PROCESS OF NON-HAZARDOUS AGROINDUSTRIAL LIQUID ORGANIC WASTE

Document prepared by Polaris Network España SL

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	*POLARIS NETWORK ESPAÑA SL*
Version	*2*
Date	*06/02/2024*
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	32.811,34 ton CO_2 average annual, (328.113,41 ton CO_2 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	-

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

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

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

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

Large-scale.

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 biodiesel, and oil industries that produce GHG in the region and won´t be treated otherwise. Worms Argentina S.A is certified as a "B Corp" company (a company that measures social and environmental impact and commits itself personally, institutionally and legally to make long-term action decisions in the community and environment).*

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- *Not applicable.*

d- *This project is aligned with four SDG:*

   a. *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.*
   b. *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.*
   c. *SDG 12. Responsible consumption and production: By 2030, substantially reduce the generation of waste through prevention, reduction, recycling and reuse.*
   d. *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	*25.714,58*
2020	*28.102,79*
2021	*30.971,40*
2022	*38.824,76*
2023	*34.083,31*
2024	*34.083,31*
2025	*34.083,31*
2026	*34.083,31*
2027	*34.083,31*
2028	*34.083,31*
Total	***328.113,41***

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.

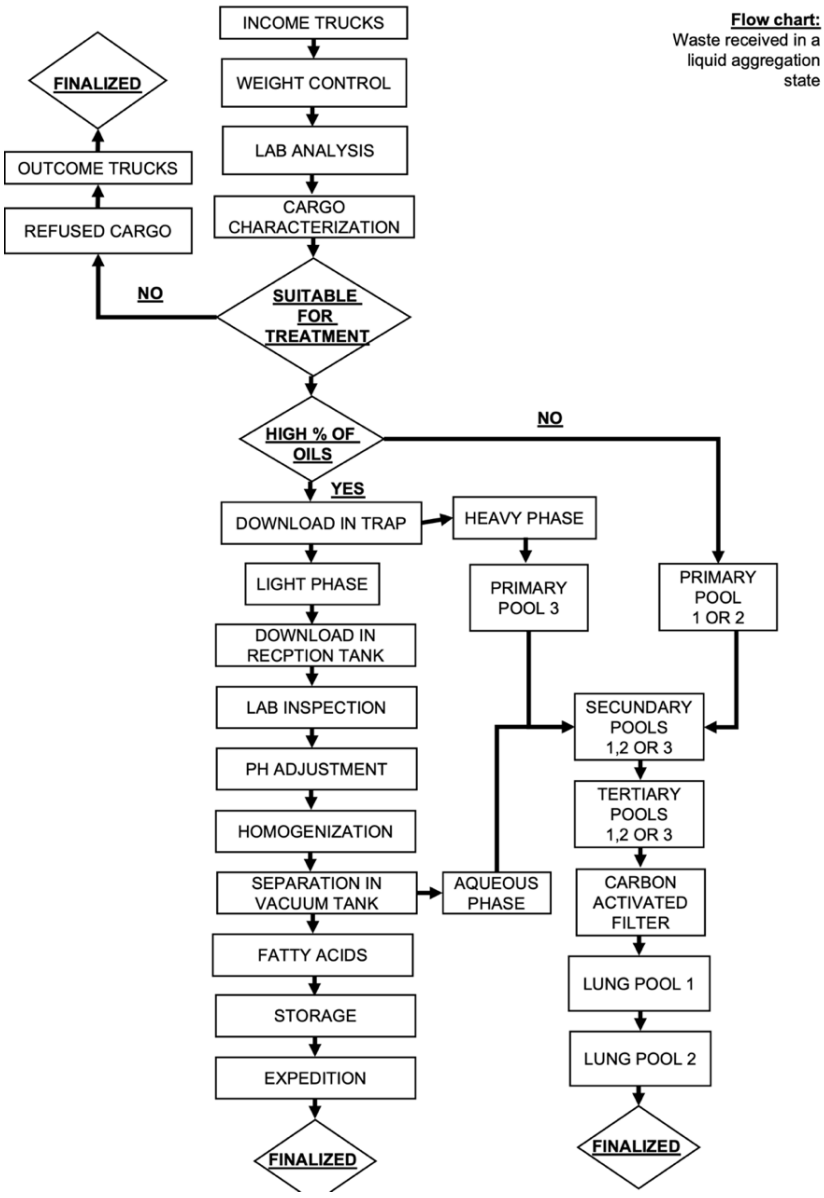
All of those purposes are reflected in the B Corp certification and documents, that demonstrate the environmental, legal and social commitment with the community, the environment and itself.

