

**CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004**

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SECTION A. General description of project activity**A.1 Title of the project activity:**

Frio Industrias Argentinas S.A (“FIASA”) Hydro-fluorocarbon 23 (“HFC23”) Capture, Storage and Decomposition Project.

Version 1

December 17th, 2005.

A.2. Description of the project activity:

The project purpose is to reduce HFC23 emissions by a capture, storage and thermal oxidation of HFC23 system to be placed in FIASA CFCs-and-HCFC22 production plant¹, followed by treatment of combustion gases prior to safe disposal of all emissions.

HFC23’s emissions are controlled under the Kyoto Protocol only. There is neither any regulation to control this gas nor any real market² for this gas in Argentina, as of today. There is not any private incentive to reduce any HFC23 emission in Argentina as the investment cost to capture and destroy HFC23’s emissions is high. HFC23 is inevitably generated as a by-product in the production of Hydro-Chlorofluorocarbon22 (“HCFC22”). HFC23 is a greenhouse gas (“GHG”) listed in Annex A of the Kyoto Protocol, it has an approved global warming potential (“GWP”)³ of 11,700⁴ tCO₂/tHFC23.

The project is neither constructed nor financed, as of today. Since FIASA production plant has no facilities for capturing, storing and decomposing the HFC23 that is generated during the production of HCFC22, the HFC23 inevitably produced is vented entirely, as of today. The project estimated ERs to be generated during the first 7, 14 and 21 years of operation are 10,039,372; 20,078,744; 30,118,116 tCO₂e, respectively⁵.

The project will comply with all Argentinean regulations including approval of the Argentinean DNA⁶. Similarly, FIASA, which is the sponsor of the project, is in compliance with all Argentinean regulations for this type of activity.

To calculate the project total ERs the approved monitoring methodology AM0001 (“monitoring AM0001”) will be used. The project boundary is the site of the project where the HFC23 will be captured and destroyed.

The contribution of the project to sustainable development is:

- Mitigation of global climate change through a reduction in GHG emissions in Argentina.
- Technological transferring for HFCs abatement technology to a Non-Annex B⁷ country.
- Employment creation for the development, design, engineering, procurement, finance, construction, operation and maintenance of the project.
- Taxes increase in benefit of the Republic of Argentina.

¹ FIASA is the only chlorofluorocarbons manufacturer in Argentina. The main products of FIASA are: CFC11, CFC12, and HCFC22.

² HFC23 is used for low temperature refrigerators and in the manufacture of semiconductors.

³ GWP converts 1 tonne of HFC23 to tonnes of CO₂ equivalents.

⁴ Is the 1995 IPCC GWP value that Baseline Methodology AM0001 requires to be used.

⁵ These values have been estimated by using the approved baseline methodology AM0001 (“AM0001”).

⁶ The project has already the approval of the Environmental Secretary of the San Luis Province.

⁷ Non-Annex B countries are the countries that do not have emission targets under the Kyoto Protocol.

-The sponsor will implement a pilot project with part of the CERs proceeding which will consist in installing a reclaim-regeneration plant of CFC12; this is further detailed under G.3. With this project, the sponsor will help mitigating ozone deplete substances (“ODS”) production.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party):	Private and/or public entity(ies) project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Argentina (host)	Frio Industrias Argentinas S.A. (“FIASA”).	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its <u>approval</u> . At the time of requesting registration, the approval by the Party(ies) involved is required.		
Note: <i>When the PDD is filled in support of a proposed new methodology (forms CDM-NBM and CDM-NMM), at least the host Party (ies) and any known project participants (e.g. those proposing a new methodology) shall be identified.</i>		

Contact information of project participant is provided under Annex I.

A.4. Technical description of the project activity:
A.4.1. Location of the project activity:
A.4.1.1. Host Party(ies):

Republic of Argentina.

A.4.1.2. Region/State/Province etc.:

Department of Pedernera / Province of San Luis.

A.4.1.3. City/Town/Community etc:

Villa Mercedes City.

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project will be installed behind the HCFC22 production plant, within FIASA production facility. FIASA is located in the Industrial Park of Villa Mercedes, National Route#7, Km.#703, Provincial Route#2, in the Villa Mercedes City, in the San Luis Province, in the Pedernera Department. The Industrial Park of Villa Mercedes is one of the most active industrial zones in Argentina⁸.

A.4.2. Category(ies) of project activity:

The project falls into:

Scope Number: 11.

Sectoral Scope: Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride.

⁸ The project site map can be seen under Annex 4.

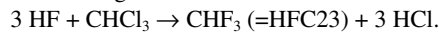
A.4.3. Technology to be employed by the project activity:

The project will use thermal oxidation technology, a technology that has proven highly efficient for the continuous decomposition of fluorocarbons. The selected technology does not cause liquid effluents but instead a commercial liquid solution composed by HF with traces of HCl, which will be recovered and directed to storage for future sell in the *Mercosur* – Not having liquid effluents will minimize environmental impacts.

