

MONITORING REPORT

Process of Non-Hazardous Agroindustrial Liquid Organic Waste

Document prepared by Worms Argentina S.A.

Version number 3 28/11/2024

Monitoring Report	
Name of project	Process of Non-Hazardous Agroindustrial Liquid Organic Waste
BCR Project ID	BCR-AR-763-13-002
Registration date of the project activity	11/04/2024
Project holder	WORMS ARGENTINA S.A.
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Version number of the Project Document applicable to this monitoring report	Version number 3
Applied methodology	AM0057 "Avoided emissions from biomass wastes through use as feed stock in pulp and paper, cardboard, fibreboard or bio-oil production", Version 3.0.1.
Project location (Country, Region, City)	Country: Argentina Region: Santa Fe City: Arroyo Seco

Monitoring Report	
Project starting date	01/01/2019
Quantification period of GHG reductions/removals	01/01/2019 to 31/12/2028
Monitoring period number	1
Monitoring period	01/01/2019 to 31/12/2023
Amount of emission reductions or removals achieved by the project in this monitoring period	157,699 ton CO ₂ e
Contribution to Sustainable Development Goals	<ul style="list-style-type: none"> - SDG 6. Clean water and sanitation. - SDG 9. Industry, Innovation and Infrastructure. - SDG 12. Responsible consumption and production - SDG 13. Climate action
Special category, related to co-benefits	No special category.

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1 General description of project

The project involves reducing the emission of methane into the atmosphere from the recovery of vegetable oil, from non-hazardous organic waste from bio-oil from agro-industries waste, that otherwise would have been left to decompose in a solid waste disposal site (SWDS).

As section 10.1.5 of the BCN Standard, this project is classified in sector 13 of the CDM: waste handling and disposal. This project includes the recovery of materials coming from waste in aim to reduce GHG emissions through utilizing waste.

The project applies the methodology outlined in sector 13 of the Clean Development Mechanism (CDM): Waste handling and disposal; specifically AM0057 “Avoided emissions from biomass wastes through use as feed stock in pulp and paper, cardboard, fibreboard or bio-oil production”, Version 3.0.1. This methodology is applicable because the project use agricultural wastes as feed stock for bio-oil production, and the end product is similar in characteristics and quality to existing high quality products in the market.

The final product of the project is a bio-oil from recovered fatty acids with industrial uses in biodiesel production.

1.1 Sectoral scope and project type

For the validation and verification of projects and program of activities by a designated operating entity (DOE) that uses this methodology, the application of sectoral scope 13 is mandatory. It is not a grouped Project.

The project type is “Activities related to Handling and disposing of waste”.

1.2 Project start date

The project’s start date is January 01, 2019, in accordance with BCR Standard section 10.4, because it’s the day that the first liquid waste enters in WORMS, which is recorded and can be corroborated through the truck entry records.


1.3 Project quantification period

Project quantification period is from 01/01/2019 to 31/12/2028 for a total of 10 years without renovation.

It is carried out annually for a period of 10 years, since 1/1/2019 to 31/12/2028.

For the first five years (from 1/1/2019 to 31/12/2023), the emissions have been verified because of the validation of amount of waste disposed and used by the project holder. For the next five years (01/01/2024 to 31/12/2028), the validation and verification will be carried out following BCR Standard version 3.3, at most every three years: second monitoring period since 01/01/2024 to 31/12/2026 and third monitoring period since 01/01/2027 to 31/12/2028.

1.4 Project location and project boundaries

<u>Physical address</u>	<u>Geographic coordinates/Other information</u>
Industrial Sector 3 Prof. Nucci St. S/N between Buenos Aires highway and San Martín street, Arroyo Seco, Santa Fe, Argentina	33°08'28.7"S, 60°32'09.3"W
https://maps.app.goo.gl/f7zR9nWNvqp5DuqMA	
	

The project boundary is defined as the physical, geographical location of the following:

The generation sites, where the liquid wastes are generated and gathered in order for the trucks to transport them to the waste treatment facilities in Worms Argentina, S.A. Without the project activity in these areas the liquid waste would be spilled in the sewers or deposited into landfills resulting in methane emissions.

The tanks area, where the liquid wastes (fatty acids and wastewater) are treated. It has a total capability of 1.219m³.

The pools system, with a total of two reception pools, three primary pools, three secondary pools, three tertiary pools and two lung pools. The total surface area occupied by the system is 19.427m² and a volume of 116.562m³.

Use of the recycled wastewater for watering the internal areas and facilities in Worms Argentina S.A. and also rural dusty roads after notifying the local government.

The transports between the generation sites and the liquid waste treatment facilities.

INCOME	PRODUCTION	DEPARTURES
<ul style="list-style-type: none"> - Bio-oils - Fatty acids - Fuel consumption until reaching the plant. <p>Both in the form of effluents or liquid waste originated in the vegetable oil production industries and bio-diesel industries.</p>	<ul style="list-style-type: none"> - Recovered fatty acids - Recovered water from wastewater recycling process. 	<ul style="list-style-type: none"> - Distribution. - Electricity consumption (included in production)

1.5 Summary Description of the Implementation Status of the Project

The project involves reducing the emission of methane into the atmosphere from the recovery of vegetable oil, from non-hazardous organic waste from bio-oil from agro-industries waste, that otherwise would have been left to decompose in a solid waste disposal site (SWDS).

As section 10.1.5 of the BCN Standard, this project is classified in sector 13 of the CDM: waste handling and disposal. This project includes the recovery of materials coming from waste in aim to reduce GHG emissions through utilizing waste.

The large amount of non-hazardous, waste in Argentina is estimated at 11,000,000 tons, only 10% is adequately treated. Worms Argentina S.A. efficiently transforms non-hazardous effluents from mostly biodiesel, and oil industries that produce GHG in the region and won't be treated otherwise. Worms Argentina S.A is certified as a ["B Corp" company](#) (a company that measures social and environmental impact and commits itself personally, institutionally and legally to make long-term action decisions in the community and environment).

Specific environmental treatment allows for the recovery of fatty acids and bio-oils that can be used by different industries and that otherwise would not be treated resulting in organic decomposition generating GHG. Worms Argentina S.A researches and provides viable and sustainable solutions to complex problems such as non-hazardous liquid waste.

The total GHG emission reductions or removals achieved in this monitoring period are:

Period	Baseline (tCO ₂ e)	Emission (tCO ₂ e)	Leakage (tCO ₂ e)	TOTAL EMISSIONS SAVINGS (tCO ₂ e)
01/01/2019 -31/12/2019	26,210	495	-	25,715
01/01/2020 - 31/12/2020	28,536	433	-	28,103
01/01/2021 - 31/12/2021	31,348	376	-	30,972
01/01/2022 - 31/12/2022	39,266	441	-	38,825
1/01/2023 – 31/12/2023	34,538	454	-	34,084
TOTAL	159,898	2,199	-	157,699

2 Title, reference and version of the baseline and monitoring methodology applied to the project

AM0057 "Avoided emissions from biomass wastes through use as feed stock in pulp and paper, cardboard, fibreboard or bio-oil production", Version 3.0.1.

Tools applied:

- Tool 3. Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion. Version 03.0
- Tool 4. Emissions from solid waste disposal sites. Version 08.1.
- Tool 5. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation. Version 03.0.

3 Registry or participation under other GHG Programs/Registries

Not applicable because the project is not in other GHG program.

4 Contribution to Sustainable Development Goals (SGD)

The monitoring will be done in relation to the tool based on the BioCarbon Registry format as specified in the SDG-Liquidos file. This project is aligned with four SDG:

-SDG 6. Clean water and sanitation: Specifically, the contribution is in the global target 6.3: by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally; with the indicator 6.3.1. “proportion of wastewater safely treated”. The project involves the separation of the water phase from bio-oils and fatty acids and its re-use for watering, so the contribution to this SDG is in tones of effluents treated by period.

SDG, global target and project activity (UNIT)	MONITORING PERIOD
6.3.“proportion of wastewater safely treated”. (Tons of effluents treated)	1/january/2019 to 31/december/2023 531.465,23

-SDG 9. Industry, Innovation and Infrastructure: Promote inclusive and sustainable industrialization and, by 2030, significantly increase the share of industry in employment and gross domestic product, according to national circumstances, and double its share in least developed countries; by the creation of local and quality employment in an innovative project of a sustainable industries. Specifically, the contribution is in the global target 9.2, with indicator 9.2.2. Manufacturing employment as a proportion of total employment. The project involves the increase of proportion of local people employed (in total number of employees).

SDG, global target and project activity (UNIT)	MONITORING PERIOD
	1/january/2019 to 31/december/2023
9.2. Proportion of local people employed in total number of employees (%)	40%

-SDG 12. Responsible consumption and production: Specifically, the contribution is in the global target 12.5 “by 2030, substantially reduce waste generation through prevention reduction, recycling and reuse”, indicator 12.5.1. National recycling rate, tons of material recycled. The project involves the recovered of Bio-oils and fatty acids from effluents and non hazardous wastewater, so the treatment of these effluents becomes a great apportionation to SDG 12.