The project objective is to obtain a valuable product 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, recovering fatty acids from agro-industrial waste for its use in the production of biodiesel.

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:



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://www.google.es/maps/place/Complejo+Industrial+de+Tratamiento+y+Valorización+de+NFU%60s/@-33.1420886,-60.5353886,1199m/data=!3m1!1e3!4m5!3m4!1s0x95b7098003704eeb:0xc44239fc4fc4b71b!8m2!3d-33.142272!4d-60.5358492

2.5 Additional information about the GHG Project

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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 AM005 **"***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 S.A., the project involves the use of fatty acids from agro-industrial waste for the production of a biodiesel with the same and high quality than other products in the market.

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 higher than existing products.*
During the production of pulp and paper, cardboard or fibreboard no significant additional process leading to emissions of	*Not applicable.*

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 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.*
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 3. Tool to calculate project or leakage CO2 emissions from fossil fuel combustion

Applicability TOOL 3	***Justification***
This tool provides procedures to calculate project and/or leakage CO2 emissions from the combustion of fossil fuels. It can be used in cases where CO2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. *Methodologies using this tool should specify to which combustion process j this tool is being applied.*	*Applicable because of the project involves combustion of fossil fuel.*

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 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.*	*This project used application B) because the project activity avoids the disposal of waste in a SWDS.*

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:	*Since the electricity will be consumed only from grid, the project emission from electricity consumption is estimated as Scenario A.*

(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 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.

3.2 Project boundaries, sources and GHGs

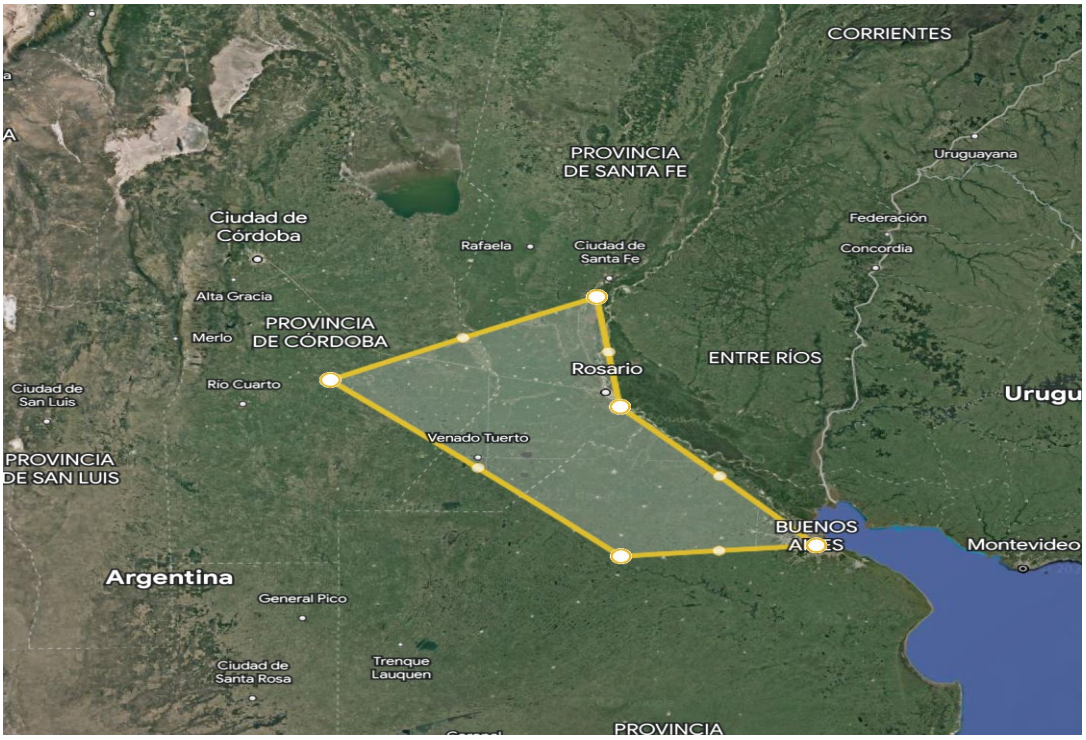
The project boundary is defined as the physical, geographical location of the following:

a) *The generation sites, where the liquid wastes are generated and gathered in order for the trucks to transport them to the waste treatment facilities in Worms Argentina, S.A. Without the project activity in these areas the liquid waste would be spilled in the sewers or deposited into landfills resulting in methane emissions.*
b) *The tanks area, where the liquid wastes (fatty acids and wastewater) are treated. It has a total capability of 1.219m³.*

c) *The pools system, with a total of two reception pools, three primary pools, three secondary pools, three tertiary pools and two lung pools. The total surface area occupied by the system is 19.427m² and a volume of 116.562m³.*
d) *Use of the recycled wastewater for watering the internal areas and facilities in Worms Argentina S.A. and also rural dusty roads after notifying the local government.*
e) *The transports between the generation sites and the liquid waste treatment facilities.*

INCOME	*PRODUCTION*	*DEPARTURES*
- Bio-oils *- Fatty acids* *- Fuel consumption until reaching the plant.* *Both in the form of effluents or liquid waste originated in the vegetable oil production industries and bio-diesel industries.*	*- Recovered fatty acids* *- Recovered water from wastewater recycling process.*	*- Distribution.* *- Electricity consumption (included in production)*

3.2.1 Spatial limits of the project



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	Yes	Significant emission from liquid waste treatment
	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 periods for the quantification of GHG emission reductions.

3.2.3.1 Project start date

The project's start date is January 01, 2019, in accordance with BCR Standard section 10.4.

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 1/1/2019 to 31/12/2028.

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 solid 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.

3.3 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? And

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.

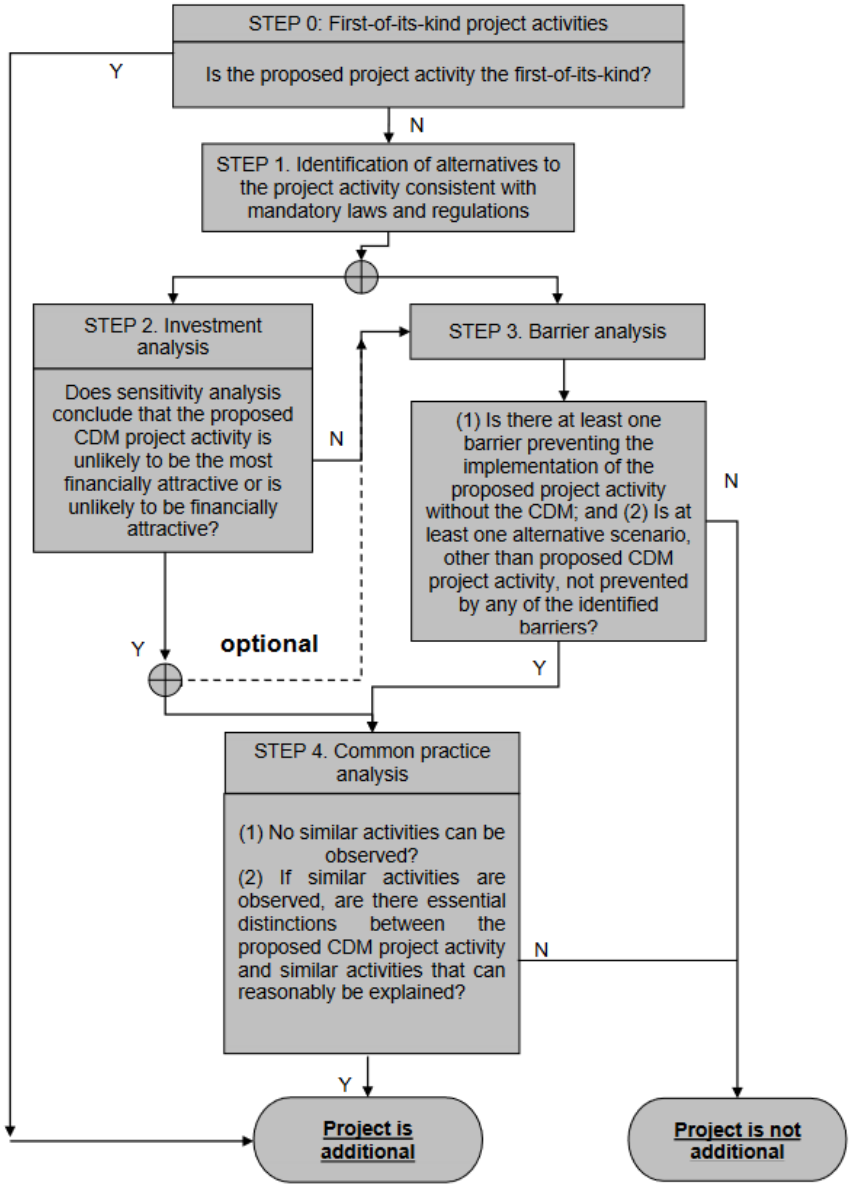
The processes in Worms Argentina S.A. they are carried out manually by operators specifically trained to prepare the mixture of the residues, previously received and controlled, being the ones that occupied this study non-hazardous liquid waste originated in diverse agro-industries present in the area.