Given the following main reaction in the production process of HCFC22:



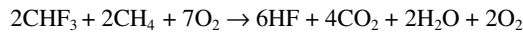
HCFC23 is inevitable generated by the following chemical reaction:



The project will consist in:

- Installing a facility at the FIASA production plant that will separate, capture and store in cryogenic tanks the HFC23 waste stream generated as by-product during the HCFC22 production process
- Installing another facility to destroy the HFC23 through decomposing HFC23 by heating it at more than 1,200°C in a thermal oxidation chamber using natural gas (“NG”) as supplemental fuel.

In this technology of thermal oxidation, HFC23 (containing traces of HCFC22) will be oxidized to CO₂⁹, HF and water by the following chemical reaction:



When burning HCFC22, HCl will be also produced by the following chemical reaction:



An over-stoichiometric supply of the methane fuel (natural gas) and oxygen is necessary to ensure that the HFC23 containing traces of HCFC22 is completely destroyed.

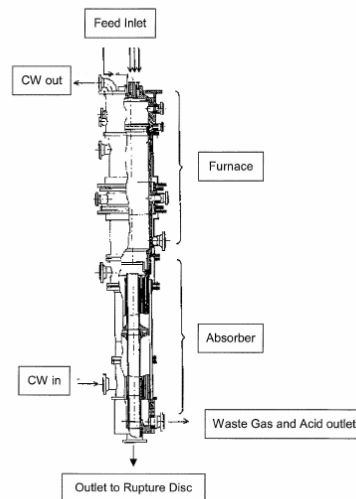
The HF-and-HCl gases formed during the process are subsequently absorbed in water in an absorption train. All gases that are not absorbed in the absorption train (CO₂, N₂, and traces of HCl and Cl₂) are then scrubbed before being released into the atmosphere.

The complete thermal oxidation plant has the following three main components:

- Thermal Oxidation Reactor: Composed of main burner, combustion chamber, and absorption section.
- Absorption Train: On it the HF acid flows by gravity into the HF-storage tank and is pumped to the final storage/transport.
- Final vent scrubber: The not-absorbed gas containing CO₂, Cl₂, HF, HCl, O₂ and purging N₂ is fed to the Final Vent Scrubber in which Cl₂, HF and HCl have to be scrubbed – the inert gases are released to atmosphere.

The Thermal Oxidation Reactor can be observed in the following Sketch below:

⁹ This CO₂ generates is counted under project emissions.



Source: The sponsor

All gases exhausted from the facilities become environmentally safe materials but nevertheless will be monitored with the current regulations on air quality in the Province of San Luis, Argentina.

The project will transfer environmentally safe and sound technology to Argentina, by:

- Giving training to Argentinean labor for operation and maintenance.
- Hiring local labor during operation and maintenance.
- Serving as example for one of the most environmentally beneficial ways of performing HCFC22 production.
- Internalizing the financial and technical risks of being the first of its kind in Argentina, thus decreasing these risks for similar future projects.
- Expanding the knowledge of CDM potential for this type of activity.
- In addition, the installation of this project offers possibilities of decomposing HFC23 captured from other production plants and of decomposing HFCs other than HFC23 in the future. It will also be possible to decompose in the future other ozone deplete substances (“ODS”) such as CFCs. These additional potential future environmental benefits are not accounted under the project estimated ERs.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

Given that there is not a known market in Argentina and its surrounding countries for HFC23, and the gas has no toxic effects whatsoever upon the population or livestock, which is the reason that there are no restrictions of these emissions in Argentina, the full amount of HFC23 generated as a result of the production of HCFC22 in FIASA is presently vented to the atmosphere. There is no private incentive to do otherwise since the investment to capture and destroy HFC23 is expensive and the technology is complex. The high cost of this technology also makes unlikely that regulations for this end are imposed

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in the future (there are no such quantitative limits in any non-Annex B country, as of today). As no regulation of this type is envisaged to occur, the anticipated reduction in tCO₂e due to it is zero.

Furthermore, it is expected that HFC23 destruction will increase at FIASA as FIASA gradually phases out CFC12 production¹⁰, and there is more free installed production capacity at the plant to produce HCFC22¹¹. However the impact of HFC23 production future increase in accounted ERs is limited since AM0001 establishes a cut off limit of HCFC22 production to be accounted for ERs based on historical production at the plant.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

The project estimated annual ERs, over the 21-year crediting period, are as follow:

Year	Annual estimation of emissions reductions in tonnes of CO ₂ e
2006 ¹²	717,098
2007	1,434,196
2008	1,434,196
2009	1,434,196
2010	1,434,196
2011	1,434,196
2012	1,434,196
2013	1,434,196
2014	1,434,196
2015	1,434,196
2016	1,434,196
2017	1,434,196
2018	1,434,196
2019	1,434,196
2020	1,434,196
2021	1,434,196
2022	1,434,196
2023	1,434,196
2024	1,434,196
2025	1,434,196
2026	1,434,196
2027	717,098
Total estimated reductions (tonnes of CO₂e)	30,118,116
Total number of crediting years	21
Annual average over the crediting period of estimated reductions (tonnes of CO₂e)	1,434,196

Source: Own production.