SDG, global target and project activity (UNIT)	MONITORING PERIOD
	1/january/2019 to 31/december/2023
12.5. Bio-oils and fatty acids recovered from effluents and non hazardous wastewater (tons)	531.465,23

-SDG 13 - Climate action: Continue along the same path in the fight against climate change; The project involves reducing the emission of methane into the

atmosphere from organic matter (from non-hazardous organic waste from biodiesel and oil industries mainly) contained in non-hazardous wastewater and effluents that otherwise would have been left to decompose generating GHG. Specifically, the project contributes to global target number 13.2. with the emission reduction of the project activity, because the project involves reducing the emissions of methane into the atmosphere from organic matter. So, the activity unit of measurement is the tons of CO₂ e reduced by the project activity.

SDG, global target and project activity (UNIT)	MONITORING PERIOD
	1/january/2019 to 31/december/2023
13.2. Emissions Reductions of the Project activity (t CO ₂ e)	157.699

5 Compliance with Applicable Legislation

Worms Argentina S.A. complies with all the regulations required at local, regional and national level, in addition to having updated all the necessary permits, as shown by the following links to the documents.

- 7-Otorgamiento uso conforme de suelo A. Seco 29-06-2017
- 34-Habilitación Municipal Planta A. Seco - Resol. N° 024-18 - 16.03.2018
- 27-Resol. N° 523 WORMS ARG. S.A. EIA
- 55-Disp. 287-19 Renovación Reg. RT 0029
- Permiso vuelco de efluentes 21-06-19 WORMS
- 2-WORMS Renovación directorio 2021

6 Climate change adaptation

Worms Argentina S.A. is dedicated to specific environmental sanitation tasks that seek to contribute to the development of a balance between society, business and the environment, for which it is responsible for researching and providing viable and sustainable solutions to complex issues such as bio-oil and agriculture waste. Specific environmental sanitation tasks contribute to the development of a balance between society, business and the environment, Worms Argentina S.A

researches and provides viable solutions and sustainable solutions to complex problems such as non-hazardous oil waste by the treatment of this waste.

All of those purposes are reflected in the B Corp certification and documents, that demonstrate the environmental, legal and social commitment with the community, the environment and itself.

The project objective is to obtain a valuable product (bio-oil) at the same time that the carbon footprint of the liquid waste treatment is reduced. The entire project base it's activity in waste valorization, generating bio-oils from recovering fatty acids from agro-industrial, oil industries and other industrial wastes for its use in other industries and process such as biodiesel production.

During the duration of the project the goal is to increase the capability of waste reception and treatment which will result in an increase of the prevent emissions. This increase has only been temporarily affected by the climate conditions as a consequence of the drought in 2023.

7 Carbon ownership and rights

The owner of the project is Worms Argentina S.A. All the carbons rights will remain within the company Worms Argentina S.A.

The project location corresponds with an area where there are not indigenous communities or traditional territories according to the Indigenous Affairs Institute INAI (Instituto Nacional de Asuntos Indígenas in spanish), the governmental body of Argentina that regulates and controlled issues related with traditional and ingenuous communities with in the country.

The following map provides information of the Territories with actual Occupation, Traditional and Public according to the law 26.160 that clearly specifies that there are not indigenous territories near the project location or spatial limit.



Figure 6. Map of territories with current, traditional and public occupation (Law 26,160) of the Indigenous Affairs Institute. (Source: INAI [Instituto Nacional de Asuntos Indígenas](#)”.

Worms Argentina S.A. is the owner of the land and the main stakeholder and responsible for production, assuming all the costs, risks and will be the one in control of the carbon rights that will remain in its entirety with in the company.

Worms Argentina S.A. will have a 100% of the carbon rights and although it will continue with its collaborations and activities with local communities and stakeholders for social actions, there is no need of additional agreements regarding this topic.

8 Environmental Aspects

Worms Argentina S.A. executes a series of control programs in order to comply with regulations and maintain the best practices available in its management and quality system. The main programs are described below and reports condensing soil, water and air monitoring are attached.

SOIL RESOURCE PROTECTION PROGRAM

Hazardous Waste Management Subprogram:

This Subprogram is based on the segregation of hazardous waste streams at their generation points. The operating personnel will be trained and made aware of the areas where the generation of hazardous waste is foreseeable.

In the eventual case of receiving improper or rejects with dangerous characteristics, they will be stored in compliance with current regulations, and subsequent referral to an authorized operator according to the current in question.

Drainage and Flooding Control Subprogram:

The construction works of the internal circulation roads and transport parking areas were carried out respecting the natural drainage conditions of the land, avoiding the generation of flooding inside the property.

Likewise, the maintenance of the internal protection channels and the external pluvial drainage channels is carried out, controlling the clogging and vegetation in them.

WATER RESOURCE PROTECTION PROGRAM

Groundwater monitoring subprogram

From the construction of the extraction well, a sampling of the resource extracted from the aquifer will be carried out in order to determine the base conditions and their variation over time. The objective of the monitoring will be to ensure the quality of the water extracted and at the same time determine that the extraction carried out does not affect the hydrogeological profile of the resource.

Number of samples: 1.

Sampling Point: underground water extraction well.

Maximum admissible limits (LMA): s/Annex A of Law 11,220.

<u>Parameter</u>	<u>Annual Frequency</u>	<u>Optional Analyzes</u>
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Turbidity	X	
Color	X	
Smell and taste	X	
Ph	X	
Total Alkalinity	X	
Total hardness		X
Chloride		X
Sulfate		X
Magnesium		X
Fluorine		X
Arsenic	X	
Lead		X
Nitrites	X	
Nitrates	X	
Ammonia		X
Iron		X
Total dissolved solids	X	
Conductivity	X	
Bacteriological: total aerobes, total coliforms, Escherichia coli, Pseudomonas aeruginosa	X	

AIR QUALITY REPORT

Worms Argentina S.A. has prepared a report with the objective of determine the concentration of Suspended Particulate Matter (PM10) and Hydrogen Sulfide in the air, in four (4) assigned monitoring posts, for a short measurement period (20 min).

The work has been carried out under standardized procedures, by trained personnel and through the use of equipment and instruments developed for this purpose. HSE Engineering guarantees the veracity of the information contained in this report and its confidentiality.

The environmental regulation applicable to this monitoring report is the Resolution N° 201/04 – Air quality guide levels for province of Santa Fe.

<u>Contaminants</u>	<u>C.A.P.C. (20 min) mg/m³</u>
particulate matter (PM10)	0.50
Hydrogen sulfide (H2S)	—

The methodologies applied were:

EPA1 Method IO-2.3: Reference standard for determining suspended particulate matter (such as PM10) for short monitoring periods (20 min.).

Methods of Air Sampling and Analysis (Third Edition) - 701: Standard method for determination of hydrogen sulfide in the atmosphere.

Four SKC model 1700 air sampling equipment with a PM10 cyclone and an impingers system containing a capture solution for H2S were used.

MONITORING DESCRIPTION

The monitoring positions were recorded with the applicant. They were located around the plant, arranged as shown in the following image:



The equipment was installed and put into operation on 11/04/2021.

At the time of monitoring, the following data was recorded:

Temperature	Humidity	Pressure	Visibility	Wind - Dir	Wind - speed	Precipitation	Weather Conditions
28°	33 %	1003.73 HPa	14 Km/h	SO	9 Km/h	N/A	Partly cloudy

RESULTS

The results obtained are presented below:

PARAMETERS	Point 1 CA-01	Point 2 CA-02	Point 3 CA-03	Point 4 CA-04	UNIT	Guide Level *
particulate matter PM10	0,07	0,11	0,008	0,007	mg/m ³	0,50
Hydrogen sulfide (H ₂ S)	Not detected	Not detected	Not detected	Not detected	mg/m ³	-

* NOTE: Analysis Protocol No. 2254-2255-2256-2257 issued by the HSE Laboratory is attached.

CONCLUSION

In accordance with the provisions of Resolution 201/04 of the Secretary of the Environment of the Province of Santa Fe, all the monitoring points of the Plant belonging to the company Worms Argentina S.A. - from the town of Arroyo Seco - COMPLY with the guide values established as maximum concentration in short periods (C.A.P.C.), for all the parameters analyzed: Suspended Particulate Matter and Hydrogen Sulfide (H₂S).

WATER QUALITY ANALYSIS

Worms Argentina S.A has prepared a report with the objective of determine and evaluate the concentration of the following parameters in the effluent: pH, color, conductivity, turbidity, solids in total suspension, bod, cod, total coliforms and fecal coliforms.

This report was prepared based on the results obtained from the monitoring carried out at the request of Worms Argentina S.A – Dry Creek (Sta. Fe). The work has been carried out under standardized procedures, by trained personnel and through the use of equipment and instruments developed for this purpose. HSE Engineering guarantees the veracity of the information contained in this document and its confidentiality.

The analytical determinations to which the water samples obtained from the monitored wells were subjected were selected as required by Law 11,220 Annex A, identical parameters and limits established in Provincial Resolution No. 1089/82 Annex A (Limits for the provision of drinking water).

Said law provides for the regulation of service provision and provides for a system for the preservation of natural resources and the environment.