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.

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" it has also been taken into account the methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period, version 03.0.1".

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



Step 0: The project it's not the first of its kind.

Step 1: 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.

Step 3: This project faces barriers that do not prevent the implementation of the alternatives. The major difference observed between the project and other alternatives with similar activities is avoiding the use of catalyst. The most common one used is sulfuric acid (H_2SO_4).

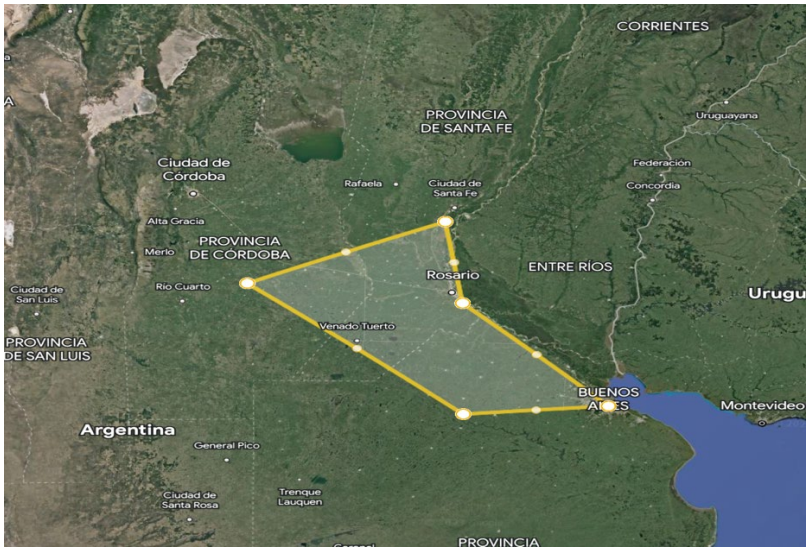
This chemical substance helps with the hydrolysis process required to separate the oils and fatty acids from water accelerating the process and allowing a more homogenous treatment of the effluents regardless of the composition or percentage of organic material. In order to maximize the efficiency of this chemical separation the effluents need to be heated to reach the optimal temperature for the catalyst to work.

The project does not add any catalyst to the reaction minimizing the impact to the environment avoiding the use of dangerous chemical substances, but as a consequence the process is slower and requires bigger installations and more chemical analysis of the samples to ensure an optimal process without the H_2SO_4.

The extra time of the hydrolysis process, the need of extra chemical analysis and the extra space for pools required to implement the project constitute the barriers that this project face and do not affect the alternative.

Combining the elements already described, the mayor differences are the avoidance of using potentially hazardous chemicals like sulfuric acid and reducing the energy required for thermal treatment and also selecting the most efficient treatment for each waste depending on their chemical composition and percentage of the bio-oils and fatty acids presents within them.

<u>Step 4:</u> The applicable geographical area considered for this project is the region determined by a ratio of 200 km instead of the entire country. The reason for this is the significant importance of the agro-industrial companies located in the area that generate the majority of the residues that are used for the project activity, making it technological and economically feasible.



There is another project that realize a similar activity located in the same geographical area, this company is commercially known as Oleo Química GEO S.R.L, located in Rosario, Santa Fe, Argentina.