¹⁰ Under the Montreal Protocol, CFC production phase out is set as January 1st, 2010, and consumption freeze is set as July 1st, 1999 - for developing countries, as Argentina is.

¹¹ Under the Montreal Protocol, HCFC22 production phase-out is set as January 1st, 2040, and consumption freeze is set as January 1st, 2016; but this fact will not interfere with the project because 2040 is beyond the end of the project life (June 30, 2027).

¹² From July 1st to December 31st, 2006.

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A.4.5. Public funding of the project activity:

The project will not receive any public funding.

SECTION B. Application of a baseline methodology.**B.1. Title and reference of the approved baseline methodology applied to the project activity:**

Baseline Methodology AM0001: Incineration of HFC23 waste streams (“AM0001”).

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

AM0001 is applicable to HFC23 waste streams from an existing HCFC22 production facility with at least 3 years of operating history between beginning of the year 2000 and the end of the year 2004 where the project activity occurs and where no regulation requires the destruction of the total amount of HFC23 waste. As FIASA was built in 1987 to produce CFC11, CFC12 and HCFC22, and has at least 3 years of operating history between beginning of the year 2000 and the end of the year 2004, AM0001 is applicable to the project.

B.2. Description of how the methodology is applied in the context of the project activity:

Con formato

Following AM0001, the ERs achieved by the project during a given year y is equal to the quantity of HFC23 waste from HCFC22 production facility (“ Q_{HFC23y} ”) destroyed by the project less the baseline HFC23 destruction (“ B_{HFC23} ”) during that year multiplied by the approved GWP_HFC23 less the GHG emissions generated by the destruction process (“ E_{DPy} ”) less GHG leakage (“ L_y ”) due to the destruction process.

AM0001’s formula given to calculate ERs is the following:

$$ER_y (tCO_2e) = (Q_{HFC23} - B_{HFC23}) * GWP_{HFC23} - ED_{Py} - L_y$$

Where:

- The quantity of waste HFC23 destroyed (“ Q_{HFC23y} ”) is calculated as the product of the quantity of waste HFC23 supplied to the destruction process (“ q_{HFC23y} ”) measured in metric tonnes and the purity of the waste HFC23 (“ P_{HFC23y} ”) supplied to the destruction process expressed as a fraction of HFC23 in the waste [$Q_{HFC23y} = q_{HFC23} * P_{HFC23y}$]¹³. Purity will be monthly ex-post monitored by using gas chromatography.

- Q_{HFC23} : will be measured monthly ex-post and is restricted to

$$Q_{HFC23y} \leq Q_{HCFC22y} * w^{14}$$

For the project, w has been set as 3% since there was historical data to calculate it¹⁵, and the maximum cut off value for QHCFC22 has been set at 4,087.1 tonnes¹⁶. Cut off value compliance will be checked yearly.

- B_{HFC23} : will be zero as long as the government does not introduce a regulation on HFC23¹⁷ - This regulation will be monitored monthly ex-post.

¹³ Purity will be monitored using gas chromatography.

¹⁴ Following AM0001, to exclude the possibility of manipulating the production process to increase the quantity of waste, the quantity of HFC23 (Q_{HFC23y}) waste will be limited to a fraction (“ w ”) of the actual HCFC22 production during the year at the originated plant ($Q_{HCFC22y}$). $Q_{HFC23y} \leq Q_{HCFC22y} * w$. Where $Q_{HCFC22y}$ is limited to the maximum historical annual production level at this plant during any of the last 3 years between 2000 and 2004, including CFC production at swing plants (as FIASA production plant is) adjusted appropriately to account for the different production rates of HCFC22 and CFCs; and the value of w is set at the lowest of the 3 historical annually measured w (w is the waste generation rate calculated as HFC23/HCFC22).

¹⁵ Further details can be seen under annex 3.

¹⁶ Further details can be seen in annex 3.

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-GWP_HFC23: is set as 11,700 tCO₂/tHFC23, which is the 1995-IPCC GWP assigned.

-ED_Py equals to the following formula: $ND_HFC23 * GWP_HFC23 + Q_NGy * E_NGy + Q_HFC23 * EF$; where:

-ND_HFC23 is the quantity of HFC23 **not** destroyed during the year- will be measured monthly ex-post.

-Q_NGy is the quantity of natural gas used in the destruction process during the year measured in cubic meters (m³) – will be measured monthly ex-post.

-E_NGy (tCO₂e/gas m³) is the emissions coefficient for natural gas combustion – will be set for the project operating life at 2.88 tCO₂/tNG¹⁸.

