BioCarbon Standard

MONITORING REPORT

Process of Non-Hazardous Agroindustrial Liquid Organic Waste

Document prepared by POLARIS NETWORK ESPAÑA SL

Date of issue (*Version number 3 16/07/2024*)

Monitoring Report Template (Version 1.1)[1]	
Name of project	Process of Non-Hazardous Agroindustrial Liquid Organic Waste
BCR Project ID	BCR-AR-763-13-002
Registration date of the project activity	11/04/2024
Project holder	WORMS ARGENTINA S.A.
Contact	PABLO MAURICIO ZIMMERMAN, Nucci y San Martín Arroyo Seco Santa Fe (Argentina), ftiscornia@wormsargentina.com.ar +543402575283
Version number of the Project Document applicable to this monitoring report	*Version number 3 (16/07/2024)*
Applied methodology	*AM0057 "Avoided emissions from biomass wastes through use as feed stock in pulp and paper, cardboard, fibreboard or bio-oil production", Version 3.0.1.*
Project location (Country, Region, City)	*Country: Argentina* *Region: Santa Fe*

Monitoring Report Template (Version 1.1)[1]	
	City: Arroyo Seco
Project starting date	*01/01/2019*
Quantification period of GHG reductions/removals	*01/01/2019 to 31/12/2028*
Monitoring period number	*1*
Monitoring period	01/01/2019 to 31/12/2028
Amount of emission reductions or removals achieved by the project in this monitoring period	328.113,41 ton CO_2e
Contribution to 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.*

Monitoring Report Template (Version 1.1)[1]	
Special category, related to co-benefits	not applicable

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1 General description of project

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

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

1.1 Sectoral scope and project type

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

1.2 Project start date

01/01/2019.

1.3 Project quantification period

Project quantification period is from 01/01/2019 to 31/12/2028 for a total of 10 years.

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

For the first five years (from 1/1/2019 to 31/12/2023), the emissions have been verified because of the validation of amount of waste disposed and used by the project holder. For the next five years (1/1/2024 to 31/12/2028), the project is monitored anually. The validation and verification will be carried out following BCR Standard version 3.3, at most every three years.

1.4 Project location and project boundaries

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

1.5 Summary Description of the Implementation Status of the Project

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

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

The large amount of non-hazardous, waste in Argentina is estimated at 11,000,000 tons, only 10% is adequately treated. Worms Argentina S.A. efficiently transforms non-hazardous effluents from mostly biodiesel, and oil industries that produce GHG in the region and won´t be treated otherwise. Worms Argentina S.A is certified as a *"B Corp" company* (a company that measures social and environmental impact and commits itself personally, institutionally and legally to make long-term action decisions in the community and environment).

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

Not applicable.

Average estimate of emission reductions attributable to the project activities:

Period	Baseline (tCO_2e)	Emission (tCO_2e)	Leakage (tCO_2e)	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

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

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

3 Registry or participation under other GHG Programs/Registries

Not Applicable.

4 Contribution to Sustainable Development Goals (SGD)

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

SDG 6. Clean water and sanitation: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

SDG 9. Industry, Innovation and Infrastructure: Promote inclusive and sustainable industrialization and, by 2030, significantly increase the share of industry in employment and gross domestic product, according to national circumstances, and double its share in least developed countries.

SDG 12. Responsible consumption and production: By 2030, substantially reduce the generation of waste through prevention, reduction, recycling and reuse.

SDG 13. Climate action: Continue along the same path in the fight against climate change.

5 Compliance with Applicable Legislation

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

- 7-Otorgamiento uso conforme de suelo A. Seco 29-06-2017
- 34-Habilitación Municipal Planta A. Seco - Resol. Nº 024-18 - 16.03.2018
- 27-Resol. Nº 523 WORMS ARG. S.A. EIA
- 55-Disp. 287-19 Renovación Reg. RT 0029
- Permiso vuelco de efluentes 21-06-19 WORMS
- 2-WORMS Renovación directorio 2021

6 Climate change adaptation

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

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

The project objective is to obtain a valuable product 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.