The major difference observed with similar activities is avoiding the use of catalyst but it´s also noticeable that, the temperature for the effluent's treatment in other projects can´t be inferior to 70º C to use the catalyst, which means that they must use energy to heat the effluents originated from waste to treat them and separate the fatty-acids.

This project it's not registered as CDM project activities, project activities submitted for registration, nor project activities undergoing validation.

$$F=1-N_{diff}/N_{all} = 1 - 0/1 = 1.$$

Although N_{all} - N_{diff} does not reach the minimum to be consider common practice (3) it is because the area selected is geographically more limited that the entire country, but the process itself it's standard in the industry, being more relevant the fact that F is above 0.2.

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:

$$ERy = BEy - PEy - LEy$$

Where:

ERy = Emission reduction in the year y (tCO_2e)

BEy = Baseline emissions in year y (tCO_2e)

PEy = Project emissions in the year y (tCO_2e)

LEy = Leakage emissions in year y (tCO_2e)

Period	Baseline	Emission	Leakage	TOTAL EMISSIONS SAVINGS (tCO_2e)
01/01/2019 -31/12/2019	26.210,45	495,86	-	25.714,58
01/01/2020 - 31/12/2020	28.536,62	433,83	-	28.102,79
01/01/2021 - 31/12/2021	31.348,14	376,74	-	30.971,40
01/01/2022 - 31/12/2022	39.266,26	441,50	-	38.824,76
1/01/2023 – 31/12/2023	34.538,52	455,21	-	34.083,31
1/01/2024 – 31/12/2024	34.538,52	455,21	-	34.083,31
1/01/2025 – 31/12/2025	34.538,52	455,21	-	34.083,31
1/01/2026 – 31/12/2026	34.538,52	455,21	-	34.083,31
1/01/2027 – 31/12/2027	34.538,52	455,21	-	34.083,31
1/01/2028 – 31/12/2028	34.538,52	455,21	-	34.083,31
	332.592,61	4.479,20		328.113,41

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

Not applicable.

3.7.2 *Stratification (Projects in the AFOLU sector)*

Not applicable.

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_{CH_4}	=	*Global Warming Potential of methane*
OX	=	*Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)*
F	=	*Fraction of methane in the SWDS gas (volume fraction)*
MCF_y	=	*Methane correction factor for year y*
DOC_j	=	*Fraction of degradable organic carbon in the waste type j (weight fraction)*
k	=	*Decay rate for the waste type j (1/yr)*
j	=	*Type of residual waste or types of waste in the MSW*

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

The default value is applied for application B and in humid/wet conditions, so 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 (fy)

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

Global Warming Potential of methane (GWP_{CH_4})

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

Oxidation factor (OX)

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

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

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

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

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

Methane correction factor for year y (MCF_y)

For application B, considering SWDS without a water table above the bottom of the SWDS, the default values (based on SWDS type) for 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 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).

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
$W_{,y}$ (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.

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*
2019	*26.210,45*
2020	*28.536,62*
2021	*31.348,14*
2022	*39.266,26*
2023	*34.538,52*
2024	*34.538,52*
2025	*34.538,52*
2026	*34.538,52*
2027	*34.538,52*
2028	*34.538,52*
TOTAL	*332.592,61*

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:

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

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

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

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

Where:

$FC_{,i,y}$	=	*Fossil fuel consumption in mass basis (kilograms)*
$FC_{i,j,y,L}$	=	*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 table 4, page 7 and 8 from the tool, $NCV_{i,y}$ (option d) is a default value from IPCC at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

So, ***$NCVi,y$ = 0,0433 GJ/kg***

Weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ) ($EFCO_{2,i,y}$)

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

So, ***$EFCO2,i,y$ 0,0748 ton CO_2/GJ.***

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

The diesel used during the project activity for transport are:

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

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

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)
$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EF,j,y}$	=	Emission factor for electricity generation for source j in year y (t 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.