-Q_HFC23 * EF is the quantity of CO₂ produced by the destruction process (the thermal destruction process converts the carbon in the HFC23 into CO₂, which is released to the atmosphere); where: $EF = 44 / [(molecular\ weight\ of\ HFC23) / (number\ of\ C\ in\ a\ molecule\ of\ HFC23)] = 44 / 70 = 0.62857$. Q_HFC23 will be monitored monthly ex-post and constraint to cut off value of 4,087.1 tonnes/year.

-Ly equals to the following formula: $\sum_i (Q_Fi,y * E_Fi,y) + ETy$; where:

-Q_Fi,y is the quantity of the energy type Fi purchased for the destruction process during year y,

-E_Fi,y is the GHG emissions factor for energy type Fi during year and

-ETy is the GHG emissions associated with sludge transport during year y.

As sludge transport and steam will be inexistent for the project, leakage for the project will be given by the following formula:

$Ly = Q_Fy * E_Fy$, where Q_F1 is the quantity of electricity bought from the grid only, and E_F1 the applicable grid emission factor; E_F1 will be set for the project operating life at 0.744 tCO₂/MWh¹⁹.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity:

AM0001 states that “in the absence of regulations requiring HFC23 destruction HFC23 is typically released to the atmosphere because a destruction facility entails significant capital and operating costs and the host entity has no direct economic incentive to incur these costs. **If the quantity of HFC23 destroyed is greater than the baseline quantity destroyed, the project activity is additional.** The baseline quantity of HFC23 destroyed is the quantity, if any, required to be destroyed by the host country’s regulations governing the plant”.

In the case of the project there is neither any existing applicable regulation to HFC23 required by the host country, nor it is envisaged that so would happen, but will be monitored anyway. Currently, there are not such regulations in any Non-Annex B country.

Because AM0001’s additionality condition is met by the project, the CDM Project activity is not the baseline scenario, meaning the project is additional.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

The project boundary is defined as the facility to capture, transport and destroy the HFC23.

¹⁷ “B_HFC23 = Q_HFC23 * ry; where ry is fraction of the waste stream required to be destroyed by the regulations that apply during year y. In the absence of regulations requiring the destruction of HFC23 emissions, ry is zero”.

¹⁸ Further details can be seen in annex 3.

¹⁹ Further details can be seen in annex 3.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

The baseline was completed on November 30th, 2005 by:

Frio Industrias Argentinas S.A

Frio Industrias Argentinas S.A is a project participant listed in Annex 1 of this document.

SECTION C. Duration of the project activity / Crediting period**C.1 Duration of the project activity:**

Con formato

C.1.1. Starting date of the project activity:

01/01/2006.

C.1.2. Expected operational lifetime of the project activity:

21 y-0m

C.2 Choice of the crediting period and related information:

The project will use a renewable crediting period.

C.2.1. Renewable crediting period**C.2.1.1. Starting date of the first crediting period:**

01/07/2006.

C.2.1.2. Length of the first crediting period:

7y-0m.

C.2.2. Fixed crediting period:**C.2.2.1. Starting date:**

N/A.

C.2.2.2. Length:

N/A

SECTION D. Application of a monitoring methodology and plan**D.1. Name and reference of approved monitoring methodology applied to the project activity:**

Monitoring Methodology AM0001: Incineration of HFC23 waste streams (“AM0001 Monitoring Methodology”).

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

AM0001 monitoring methodology is applicable to the project because the project will destroy HFC23 waste streams from an existing HCFC22 production facility with at least 3 years of operating history between beginning of the year 2000 and the end of the year 2004; and in the project host country there is no applicable regulation requiring any destruction of HFC23 waste.

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario.

N/A

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number <i>(Please use numbers to ease cross-referencing to D.3)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

N/A

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number <i>(Please use numbers to ease cross-referencing to table D.3)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

N/A

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D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number <i>(Please use numbers to ease cross-referencing to table D.3)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1. q_HFC23y	Quantity of HFC23 supplied to the destruction process	Flow meter	KgHFC	(m) measured by flow meters in parallel that are calibrated weekly	Monthly (continuously measurement)	100%	electronic	Is to be measured prior to the incineration. To measure this quantity accurately two flow meters, each calibrated weekly, will be used. Most of the time, under normal operation, both flow meters measure the same amount of HFC23 flows simultaneously. Where the flow-meter readings differ by greater than twice their claimed accuracy (for example 10% if the accuracy is claimed to be +-5%) then the reason for discrepancy is investigated and the fault remedied. For the sake of conservativeness the lower value of the two readings will always be used to estimate the HFC23 waste flows. The Output of HFC23 from the HCFC22 plant will be checked yearly by comparing the amount of HCFC22 produced to the HFC23 captured.
2. P_HFC23y	Purity of HFC23 supplied to the destruction process	Meter	%	(m) measured monthly by sampling	Monthly (continuously measurement)		electronic	Measured using gas chromatography. Will be checked monthly by sampling using gas chromatography. Combinations of continuous flow measurement and calculation will be used to estimate quantities of other materials; e.g. air that may be in the HFCs if this is appropriate.

