PROCESS OF NON-HAZARDOUS AGROINDUSTRIAL LIQUID ORGANIC WASTE

Document prepared by Worms Argentina S.A.

Name of the project	Process of Non-Hazardous Agroindustrial Liquid Organic Waste
Project holder	*WORMS ARGENTINA S.A.*
Project holder's contact information	*PABLO MAURICIO ZIMMERMAN, Nucci y San Martín Arroyo Seco Santa Fe (Argentina), ftiscornia@wormsargentina.com.ar +5434025752 83*
Project participants	*WORMS ARGENTINA S.A.*
Version	*3*
Date	*28/11/2024*
Project type	*Waste handling and disposal*
Grouped project	-
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 (City, Region, Country)	*Country: Argentina* *Region: Santa Fe* *City: Arroyo Seco*
Starting date	01/01/2019

Quantification period of GHG emissions reduction	01/01/2019 to 31/12/2028
Estimated total and average annual GHG emission reduction amount	32.811 ton CO_2e average annual, (328.119 ton CO_2e total in 10 years).
Sustainable Development Goals	- *SDG 6. Clean water and sanitation: 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.* - *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.* - *SDG 12. Responsible consumption and production: By 2030, substantially reduce the generation of waste through prevention, reduction, recycling and reuse.* - *SDG 13. Climate action: Continue along the same path in the fight against climate change.*
Special category, related to co-benefits	-

Table of contents

1 Project type and eligibility

1.1 Scope in the BCR Standard

The scope of the BCR Standard is limited to:	
The following greenhouse gases, included in the Kyoto Protocol: Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_2O).	X
GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to GHG removal activities and REDD+ activities (AFOLU Sector).	
Quantifiable GHG emission reductions and/or removals generated by the implementation of GHG removal activities and/or REDD+ activities (AFOLU Sector).	
GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to activities in the energy, transportation and waste sectors.	X
Quantifiable GHG emission reductions generated by the implementation of activities in the energy, transportation and waste sectors.	X

The project involves reducing the emission of GHG 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 BCR 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 originated by from recovered fatty acids with industrial applications such us biodiesel production.

1.2 Project type

Activities in the AFOLU sector, other than REDD+	
REDD+ Activities	
Activities in the energy sector	
Activities in the transportation sector	
Activities related to Handling and disposing of waste	X

1.3 Project scale

For the determination of the scale of the project, the following statements have been considered:

- As BCR Standard section 10.3 establishes that projects in sectors other than AFOLU are subdivided in large-scale and small-scale, following the definitions of the CDM.

- The methodology used for the calculation of the emission reductions in this project is 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 considered by CDM as "methodology for large-scale CDM project activities".

- The Clean Development Mechanism Booklet (fourteenth edition) establishes that "methodologies for large-scale project activities can be used for project activities of any size, whereas small-scale methodologies can only be applied if the project activity is within certain limits".

- The Clean Development Mechanism Booklet (fourteenth edition) establishes that "Small-scale methodologies are grouped into three different types": Type I: Renewable energy project activities with a maximum output capacity of 15 MW (or an appropriate equivalent); Type II: Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, with a maximum output (i.e. maximum savings) of 60 GWh per year (or an appropriate equivalent); Type III: Other project activities that result in emission reductions of less than or equal to 60 kt CO_2 equivalent per year.

Since the project activities has less than 60 kt CO_2 equivalent per year in emission reductions (32.811 ton CO_2e average annual), the project is small-scale type III.

2 General description of the project

a- 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 agro-industries, 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).

b- 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.

c- The project is not proposed to apply to a special category.

d- This project is aligned with four SDG:

- *SDG 6. Clean water and sanitation: 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.*
- *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.*
- *SDG 12. Responsible consumption and production: By 2030, substantially reduce the generation of waste through prevention, reduction, recycling and reuse.*
- *SDG 13. Climate action: Continue along the same path in the fight against climate change.*

e- Average estimate of emission reductions attributable to the project activities:

Year	***Estimated Net GHG Reduction (tCO_{2e})***
2019 (01/01/2019-31/12/2019)	*25,715*
2020 (01/01/2020-31/12/2020)	*28,103*
2021 (01/01/2021-31/12/2021)	*30,972*
2022 (01/01/2022-31/12/2022)	*38,825*

2023 (01/01/2023-31/12/2023)	*34,084*
2024 (01/01/2024-31/12/2024)	*34,084*
2025 (01/01/2025-31/12/2025)	*34,084*
2026 (01/01/2026-31/12/2026)	*34,084*
2027 (01/01/2027-31/12/2027)	*34,084*
2028 (01/01/2028-31/12/2028)	*34,084*
Total (ton CO_2e)	*328,119*

2.1 GHG project name

Process of Non-Hazardous Agroindustrial Liquid Organic Waste.

2.2 Objectives

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.

2.3 Project activities

The process for the reception of waste in a liquid aggregation state is summarized in the flow chart:

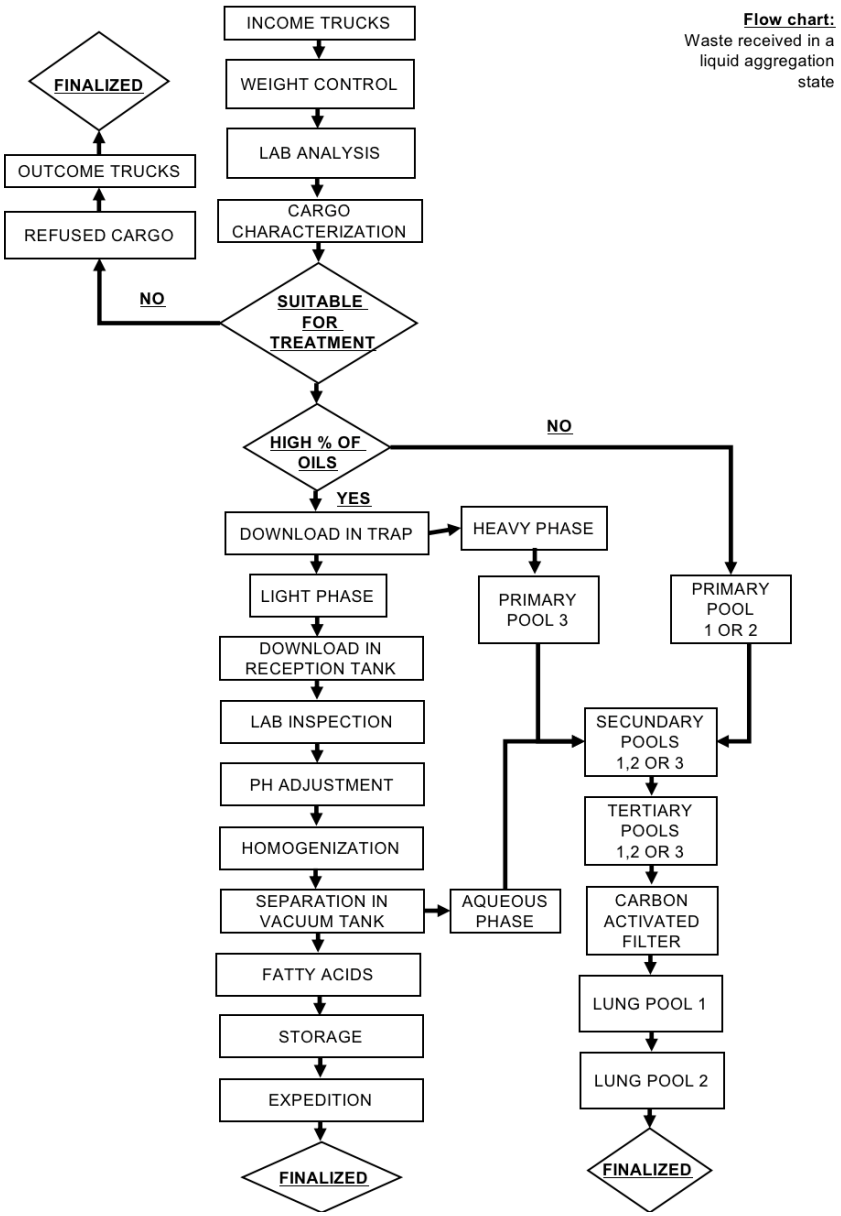

Figure 1. Chart of the process for the reception of waste in a liquid aggregation state

The treatment of the effluents produces follows this sequence:

Reception:

The trucks containing the residues are recaptioned within the installations of the organization where their origin and residue typology are assessed. Once everything has been checked the cargo is weighted.