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.*

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**
$PE_{EC,y}$	4,69	5,26	6,13	7,15	5,36
$PE_{CO2,TR,y}$	491,17	428,57	370,61	434,36	449,85
TOTAL PE	**495,86**	**433,83**	**376,74**	**441,50**	**455,21**

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

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	26.210,45	495,86	-	25.714,58
2020	28.536,62	433,83	-	28.102,79
2021	31.348,14	376,74	-	30.971,40
2022	39.266,26	441,50	-	38.824,76
2023	34.538,52	455,21	-	34.083,31
2024	34.538,52	455,21	-	34.083,31
2025	34.538,52	455,21	-	34.083,31
2026	34.538,52	455,21	-	34.083,31
2027	34.538,52	455,21	-	34.083,31
2028	34.538,52	455,21	-	34.083,31
TOTAL	***332.592,61***	***4.479,20***	-	***328.113,41***

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

This document has been prepared by POLARIS NETWORK ESPAÑA, SL

Individual or organization	**POLARIS NETWORK ESPAÑA, SL**
Contact person	Marcos Andres Mendez
Job position	New business manager
Address	Salduba 35, Estepona (Málaga- España)
Phone number	+34633179294
Email	marcosmendez.spain@polarislatam.com

5.3 Agreements related to carbon rights

All the carbons rights will remain within the company Worms Argentina S.A.

5.4 Land tenure (Projects in the AFOLU sector)

Not applicable.

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 compilated 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

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:

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	***Measures***
NATURAL PHENOMENA - Flood	- *Road and water reservoir maintenance.* - *Suspension of operations in case of risk of flooding.*
NATURAL PHENOMENA - thunderstorm	- *Lightning rod installation.*
Extern agents and staff risk.	- *24 hours security with perimeter fencing, cameras and access control.*
Risk of fire (forest or grass, waste piles or organic waste composting process).	*Emergency Response Plan. Alarm and start of preventive protocol to avoid damage to combustible materials in storage.*
Personal risk or transportation incident	- *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	***Measures***
Increase in cost and expenses	*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	*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	***Measures***
Change in governmental priorities	*- Establish measures to ensure the project´s independency from governmental help and self-operating capacity.* *- Closed work with local governments to collaborate in local policies.*
Problems in communication with the stakeholders	*- 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.

- *Using bio-oils whose origin is from 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:

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

<u>RESULTS:</u> The results obtained by the analysis laboratory are presented below:

<u>PARAMETERS</u>	***<u>LC</u>***	***<u>UNIT</u>***	***<u>P1</u>***	***<u>P2</u>***	***<u>P6</u>***	***<u>P7</u>***	***<u>P8</u>***	***<u>LIMIT</u>***
Color	*1*	*PI/Co*	*1*					*20*
Conductivity	*0,1*	*µS/cm*	*935*	*734*	*804*	*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

Worms Argentina S.A. has formal and regular processes for gathering information from stakeholders (focus groups, surveys, community meetings, 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, the axes of the social policies are:

Donations

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.

These social actors as important for the community as are clubs, schools, volunteer firefighters, community gardens, invite the community and companies to make their contribution either to, the continuity of its services and for building maintenance and purchase of new tools and machinery.
Currently, Worms Argentina S.A makes monetary donations to:

1. *-Volunteer Firefighters of the town of Arroyo Seco*

Who do we donate to?

For the eligibility of civil or commercial organizations receiving donations, they carry out a permanent survey of the organizations in the community and their needs, through:

- *General mapping of social organizations and analysis of the areas they work with (impact areas) to evaluate which ones we identify with and begin to generate networks and joint projects.*
- *Periodic meetings to generate a close and trusting bond with them.*

Supplier Policy, all suppliers adhere to the Supplier Code of Conduct, 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 Community.

Recruitment policy that prioritizes hiring local workers, currently going from 40% to 59% currently.

10 Consultation with interested parties (stakeholders)

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=HHwWgICyhdGHj60oAAAA

https://twitter.com/WormsSA/status/1453861053650120724?cxt=HHwWqMC5-Zy7k60oAAAA

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

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

It can be seen in the following Link, agreements, social training, visits to the representative plant of the Government of Argentina, etc.

https://twitter.com/wormssa

The company implemented a book of complaints and suggestions open to the community in the area where the non-hazardous organic waste processing plant is located.

10.1 Summary of comments received

The origin of the waste is given by the large amount of non-hazardous Agroindustrial liquid organic waste from oil plants, breweries and agro-industries that produce in the Region to which Worms Argentina S.A A. belongs. (Province of Santa Fe and Buenos Aires, Argentina),

for which reason said company is dedicated to specific tasks of environmental sanitation that seek to contribute to the development of a balance between society, the company, and the environment, for which it is responsible for investigating and provide viable solutions and sustainable solutions to complex problems such as non-hazardous solid waste.