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3. Q_NGy	Quantity of natural gas used by the destruction process	Meter	M ³	(m) measured	Monthly (continuously measurement)	100%	electronic	Measured using a fuel meter
4. ND_HFC23y	Quantity of HFC23 in gaseous effluent	Meter	kgHFC	(m) measured	Monthly	100%	Electronic	When the thermal oxidizer stops, analysis of the effluent gas is done to check leaked HFC23 by sampling.
7. Q_HCFCy	The quantity of HCFC22 produced in the HFC23 waste	Meter	tHCFC22	(m) measured	Monthly (continuously measurement)	100%	Electronic	Reference data to check cut off condition and rough estimation of Q_HFC23y.
8. HFC23_sold	HFC23 sold by the facility generating the HFC23 waste	Meter	tHFC23	(m) measured	Monthly (continuously measurement)	100%	Electronic	Reference data to check out cut off condition and rough estimation of Q_HFC23y. Parameter 8 is zero as long as no HFC23 market exists in Argentina. Even when a change of this situation is not expected, this parameter will be monitored.

Baseline Emission Parameters numbering use ID numbers defined in the AM0001 Methodology/Version 03.

In addition the quantities of gaseous effluents (CO, HCl, HF, C12, dioxin and NOX) will be monitored **every six months** to check compliance with local regulation²⁰.

The project quantities of gaseous effluents will not surpass Argentina standards listed below²¹:

²⁰ Further details of gases effluents monitoring is given under F.1.

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Gaseous effluent	Argentina standards mg/sec
CO	No value in table
HCl	6.10 E03
HF	2.40 E03
F ₂	2.40 E03
Cl ₂	1.10 E03
Dioxin	No value in table
NO _x	1.2 E05
Dust	No value in table

Source: The project's EIA.

This technology does not generate liquid effluents, thus the project will have neither liquid effluents nor solid waste.

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.):

$EDPy = ND_HFC23 * GWP_HFC23 + Q_NGy * E_NGy + Q_HFC23 * EF$; where:

-ND_HFC23 is the quantity of HFC23 **not** destroyed during the year. It will be monitored monthly ex-post.

-Q_NGy is the quantity of natural gas used in the destruction process during the year measured in cubic meters (m³). It will be monitored monthly ex-post.

-E_NGy (tCO₂e/gas m³) is the emissions coefficient for natural gas combustion. It will be fixed for the 21-year crediting period at 2.88 tCO₂/tNG.

-Q_HFC23 * EF is the quantity of CO₂ produced by the destruction; where Q_HFC23 will be monitored monthly ex-post and constraint to cut off value of 4,087.1 tonnes/year of HCFC22-cut off compliance will be checked yearly; w will be fixed at 3%, and EF is set as 0.62857.

²¹ The Province of San Luis, Argentina, where the Villa Mercedes plant is located, through provincial Law 4094, has adhered to the terms of national Law 20.284. This law sets some air quality standards in its Annex II, calling for emergency declaration when said limits are surpassed in any region or locality, but it has not set any specific emission limits or quality parameters for the gaseous emissions that are vented from fixed single sources of emissions.

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D.2.3. Treatment of leakage in the monitoring plan**D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity**

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
5. Q_F1,y	Electricity consumption by the destruction process	Meter	KWh	(m) measured	Monthly	100%	Electronic	Metered by a meter device to be installed in the project site. Will be double-checked with electricity purchase receipts.

Baseline Emission Parameters numbering use ID numbers defined in the AM0001 Methodology/Version 03.

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

$L_y = \sum_i (Q_{Fi,y} * E_{Fi,y}) + ET_y$; where:

-Q_{Fi,y} is the quantity of the energy type Fi purchased for the destruction process during year y,

-E_{Fi,y} is the GHG emissions factor for energy type Fi during year and

-ET_y is the GHG emissions associated with sludge transport during year y.

As sludge transport and steam will be inexistent for the project, leakage for the project will be given by the following formula:

$L_y = Q_{Fy} * E_{Fy}$, where Q_{F1} is the quantity of electricity bought from the grid only, and E_{F1} the applicable grid emission factor; E_{F1} will be set for the project operating life at 0.744 tCO₂/MWh²².

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

$ER_y (tCO_2e) = (Q_{HFC23} - B_{HFC23}) * GWP_{HFC23} - EDP_y - L_y$

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

²²Further details can be seen in annex 3.