The purposes of this law are to guarantee the maintenance and promote the rehabilitation, improvement and development of the service throughout the province of Santa Fe, to establish the standards that ensure quality and efficiency levels consistent with the nature of the service, to establish an adequate legal framework that allows reconciling an efficient and effective provision of the service by providers, with the proper exercise of state powers related to the protection of the health interest, the welfare of the population, and the environment and natural resources throughout the province of Santa Fe.

The sampling methodology used is that recommended in the manual of Standardized Methods for the Analysis of Potable and Residual Water published by the APHA-AWWA-WEF1, 23rd edition.

All analytical determinations are performed using international standardized methods.

Methods from the manual of Standardized Methods for the Analysis of Drinking and Wastewater published by the APHA-AWWA-WEF, 23rd edition, together with the EPA 481.1 standard, are currently used.

MONITORING DESCRIPTION

The sampling was carried out in the corresponding phreatic wells that the company has for this purpose. It was only possible to take samples from wells 1, 2, 6, 7 and 8, since the rest of the parameters were dry. The following image shows the location of the water meters on the property, with their respective coordinates. The sampling was carried out on 11/04/2021.

P4 (blanco)	33° 8'29.90"S; 60°32'18.30"O
P1	33° 8'35.00"S; 60°32'2.20"O
P2	33° 8'38.30"S; 60°32'9.40"O
P3	33° 8'31.60"S; 60°32'8.00"O
P5	33° 8'28.86"S; 60°32'6.10"O
P6	33° 8'33.29"S; 60°31'57.93"O
P7	33° 8'30.24"S; 60°31'53.03"O
P8	33° 8'26.91"S; 60°31'55.52"O



RESULTS: The results obtained by the analysis laboratory are presented below:

<u>PARAMETERS</u>	<u>LC</u>	<u>UNIT</u>	<u>P1</u>	<u>P2</u>	<u>P6</u>	<u>P7</u>	<u>P8</u>	<u>LIMIT</u>
Color	1	PI/Co	1					20
Conductivity	0,1	µS/cm	935	734	804	170 1	805	-
BIOCHEMICAL DEMAND FOR OXYGEN (DBO)	10	mg/l	N/D	N/D	N/D	N/D	N/D	-
CHEMICAL DEMAND OF OXYGEN (DQO)	5	mg/l	N/D	N/D	N/D	N/D	N/D	-
PH	-	UpH	7,4					-
SOLIDS IN SUSPENSION TOTALS (SST)	1	mg/l	<1	<1	<1	<1	<1	-
Turbidity	1	UNT	<1					
FECAL COLIFORMS	2,2	NMP/100ml	<1,1	<1,1	<1,1	<1,1	<1, 1	<2,2
TOTAL COLIFORMS	2,2	NMP/100ml	<1,1	<1,1	<1,1	<1,1	<1, 1	<2,2

* NOTE: Analysis Protocol No. 2258-2259-2260-2261-2262 issued by the HSE Engineering Laboratory is attached.

CONCLUSION

In accordance with the guide values established for the parameters legislated in Provincial Resolution No. 1089/82 Annex A (Limits for the provision of drinking water), the analytes are below said established limit values.

Likewise, groundwater is not used as a source of drinking water supply, but with its control it must be verified that there has been no impact on the water resource in relation to the inputs, raw materials and products used in the production. industrial activity developed in the complex.

Observing the results, it can be stated that there are no impacts that negatively affect the groundwater resource at the groundwater level.

ADDITIONAL ENVIRONMENTAL MEASURES:

In addition to the measures already described there are certain actions conducted within the organization facilities aiming to improve the general environmental conditions.

Tree barriers: all around the borders of the installations tree barriers have been installed to avoid visual and odor impacts generated.

Sand roads irrigation: the irrigation of the sand roads using regenerated water as byproduct of the liquid waste treatment prevents particle pollution by minimizing the effects of particulate matter produced by the intense truck traffic.

9 Socioeconomic Aspects

As a B Corporation (BCorp) certified company, Worms S.A. analyses social aspects as part of its focus on social and environmental impact. The B Corp certification is an international standard that assesses the social and environmental responsibility of companies, beyond economic profitability. This certification is the result of the effort to become a sustainable company that considers society as the main part of the project.

Since its inception, Worms has analyzed the main socio-economic effects of its activities. Before the start of the process, an analysis of the demographic and labor analysis was analyzed: based on official statistic datas of Argentina and Arroyo Seco governments (<https://www.municipalidad->

argentina.com.ar/municipalidad-arroyo-seco-s.html ;
<https://www.arroyoseco.gov.ar/web/>), an analysis of the population in the immediate surroundings was carried out. According to these sources, the population of Arroyo Seco is around 20,000 inhabitants and its economy is based mainly on agricultural and livestock activities. This environment makes it a great support for Rosario. Being close to Rosario, many inhabitants work in that city, so there is a large constant flow of people who depend on that other city. Arroyo Seco is surrounded by fields where soybeans, corn, wheat and sunflowers are grown, as well as land for cattle raising. In terms of poverty, economic crises have greatly affected this agricultural sector, generating a reduction in purchasing power and an increase in the unemployed population.

Taking into account this analysis of the socio-economic situation of the environment closest to Worms, S.A. the environment close to the facilities was analyzed:

- Close population: the installations are more than 2 kilometers from the nearest population center (Arroyo Seco), there is no houses nearby.
- Neighborhood conditions: the boundaries of Worms S.A. are farmland and other companies: pig farm and agricultural land. The access roads to the facilities are made of dirt, which can lead to dust being raised when entering.
- Indigenous communities or traditional territories: the project location corresponds with an area where there are not indigenous communities or traditional territories according to the Indigenous Affairs Institute INAI (Instituto Nacional de Asuntos Indígenas in spanish), the governmental body of Argentina that regulates and controlled issues related with traditional and ingenuous communities with in the country.

Taking into account this initial situation, the socioeconomic effects of this project are:

- Improvement of the environment.
- Increase in local employment.
- Give a second life to the waste generated by neighbouring companies.

All these impacts are positive, not generating relevant negative effects, so following the BCR tool No Net Harm, no corrective actions and measures are established.

The project activities do not cause harm to local communities or society in general.

10 Stakeholders' Consultation

Worms Argentina S.A. has formal and regular processes for gathering information from stakeholders (focus groups, surveys, community meetings, neighbors, authorities, etc.) and has not received any negative feedback from them so far. In the other hand, is focusing in improving the positive impact in the community.

Worms Argentina S.A. has made a consultation with the principal stakeholders. All the information of the project can be consulted in our website <https://worms.ar/> or in our social media: Instagram, Twitter, LinkedIn and Facebook. These platforms remain open throughout the project to facilitate access to all information related to the project, as well as its potential environmental and social effects.

As a BCorp company, stakeholders are essential for Worms Argentina S.A., since its mission is to create value not only for shareholders, but also for society and the environment. Worms Argentina S.A. takes a complete approach about the role of the company in the environment and the society, by creating excellent relations and being active in sharing knowledge and creating awareness about the project.

All stakeholders have been consulted and are invited to provide comments. Appropriate mechanisms are also in place for them to provide comments on an ongoing basis throughout the project development. All stakeholders are involved in the process in an appropriate manner. Also, every year Worms Argentina S.A. makes a general mapping of social organizations and analysis of the areas we work with (impact areas) to evaluate which ones we identify with and begin to generate networks and joint projects.

The stakeholders detected and their influence on the project are following:

Local community:

Although the company is located more than 2 kilometers from the nearest population center (Arroyo Seco), and considering that there are no indigenous populations in the

area, Worms Argentina S.A. believes it is important to improve its immediate surroundings and create a positive impact on the local community.

The actions to include all the interested parties by the local community are:

- Yearly meetings: by having yearly meetings with local authorities and with neighbors to discuss the different actions that can be taking to support different initiatives.
- Visits to the premises: by organizing visits to the premises in order to create awareness about the project and the positive impact, by donating compost for local gardens.

From these meetings, Worms Argentina S.A. took the initiative to improve the road that goes to the premises and is taking all corrective actions needed to avoid any problem for the rest of the users of the road. Minutes are taken from all these meetings, signed by both parties, which record all the suggestions, complaints from the community and all the actions that Worms will take to resolve them.

Since the start of the project, meetings with local community have collected comments about the dust generated on the unpaved roads surrounding the company. This meetings take place at the Worms Argentina S.A. facilities, accompanied by a visit to the same. Since the roads are not paved, the traffic of trucks causes dust to rise and wear them out more than they should.

Over the years, agreements with local communities have been maintained.

To avoid raising dust, Worms Argentina S.A. has taken the decision to increase irrigation with its treated effluent and thus not have to use fresh water, keeping the roads as dust-free as possible and improving the well-being of residents. This can be seen reflected in the minutes with the community of December 23, 2018, November 15, 2019, November 10, 2020, December 1, 2021, December 15, 2022 and December 18, 2023.

- Suggestion book and box: also, the company has and implemented a book of complaints and suggestions and a suggestion box as well open to the community in the area where the non-hazardous organic waste processing plant is located. This book reflects that there have been no comments in the five years of the project.
- Donations: on the other hand and in addition to road maintenance and infrastructure improvements, Worms makes charitable donations to local organizations. The donations are directed to those civil and/or commercial organizations of the town of Arroyo Seco, since Worms Argentina S.A is committed to developing the local territory in which our

production plant is located. Worms Argentina S.A makes monetary donations to Volunteer Firefighters of the town of Arroyo Seco.