7 Carbon ownership and rights

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

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

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

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

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

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

8 Environmental Aspects

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

SOIL RESOURCE PROTECTION PROGRAM

Hazardous Waste Management Subprogram:

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

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

Drainage and Flooding Control Subprogram:

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

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

WATER RESOURCE PROTECTION PROGRAM

Groundwater monitoring subprogram

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

Number of samples: 1.

Sampling Point: underground water extraction well.

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

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/m^3**
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/m^3	0,50

Hydrogen sulfide (H2S)	Not detected	Not detected	Not detected	Not detected	mg/m^3	-

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

CONCLUSION

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

WATER QUALITY ANALYSIS

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

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

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

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

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

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

All analytical determinations are performed using international standardized methods.

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

MONITORING DESCRIPTION

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

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

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

PARAMETERS	**LC**	**UNIT**	**P1**	**P2**	**P6**	**P7**	**P8**	**LIMIT**
Color	1	PI/Co	1					20
Conductivity	0,1	µS/cm	935	734	804	1701	805	-
BIOCHEMICAL DEMAND FOR OXYGEN (DBO)	10	mg/l	N/D	N/D	N/D	N/D	N/D	-
CHEMICAL DEMAND OF OXYGEN (DQO)	5	mg/l	N/D	N/D	N/D	N/D	N/D	-
PH	-	UpH	7,4					-

SOLIDS IN SUSPENSION TOTALS (SST)	1	mg/l	<1	<1	<1	<1	<1	-
Turbidity	1	UNT	<1					
FECAL COLIFORMS	2,2	NMP/100ml	<1,1	<1,1	<1,1	<1,1	<1,1	<2,2
TOTAL COLIFORMS	2,2	NMP/100ml	<1,1	<1,1	<1,1	<1,1	<1,1	<2,2

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

CONCLUSION

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

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

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

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 Socioeconomic 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:

-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 Stakeholders' Consultation

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.

11 REDD+ Safeguards

Not Applicable.

12 Special categories, related to co-benefits

Not Applicable.

13 Grouped Projects

Not Applicable.

14 Implementation of the project

14.1 Implementation status of the project

Include a description of the implementation and operational status of the project as of this monitoring period in accordance with the latest version of the BCR Validation and Verification Manual[2]. Include information on the following:

1. *01/01/2019 to 31/12/2028. In the description there were no events that could impact the reductions or removals of GHG emissions and their monitoring;*
2. *Not Applicable;*
3. *Not Applicable;*
4. *Not Applicable.*

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

1. *Not Applicable;*
2. *Not Applicable;*
3. *Not Applicable.*

14.2 Revision of monitoring plan

Not Applicable.

[2] https://biocarbonstandard.com/procedures/BCR_Validation-and-Verification-Manual.pdf

14.3 Request for deviation applied to this monitoring period

Not Applicable.

14.4 Notification or request of approval of changes

Not Applicable.

15 Monitoring system

15.1 Description of the monitoring plan

Risk Management

With the objective of coordinating actions to prevent possible emergencies, Worms Argentina S.A. has implemented a contingency plan that includes different risks and actions related to the Tool https://biocarbonstandard.com/wp-content/uploads/no-net-harm. pdf

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.

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.

15.2 Data and parameters to quantify the reduction of emissions

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

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	$\mathbf{f_y}$
Data unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1.

Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	The landfill sites where the bio-oil had been deposited are unmanaged, so the value applied for f_y is 0.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 3

Data/Parameter	**GWP_{CH4}**
Data unit	t CO_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	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.

methods and procedures applied	
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	$\mathbf{EF_{EF,jI,y}}$
Data unit	t CO_2/MWh
Description	Emission factor for electricity generation for source j in year y
Source data	Methodological tool 5 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"(version 3).
Value applied	

	2019	2020	2021	2022	2023
$EF_{,EF,j,y}$ (t)	0,267	0,275	0,292	0,2717	02318

Justification of choice of data or description of measurement methods and procedures applied	Based on the information from the Argentine Government. https://www.argentina.gob.ar/economia/energia/energia-electrica/estadisticas https://cammesaweb.cammesa.com/download/factor-de-emision/
Purpose of data	Determination of the project emissions
Any comments	For the estimation period 2024-2028, the value is the same as for 2023.