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Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1. q_HFC23y	Low	This variable will be measured using 2 flow-meters in parallel with weekly calibration.
2. P_HFC23y	Low	Will be measured using gas chromatography.
3. Q_NGy	Low	Will be metered using natural gas meter.
4. ND_HFC23y	Low	Will be measured from the gas effluent of the destruction process.
5. Q_F1,y	Low	Will be metered using electricity meter.
7. Q_HCFCy	Low	Will be obtained from production records of the facility where the HFC23 waste originates.
8. HFC23 sold	Low	Will be obtained from production records of the facility where the HFC23 waste originates

Baseline Emission Parameters numbering use ID numbers defined in the AM0001 Methodology/Version 03.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

Con formato

QA&QC procedures are set in the ERCP Organizational Structure and Quality Assurance and Control Procedure, which can be seen in the project's MP. The variables will be monitored as described in section D.2. All of the measurement instruments are to be recalibrated monthly except for the measurement instrument (two flow meters) of HFC23 whose calibration will be checked weekly to reduce the error level as directed under D.2.2.1. The output of HFC23 from the HCFC22 plant will be checked yearly to assure compliance with cut-off limit. A selected team of operations and maintenance personnel at FIASA (4 employees) will receive specialized training from experts to be sent on-site by the technology's supplier, as part of the contract signed between the sponsor and the technology's supplier. This training is programmed to last 8 weeks.

D.5 Name of person/entity determining the monitoring methodology:

Con formato

The monitoring methodology and plan was completed on November 30th, 2005 by:
 Frio Industrias Argentinas S.A
 Frio Industrias Argentinas S.A is a project participant listed in annex 1 of this document.

SECTION E. Estimation of GHG emissions by sources**E.1. Estimate of GHG emissions by sources:**

$EDPy = ND_HFC23 * GWP_HFC23 + Q_NGy * E_NGy + Q_HFC23 * EF$; approximate values for the variables have been set as follows:

$$ND_HFC23 = 0.001\% * 122.61 \text{ tHFC23}$$

$$GWP_HFC23 = 11,700 \text{ tCO}_2/\text{tHFC23}$$

$$Q_NGy = 88 \text{ tNG.}$$

$$E_NGy = 2.88 \text{ tCO}_2/\text{tNG.}$$

$$Q_HFC23 = 122.61 \text{ tHFC23.}$$

$$EF = 0.62857.$$

With approximate annual values, the following project emissions are obtained:

$$EDPy = 0.001\% * 122.61 \text{ tHFC23} * 11,700 \text{ tCO}_2/\text{tHFC23} + 88 \text{ tNG} * 2.88 \text{ tCO}_2/\text{tNG} +$$

$$122.61 \text{ tHFC23} * 0.62857.$$

$$EDPy = 343 \text{ tCO}_2/\text{yr.}$$

E.2. Estimated leakage:

$Ly = \sum_i (Q_Fi,y * E_Fi,y) + ETy$; approximate annual values for the variables have been set as follows:

$$Q_F1,y = 44 \text{ MWh}$$

$$E_F1,y = 0.744 \text{ tCO}_2/\text{MWh.}$$

$$ETy = 0$$

With approximate values, the following project leakage is obtained:

$$Ly = 44 \text{ MWh/yr} * 0.744 \text{ tCO}_2/\text{MWh}$$

$$Ly = 33 \text{ tCO}_2/\text{yr}$$

E.3. The sum of E.1 and E.2 representing the project activity emissions:

$$E1 + E2 = 376 \text{ tCO}_2/\text{yr.}$$

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

$ERy (\text{tCO}_2\text{e})$ before leakage and project emissions discount = $(Q_HFC23 - B_HFC23) * GWP_HFC23$.

Approximate annual values for the variables have been set as follows:

$$Q_HFC23^{23} = 4,087 \text{ tHFC23} * 3\% = 122.61 \text{ tHFC23}$$

$$B_HFC23 = 0$$

$$GWP_HFC23 = 11,700 \text{ tCO}_2/\text{tHFC23.}$$

With approximate values, the following ERs are obtained:

$$(Q_HFC23 - B_HFC23) * GWP_HFC23 = 1,434,572 \text{ tCO}_2.$$

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

$$ERy (\text{tCO}_2\text{e}) = (Q_HFC23 - B_HFC23) * GWP_HFC23 - EDPy - Ly$$

Replacing for estimated values:

$$ERy (\text{tCO}_2\text{e}) = 1,434,572 \text{ tCO}_2\text{e} - 376 \text{ tCO}_2\text{e} = 1,434,196^{24} \text{ tCO}_2\text{e.}$$

²³ For estimation purposes the HFC23 Purity ("P_HFC23") is assumed to be 100%, as done in the Ulsan-Korean HFC23 project (which AM0001 takes as example).