Cargo control:

A sample from the cargo is taken and brought to the laboratory where a few of their properties are checked. The parameters measured are:

- *Conductivity.*
- *pH.*
- *Temperature.*
- *Percentage of bio-oils.*

If estranges odors or high temperatures or any other parameter indicating that the cargo might contain hazardous residues are detected, the cargo is rejected.

Fatty Acids recovery

The effluents with a high percentage of fatty acids start the download process. The first part recover is the bottom of the truck where the heavy phase is located. It contains mostly residual water and it is deposited in the primary poll 3. The light phase is directed to the tanks.

The person assigned from the lab coordinates the following operations:

1) pH Adjustment: to homogenized the pH in the tank the effluents are recirculated with a bomb with in the tank itself.

2) Effluents rest in the tanks and separation of the heavy water phase. The resting time is applied in conics or vertical tanks and eventually in tanks equipped with vapor serpentines which provide with heat (depending of the characteristic of the residue). This process takes between 24 and 48 hrs. and after that the heavy phase is deposited in the Pool 3.

3) The light phase is directed to a vacuum tank where the final separation of the water and the bio-oils and fatty acids take place. Those bio-oils and fatty acids constitute one of the final products commercialized for industrial uses and its traceability is accredited under the norms ISCC, in some cases for exportation. That is the main reason why this stage tries to optimize the separation of the lipids prior to derivate the water phase to secondary pools.

4) The fatty acids or bio-oils get sent to one of the tanks for storage until the moment of expedition. In this stage samples are taken regularly to control the pH, humidity and any other parameter required by the standards demanded by the buyers.

Biological purification system:

The pools system is controlled to oversee the variables in the biological degradation depending on factors such as the temperature, rains, etc. The normal functioning process occurs as it follows:

In the reception or primary pools 1 and 2 and the primary pool 3 the effluents with a low percentage of fatty acids and bio-oils. The system works in anaerobic conditions maintaining the levels of organic matter stable. Every week the fatty acids and oils are recovered with pumps and place again in the tanks.

From there the effluents are pumped to the tertiary pools, now containing a very low percentage of fatty acids and bio-oils and in aerobic conditions. All the transfers from one pool to other focus on the aqueous phase of the bottom.

The effluents are then transferred from the tertiary pools to the lung pools but it is not a direct process. Instead, the effluents go through a carbon activated filter. Once the water has been purified it is deposited in the lung pools where it is storage and used for watering of the installations and roads to prevent the solid soil particles in the air produced by the truck's circulation in the rural roads. The materials used in the carbon activated filter (carbon and sand) are recovered when it is necessary to changed them and transferred to the compost installations.

2.4 Project location

Physical address	***Geographic coordinates/Other information***

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/f7zR9nWNvgp5DugMA

Figure 2. Picture from the location of Worms Argentina S.A. Source: Google Earth

2.5 Additional information about the GHG Project

-

3 Quantification of GHG emissions reduction

3.1 Quantification methodology

This project activity applied latest CDM 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.

3.1.1 Applicability conditions of the methodology

The following table explains and justifies compliance with the applicability conditions of the methodology used.

This project activity applied latest CDM Methodology AM0057 "Avoided emissions from biomass wastes through use as feed stock in pulp and paper, cardboard, fibreboard or bio-oil production" 3.0.1.

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.

This methodology is applicable for project activities using agricultural wastes as feed stock for: pulp and paper, cardboard, fibreboard or bio-oil production, where the end product is similar in characteristics and quality to existing high quality products in the market and does not require special use or disposal methods. In the case of Worms Argentina S.A., the project involves the production on bio-oil by using recovered fatty acids from agro-industrial wastes. This bio-oil is destined primarily to biodiesel production and has the same quality as other bio-oils used in the same process.

The applicability conditions of the methodology and its tools are collected the following table:

AM0057 conditions	***Applicability of the project activity***
The project activity is the construction of a new pulp and paper, cardboard, fibreboard or bio-oil production facility that uses agricultural wastes as feedstock;	*The project activity starts with the new production of bio-oil that uses agricultural sludge wastes as feedstock.*
The waste should not be stored in conditions that would lead to anaerobic decomposition and, hence, generation of CH_4;	*The process doesn't involve the decomposition of the waste.*
The pulp and paper, cardboard, fibreboard or bio-oil produced with the agricultural wastes is of similar characteristics and quality to existing high quality products in the market and does not require special use or disposal methods;	*The quality of the bio-oil produced is similar than existing products. As the fact sheet indicates, the bio-oil produced is product of plant origin obtained from the recovery of oily substances present in industrial effluents from the neutralization processing of oil refining, this is an excellent raw material for the production of Hydrogenated Vegetable Oil or HVO, renewable diesel.*
During the production of pulp and paper, cardboard or fibreboard no significant additional process leading to emissions of greenhouse gas compared to the baseline scenario, except for electricity and fossil fuel consumption, is envisaged (an example of this can be the use of substance produced with highly GHG intensive activities). If this is the case, then the project participant	*Not applicable because the project does not involve the production of pulp and paper, cardboard or fibreboard.*

must submit a request for deviation to include emissions from this source;	
Emission reductions are only claimed for avoidance of methane emissions when it can be demonstrated that the agricultural residues are left to decompose anaerobically;	*If the project doesn't exist, the bio-oil used as raw material would have been left to decompose in a solid waste disposal site (SWDS).*
In the case of bio-oil, its production does not involve a process that leads to emissions of greenhouse gas except for those arising directly from pyrolysis, or associated with electricity or fossil fuel consumption;	*The project doesn't involve pyrolysis and the emissions of greenhouse gas associated with electricity or fossil fuel consumption has been considered.*
In case the biomass is combusted for the purpose of providing heat or electricity to the plant, the biomass fuel is derived from biomass residues, as specified in ACM0006;	*Not applicable because the project does not involve the combustion of biomass.*
In the case of bio-oil, the pyrolysed residues (char) will be further combusted and the energy derived thereof used in the project activity. The residual waste from this process does not contain more than 1% residual carbon.	*The project doesn't involve pyrolysis.*

Tool 4. Emissions from solid waste disposal sites. Version 08.1.

