) Phone: +39 010 53851 Fax: +39 010 5351000 ACCREDIA Accreditation Reg. n.: 001H

EPD within the same product category but from different programmes may not be comparable.

Glossary

ACIDIFICATION: It indicates a phenomenon by which precipitations have a lower pH than usual. It can cause damages to forests and crops, as well as to aquatic ecosystems and buildings. It is mainly due to SO_2, NOx and NH_3 emissions, included in the Acidification Potential (AP) and indicated in grams of SO_2.
NACE CODE: statistic classification of economic activities in the European Community.
EUTROPHICATION: it indicates an excessive growth of aquatic plants, caused by the presence of elevated doses of nutritional substances in the aquatic ecosystem (like nitrogen, phosphorus or sulfur). These substances, which usually come from either natural or anthropic sources, cause the surrounding environment to become asphyxiated. The EP indicator (Eutrophication Potential) is expressed in equivalent grams of PO_4.
FORMATION OF PHOTOCHEMICAL OXIDANTS: it indicates the production of compounds which can trigger an oxidization process in presence of light. This in turn leads to the production of ozone in the troposphere. The POCP (Photochemical Ozone Creation Potential) indicator includes in particular emissions of Volatile Organic Compounds (VOC), and is indicated in equivalent grams of ethylene (g C_2H_4).
GWP: this is an indicator (Global Warming Potential) which mostly includes emissions of carbon dioxide, the main greenhouse gas, as well as other gases with a lower level of absorption in terms of infrared rays, like methane (CH_4), nitrogen protoxide (N_2O) and chlorofluorocarbons (CFC). The indicator is given as a function of the level of emission of CO_2 (g CO2).
HDPE: High Density Polyethylene.
LCA: Life Cycle Assessment.
RS: Hazardous, potentially infective sanitary waste.