The processes are carried out manually by operators specifically trained by Worms Argentina S.A who prepare the mixture of the previously received and controlled waste.

Previously, the companies that generated this waste and disposed of in landfills, generating significant GHG emissions in its decomposition.

Given the situations referred to in the previous point, Worms Argentina S.A is highly regarded in its region due to the work it does to reduce environmental impact, and the need to have a plant of this nature in the region.

Therefore, by the surrounding municipalities, at the provincial and national level, the company has been encouraged to follow this path and continue with investments for new projects in the fight against climate change, which entails, in its main objectives, Health and Well-being, Quality Education, Gender Equality, Decent Work and Economic Growth, Renewal Industry and Infrastructure, Sustainable Cities and Communities, Responsible Consumption and Production and finally Climate Action.

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, which brings about social unrest.

11 Sustainable Development Goals (SDGs)

This project is aligned with four SDG:

- *SDG 6. Clean water and sanitation:*
    - *Global target: 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.
    - *Global indicator: Proportion of wastewater safely treated.*
    - *Project activity and contribution: all the effluents treated results in a separation of an organic fraction recovered and safely treated water that gets re-used.*
- *SDG 9. Industry, Innovation and Infrastructure*
    - *Global target: 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.*
    - *Global indicator: Manufacturing employment as a proportion of total employment.*
    - *Project activity and contribution: increased of local population employed by the project manufacturing activity.*
- *SDG 12. Responsible consumption and production:*
    - *Global target: By 2030, substantially reduce the generation of waste through prevention, reduction, recycling and reuse.*
    - *Global indicator: National recycling rate, tons of material recycled.*
    - *Project activity contribution: Tons of effluents treated for the recovery of the fatty acids and water.*
- *SDG 13. Climate action:*
    - *Global target: Continue along the same path in the fight against climate change.*
    - *Global indicator: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other).*
    - *Project activity and contribution: Avoided tons of GHG with the application of the waste management treatment.*

12 REDD+ Safeguards (For REDD+ projects)

Not applicable.

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

Not applicable

14 Grouped projects (if applicable)

Not Applicable

15 Other GHG program

Not applicable.

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

Monitoring procedures

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 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 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 organisation 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 stablishing 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	*Responsability*
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 procced 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*

Data and parameters monitored

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	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 2

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

Data/Parameter 3

Data/Parameter	GWP_{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 4

Data/Parameter	***OX***
Data unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source data	Based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories and Methodological tool 4 "Emission from solid waste disposal sites" version 08.1.
Value applied	0,1
Justification of choice of data or description of measurement methods and procedures applied	As per table 2 (page 7) and table 2 (page 14), for applications A and B, the default value of OX is 0,1.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 5

Data/Parameter	***F***
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)

Source data	Methodological tool 4 "Emission from solid waste disposal sites" version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	0,5
Justification of choice of data or description of measurement methods and procedures applied	As per table 2 (page 7) and table 3 (page 14), for applications A and B, the default value of F is 0,5.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 6

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

Data/Parameter 7

Data/Parameter	MCF_y
Data unit	-
Description	Methane correction factor for year y

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

Data/Parameter 8

Data/Parameter	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 9

Data/Parameter	k_j
Data unit	1/yr
Description	Decay rate for the waste type j (1/yr)
Source data	Methodological tool 4 "Emission from solid waste disposal sites" version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	0,185
Justification of choice of data or description of measurement methods and procedures applied	As per table 7 (page 17), for rapidly degrading waste (food, food waste, beverages and tobacco) and boreal and temperate (MAT ≤ 20ºC), Wet (MAP/p ET > 1), the value is 0,185 1/yr.
Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 10

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

Data/Parameter 11

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

Data/Parameter 12

Data/Parameter	$NCV_{i,y}$
Data unit	GJ/kg
Description	Weighted average net calorific value of the fuel type i in year y
Source data	2006 IPCC Guidelines on National GHG Inventories and tool 3 "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 3).
Value applied	0,0433 GJ/kg
Justification of choice of data or description of measurement methods and procedures applied	As per table 4, page 7 and 8 from the tool, $NCV_{i,y}$ (option d) is a default value from IPCC at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Purpose of data	Determination of the project emissions
Any comments	-