Local Authorities:

The local authorities have a big influence in the authorizations and regulations of the project activity. Hence, Worms S.A. maintains a close relationship with local authorities through different mechanisms: by having regular meetings to get the licenses and all necessary local authorizations, before the project start, and therefore every time that needs renovation, also every year by visiting the municipality and asking them for direct feedback.

In addition to the regular meetings held with local authorities regarding the licenses and authorizations required to develop the project, numerous visits have also been made to the facilities over the years.

During this first visit (13/06/2020) by the deputy of the province of Santa Fe, Maximiliano Pullaro, and his advisors, they were informed of the innovative and entrepreneurial activity of Worms S.A. and visited the facilities to learn about our project first-hand. (<https://twitter.com/WormsSA/status/1271927365594230785?cxt=HHwWqsC95ebM5aYjAAAA>). The comments received were very positive, highly appreciating the innovative spirit that generates jobs and enriches the province, in addition to safeguarding the planet.

National and Regional Authorities:

Worms collaborates with different authorities to support with the expertise in the development of the sustainability in the Country, by organizing meetings in their premises.

From a national point of view, the visit of the Minister of Productive Development of the Argentine Republic (Matias Kulfas) has been received at the facilities. He himself has declared that the circular economy is 1 of the 4 axes of the Green Productive Development Plan promoted by the Nation, being a plan to reduce the environmental impact of its productive activities and will allow the generation of more jobs. (<https://twitter.com/KulfasM/status/1453851371195744256?cxt=HHwWgICyhdGHj60oAAA>, <https://twitter.com/WormsSA/status/1453861053650120724?cxt=HHwWqMC5-Zy7k60oAAAA>). He himself has declared that the circular economy is 1 of the 4 axes of the Green Productive Development Plan promoted by the Nation, being a plan to reduce

the environmental impact of its productive activities and will allow the generation of more jobs.

We also received a visit (6/2/2021) from the Minister of Production of the Nation (Daniel Schteingart) with his team, interested in the continuous improvements of his projects. (<https://x.com/WormsSA/status/1358163038558388224>; <https://twitter.com/WormsSA/status/1363628583772635141?cxt=HHwWioCy1Zu-yuwlAAAA>). Schteingart and his team toured the facilities and discussed the different production processes. The minister praised our actions and contribution to the planet through the circular economy.

Workers:

The company has a commitment to workers, considering them as key agents in the creation of social and environmental value. The actions and mechanisms that are taken to promote, include and interact with employees are the following:

- Employee handbook: the purpose of the employee handbook is to inform Worms Argentina S.A.'s general policies, standards, procedures and benefits. This handbook helps the organization to have a more effective and efficient operation, to maintain an optimal work environment for all employees and to generate awareness of why our company exists.
- Work environment survey: Worms Argentina S.A. strives to provide a friendly environment in which people thrive, accept challenges, develop themselves by fulfilling their goals and those of the company. Also, the company values the talents and abilities of its employees and seeks to foster an open, cooperative and dynamic environment in which both they and the company can thrive.
- Inclusive searches mechanism and recruitment policy: Worms Argentina S.A. encourages the search for professionals and collaborators who are promoters of a corporate and social culture, committed to caring for the environment and that contemplates integration without distinction of gender, sexual preferences, different abilities, ideology, religion. Also, Worms prioritizes hiring local workers.
- Performance evaluation policy: Worms Argentina S.A. continuously diagnoses and evaluates the comprehensive management of human capital, psycho-social conditions, and the degree of employee satisfaction with their team and the company. To do so, Worms Argentina S.A. has a performance evaluation system and implements work environment surveys.

All these actions allows to collect workers' point of view of the project on an ongoing basis.

Among all the measures taken to analyse employee satisfaction, such as surveys, suggestion books and other mechanisms and satisfaction policies, no negative comments have been recorded about the project.

Suppliers:

Counting on products that are not raw material of these project, more than 80% of suppliers are national, spending on local suppliers is more than 60%, contributing to the improvement of socio-economic conditions in the local community. Besides, all waste suppliers are localized in less than 200 km around the installations of Worms Argentina S.A.

All suppliers adhere to the Supplier Code of Conduct. We are committed to strengthening communication and establishing common criteria and bases with our suppliers to contribute together to sustainable development. Worms Argentina S.A. do not maintain business relations with companies that do not comply with requirements as transparency, environmental protection or SDG alignment. Also, Worms S.A. has a continuous communication process and open communication channels with its suppliers to receive complaints and suggestions and to show closeness and transparency.

In addition to the usual communications with suppliers due to the daily actions of the project, each supplier adheres to our code of conduct through the signing of the agreement. To date, no comments have been received from suppliers. In fact, Worms Argentina S.A. has always received praise when presenting and signing the agreements, given its great commitment to the planet and society.

Customers:

As the Customer Satisfaction Procedure establishes, Worms Argentina S.A: sends a customer satisfaction surveys to all customers after delivery of units. The objective of this surveys is the determination of the degree of satisfaction and perception regarding the degree of compliance with respect to the services provided. All comments were related to minor procedures such as the delivery of products and have been immediately resolved by the work team.

In summary, the company maintains its way of working and continuously improves to continue in the fight against climate change, investing in technology to achieve its objectives; and the most important thing is that to date the company has no complaints from the neighboring population regarding the treatments it carries out without generating odors. As mentioned before, Worms Argentina S.A. has no received comments about the development of the project. However, all communication channels remain open to achieve continuous improvement and to maintain the good work of the project.

11 REDD+ Safeguards

Not applicable because it's not a REDD+ project.

12 Special categories, related to co-benefits

Not applicable because the project is not a special category.

13 Grouped Projects

Not applicable because it's not grouped project.

14 Implementation of the project

14.1 Implementation status of the project

- 1. The starting date of operation of the project and, the operation of the project activities during this monitoring period. The description shall include any information on events that may impact the GHG emission reductions or removals and monitoring;*

01/01/2019 to 31/12/2023. There were no events that could impact the reductions or removals of GHG emissions and their monitoring during this monitoring period.

- 2. For project activities that consist of more than one site, the report shall clearly describe the status of implementation and starting date of operation for each site;*

Not applicable because the project is not in more than one site.

- 3. The information regarding the actual operation of the project during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc.;*

There were no special events during this monitoring period.

- 4. A brief description of: (i) events or situations that occurred during the monitoring period, which may impact the applicability of the methodology, and (ii) how the issues resulting from these events or situations are being addressed.*

There were no special events, situations or issues during this monitoring period.

For AFOLU projects, also provide a description of the following:

- 1. Not Applicable because it's not an AFOLU project.*
- 2. Not Applicable because it's not an AFOLU project.*
- 3. Not Applicable because it's not an AFOLU project.*

14.2 Revision of monitoring plan

Not applicable. The monitoring plan has not been revised.

14.3 Request for deviation applied to this monitoring period

Not applicable because this is the first monitoring period.

14.4 Notification or request of approval of changes

Not applicable because this is the first monitoring period.

15 Monitoring system

15.1 Description of the monitoring plan

Following the BCR Standard, the monitoring plan is designed to ensure that both the project process and all the data required to calculate the GHG mitigation are constantly updated and allow the project to be more efficient, detect possible problems or threats and implement contingency and improvement plans when required.

a) Project boundary monitoring

The project boundary is defined as the physical, geographical location of the following:

- a) The landfill sites, where the solid waste would have been disposed and the methane emission occurs in absence of the proposed project activity;
 - b) The composting facility, where the treatment of biomass through composting takes place;
 - c) Consumer places where the compost is handled, disposed, submitted to soil application;
 - d) And the itineraries between b and c where the transportation of compost occurs.
- It should be noted that the waste transportation itineraries between a & b are not considered as the project site is located next to the landfill site.

As part of the usual operation of the installations, the project boundary monitoring consists of a surveillance and control service that controls that there are no interferences with regular activity by any external or uncontrolled element within the project boundary.

b) Monitoring of the execution of project activities

The liquid non-hazardous waste received in Worms Argentina S.A. installations used to be dispatched or delivered in to landfills because there was not a specific local regulation neither a suitable space for correct treatment, being the other option to send the residues and wastes to the Buenos Aires province, located at more than 350 km. Since the opening of the treatment facilities in Worms Argentina S.A. all the problems related with the accumulation in landfills of the effluents and liquid wastes, the interaction with wildlife elements that transmits diseases and the deterioration of aquatic ecosystems and landscapes have been mitigated and, in some cases, completely avoided.

All the environmental measures and monitoring programs within the installations are conducted annually as specified in the registers as well as the calibration of the scale for the cargo weight control. All this documentation is presented to the Instituto Nacional de Tecnología Industrial (INTI), the national organization that verifies and inspect these parameters to authorize the exportation of products.

Worms has a manual of the Integrated Management System that details:

- 1) The objective of establishing a methodology to ensure the quality of the fatty acids recover in Worms Argentina S.A.

2) The goal to recover fatty acids with export quality levels.