Applicability TOOL 4	***Justification***
The tool can be used to determine emissions for the following types of applications: *(a) Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. "ACM0001: Flaring or use of landfill gas"). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an ex ante estimation of emissions in the project design document (CDM-PDD). The emissions will then be monitored during*	*This project used application B) because the project activity avoids the disposal of waste in a SWDS.*

the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS); *(b) Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. An example of this application of the tool is ACM0022, in which municipal solid waste (MSW) is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both ex ante and ex post estimation of emissions. These project activities may apply the simplified approach detailed in o when calculating baseline emissions.*	

Tool 5. "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" Version 3.

Applicability TOOL 5.	***Justification***
If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: *(a) Scenario A: Electricity consumption from the grid. The electricity is purchased 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;* *(b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or* *(c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at*	*Since the electricity will be consumed only from grid, the project emission from electricity consumption is estimated as Scenario A.*

the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.	

3.1.2 Methodology deviations (if applicable)

Not applicable because there is no derivations of the methodology.

3.2 Project boundaries, sources and GHGs

3.2.1 Spatial limits of the project

The applicable geographical area selected for the project is the one determined by the provinces of Santa Fe, Entre Ríos and Buenos Aires. The reason why the area is limited to this three instead of the entire country is that the most relevant element is the river Paraná. This river concentrates the fluvial ports that constitute the main suppliers for Worms Argentina S.A. and also heavily influence the concentration of agro-industrial companies where the wastes are produced. The origin and composition of the wastes employed in the project force the situation of the installations to the point that outside this area the cost of transport and logistic difficulties will make it extremely hard to succeed.

The high dependency of the project and project activity of the fluvial ports makes necessary to include all the provinces that the Paraná River crosses to compile with all the regulations and administrative management at regional level.

Even though the geographical area includes the provinces previously mentioned, the effective geographical area where the project operates is within a ratio of 200km around the project location, the main reason being that the agro-industrial companies located in this ratio generate the entirety of the residues that are used for the project activity, making it technological and economically feasible.

This is also aligned with the applicability conditions reference in the Methodology AM0057, version 3.0.1, page 12, where it establishes that "In any case, the region should cover a radius around the project activity of at least 20 km but not more than 200 km".

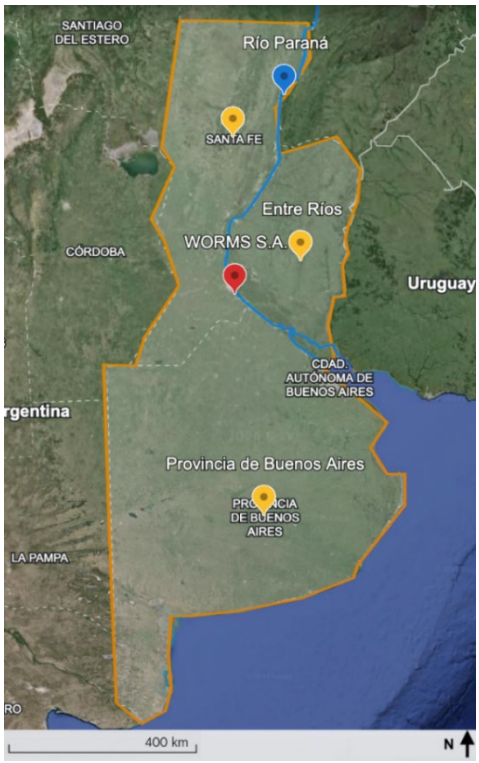

Figure 3. Spatial limits of the project Worms Argentina S.A. Source: Google Earth.

3.2.2 *Carbon reservoirs and GHG sources*

Source or reservoir	***GHG***	***Included (Yes/No/Optional)***	***Justification***
Baseline scenario- landfill site	*CO_2*	*No*	*Not significant*
	CH_4	*Yes*	*Main source of emissions*
	N_2O	*No*	*Not significant*
Project scenario – Effluent treatment and fatty acids recovery	*CO_2*	*Yes*	*Emission from diesel consumption and electricity consumption at site.*
	CH_4	*No*	*Not significant*
	N_2O	*No*	*Not significant*

3.2.3 *Time limits and analysis periods*

In accordance with BCR Standard section 10.5, the project timeframe corresponds to 10-years for the quantification of GHG emission reductions without renovation; it's a unique period: 01/01/2019-31/12/2028.

For the first five years (from 01/01/2019 to 31/12/2023), the emissions have been verified because of the validation of amount of waste disposed and used by the project holder. Hence, the calculations of the emission reductions in 2024-2028 period are estimations based on 2023's results.

3.2.3.1 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 Argentina S.A., which is recorded and can be corroborated through the truck entry records.

3.2.3.2 Quantification period of GHG emission reductions

The crediting period for energy, waste, and other product use projects is 10 years, since 01/01/2019 to 31/12/2028, without renovation.

3.2.3.3 Monitoring periods

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.

3.3 Identification and description of the baseline or reference scenario

Based on AM0057 Methodology (Version 3.0.1.) and the methodological tool number 04 "Emissions from solid waste disposal sites" (Version 08.1), the baseline scenario is identified following the steps:

Step 1. Identify all realistic and credible alternatives to the project activity

As the Step 1 of the latest version of the "Tool for the demonstration and assessment of additionality": as far as the Step 1 is concerned, the current regulation in Argentina does not consider the bio-oil waste as hazardous residues which means that there is not a mandatory

alternative to the project, being the most common solution its transport to landfill or controlled spilling to the sewers.

(1) How the agricultural waste would have been treated?

For the baseline for the agricultural waste, the scenario is B3 "The agricultural waste is dumped or left to decay under clearly anaerobic conditions, such as landfilling".

(2) (ii) What is the most likely alternative for the production of bio-oil?

For the bio-oil production baseline, the scenario is O2 "Construction of a new bio-oil plant and the production of bio-oil using other locally available sources of biomass".

Step 2: Eliminate alternatives that face prohibitive barriers or are economically not attractive

As the Step 2 of the latest version of the "Tool for the demonstration and assessment of additionality": there is not prohibitive barriers for this project and the project is economically attractive.

Step 3: Selection of baseline scenario

The methodology is applicable if the identified scenario is B3, because it's a common practice in the region to dispose the waste in a solid waste management site; and O2.

3.4 Additionality

As more and more corporations announce commitments to net-zero emissions, there are still few that have set concrete climate goals to make that decarbonization a reality. Effective leadership that allows moving from ambition to real action to face the climate crisis must recognize that transitions are challenging and the path to a sustainable and fair future will not be simple.

This is why the private sector needs to understand the complexities of decarbonizing its operations while investing heavily in actions that support a just transition for all: people and biodiversity. For this reason, as part of an ecological transition process and corporate climate strategies, it is fair to allow the private sector that works to capture or avoid

greenhouse gas emissions by selling carbon credits and take an important step thanks to that benefit in improving, with developed technologies, the achievement of the main objective NetZero.

In order to contribute to this goal, Worms Argentina S.A operates in the Agro-industrial Pole region of Rosario, Province of Santa Fe (Argentina), which is the area with the largest soybean production and processing in the world, and concentrates a huge generation of organic waste, which is processed only by Worms Argentina S.A in this area.

The processes in Worms Argentina S.A. they are carried out manually by operators specifically trained to prepare the mixture of the residues, previously received and controlled, being the ones that occupied this study non-hazardous liquid waste originated in diverse agro-industries present in the area.

Previously, the aforementioned companies carried out the transfer of these aforementioned wastes to outsourced companies for their final disposal, which were treated to the extend required by waste water regulations without considering the generation of by-products such as bio-oils or fatty acids.