E.6. Table providing values obtained when applying formulae above:

The project estimated annual ERs, over the 21-year crediting period, are as follow:

Year	Estimation of project activity emission reductions (tonnes of CO ₂ e)	Estimation of baseline emission reductions (tonnes of CO ₂)	Estimation of leakage (tonnes of CO ₂) ²⁵	Estimation of emissions reductions in tonnes of CO ₂ e ²⁶
2006	717,286	0	188	717,098
2007	1,434,572	0	376	1,434,196
2008	1,434,572	0	376	1,434,196
2009	1,434,572	0	376	1,434,196
2010	1,434,572	0	376	1,434,196
2011	1,434,572	0	376	1,434,196
2012	1,434,572	0	376	1,434,196
2013	1,434,572	0	376	1,434,196
2014	1,434,572	0	376	1,434,196
2015	1,434,572	0	376	1,434,196
2016	1,434,572	0	376	1,434,196
2017	1,434,572	0	376	1,434,196
2018	1,434,572	0	376	1,434,196
2019	1,434,572	0	376	1,434,196
2020	1,434,572	0	376	1,434,196
2021	1,434,572	0	376	1,434,196
2022	1,434,572	0	376	1,434,196
2023	1,434,572	0	376	1,434,196
2024	1,434,572	0	376	1,434,196
2025	1,434,572	0	376	1,434,196
2026	1,434,572	0	376	1,434,196
2027	717,286	0	188	717,098
Total (tonnes of CO₂e)	30,126,014	0	7,898	30,118,116

Source: Own calculation.

SECTION F. Environmental impacts**F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:**

An EIA was completed for the project in October, 2005. The complete project's EIA is made available to the DOE. The environmental impacts identified in the EIA are as follow:

-Gaseous effluent: Samples of effluent gasses will be periodically (every six months) taken at the vent stack for analysis to ensure that the level of eventual contaminants in the effluent gases fully

²⁴ This value has been rounding down to the nearest integer.

²⁵ Including project emissions.

²⁶ Rounded down to the nearest integer.

comply with local emission standards and environmental regulations²⁷. Gaseous effluents expected are: CO, HCl, HF, Cl₂, dioxin and NO_x and emissions of them are as follow:

Gaseous effluents (System effluents)

	System specifications (exhaust conditions) ppm
CO	30 ppm
HCl	5 ppm
HF	3 ppm
F ₂	3 ppm
Cl ₂	1 ppm
Dioxin	0.5 ng-TEQ/N m ³
NO _x	100 ppm
Dust	10 mg/N m ³

Con formato

Source: The project's EIA

-Liquid Effluents: The selected technology has the advantage of not causing water effluents therefore the project will neither generate water effluents nor solid waste.

-Noise and vibrations: Noise and vibrations from rotating machines in this project are low and any necessary countermeasures are taken to avoid environmental or hygiene impact at the boundary of the project site (which is an industrial zone, already highly disturbed). The project site is a non-residential area.

-Solid wastes: During the project operation there will be no solid waste thus there will be no sludge transport needed. The only liquid residue will be a solution composed of HF with traces of HCl, which will be extracted and sold in *Mercosur*.

An emergency contingency plan is established in the EIA, this indicates the procedure in case of: explosions or fire, residues spills, accidents during operation, unfavorable weather conditions (i.e. fog). This emergency contingency plan includes coordinated plans between the police department, fire department, local hospitals and the plant's personnel. This plan includes establishing leadership line of action, training, capacitating and communication programs; and also buying emergency equipment.

It is stated in the EIA that the project sponsor has committed to the following:

- Considering the protection of the environment as part of its activities.
- Integrating the conservation of the environment in all company's plans.
- Fomenting the rational and adequate use of electricity.
- Disposing solid residues in nearby landfills.
- Reducing noise at minimum possible levels.
- Fostering the sensitivity of the plant's personnel to the environmental policies established.
- Training personnel in environmental protection.

²⁷ The province of San Luis, Argentina, where the Villa Mercedes plant is located, through provincial Law 4094, has adhered to the terms of National Law 20284. This law sets some air quality standards in its Annex II, calling for emergency declaration when said limits are surpassed in any region or locality, but it has not set any specific emission limits or quality parameters for the gaseous emissions that are vented from fixed single sources of emissions. Argentinean standards can be seen under section D.2.2.1.

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F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Argentinean regulations do not require an EIA for the project type of activity however an EIA was completed for the project at the sponsor's initiative. Project participants consider that positive environmental impacts derived from the emission reduction of GHG emissions through the virtual elimination of all the emissions of HFC23 and CER-related activity will undoubtedly more than outbalance any minor negative impact that may be eventually caused by the project.

SECTION G. Stakeholders' comments

G.1. Brief description how comments by local stakeholders have been invited and compiled:

Comments were invited on several occasions by way of newspapers, Internet, meetings - an announcement was made on the Web of the FRÍO INDUSTRIAS ARGENTINAS S.A on 17/July/2004, but no comments have been received to date, due to it. The project has been officially published in local radio and newspapers. Meetings performed to present the project to local stakeholder include the following:

-On August 20th, 2004, an informative meeting was held between the sponsor and employees and The Chemical and Petrochemical Industries San Luis Union leaders.

-On August 23rd, 2004, an informative meeting was held between the sponsor and Villa Mercedes Industrial Chamber and another between the sponsor and The Law and Environmental Sustainable Development Ministry at San Luis.