Data/Parameter 13

Data/Parameter	$EF_{CO2,i,y}$
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 and "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 3).
Value applied	0,0748 ton CO_2/GJ
Justification of choice of data or description of measurement methods and procedures applied	As per table 5, page 8 and 9 from the tool, $EF_{CO2,I,y}$ (option four) is a default value from IPCC at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Purpose of data	Determination of the project emissions.
Any comments	-

Data/Parameter 14

Data/Parameter	$EF_{EF,jl,y}$
Data unit	*t CO_2/MWh*
Description	Emission factor for electricity generation for source j in year y
Source data	Methodological tool 5 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"(version 3).
Value applied	2019: $EF_{EF,j,y}$ (t) 0,267; 2020: 0,275; 2021: 0,292; 2022: 0,2717; 2023: 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 15

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 16

Data/Parameter	$W_{j,x}$
Data unit	t
Description	Amount of solid waste type j prevent from disposal in the SWDS in year x
Source data	Measurements by project holder.
Value applied	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.

Data/Parameter 17

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	<table><tr><td></td><td>2019</td><td>2020</td><td>2021</td><td>2022</td><td>2023</td></tr><tr><td>$EC_{PJ,j,y}$ (MWh)</td><td>15,523</td><td>16,900</td><td>18,189</td><td>22,798</td><td>20,124</td></tr></table>
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 18

Data/Parameter	$FC_{TR,i,y}$
Data unit	Liters per year
Description	Fossil fuel consumption

Source data	Measurements by project holder
Value applied	<table><tr><td></td><td>2019</td><td>2020</td><td>2021</td><td>2022</td><td>2023</td></tr><tr><td>$FC_{TR,i,y}$ (L)</td><td>180.537,00</td><td>157.526,00</td><td>136.222,00</td><td>159.653,00</td><td>165.347,00</td></tr></table>
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.

SDG and Risks monitoring

The monitoring of the SDGs will be carried out in relation to the tool based on the Registration format of the BioCaron Registration Platform called "SDG Tool". The monitoring of social, environmental and economic risks according to the tool BCR project activities do not cause any net-harm to the environment or to local communities and society in general. Attached is the monitoring plan for the BioCarbon format (BCR_Monitoring-Report-Format), with the file named "*BCR_Monitoring-Report-liquid2023*" and the file "*SDG-Tool-2023-Worms liquid V2"*.

Relevant SDG Indicator	**SGD 6: Clean water and sanitation**
Unit	tCO_2e
Description	Ensure availability and sustainable management of water and sanitation for all
Source of data	Chief operating officer
Purpose of monitoring	Fulfilment of SDG 6
Monitoring Frecuency	Annual

Relevant SDG Indicator	**SGD 9: Industry, innovation and infrastructure**
Unit	tCO_2e
Description	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Source of data	Chief operating officer
Purpose of monitoring	Fulfilment of SDG 9
Monitoring Frecuency	Annual

Relevant SDG Indicator	**SGD 12: responsable production and consumption**
Unit	tCO_2e
Description	Ensure sustainable consumption and production patterns.
Source of data	Chief operating officer
Purpose of monitoring	Fulfilment of SDG 12
Monitoring Frecuency	Annual

Relevant SDG Indicator	**SGD 13: Climate Action**
Unit	tCO_2e
Description	Take urgent action to combat climate change and its impacts
Source of data	Chief operating officer
Purpose of monitoring	Fulfilment of SDG 13
Monitoring Frecuency	Annual

Indicator	**Natural Risks**
Unit	tCO_2e
Description	Identification of potential natural and anthropogenic risks that GHG mitigation actions may face and determine the necessary measures to mitigate said risks.
Source of data	Chief operating officer
Purpose of monitoring	Compliance Monitoring Of natural risks
Monitoring Frecuency	Annual

Indicator	**Financial Risks**
Unit	tCO_2e
Description	Identify potential financial risks related to expected costs and investments, as well as project cash flows and define measures to mitigate financial risks.
Source of data	Chief operating officer
Purpose of monitoring	Compliance Monitoring Of Financial Risks
Monitoring Frecuency	Annual

Indicator	**Social Risks**
Unit	tCO_2e
Description	Determine medium and short-term risks associated with the participation of local communities and interested parties in the proposed activities.
Source of data	Chief operating officer
Purpose of monitoring	Compliance Monitoring Of Social Risks
Monitoring Frecuency	Annual