Non-hazardous residues as the ones used in the valorization process of Worms are regulated by the Law of Integral Management of Household Wastes N° 25.916. This regulation established that transportation to landfills or final disposition sites is the correct treatment, although it encourages the implementation of valorization systems to boost circular economy without mentioning any specific process and in any case the valorization is a recommendation and not mandatory. Worms is, therefore, going further than mandatory regulations while still being aligned with the regulatory frame.

In order to increase the efficiency of the process and the amount of liquid-waste treated, Worms Argentina S.A needs to continue to invest in increasing its processing capacity.

Additionality determination of the project activity follows the methodological tool "Tool for the demonstration and assessment of additionality, version 07.0.0" .

The basic structure of the process is detailed according to the sequence specified by the methodology:

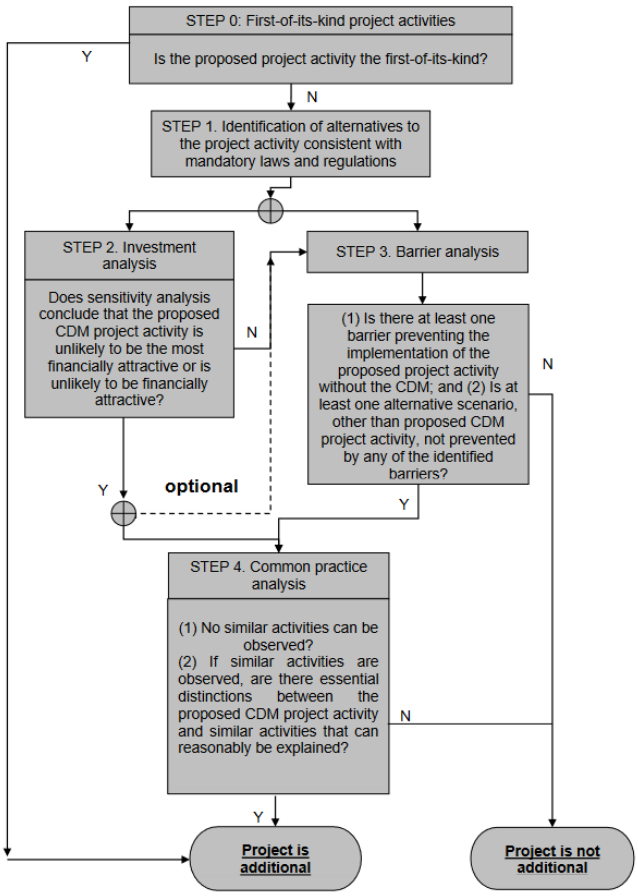

Figure 4. Chart of the basic structure for the determination of the additionatily by the methodological [Tool for the demonstration and assessment of additionality, version 07.0.0](#)".

Step 0:

To determinate whether or not the project is the first of its kind the tool used has been the Methodological tool 23, Additionality of first-of-its-kind project activities Version 03.0.

According to the Methodological tool 23, version 03.0 Paragraph 8 Applicable geographical area - should be the entire host country. If the project participants opt to limit the applicable geographical area to a specific geographical area (such as province, region, etc.) within the host country, then they shall provide justification.

The applicable geographical area selected for the project is the one determined by the provinces of Santa Fe, Entre Ríos and Buenos Aires. The reason why the area is limited to

this three instead of the entire country is that the most relevant element is the river Paraná. This river concentrates the fluvial ports that constitute the main suppliers for Worms and also heavily influence the concentration of agro-industrial companies where the wastes are produced. The origin and composition of the wastes employed in the project force the situation of the installations to the point that outside this area the cost of transport and logistic difficulties will make it extremely hard to succeed.

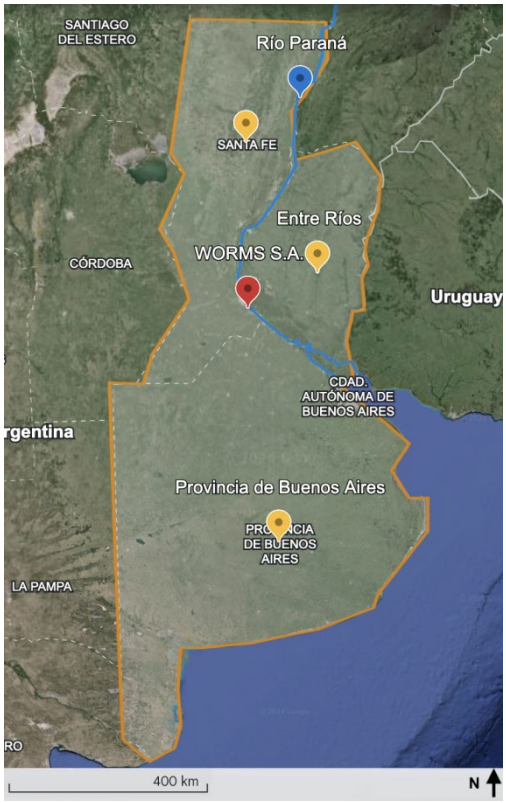

Figure 5. Spatial limits of the project. Worms Argentina S.A. Source: Google Earth.

The high dependency of the project and project activity of the fluvial ports makes necessary to include all the provinces that the Paraná River crosses to compile with all the regulations and administrative management at regional level.

Even though the geographical area includes the provinces previously mentioned, the effective geographical area where the project operates is within a ratio of 200 km around the project location, the main reason being that the agro-industrial companies located in this ratio generate the entirety of the residues that are used for the project activity, making it technological and economically feasible.

This is also aligned with the applicability conditions reference in the Methodology AM0057, version 3.0.1, page 12, where it establishes that "In any case, the region should cover a radius around the project activity of at least 20 km but not more than 200 km".

According to the definitions of the Methodological tool 23, version 03.0, Paragraph 9, there are four types of measures (fuel and feedstock switch, switch of technology, methane destruction and methane formation avoidance). There is a measure implemented by Worms Argentina S.A. for emission reduction activities:

- *Methane formation avoidance: Worms Argentina S.A. uses organic wastes as a feedstock to recover fatty acids. This organic waste would have been left to decay in landfills or other authorize areas for non-hazardous waste disposal.*

The output generated is recover fatty acids that could be used in different industrial processes, in the case of Worms, primarily for bio-diesel generation, fulfilling the definition of the Methodological tool 23, version 03.0, Paragraph 10.

According to the definitions of the Methodological Tool 23, version 03.0, Paragraph 11, a different technology defers by at least one the following three: energy source/fuel, feedstock and size of the installation. By contrast, in the same geographical are that deliver the following companies have been identified using a different feedstock or production process:

- *Oleo Química GEO S.R.L, located in Rosario, Santa Fe, Argentina, is a company that also treated agro-industrial wastes to generate recover fatty acids. However, this company only operates with residues originated in bio-oil industries. This claim is done by the company in the public information about their production process in its webpage where they state that "Our main production is relative to vegetal oleins for animal consumption, made from the by-products generated by the oil industry" (GEO S.R.L, 2019, Our products, available in https://www.geosrl.com.ar/en/ last consulted in October 2024). There is also a difference in the use of the fatty acids recovered considering that GEO used them to produce vegetable oleins for animal feedstock.*

- *Silva TI SE SERVICIOS S.R.L.: This company operates with liquid residues or effluents but they are of a different nature. Instead of working with organic oils they treated mineral oils and effluents with rest of hydrocarbons. Those type of residues are considered either special residues or hazardous residues, requiring special licenses. The information regarding the type of residues treated by the company could be check by consulting their web-page where they stated that "in the year 2010 we have decided to innovate in the market by constructing our Treatment Plant*

mineral oil used waste and effluents with hydrocarbons residues; Nueva Energía Argentina S.A " (Silva Ti Se Servicios S.R.L. available in https://silvaservicios.com.ar/ last consulted in October 2024) . In Nueva Energía Argentina S.A brochure is clearly stated that thy only operate with mineral oils. Also, all the licenses expedited to Silva TI SE SERVICIOS S.R.L referred the especial or hazardous nature of the wastes treated being without a doubt a different feedstock.