3) Definitions of the fatty acids as the vegetal fatty acids obtained from the processing and/or refining of vegetal-oils. During this process the triglycerides are separated from the free fatty acids originated by neutralization soapstock by heat treatment process.

The fatty acids in Worms Argentina are generated from the recovery of sub-products in the sunflower, soy, corn and peanut oil production.

4) Responsible

Position	Responsibility
Direction	Provide the Organization with infrastructure, equipment and supplies necessities to comply with this procedure.
Laboratory analyst	Carry out the process and product quality controls defined in this procedure.
Production supervisor	Supervise operational staff in the compliance with the best practices for fatty acids recovery.
Operational staff	<ul style="list-style-type: none"> - Comply with the instructions of the production supervisor considering the lab results for quality assessments of the fatty acids. - Report any anomalous situation that would be detected in the development of their tasks.

5) Procedure

1) Once the cargo has been accepted by the Quality Control Laboratory and the Process Plant Personal has been informed of the effluent contents, they determinate which one of the three alternatives must be applied:

- a) Downloading of the truck into conical plastic tanks of 35 m³ of capacitance.
- b) Downloading of the truck into heated tanks or trays.
- c) Dumping the truck's content into treatment pools.

2) The decision towards how to proceed according to one of the three alternatives previously mentioned is taken by the person in control of the treatment pools.

The alternative (a) is applied when the lab reports the presence of an important quantity of fatty acids in liquid state at room temperature, which is easily separated with in the plastic tanks in a 12/48 hs period. Once the separation is finalized the water phase which still contains traces of fatty acids is purged in the treatment pools. The fatty acids separated are located into vertical plastic tanks of 25m³ of capacity destined to the final product.

The alternative (b) is applied when the lab reports the presence of an important quantity of fatty acids highly emulsified with the rest of the effluent fractions. In this case, the effluents are placed in one of the two 40 tons tanks or in the open heated tank of 27 tons. The effluents are heated until it reaches temperatures of 60/70°C to stop the emulsification and facilitate the water separation. After 12 hours the separated water is sent to the treatment pools and the fatty acids are stored in the final products tanks.

The alternative (c) is applied when the content of fatty acids reported by the lab is low. This material together with the separated water from the alternatives (a) and (b) is treated by natural sun radiation. The effluents are located in one of the three primary pools where daily liberates an important quantity of fatty acids as the pools behave as almost an ideal black body, absorbing enormous quantities of infrared radiation bringing the temperature to values above 67°C, resulting in the separation of the fatty acids. Those are recovered with contention barriers similar to the ones used to control oils and petrol spills. The fatty acids are physically gathered in one of the corners of the pool by these barriers and recover with a vacuum pump installed in a truck or in a vacuum tank. The recovered product is purged in the truck or the vacuum tank and the fatty acids are placed in the final product tanks.

3) The funds of the three primary pools are sent to the three secondary pools using submersible pumps. In them, the solar action described above continues to release fatty acids, although to a lesser extent, that is collected again with the procedure described previously.

4) The funds of the three secondary pools are transferred to the three tertiary pools, where some amount of fatty acids are still liberated, that are recovered by the same procedure already described in previous points, although in less quantity.

5) The funds of the three tertiary pools are sent to the final effluent pool. These funds, almost entirely composed of water, retain some amount of organic matter and other nutrients that, despite not having commercial value because their separation is already

very expensive, are suitable for the irrigation of compost piles generated during the treatment of solid waste in the plant, and for the irrigation of the sand roads.

6) Registry

REGISTRY	RESPONSIBLE	ARCHIEVE		FORMAT	HOLDING TIME	DISPOSAL
		RESPONSIBLE	PLACE			
Income Control Of Suppliers	Production Supervisor	Production Supervisor	Shared Resource	Digital	Undefined	Passive Archive
Production And Storage Record	Production Supervisor	Production Supervisor	Shared Resource	Digital	Undefined	Passive Archive
Raw Materials And Product Quality Registration	Laboratory Analyst	Laboratory Analyst	Shared Resource	Digital	Undefined	Passive Archive

c) Monitoring of the quantification of project emission reduction/removals

Project emission is due to both fuel and electricity consumption as well as the emissions from the composting process itself:

Parameter	Monitoring action
Fossil fuel consumption	<ul style="list-style-type: none"> - Control of consumption: based on the quantity of fuel purchased, invoices received will be controlled and correctly recorded. - Monitoring and periodic control of compost piles to adjust the use of machinery use to flip the piles and that way minimizing the emissions from trucks movement and machinery.

	- Number of flips and hours of use of the trucks and machinery base on internal records and suppliers provided information.
Energy consumption	- Consumption of electricity based on suppliers' information.

d) Quality control and quality assurance procedures

To guarantee the quality of the production of Worms Argentina S.A. control procedures are carried out by performing chemical and bacteriological analyses. Documented information referring to the inscriptions of the products of Worms Argentina S.A. is attached hereto, used as soil amendment by Servicio Nacional de Sanidad y Calidad Agroalimentaria (SENASA).

The company gradually incorporates into its practices the guidelines of Joint Resolution N° 1/2019 (RESFC-2019-1-APN-SECCYMA#SGP) issued by the NAC SERVICE OF HEALTH AND AGRO-FOOD QUALITY and the SECRETARY OF ENVIRONMENTAL CONTROL AND MONITORING of the Nation that approves the REGULATORY FRAMEWORK FOR THE PRODUCTION, REGISTRATION AND APPLICATION OF COMPOST.

However, it is necessary to sanction a provincial rule that adopts it in the local legal system (or one that establishes the conditions for regulating the activity at the Provincial discretion), as well as the adaptation and updating of regulations by SENASA.

Notwithstanding this, to date the firm is in the process of managing a new application for registration in the National Registry of Fertilizers, Amendments, Substrates, Conditioners, Protectors and Raw Materials within the framework of this Resolution.

e) Verification of field data and review of information processing

All the results of analysis and control are double checked between the operators and the person responsible of the lab. This double verification allows to ensure that there parameters and datas are correct and the process is not committed. All the data recovered are annually audited and checked by the manager of the company and the production manager.

f) Data recording and archiving system

All information regarding waste and residue entrance as well as compost produce and sell is adequately preserved in a physical archive. All information coming from suppliers, clients and any other part intervening in the project activity is also preserved.

In order to improve the efficiency of the recording and archiving system, a digitalization process has already started to keep both a physical and on-line registries of the data parameters and information regardless the entire monitoring plan and all the compatible procedures (environmental, safety and quality control procedures, etc.).

g) Specification of any potential emissions that would occur outside the project boundary as a result of GHG project activities (leakage)

Not applicable because there is no leakage in this project.

h) Information related to the environmental impact assessment of the GHG project activities

The information regarding the environmental impact assessment could be segregated depending on the natural resource impacted.

Resource	Protection program
Soil	<ul style="list-style-type: none"> - Hazardous waste management subprogram: this Subprogram is based on the segregation of hazardous waste streams at their generation points. The operating personnel will be trained and made aware of the areas where the generation of hazardous waste is foreseeable. - Drainage and Flooding Control Subprogram: the construction works of the internal circulation roads and transport parking areas were carried out respecting the natural drainage conditions of the land, avoiding the generation of flooding inside the property. Likewise, the maintenance of the internal protection channels and the external pluvial drainage channels is carried out, controlling the clogging and vegetation in them.
Water	<ul style="list-style-type: none"> - Groundwater monitoring subprogram: from the construction of the extraction well, a sampling of the resource extracted from the aquifer will

	<p>be carried out in order to determine the base conditions and their variation over time. The objective of the monitoring will be to ensure the quality of the water extracted and at the same time determine that the extraction carried out does not affect the hydrogeological profile of the resource.</p> <p>- Water quality analysis: Worms Argentina S.A. has prepared a report with the objective of determine and evaluate the concentration of the following parameters in the effluent: pH, color, conductivity, turbidity, solids in total suspension, bod, cod, total coliforms and fecal coliforms.</p> <p>This report was prepared based on the results obtained from the monitoring carried out at the request of Worms–Dry Creek (Sta. Fe).</p>
Air	<p>Worms Argentina S.A. has prepared a report with the objective of determine the concentration of Suspended Particulate Matter (PM10) and Hydrogen Sulfide in the air, in four (4) assigned monitoring posts, for a short measurement period (20 min). The monitoring positions were recorded with the applicant.</p>

i) Established procedures for the management of GHG emission reductions or removals and associated quality control for monitoring activities.

In order to ensure the correct data quality for the GHG calculations in place, there are various protocols in place to control the origin, the reliability, the pertinence and the update status of the data used.

Primary data:

This information is the one that is directly measure by the company. For the GHG calculation this data group is related with the amount of waste treated. The cargo control protocols include the actual weight of the cargo and the comparison with the amount declared by the suppliers.

The scale used for weighing the amount of waste has a calibration plan to minimize the uncertainty generated.

All the measures are scored with the correspondent receipts where the origin and amount of waste are specified.