Data/Parameter 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

<table>
<tr><td>Data/Parameter</td><td>W_{j,x}</td></tr>
<tr><td>Data unit</td><td>t</td></tr>
<tr><td>Description</td><td>Amount of solid waste type j prevent from disposal in the SWDS in year x</td></tr>
<tr><td>Source data</td><td>Measurements by project holder.</td></tr>
<tr><td>Value applied</td><td>Since the measurement of the amount of solid waste has an 2% of uncertainly, the final values applied are:
<table>
<tr><td></td><td>2019</td><td>2020</td><td>2021</td><td>2022</td><td>2023</td></tr>
<tr><td>W_{,y} (t)</td><td>87.116,58</td><td>94.848,16</td><td>102.109,07</td><td>127.948,00</td><td>112.937,75</td></tr>
</table></td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td>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.</td></tr>
<tr><td>Purpose of data</td><td>Determination of the baseline</td></tr>
<tr><td>Monitoring frequency</td><td>Monitored continuously with the entrance of each truck at the plant.</td></tr>
</table>

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	See nested table below
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.

	2019	*2020*	*2021*	*2022*	*2023*
$EC_{PJ,j,y}$ *(MWh)*	*15,523*	*16,900*	*18,189*	*22,798*	*20,124*

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	
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.

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

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- Liquid V2”*.

Relevant SDG Indicator	**SGD 6: Clean water and sanitation**
Unit	Not Applicable
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	Not Applicable

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: responsible production and consumption**
Unit	Not Applicable
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	Not Applicable
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	Not Applicable
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	Not Applicable
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	Not Applicable
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

16 Quantification of GHG emission reduction / removals

16.1 Baseline emissions

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

$BE_{CH4,SWDS,}$	=	Baseline methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (t CO_2e/yr)
x	=	Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period (x = 1) to year y (x = y)
y	=	Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
$DOC_{f,y}$	=	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
$W_{j,x}$	=	Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)
φ_y	=	Model correction factor to account for model uncertainties for year y.
f_y	=	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
GWP_{CH4}	=	Global Warming Potential of methane

OX = Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)

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

MCF_y = Methane correction factor for year y

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

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

j = Type of residual waste or types of waste in the MSW

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

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

Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y (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_{CH4})

This parameter is established by IPCC for each years. **GWP_{CH4} = 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 (tCO2e)**
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 (tCO2e)	332.592,61

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, **$NCV_{i,y}$ = 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 ($FC_{,i,y}$)

The diesel used during the project activity are:

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

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**
$PE_{FC,y}$	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 (tCO2e)	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	GHG emission reductions in the baseline scenario (tCO2e)	GHG emission reductions in the project scenario (tCO_{2e})	GHG emissions attributable to leakages (tCO_{2e})	Estimated Net GHG 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 (tCO2e)	**332.592,61**	**4.479,20**	**-**	**328.113,41**

16.2 Project emissions/removals

Provide all formulae used to quantifying the project emissions/removals. Include a description to calculate the project emissions/removals, providing sufficient information that permits to reproduce the calculation. A table shall be used and included in this monitoring report. Attach electronic spreadsheets as a separate file.

16.3 Leakages

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

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

Where:

LE_y	=	Leakage in year y (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.

16.4 Net GHG Emission Reductions / Removals

Present the net GHG emission reduction/removals, including the total baseline emissions, the project emissions reductions/removals, the total leakage, and the total emissions reductions/removals. Specify the GHG emission reductions/removals by calendar year.

Quantify the net GHG emission reductions and removals, summarizing the key results using the table below.

Year	GHG emission reductions in the baseline scenario (tCO2e)	GHG emission reductions in the project scenario (tCO_{2e})	GHG emissions attributable to leakages (tCO_{2e})	Estimated Net GHG 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 (tCO_2e)	**332.592,61**	**4.479,20**		**328.113,41**

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

It is carried out annually for a period of 10 years, from 2019 to 2028.

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

Estimated total and average annual GHG emission reduction amount 328.113,41 ton CO_2e total in 10 years, (32 ton CO_2e average annual).