- *Pelco (Servicios - Grupo Pelco): This company treats liquid effluents form various origins including organic wastes, but the services they offer are both biological and physiochemical treatment to depurate the liquid effluents as a water depurating system and not focusing on the recovery of fatty acids but instead in waste water treatment. This information has been made public by the company in their sustainability report of 2023, page 12 in section services provided by Pelco Goup.*

By contrast, Worms Argentina S.A. uses as feedstock liquid organic wastes originated in bio-oils, cellulose, breweries, and agro-industrial companies located in the applicable area.

The methodology procedure establishes in the Methodological tool 23, version 03.0 Paragraph 12, that a proposed project activity is the first of its kind in the applicable geographical area if is the first in the applicable geographical area that applies a technology that is different from technologies that are implemented by any other project, which are able to deliver the same output and have started commercial operation in the applicable geographical area before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of the proposed project activity, whichever is earlier; The project implements one or more of the measures and the project participants selected a crediting period for the project activity that is "a maximum of 10 years with no option of renewal" .

In Worms Argentina S.A.' s case:

- *It is implementing one measure that results in methane formation avoidance (treating organic waste that would have been left to decay).*
- *It is implementing a different technology in the applicable geographical area (using a different feedstock) delivering the same output (recovered fatty acids) and has started commercial operation before the PDD is published.*
- *The participants have selected a crediting period of 10 years with no renewal.*

All things considered this project is a first-of-its-kind and therefore the project is additional.

3.5 Uncertainty management

The uncertainty of the estimates of project reductions is related to the activity data and emission factors:

- *Emission factors: official and specific sources for each category, based on 2006 IPCC Guidelines for National Greenhouse Gas Inventories.*
    - *Fossil fuel emission factor.*
    - *Electricity generation emission factor.*
- *General factors: unofficial and verified sources by the project holder or other external's analysis.*
    - *Waste quantity: directly measured by income control trucks and weighted of accepted cargos.*
- *Estimated factors: unofficial sources that provides from the supplier invoices.*
    - *Electricity consumption: Supplier Invoices - Direct Collection.*
    - *Fuels-mobile sources: Supplier Invoices - Direct Collection.*

When using default values, following the conservative principle, traditional values of settings and the most recent version of official documents have been used. All of those parameters and their sources are indicated at section 16.

3.6 Leakage and non-permanence

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 (tCO_2e/yr)*
$L_{y,disp}$	=	*Leakage from possible disposition of recycled paper, recycled materials, or bio-oil production (tCO_2e/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.

3.7 Mitigation results

The project is a retroactive project, and the emission reduction is calculated after the commissioning of the project. The results shown in the table are the consequence of the application of the AM0057 Methodology (Version 3.0.1.)

Therefore, the formula used for calculate the emission reduction, as indicated in the AM0057 Methodology (Version 3.0.1.), is the Equation 13: $ER_y = BE_y + PE_y - LE_y$. Where:

ER_y= Emission reduction in the year y (tCO_2e)

BE_y = Baseline emissions in year y (tCO_2e)

PE_y= Project emissions in the year y (tCO_2e)

LE_y= Leakage emissions in year y (tCO_2e)

Period	Baseline (tCO_2e)	Emission (tCO_2e)	Leakage (tCO_2e)	TOTAL EMISSIONS SAVINGS (tCO_2e)
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
1/01/2024 – 31/12/2024	34,538	454	-	34,084
1/01/2025 – 31/12/2025	34,538	454	-	34,084
1/01/2026 – 31/12/2026	34,538	454	-	34,084
1/01/2027 – 31/12/2027	34,538	454	-	34,084
1/01/2028 – 31/12/2028	34,538	454	-	34,084

TOTAL (tCO2e)	*332,588*	*4,469*		*328,119*

3.7.1 Eligible areas within GHG project boundaries (AFOLU sector projects)

Not applicable because the project is in waste sector.

3.7.2 Stratification (Projects in the AFOLU sector)

Not applicable because the project is in waste sector.

3.7.3 GHG emissions reduction/removal in the baseline scenario

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 missions 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: $BE_y = BE_{CH4,SWDS,y}$. *Where:*

BE_y	=	*Baseline emissions in year y (tCO_2e/yr)*
$BE_{CH4,SWDS,y}$	=	*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:

$$BE_{CH4,SWDS,y} = \varphi_y * (1 - f_y) * GWP_{CH4} * (1 - OX) * \frac{16}{12} * F * DOC_{f,y} * MCF_y * \sum_{x=1}^{y} \sum_j (W_{j,x} * DOC_j * e^{-kj*(y-x)} * (1 - e^{-kj})$$

Where:

$BE_{CH4,SWDS,y}$	=	*Baseline methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y ($t CO_2e$/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_{CH4}	=	*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 φ_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*** *($tCO_2e/t\ CH_4$)*

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 MCFy 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 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 ≤ 20ºC), 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

For the estimation period 2024-2028, the value for $W_{j,x}$ is the same as for 2023 per year.

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_2e)
2019	26,210
2020	28,536
2021	31,348
2022	39,266
2023	34,538
2024	34,538
2025	34,538
2026	34,538
2027	34,538
2028	34,538
TOTAL (tCO_2e)	332,588

3.7.4 GHG emissions reduction/removal in the project scenario

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):

$$PE_y = PE_{FC,j,y} + PE_{EC,y} + PE_{CO2,TR,y} + PE_{CO2,SWTR,y} + PE_{Py,y}$$

Where:

PE_y	=	*Project emissions in year y (tCO_2e/yr)*
$PE_{FC,j,y}$	=	*Project emissions from fossil fuel combustion in process j during the year y (tCO_2/yr)*
$PE_{EC,y}$	=	*Project emissions from electricity consumption by the project activity during the year y (tCO_2e/yr)*
$PE_{CO2,TR,y}$	=	*Project emissions from increased transport of agricultural waste to the plant in year y (tCO_2e/yr)*
$PE_{CO2,SWTR,y}$	=	*Project emissions from the transport of solid waste from the manufacturing process to a disposal site (tCO_2e/yr)*
$PE_{Py,y}$	=	*Project emissions in the off-gas from the pyrolysis process in year y (tCO_2e)*

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:

$$PE_y = PE_{EC,y} + PE_{CO2,TR,y}$$

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:

$$PE_{CO2,TR,y} = \sum_i FC_{TR,i,y} * NCV_{i,y} * EF_{CO2,FF,i}$$

Where:

$PE_{CO2,TR,y}$	=	*Project emissions from transport of agricultural waste to the plant in year y (tCO_2e/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)*
$EF_{CO2,FF,i}$	=	*CO_2 emission factor for fossil fuel type i (tCO_2/MJ)*

$NCV_{i,y}$ = *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:

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

Where:

$FC_{TR,i,y}$	=	*Fossil fuel consumption in mass basis (kilograms)*
$FC_{TR,i,y,L}$	=	*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, **ρ_i = 0,840 kg/l**

Weighted average net calorific value of the fuel type i in year y (GJ/kg) ($NCV_{i,y}$)

As per page 17 from the methodology AM0057, considering there is no project specific data or country specific data, $NCV_{i,y}$ 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, $NCV_{i,y}$= ***0,0433 GJ/kg***

Weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ) ($EF_{CO2,FF,i}$)

As per page 17 from the methodology AM0057, considering there is no project specific data or country specific data, $EF_{CO2,I,y}$ 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 CO_2/GJ.***

VARIABLE: Fossil fuel consumption ($FC_{TR,i,y}$) in trucks for transportation

The diesel used during the project activity for transport are:

	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

For the estimation period 2024-2028, the value for $FC_{TR,i,y}$ is the same as for 2023 per year.