Secondary data:

This information is acquired and not directly measure by the company. There are two main groups of data in this category:

- 1- Supplier's invoices regarding emission related products consumed: in particular electricity and fossil fuels. Suppliers' invoices specify the amount of these that have been consumed by Worms in the correspondent period adding transparency and traceability.
- 2- Factors: factors are all the parameters determined by public, relevant and trustworthy sources used in the calculations according to the methodologies applied to the process. All of them come from the IPCC Guidelines or the IPCC Emission Factor Database (EFDB).

In those cases where the information is not available in those sources or a more specific data is required Argentinian national documents have been consulted (National energy mix or fossil fuels emissions factors).

Data update:

All the primary data is daily control, checked and correctly stored in the facilities to fulfil the company obligations with the current legislation and internal environmental and quality control systems.

Supplier's invoices are generated for every period depending of the characteristics (electricity or fossil fuels). Those are also generated based on the actual demand and use and not on estimations.

For every calculation and verification period all the factors will be checked again to ensure that the latest and most updated version of the reputable sources is the one being used.

Sectorial national policies:

There are two main regulations in place in the country host of the project (Argentina) affecting directly the sectorial scope and project activity:

- The joint resolution 1/2019 or [RESFC-2019-1-APN-SECCYMA#SGP](#) determines in Annex 1 the regulatory framework for the production, registration and application of compost.
- The [Law 24.916 of Household waste management](#), approved in august 4, 2004 that regulates the urban solid waste treatment.

All the activities within the project boundaries are conducted according to those as well as with the [National Plan of Adaptation and Mitigation to Climate Change 2030](#) in Argentina (2022).

New parameters, activities or requirements could be modified in the future to adapt to possible regulatory changes, therefore, all the policies mentioned will be monitored to ensure that future updates and requirements will be adequately incorporated in the company's activities and procedures.

j) Description of established procedures for periodic calculation of GHG emission reductions or removals and leakage

Project's reductions will be calculated following the last version of CDM methodology AMS-III.F, and all of its tools. The project holder will ensure that the tools, methodologies and standards are updated in their last version before every calculation. The calculation of emission reductions will be done every three years, as the monitoring period establishes.

k) Assignment of roles and responsibilities for monitoring and reporting of variables relevant to the calculation of GHG emission reductions or removals

Monitoring of the entire project and its calculations will be carried out by the person in charge of general management of Worms Argentina S.A.

l) Procedures for assessing the project's contribution to the Sustainable Development Goals (SDGs)

The procedures to assess the project's contribution to SDG depends on the nature of the information required to monitor the extent of the contribution:

SDG	Procedure
SGD 6 - Clean water and sanitation	The project involves the separation of the water phase from bio-oils and fatty acids and its re-use for watering, so the contribution to this SDG is in tones of

	effluents treated by period. This will be checked by the reception of the liquid waste.
SDG 9 - Industry, Innovation and Infrastructure.	Annual control of the proportion of local people employed in total number of employees (%). This will be checked with the contracts and payrolls and the employees information.
SDG 12 - Responsible consumption and production:	Control of effluents treated with the truck information in their reception.
SDG 13 - Climate action: Continue along the same path in the fight against climate change	To monitor and control the emissions avoided by the treatment of the non-hazardous organic waste from biodiesel and oil industries that otherwise would have been left to decompose generating GHG.

m) Criteria and indicators related to the project's contribution to sustainable development goals, applicable to the project activities proposed by the project holder

Criteria and indicators	Measure (unit)
SDG 6, indicator 6.3.1. "proportion of wastewater safely treated".	6.3 Tones of effluents treated by period (tons).
SDG 9, indicator 9.2.2. Manufacturing employment as a proportion of total employment.	9.2. Proportion of local people employed in total number of employees (%)
SDG 12, indicator 12.5.1. National recycling rate, tons of material recycled.	12.5 Tons of bio-oil and fatty acids recovered from effluents and non hazardous waste water (tons).
SDG 13, indicator 13.2 Take urgent action to combat climate change and its impacts.	13.2 Emissions Reductions of the Project activity (t CO ₂ e)

n) Procedures related to co-benefits and special category monitoring, where applicable

Not applicable because this project has no special category.

- o) The criteria and indicators established to demonstrate the additional co-benefits and the measurement of co-benefits and the special category, when applicable.**

Not applicable because this project has no special category.

15.2 Data and parameters to quantify the reduction of emissions

The monitoring plan is designed to ensure that both the project process and all the data required to calculate the GHG mitigation are constantly updated and allow the project to be more efficient, detect possible problems or threats and implement contingency and improvement plans when required.

15.2.1 Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data and parameters available at the validation

Relevant data and parameters will be determined or available at validation as indicated in the tables below.

Data/Parameter 1

Data/Parameter	ϕ_y
Data unit	-
Description	Default value for the model correction factor to account for model uncertainties for year y
Source data used	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1.
Value applied	0,85

Justification of choice of data or description of measurement methods and procedures applied	As per table 2 (page 7) and table 1 (page 13) of the tool, the default value is applied for application B and in humid/wet conditions.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 2

Data/Parameter	f_y
Data unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1.
Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	The landfill sites where the bio-oil had been deposited are unmanaged, so the value applied for f_y is 0.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 3

Data/Parameter	GWP_{CH4}
Data unit	t CO ₂ e/t CH ₄
Description	Global Warming Potential of methane.
Source data	IPCC
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Global warming potential of methane valid for the relevant commitment period.
Purpose of data	Determination of the baseline.
Any comments	https://ghgprotocol.org/sites/default/files/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_0.pdf

Data/Parameter 4

Data/Parameter	OX
Data unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source data	Based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National

	Greenhouse Gas Inventories and Methodological tool 4 “Emission from solid waste disposal sites” version 08.1.
Value applied	0,1
Justification of choice of data or description of measurement methods and procedures applied	As per table 2 (page 7) and table 2 (page 14), for applications A and B, the default value of OX is 0,1.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 5

Data/Parameter	F
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	0,5
Justification of choice of data or description of measurement methods and procedures applied	As per table 2 (page 7) and table 3 (page 14), for applications A and B, the default value of F is 0,5.

Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 6

Data/Parameter	$DOC_{f,y}$
Data unit	weight fraction
Description	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	0,5
Justification of choice of data or description of measurement methods and procedures applied	As per para 18, table 2 for application B, and table 4 (page 14) in the case of MSW, default value is established by IPCC Guidelines for National GGI.
Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 7

Data/Parameter	MCF_y
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Data unit	-
Description	Methane correction factor for year y
Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	As per para 18, table 2, for application B, considering SWDS without a water table above the bottom of the SWDS, the default values (based on SWDS type) for MCF_y is 1, as per table 5 (page 15), for anaerobic managed solid waste disposal sites.
Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 8

Data/Parameter	<i>DOC</i> ;
Data unit	-
Description	Fraction of degradable organic carbon in the waste type j (weight fraction)
Source data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	5%

Justification of choice of data or description of measurement methods and procedures applied	<p>According to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Industrial wastewater may be treated on site or released into domestic sewer systems. As specified in Chapter 6, in the section 2.3, when the residue is released into the domestic sewer system, the emissions are to be included with the domestic wastewater emissions.</p> <p>Sludge from domestic and industrial wastewater treatment plants is addressed in Chapter 2 in the section 2.2, where it is established that default values for degradable organic carbon content in sludge are given in Section 2.3 Waste Composition, in the same chapter that determines that for domestic sludge, the default DOC value (as percentage of wet waste assuming a default dry matter content of 10 percent) is 5 percent (range 4-5 percent, which means that the DOC content would be 40-50 percent of dry matter).</p>
Purpose of data	Determination of the baseline
Any comments	These criteria are the same indicated in the Data/Parameter table 6 of the Tool 04 "Methodological tool: Emissions from solid waste disposal sites" Version 08.1 referenced in the methodology AM0057.

Data/Parameter 9

Data/Parameter	k_j
Data unit	1/yr
Description	Decay rate for the waste type j (1/yr)

Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	0,185
Justification of choice of data or description of measurement methods and procedures applied	As per table 7 (page 17), for rapidly degrading waste (food, food waste, beverages and tobacco) and boreal and temperate (MAT \leq 20°C), Wet (MAP/p ET > 1), the value is 0,185 1/yr.
Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 10

Data/Parameter	Y
Data unit	year
Description	Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
Source data	Standard BCN ap 10.5
Value applied	10
Justification of choice of data or description of measurement methods and procedures applied	The crediting period for energy, waste, and other product use projects is 10 years.

Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 11

Data/Parameter	ρ_i
Data unit	kg/liter
Description	Density of fossil fuel
Source data	The official informs of the fuel supplier YPF: https://www.ypf.com/productosyservicios/Descargas/DIESEL-500-1.pdf
Value applied	0,850 kg/l
Justification of choice of data or description of measurement methods and procedures applied	As per table 3, page 7 from the tool, the value of the density of the different fuels used provides by the fuel supplier in invoices.
Purpose of data	Determination of the project emissions.
Any comments	.

Data/Parameter 12

Data/Parameter	$NCV_{i,y}$
Data unit	GJ/kg
Description	Weighted average net calorific value of the fuel type i in year y
Source data	2006 IPCC Guidelines on National GHG Inventories and tool 3 “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” (version 3).
Value applied	0,0433 GJ/kg
Justification of choice of data or description of measurement methods and procedures applied	As per table 4, page 7 and 8 from the tool, $NCV_{i,y}$ (option d) is a default value from IPCC at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Purpose of data	Determination of the project emissions
Any comments	-

Data/Parameter 13

Data/Parameter	$EF_{CO_2,i,j}$
Data unit	tCO ₂ /GJ
Description	Weighted average CO ₂ emission factor of fuel type i in year y
Source data	2006 IPCC Guidelines on National GHG Inventories and “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” (version 3).