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 CO_2 / yr)
$E C_{PJ,j,y}$	=	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 CO_2/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
$EC_{PJ,j,y}$ (MWh)	15,27	16,62	18,26	22,87	20,124

For the estimation period 2024-2028, the value for $EC_{PJ,j,y}$ is the same as for 2023 per year.

Emission factor for electricity generation for source j in year y (t CO_2/MWh) ($EF_{EF,jl,y}$)

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

*For the estimation period 2024-2028, the value for **$EF_{EF,jl,y}$** is the same as for 2023 per year.*

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

Based on The Wolrd Bank stadistics (IEA), the electric power transmission and distribution losses (% of outputs) in Argentina is 15%. So, TDLj,y = 15%

In conclusion, the results of the project emissions are as following:

	2019	**2020**	**2021**	**2022**	**2023**
$PE_{EC,y}$	4	5	6	7	5
$PE_{CO2,TR,y}$	491	428	370	434	449
TOTAL PE (tCO_2e)	**495**	**433**	**376**	**441**	**454**

*For the estimation period 2024-2028, the value for **PE** is the same as for 2023 per year.*

Hence, the results of the project are:

Year	**H emission reductions in the baseline scenario (tCO2e)**	**H emission reductions in the project scenario (tCO_{2e})**	**H emissions attributable to leakages (tCO_{2e})**	**Estimated Net H Reduction (tCO_{2e})**
2019 (01/01/2019-31/12/2019)	26,210	495	-	25,715

2020 (01/01/2020-31/12/2020)	*28,536*	*433*	-	*28,103*
2021 (01/01/2021-31/12/2021)	*31,348*	*376*	-	*30,972*
2022 (01/01/2022-31/12/2022)	*39,266*	*441*	-	*38,825*
2023 (01/01/2023-31/12/2023)	*34,538*	*454*	-	*34,084*
2024 (01/01/2024-31/12/2024)	*34,538*	*454*	-	*34,084*
2025 (01/01/2025-31/12/2025)	*34,538*	*454*	-	*34,084*
2026 (01/01/2026-31/12/2026)	*34,538*	*454*	-	*34,084*
2027 (01/01/2027-31/12/2027)	*34,538*	*454*	-	*34,084*
2028 (01/01/2028-31/12/2028)	*34,538*	*454*	-	*34,084*
TOTAL (tCO$_2$e/t CH$_4$)	*332,588*	*4,469*		*328,119*

4 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 Munic. Planta A. Seco - Resol.Nº 024-18 - 16.03.2018*
- *27-Resol. Nº 523 WORMS ARG. S.A. EIA*
- *55-Disp. 287-19 Renov. Reg. RT 0029*
- *Permiso vuelco de efluentes 21-06-19 WORMS*
- *2-WORMS Renovacion directorio 2021*

5 Carbon ownership and rights

5.1 Project holder

Provide contact information for the H Project holder.

Individual or organization	**WORMS ARGENTINA S.A.**
Contact person:	ANDRES BELTRAMO
Job position	HEAD OF OPERATIONS DEPARTMENT
Address	Prof. Nucci S/N ,Arroyo Seco, Santa Fe

Phone number	+54 9 3402 417968
Email	abeltramo@worms.ar

5.2 Other project participants

There is no other participants in this project.

5.3 Agreements related to carbon rights

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.

5.4 Land tenure (Projects in the AFOLU sector)

Not applicable because the project is in waste sector.

6 Climate change adaptation

In Worms Argentina S.A. the protection and conservation of the ecosystem services are an important part of our propose. We are committed to the challenge of being able to guarantee the human well-being of the team and the people who live in relation to the company, combining our business with the generation of positive social and environmental contributions. This purpose is compiled in the Environmental Manual, the Resource Conservation Manual and the Environmental Management System, which are included in the certification of B Corp Company.

The Environmental Manual establishes our commitments with the respect and responsible uses of the sources in all of our company: environment (ecosystems, water, soil and air), offices (waste separation and recycling, energy efficiency and water care).

Therefore, we implement different practices and policies aligned to preserve and care for the resources and the environment where we operate. Our raw material is 98% industrial waste. We provide a comprehensive solution to the problem of final deposition of liquid and solid industrial waste from the country's large generators, which over the years, in the absence of government regulations and lack of responsibility on the part of these industries, have led to the contamination of rivers, lakes and seas; to the expansion of open-air dumps, clandestine dumps, decompositions, harming the population and living beings of other species: fish and plants.

The objective of the Environmental Management System is the control of selected indicators in order to monitor and determine the degree of impact produced on the environment from the activities of all the business units operating in Worms Argentina S.A.

7 Risk management

As BCR Tool "Permanence and risk management, version 1.0 establish, Worms Argentina S.A. With the aim of coordinating the actions to prevent potential emergencies, Worms Argentina S.A. has implemented a contingency plan that includes different risks and actions. All risks have been identified by using the BRC Tool Permanence and Risk Management Version 1.1. and considered low because each of them represents the risk of impact less than 5% of the carbon benefits accumulated by the project to the verification time.

The tool also specifies that all the risks scored as medium and high should include a mitigation measurement and should be monitored. In this case, no medium or high risks have been identified but since the project is already operating, measures have been planned in case one of the identified risks would increase its impact in upcoming verification periods. However, since it's not required for low risks, they have been not implemented or monitored jet.

Environmental Risk:

Identification of the potential natural and anthropogenic risks that GHG mitigation actions may face and determine the measures necessary to mitigate such risks.

Risk	***Score***	***Measures***
NATURAL PHENOMENA - Flood	*Low*	*- Road and water reservoir maintenance.* *- Suspension of operations in case of risk of flooding.*
NATURAL PHENOMENA - Drought	*Low*	*- Diversification of suppliers to find those not affected by the drought to maintain the levels of production stable.*
NATURAL PHENOMENA - thunderstorm	*Low*	*- Lightning rod installation.*
Extern agents and staff risk.	*Low*	*- 24 hours security with perimeter fencing, cameras and access control.*
Risk of fire (forest or grass, waste piles or organic waste composting process).	*Low*	*Emergency Response Plan. Alarm and start of preventive protocol to avoid damage to combustible materials in storage.*

Personal risk or transportation incident	*Low*	*- Demarcation, signaling and maintenance of internal streets and access.* *- Accident prevention and first aid courses.*

Financial Risk

Identified potential financial risks related to expected costs and investments, as well as project cash flows and defined measures to mitigate financial risks.