Value applied	0,0748 ton CO ₂ /GJ
Justification of choice of data or description of measurement methods and procedures applied	As per table 5, page 8 and 9 from the tool, EF _{CO₂,i,y} (option four) is a default value from IPCC at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Purpose of data	Determination of the project emissions.
Any comments	-

Data/Parameter 14

Data/Parameter	EF_{EF,jl,y}						
Data unit	t CO ₂ /MWh						
Description	Emission factor for electricity generation for source j in year y						
Source data	Methodological tool 5 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation“(version 3).						
Value applied		2019	2020	2021	2022	2023	
	EF _{EF,j,y} (t)	0,267	0,275	0,292	0,2717	02318	
Justification of choice of data or description of measurement	Based on the information from the Argentine Government. https://www.argentina.gob.ar/economia/energia/energia-electrica/estadisticas						

methods and procedures applied	https://cammesaweb.cammesa.com/download/factor-de-emision/
Purpose of data	Determination of the project emissions
Any comments	-

Data/Parameter 15

Data/Parameter	TDL_{j,y}
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to source j in year y
Source data	IEA Statistics OECD/IEA 2018.
Value applied	15%
Justification of choice of data or description of measurement methods and procedures applied	Based on The World Bank Statistics (IEA), the electric power transmission and distribution losses (% of outputs) in Argentina is 15% https://data.worldbank.org/indicator/EG.ELC.LOSS.ZS
Purpose of data	Determination of the project emissions
Any comments	-

15.2.2 Data and parameters monitored

Relevant parameters will be monitored during the crediting period as indicated below.

Data/Parameter 16

Data/Parameter	$W_{j,x}$												
Data unit	t												
Description	Amount of solid waste type j prevent from disposal in the SWDS in year x												
Source data	Measurements by project holder.												
Value applied	<p>Since the measurement of the amount of solid waste has an 2% of uncertainly, the final values applied are:</p> <table border="1"> <thead> <tr> <th></th> <th>2019</th> <th>2020</th> <th>2021</th> <th>2022</th> <th>2023</th> </tr> </thead> <tbody> <tr> <td>$W_{j,x}$ (t)</td> <td>87.116,5 8</td> <td>94.848,16</td> <td>102.109,0 7</td> <td>127.948,00</td> <td>112.937,7 5</td> </tr> </tbody> </table>		2019	2020	2021	2022	2023	$W_{j,x}$ (t)	87.116,5 8	94.848,16	102.109,0 7	127.948,00	112.937,7 5
	2019	2020	2021	2022	2023								
$W_{j,x}$ (t)	87.116,5 8	94.848,16	102.109,0 7	127.948,00	112.937,7 5								
Justification of choice of data or description of measurement methods and procedures applied	<p>According to paragraph 25, of the methodological tool 4 “<i>Emissions from solid waste disposal sites. Version 08.1</i>” “in case that only one type of waste is disposed, then $W_{j,x} = W_x$ and $W_x = W_i$.” And, as per table 11 (page 19), for application B this parameter is the total amount of waste disposed in a SWDS in year x and its data source is the measurements of the project holder.</p>												
Purpose of data	Determination of the baseline												
Monitoring frequency	Monitored continuously with the entrance of each truck at the plant.												
Any comments	-												

Data/Parameter 17

Data/Parameter	$EC_{P,j,y}$						
Data unit	MWh/yr						
Description	Quantity of electricity consumed by the project electricity consumption source j in year y						
Source data	Methodological tool 5 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation“(version 3).						
Value applied		2019	2020	2021	2022	2023	
	$EC_{P,j,y}$ (MWh)	15,523	16,900	18,189	22,798	20,124	
Justification of choice of data or description of measurement methods and procedures applied	As per table 10, pages 20 and 21 from the tool, the quantity of electricity consumption are measured by the project holder continuously.						
Purpose of data	Determination of the project emissions						
Monitoring frequency	Monitored continuously with the invoice of electricity consumption by the supplier.						
Any comments	-						

Data/Parameter 18

Data/Parameter	FC_{TR,i,y}						
Data unit	Liters per year						
Description	Fossil fuel consumption						
Source data	Measurements by project holder						
Value applied		2019	2020	2021	2022	2023	
	FC _{TR,i,y} (L)	180.537,00	157.526,00	136.222,00	159.653,00	165.347,00	
Justification of choice of data or description of measurement methods and procedures applied	As per methodology tool, the fossil fuel consumption used for the transport is measured by the project holder continuously.						
Purpose of data	Determination of the project emissions						
Monitoring frequency	Monitored continuously with the invoice of fuel consumption by the supplier.						
Any comments	-						

16 Quantification of GHG emission reduction / removals

16.1 Baseline emissions

In the absence of the project activity, the vegetable oil recovered would have been left to decompose in a solid waste disposal site. Hence the baseline scenario is the continued dumping of the waste on an existing landfill site in the absence of the project activity. The baseline emissions are the amount of methane emitted from the decay of the vegetable oil.

Based in the methodology AM0057: “The most plausible baseline scenario for the agricultural waste is identified as the disposal of the waste in a landfill (Scenario B3)”; and “O2: Construction of a new bio-oil plant and the production of bio-oil using other locally available sources of biomass”. Hence, the baseline emissions are calculated as follows:

$$BE_y = BE_{CH_4, SWDS, y}$$

Where:

BE_y = Baseline emissions in year y (tCO₂e/yr)

$BE_{CH_4, SWDS, y}$ = Methane emissions avoided during the year y, calculated according to the latest approved version of the methodological tool “Emissions from solid waste disposal sites”

The latest approved version of the of the methodological tool number 4 “Emissions from solid waste disposal sites” is Version 08.1. As paragraph 3, the application used for the calculation in this project is option B) “The CDM project activity avoids or involves the disposal of waste at a SWDS”. The baseline emissions are calculated as the equation 1:

$$BE_{CH_4, SWDS, y} = \varphi_y * (1 - f_y) * GWP_{CH_4} * (1 - OX) * \frac{16}{12} * F * DOC_{f, y} * MCF_y * \sum_{x=1}^y \sum_j (W_{j, x} * DOC_j * e^{-kj*(y-x)} * (1 - e^{-kj}))$$

Where:

- $BE_{CH_4,SWDS,y}$ = Baseline methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (t CO₂e/yr)
- x = Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period ($x = 1$) to year y ($x = y$)
- y = Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
- $DOC_{f,y}$ = Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
- $W_{j,x}$ = Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)
- ϕ_y = Model correction factor to account for model uncertainties for year y .
- f_y = Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
- GWP_{CH_4} = Global Warming Potential of methane
- OX = Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
- F = Fraction of methane in the SWDS gas (volume fraction)

- MCF_y = Methane correction factor for year y
- DOC_j = Fraction of degradable organic carbon in the waste type j (weight fraction)
- k = Decay rate for the waste type j (1/yr)
- j = Type of residual waste or types of waste in the MSW

Model correction factor to account for model uncertainties for year y (φ_y)

The default value is applied for application B and in humid/wet conditions, so $\varphi_y = 0,85$.

Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y (f_y)

The landfill sites where the bio-oil had been deposited are unmanaged, so the value applied for f_y is $0.f_y = 0$

Global Warming Potential of methane (GWP_{CH_4})

This parameter is established by IPCC for each years. $GWP_{CH_4} = 28$

Oxidation factor (OX)

For applications A and B, the default value of OX is 0,1. **OX = 0,10**

Fraction of methane in the SWDS gas (volume fraction) (F)

For applications A and B, the default value of F is 0,5. **F = 0,50**

Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction) ($DOC_{f,y}$)

For application B, and table 14 (page 14) in the case of MSW, default value is established by IPCC Guidelines for National GGI. **$DOC_{f,y} = 0,5$**

Methane correction factor for year y (MCF_y)

For application B, considering SWDS without a water table above the bottom of the SWDS, the default values (based on SWDS type) for MCF_y is 1, as per table 5, for anaerobic managed solid waste disposal sites. So, **$MCF_y = 1$**

Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j)

According to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Industrial wastewater may be treated on site or released into domestic sewer systems. As specified in Chapter 6, in the section 2.3, when the residue is released into the domestic sewer system, the emissions are to be included with the domestic wastewater emissions.

Sludge from domestic and industrial wastewater treatment plants is addressed in Chapter 2 in the section 2.2, where it is established that default values for degradable organic carbon content in sludge are given in Section 2.3 Waste Composition, in the same chapter that determines that for domestic sludge, the default DOC value (as percentage of wet waste assuming a default dry matter content of 10 percent) is 5 percent (range 4-5 percent, which means that the DOC content would be 40-50 percent of dry matter).