Risk	***Score***	***Measures***
Increase in cost and expenses	*Low*	*Diversified activities in order to developed 3 activities simultaneously with in the company allowing to redirect profits from one of them in other if necessary.*
Low cash flow	*Low*	*Continuation of the expansion plan to increase the number of suppliers and clients increasing the business volume and cash flow.*

Social Risk

Determined medium- and short-term risks associated with the participation of local communities and stakeholders in the activities proposed.

Risk	***Score***	***Measures***
Change in governmental priorities	*Low*	*- Establish measures to ensure the project´s independence from governmental help and self-operating capacity.* *- Closed work with local governments to collaborate in local policies.*
Problems in communication with the stakeholders	*Low*	*- Implementation of the communication and consultation plan to aligned the different stakeholders' priorities.*

Leakage and non-permanence

In order to keep possible leakages under control, the following criteria will be maintained as it has been applied to date according to the approved baseline and monitoring methodology AM0057.

- *Using bio-oils whose origin is from agro-industrial waste not conditioning or affecting in any way the agricultural waste-based bio-oil production elsewhere.*
- *Avoiding the increased use of fossil fuel due to the replacement of biomass fuel with fossil by using agricultural industrial waste without commercial value being the alternative treatment it´s deposition in to the sewers or landfills.*
- *Preventing the leakage from the anaerobic breakdown of the bio-oil, produced in the project activity as the methodology establishes that if invoices are provided proving the sale of the bio-oil, this leakage can be omitted and the commercial sale of the bio-oil is and all the recovered fatty acids is the main goal of the installation.*

The data control required to monitor and control the GHG reduction process are the same that are required to verify the correct functioning of the company, therefore, the mechanisms of monitorization and control applied for both criteria.

The information will be collected and controlled for the VCC that will be conducted every three years maximum during the duration of the project.

7.1 Reversal Risk

This is a case of an ex-post project, which means that the current activity has been operating for four years already. All the project participants and stakeholders are already committed and with contracts in place. The possible difficulties could be of financial and social nature and have already been considered in the risk management plan.

The best proof of the commitment of the stakeholders involved is the trajectory and expansion of the project in the previous years and plans for its expansion and growth contemplated in this document.

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.*

Parameter	***Annual Frequency***	***Optional Analyzes***

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 Nº 201/04 – Air quality guide levels for province of Santa Fe.

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

The methodologies applicated 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:

Figure 7. Monitoring positions for air quality at Worms Argentina S.A. Source: Google Earth.

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*	*Win-Dir*	*Win - speed*	*Precipitation*	*Weather Conditions*
28º	*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/m³*	*0,50*
Hydrogen sulfide (H2S)	*Not detected*	*Not detected*	*Not detected*	*Not detected*	*mg/m³*	*-*

** 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

Figure 8. Location of the water meters on the property and theis respective coordinates. Source: Google Earth,

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

PARAMETERS	***LC***	***UNIT***	***P1***	***P2***	***P6***	***P7***	***P8***	***LIMIT***
Color	*1*	*PI/Co*	*1*					*20*
Conductivity	*0,1*	*µS/cm*	*935*	*734*	*804*	*1701*	*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/10 oml*	*<1,1*	*<1,1*	*<1,1*	*<1,1*	*<1,1*	*<2,2*
TOTAL COLIFORMS	*2,2*	*NMP/10 oml*	*<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.

ADITIONAL 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 Socio-economic aspects

As a B Corporation (BCorp) certified company, Worms Argentina 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 Argentina S.A. has analysed the main socio-economic effects of its activities. Before the start of the process, an analysis of the demographic and labor analysis was analyed: based on official statistic datas of Argentina and Arroyo Seco goverments (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 Argentina 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 Argentina 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 main 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 Consultation with interested parties (stakeholders)

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 Argentina S.A. will take to resolve them.

- 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.

- Donations: on the other hand and in addition to road maintenance and infrastructure improvements, Worms Argentina S.A. 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.

Local Authorities:

The local authorities have a big influence in the authorizations and regulations of the project activity. Hence, Worms Argentina 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.

An endless number of visits from different municipalities, councilors and deputies have also been received at the provincial level, seeing how it works and the need to see a company like Worms Argentina S.A. in the fight against climate change.

https://twitter.com/WormsSA/status/1271927365594230785?cxt=HHwWgsC95ebM5aYjAAAA

All these meetings and visits are registered through the minutes and signed by both parties in order to ensure Worms Argentina S.A.'s commitment with the local authorities and community.

National and Regional Authorities:

Worms Argentina S.A. 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=HHwWgICyhdGHj600AAAA, https://twitter.com/WormsSA/status/1453861053650120724?cxt=HHwWqMC5-Zy7k600AAAA)

He has also received a visit from the Minister of Production of the Nation (Daniel Schteingart) with his team, interested in the continuous improvements of his projects.

https://twitter.com/WormsSA/status/1363628583772635141?cxt=HHwWioCy1Zu-yuwlAAAA

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.

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.

Customers:

As the Customer Satisfaction Procedure establishes, Worms Argentina S.A: sends a customer satisfaction surveys to all customers after delivery of units. The objetive of this surveys is the determination of the degree of satisfaction and perception regarding the degree of compliance with respect to the services provided.

10.1 Summary of comments received

Since this project is ex-post, the comments received during the first five years of the project are summarized below. All of them have been taken into account throughout the implementation of the project with the aim of continuous improvement and including stakeholders in the process.

Local community:

- Yearly meetings and visits to the premises: 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 box and book: 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: currently, Worms Argentina S.A makes monetary donations to Volunteer Firefighters of the town of Arroyo Seco.

Local Authorities:

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 Argentina S.A. . and visited the facilities to learn about our project first-hand. (https://twitter.com/WormsSA/status/1271927365594230785?cxt=HHwWgsC95ebM5aYjAAAA). 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:

From a national point of view, the visit of the Minister of Productive Development of the Argentine Republic (Matias Kulfas, 29/10/2021) has been received at the facilities.

(https://twitter.com/KulfasM/status/1453851371195744256?cxt=HHwWgICyhdGHj600AAAA; https://twitter.com/WormsSA/status/1453861053650120724?cxt=HHwWqMC5-Zy7k600AAAA).

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:

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:

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. is in constant contact with its customers via email or telephone. To date, no negative comments have been received regarding the development of the project. All comments were related to minor

procedures such as the delivery of products and have been immediately resolved by the work team.

10.2 Consideration of comments received

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 Sustainable Development Goals (SDGs)

According to the SDG Tool provides by BCR, which is annexed to this PDD, this project is aligned with four SDG. The contribution of Worms Argentina S.A. to the SDGs is divided into three verification period of the project: 1/january/2019 to 31/december/2023, 1/january/2024 to 31/december/2026 and 1/january/2027 to 31/december/2028 Since the project si retroactive, the first period've been verified and the second and third periods are estimations based on the first one.

- *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 dumpling 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)	*VERIFICATION PERIOD*		
	1/january/2019 to 31/december/2023	*1/january/2024 to 31/december/2026*	*1/january/2027 to 31/december/2028*
6.3. "proportion of wastewater safely treated"	*531.465,23*	*344,390.72*	*229,593.81*

(Tons of effluents treated)			

*For the estimation periods (second and third), the contribution to SDG 6 is based on tons of effluent treated in the last year (2023). Hence, for the second period is 114,796.91 tons of effluent * 3 years =344,390.72 tons; and for the third * 2 years = 229,593.81 tons.*

- *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).*

For the estimation periods (second and third), the contribution to SDG 9 are an estimation

SDG, global target and project activity (UNIT)	*VERIFICATION PERIOD*		
	1/january/2019 to 31/december/2023	*1/january/2024 to 31/december/2026*	*1/january/2027 to 31/december/2028*
9.2. Proportion of local people employed in total number of employees (%)	*40%*	*50%*	*63%*

of the growth of the company, based on the proportion of local people employed in the first period.

- *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 this effluent treatment becomes a great contribution to SDG12.*

SDG, global target and project activity (UNIT)	*VERIFICATION PERIOD*		
	1/january/2019 to 31/december/2023	*1/january/2024 to 31/december/2026*	*1/january/2027 to 31/december/2028*
12.5. Bio-oils and fatty acids recovered from effluents and non	*531.465,23*	*344,390.72*	*229,593.81*

hazardous wastewater (tons)			

*For the estimation periods (second and third), the contribution to SDG 12 is based on tons of effluent treated in the last year (2023). Hence, for the second period is 114796.91 tons of effluent * 3 years =344,390.72 tons ;and * 2 years = 229,593.81 tons for the third.*

- *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 agro-industries 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 CO_2e reduced by the project activity.*

For the estimation periods (second and third), the contribution to SDG 13 is based emissions

SDG, global target and project activity (UNIT)	*VERIFICATION PERIOD*		
	1/january/2019 to 31/december/2023	*1/january/2024 to 31/december/2026*	*1/january/2027 to 31/december/2028*
13.2. Emissions Reductions of the Project activity (t CO_2e)	*157.699*	*102,252*	*68,168*

*reductions of the project activity in the last year (2023). Hence, for the second period is 34,084 t CO_2e * 3 years = 102,252 t CO_2e for the second period and * 2 years = 68,168 t CO_2e for the third.*

12 REDD+ Safeguards (For REDD+ projects)

Not applicable because the project is not a REDD+ project..

13 Special categories, related to co-benefits (optional)

Not applicable because the project is not in a special category.

14 Grouped projects (if applicable)

Not Applicable because the project is not a grouped project.

15 Other GHG program

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

16 Double counting avoidance

The BCR Tool "Avoiding Double Counting (ADC)" sets out the principles and requirements for the BCR Program, to avoid double counting of emission reductions or removals. Following the requirements, a letter should be provided to ensure that the host country of the project activity acknowledge that the project activity reduces emissions. Also, the focal point declares that the project is duly registered in the public registry system of the country.

In Argentina, the public body responsible for register the projects that mitigate de effects of global warming is the ReNaMi, (Registro Nacional de Proyectos de Mitigación del Cambio Climático) or National Register of Global Warming Mitigation Projects. However, this register specifies that even tough is a voluntary register, its not possible to voluntarily register a project, but instead, the project would be included when register and validated by the correspondent standard applied.

Worms Argentina S.A. is committed to formalize the inscription in both registers, communicating to the ReNaMi as soon as the register in BioCarbon is completed and providing the Argentinians authorities with all the information to improve the data in mitigation projects and the Nationally Determined Contribution (NDC).

Also, it's important to remark that the project submitted has never been presented to any other platform of VCCs or other register that could lead to a double counting to demonstrate compliance with GHG mitigation goals. That also means that the GHG mitigation effects of the project have never been calculated prior to the register process and without its prior quantification it is not possible to use or confuse the results for any kind double counting.

17 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;*

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 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.

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 Argentina S.A. 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 necessaries 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	*- 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 60/70ºC 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 67ºC, 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 Archieve*
Production And Storage Record	*Production Supervisor*	*Production Supervisor*	*Shared Resource*	*Digital*	*Undefined*	*Passive Archieve*
Raw Materials And Product Quality Registration	*Laboratory Analyst*	*Laboratory Analyst*	*Shared Resource*	*Digital*	*Undefined*	*Passive Archieve*

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	*- Control of consumption: based on the quantity of fuel purchased, invoices received will be controlled and correctly recorded.* *- Monitoring and periodic control of fossil fuel consumption and that way minimizing the emissions from trucks movement and machinery.*
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 Nº 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.).

Information to monitor project activities and mitigation results:

a) Data and information needed to estimate GHG emission removals or reductions during the project quantification period

To estimate GHG emission reduction during the project quantification period and in order to keep the information updated, the following parameters will be monitored:

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	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	*The value of the density of the different fuels used are provided by the fuel supplier in invoices.*
Purpose of data	*Determination of the project emissions.*
Any comments	.

Data/Parameter 2

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.*

Value applied	*0,0433 GJ/kg*
Justification of choice of data or description of measurement methods and procedures applied	*As per page 17 from the methodology AM0057, considering there is no project specific data or country specific data, $NCV_{i,y}$ 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 3

Data/Parameter	*$EF_{CO2,I,y}$*
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.*
Value applied	*0,0748 ton CO_2/GJ*
Justification of choice of data or description of measurement methods and procedures applied	*As per page 17 from the methodology AM0057, considering there is no project specific data or country specific data, $EF_{CO2,I,y}$ 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 4

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 methods and procedures applied	*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/*
Purpose of data	*Determination of the project emissions*
Any comments	*For the estimation period 2024-2028, the value is the same as for 2023.*

Data/Parameter 5

Data/Parameter	***TDLj,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 Wolrd Bank Stadistics (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	*-*

Data and parameters monitored

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

Data/Parameter 6

Data/Parameter	$EC_{PJ,j,y}$
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

	$EC_{PJ,j,y}$ (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	*For the estimation period 2024-2028, the value is the same as for 2023.*					

Data/Parameter 7

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	*For the estimation period 2024-2028, the value is the same as for 2023.*					

b) Data and additional information to establish the baseline or reference scenario

To establish the baseline scenario, the following data and parameters will be monitored:

Data and parameters available at the validation:

Data/Parameter 8

Data/Parameter	φ_y
Data unit	-
Description	*Default value for the model correction factor to account for model uncertainties for year y*
Source data	*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 9

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 10

Data/Parameter	GWP_{CH_4}
Data unit	*t CO_2e/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 11

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 12

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 13

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 14

Data/Parameter	MCF_y
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 15

Data/Parameter	***DOC_j***
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	*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 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 stablished 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).*
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 16

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 ≤20ºC), Wet (MAP/p ET > 1), the value is 0,185 1/yr.*
Purpose of data	*Determination of the baseline*
Any comments	*-*

Data/Parameter 17

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 and parameters monitored

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

Data/Parameter 18

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	*Since the measurement of the amount of solid waste has an 2% of uncertainly for years 2019 and 2020, the final values applied are:*

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

Justification of choice of data or description of measurement methods and procedures applied	*According to paragraph 25, of the methodological tool 4 "Emissions from solid waste disposal sites. Version 08.1" "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.*
Purpose of data	*Determination of the baseline*
Monitoring frequency	*Monitored continuously with the entrance of each truck at the plant.*
Any comments	*For the estimation period 2024-2028, the value is the same as for 2023.*

c) 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.

d) 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	*- Hazarous 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	*- 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.* *- 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–Dry Creek (Sta. Fe).*
Air	*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.*

e) 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 he 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 sored 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:

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 Argentina S.A. in the correspondent period adding transparency and traceability.

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 then 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 an the 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.

f) 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 AM0057, 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.

g) 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.

h) 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 organis waste from biodiesel and oil industries that otherwise would have been left to decompose generating GHG.*

i) 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_2e)*

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

Not applicable because this project has no special category.

k) 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.