These criteria are the same indicated in the Data/Parameter table 6 of the Tool 04 "Methodological tool: Emissions from solid waste disposal sites" Version 08.1 referenced in the methodology AM0057. So, **$DOC_j = 5\%$**

Decay rate for the waste type j (1/yr) (k_j)

For rapidly degrading waste (food, food waste, beverages and tobacco) and boreal and temperate ($MAT \leq 20^\circ C$), Wet ($MAP/p ET > 1$), the value is 0,185 1/yr. **$k_j = 0,185$ 1/yr.**

VARIABLES:

Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t) ($W_{j,x}$) $W_{j,x}$ is the amount of solid waste type j prevent from disposal in the SWDS in year x (t).

	2019	2020	2021	2022	2023
$W_{j,x}$ (t)	87.116,58	94.848,16	104.192,93	130.510,65	114.796,91

X is the years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period ($x = 1$) to year y ($x = y$).

Y is the year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months). **Y = 10**

So, the results of the baseline for each year are;

Year	Baseline (tCO ₂ e)
2019	26,210
2020	28,536
2021	31,348
2022	39,266
2023	34,538
TOTAL (tCO₂e)	157.699

16.2 Project emissions/removals

Project emissions are calculated with the methodology AM0057 “Avoided emissions from biomass wastes through use as feed stock in pulp and paper, cardboard, fibreboard or bio-oil production” (version 03.0.1) as follows (equation 2):

$$PE_y = PE_{FC,j,y} + PE_{EC,y} + PE_{CO_2,TR,y} + PE_{CO_2, SWTR,y} + PE_{Py,,y}$$

Where:

- PE_y = Project emissions in year y (tCO₂e/yr)
- $PE_{FC,j,y}$ = Project emissions from fossil fuel combustion in process j during the year y (tCO₂/yr)
- $PE_{EC,y}$ = Project emissions from electricity consumption by the project activity during the year y (tCO₂e/yr)
- $PE_{CO_2,TR,y}$ = Project emissions from increased transport of agricultural waste to the plant in year y (tCO₂e/yr)
- $PE_{CO_2, SWTR,y}$ = Project emissions from the transport of solid waste from the manufacturing process to a disposal site (tCO₂e/yr)
- $PE_{Py,y}$ = Project emissions in the off-gas from the pyrolysis process in year y (tCO₂e)

The project does not involve the transport of solid waste from the manufacturing process to a disposal site, fossil fuel combustion in the process and neither the pyrolysis process, so the equation is reduced as bellow:

$$PE_y = PE_{EC,y} + PE_{CO_2,TR,y}$$

Project emissions from transport of agricultural waste to the plant (PE_{CO₂,TR,y})

The project emissions from transport of agricultural waste to the plant (PE_{CO₂,TR,y}) are calculated as the equation 5 (option 2) of the methodology AM0057, as follows:

$$PE_{CO_2,TR,y} = \sum_i FC_{TR,i,y} * NCV_i * EF_{CO_2,FF,i}$$

Where:

$PE_{CO_2,TR,y}$ = Project emissions from transport of agricultural waste to the plant in year y (tCO₂e/yr)

$FC_{TR,i,y}$ = Fuel consumption of fuel type i in trucks for transportation of agricultural waste during the year y (mass or volume unit)

$EF_{CO_2,FF,i}$ = CO₂ emission factor for fossil fuel type i (tCO₂/MJ)

NCV_i = Net calorific value of fuel (MJ/kg)

Since the diesel consumption have been monitored in liters. The mass of the diesel is estimated as below:

$$FC_{i,y} = FC_{i,y,L} * \rho_i$$

Where:

$FC_{i,y}$ = Fossil fuel consumption in mass basis (kilograms)

$FC_{i,y,L}$ = Fossil fuel consumption in volumetric basis (liters)

ρ_i = Density of fossil fuel (kg/liter)

Density of fossil fuel (kg/liter). (ρ_i)

As per table 3, page 7 from the tool, the value of the density of the different fuels used provides by the fuel supplier in invoices:
<https://www.ypf.com/productosyservicios/Descargas/DIESEL-500-1.pdf>

So, $\rho_i = 0,840$ kg/l

Weighted average net calorific value of the fuel type i in year y (GJ/kg) (NCV_i)

As per table 4, page 7 and 8 from the tool, NCV_i (option d) is a default value from IPCC at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

So, NCV_i = **0,0433 GJ/kg**

Weighted average CO₂ emission factor of fuel type i in year y (tCO₂/GJ) (EF_{CO₂,FF,i})

As per table 5, page 8 and 9 from the tool, EF_{CO₂,i,y} (option four) is a default value from IPCC at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

So, EF_{CO₂,FF,i} = **0,0748 ton CO₂/GJ**.

VARIABLE: Fossil fuel consumption (FC_{i,y})

The diesel used during the project activity are:

	2019	2020	2021	2022	2023
FC _{i,y} (l)	180.537,00	157.526,00	136.222,00	159.653,00	165.347,00

Project emissions from electricity consumption by the project activity (PE_{EC,y})

The project emissions from electricity consumption (PE_{EC,y}) have been calculated following the tool 5 “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, version 3.0.

In the generic approach, PE_{EC,y} is calculated with equation 1, as bellow:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EF,j,y} * (1 + TDL_{j,y})$$

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (t CO₂ / yr)

$EC_{PJ,j,y}$ = Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)

$EF_{EF,j,y}$ = Emission factor for electricity generation for source j in year y (t CO₂/MWh)

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to source j in year y

The applied scenario is Scenario A) “Electricity consumption from the grid. The electricity is purchase from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer”.

VARIABLE:

Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr) ($EC_{PJ,j,y}$)

As per table 10, pages 20 and 21 from the tool, the quantity of electricity consumption are:

	2019	2020	2021	2022	2023
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EC_{PJ,j,y} (MWh)	15,27	16,62	18,26	22,87	20,124
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**Emission factor for electricity generation for source j in year y (t CO₂/MWh)
(EF_{EF,j,y})**

Based on the information from the Argentine Government,
<https://www.argentina.gob.ar/economia/energia/energia-electrica/estadisticas>

<https://cammesaweb.cammesa.com/download/factor-de-emision/>

	2019	2020	2021	2022	2023
EF _{EF,j,y} (tCO ₂ /MWh)	0,267	0,275	0,292	0,2717	0,2318

Average technical transmission and distribution losses for providing electricity to source j in year y (TDL_{j,y})

Based on The World Bank statistics (IEA), the electric power transmission and distribution losses (% of outputs) in Argentina is 15%. So, TDL_{j,y} = 15%

In conclusion, the results of the project emissions in the first monitoring period are as following:

	2019	2020	2021	2022	2023
PE_{FC,y} (tCO ₂ e)	4	5	6	7	5
PE_{CO2:TR,y} (tCO ₂ e)	491	428	370	434	449

TOTAL PE (tCO₂e)	495	433	376	441	454
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16.3 Leakages

As per equation 11 of the methodology, the leakage is calculated as follows:

$$LE_y = L_{y,disp} + L_{y,fossil} + L_{y,Me}$$

Where:

LE_y = Leakage in year y (tCO₂e/yr)

$L_{y,disp}$ = Leakage from possible disposition of recycled paper, recycled materials, or bio-oil production (tCO₂e/yr)

$L_{y,fossil}$ = Leakage from the increased use of fossil fuel due to the replacement of biomass fuel with fossil fuel

$L_{y, Me}$ = Leakage from the anaerobic breakdown of the bio-oil, produced in the project activity

Leakage from possible disposition of recycled paper, recycled materials, or bio-oil production ($L_{y,disp}$) can be ignored because the bio-oils origin is from industrial waste not conditioning or affecting in any way the agricultural waste-based bio-oil production elsewhere.

Leakage from the increased use of fossil fuel due to the replacement of biomass fuel with fossil fuel ($L_{y,fossil}$) does not occurred because the type of agricultural industrial waste used in the plant did not increase fossil fuel consumption elsewhere as it has not commercial value being the alternative treatment it's deposition in to the sewers or landfills.

Leakage from the anaerobic breakdown of the bio-oil, produced in the project activity ($L_{y, Me}$) can be ignored as all the bio-oil generated is sold and the methodology establishes that if invoices are provided proving the sale of the bio-

oil, this leakage can be omitted. The sale of the bio-oil is the main goal of the installation and all the recovered fatty acids and bio-oils are sold.

Considering the conditions previously detailed, the leakage in a year can be ignored.

16.4 Net GHG Emission Reductions / Removals

Hence, the results of the project in the first monitoring period are:

Year	GHG emission reductions in the baseline scenario (tCO _{2e})	GHG emission reductions in the project scenario (tCO _{2e})	GHG emissions attributable to leakages (tCO _{2e})	Estimated GHG Reduction (tCO _{2e})	Net Reduction
2019	26,210	495	-	25,715	
2020	28,536	433	-	28,103	
2021	31,348	376	-	30,972	
2022	39,266	441	-	38,825	
2023	34,538	454	-	34,084	
TOTAL (tCO_{2e})	159,898	2,199	-	157,699	

16.5 Comparison of actual emission reductions with estimates in the project document

As the project is an ex-ante project, the first period is since 2019 to 2023. Hence, this is the first monitoring period and the results of the emission reductions have been verified.

16.6 Remarks on difference from estimated value in the registered project document

Not applicable because it's the first monitoring period.