-On August 27th, 2004, a meeting was held in the Piero Hotel-Villa Mercedes, with the participation of local stakeholders. Attendants were 11 people from outside FIASA and 8 people from FIASA.

-On September 28th, 2004, a meeting was held with non-governmental organization ("NGO") INTICUYUN²⁸.

These meetings aimed at presenting the project to the community and receive the community opinion about the project. While in the meetings, the sponsor invited all attendants to freely give their opinions to the project or give any suggestion to the project.

Meetings' summaries are compiled in minutes, elaborated for every meeting performed between the sponsor and local stakeholders. All comments received from local stakeholders are stated in these minutes. These minutes are made available to the DOE.

G.2. Summary of the comments received:

Attendants to the meetings were pleased to have joined the stakeholders' seminars as they obtained good knowledge about Global Warming details, and in general the project counted with a positive reception. It was finally recommended to contact the web sites of UNFCCC, for further details or contact FRÍO INDUSTRIAS ARGENTINAS S.A. directly.

There were 3 major comments received:

²⁸ Meeting was held between Mr. Oder Acebedo (Plant Manager) and Mr. Juan Carlos Romero Gatica (President of INTICUYUN).

-Concern about the impact of the project on employees' health and security; concern about explosions possibilities.

-Interest in increased labor demand and in employee-training for the project.

-Environmental impact of the project; concern about toxic substances release.

Other comments received were the followings:

-The sponsor was invited to become a member of the Villa Mercedes Industrial Chamber to be able to exchange ideas related to the social benefits of recent local initiatives that are being implemented in the city (i.e. a logistic system for the city)

G.3. Report on how due account was taken of any comments received:

All of the comments and questions of the interviewed population were responded properly.

The lack of toxicity in the substances involved in the project, non-explosion risk, and the potential future labor demand due to the project were clarified to local stakeholders on the meetings.

The sponsor confirmed that the project:

-Will use a proven technology.

-Will hire local labor to help in the project's maintenance and train labor previously if necessary.

-Will use equipment that operates in very high quality standards

-Will abide to all Argentinean pertinent regulation.

-Will not cause any relevant risk to employees, given that there will be no toxic and/or contaminant emissions.

-Will use a technology design that will not have any relevant risk of explosion.

-Should not be a matter of concern to employees but on the contrary a matter of interest regarding potential jobs derived from it and potential training available to employees that will be hired.

-Will not have liquid effluents.

-Will treat gaseous effluents with proper scrubbers.

-Will generate harmless solid waste (i.e. during construction) that will be taken to an authorized landfill.

-Will count with periodical rigorous monitoring that will guarantee compliance with all environmental laws/regulation.

Furthermore, at the sponsor own initiative and responding to the environmental impact concerns of local stakeholders, the sponsor will develop:

-A pilot reclaim-and-regeneration CFC project. This reclaim-and-regeneration CFC/HCFC project will consist in recovering CFC/HCFC from final users of CFC/HCFC based-refrigeration systems. The sponsor has been authorized for reclaim and regeneration of CFC/HCFC by the Argentinean Secretary of Environment and Sustainable Development.

-A program of reclaiming 30 pound-disposable cylinders to extract from them residuals and then treat and condition them properly so they do not damage the environment. This program will help certain companies comply with ISO 14000 and further preserve the environment.

Annex 1**CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

Organization:	Frio Industrias Argentinas S.A
Street/P.O.Box:	Ruta #6, Km #4.5
Building:	
City:	Río Tercero
State/Region:	Provincia de Córdoba
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Represented by:	
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Salutation:	Mr.
Last Name:	Silva
Middle Name:	
First Name:	Marcelo
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Direct FAX:	+54 351 4700106
Direct tel:	+54 9 351 4032139
Personal E-Mail:	belnata@itc.com.ar

Annex 2**INFORMATION REGARDING PUBLIC FUNDING**

N/A

Annex 3**BASELINE INFORMATION****Historical Production of HCFC22 at FIASA:**

Following AM0001, the maximum historical HCFC22 production during any of the latest 3 production years between 2000 and 2004 is 4,087.1 HCFC22²⁹. It is the cut off maximum production value for the project's 21-year crediting period, following AM0001.

Historical w (HFC23/HCFC22) at FIASA:

Following AM0001, the value of w is set at the lowest of the three historical annual values between 2000 and 2004 and is not to exceed 3%. The w value for the project has been set at 3%, since all w measured in the latest 3 years of operation between 2000 and 2004 at FIASA were higher than 3%. Evidence of historical measurement at FIASA is made available to the DOE. Historical HFC23-generation at FIASA was directly measured by using chromatography taking several samples a day during production days.

²⁹ The conversion ratio for this swing plant is 0.9. Supporting documents are available to the DOE.

Annual Gas consumption Estimation (“Q_NG”):

$$= (20 * 8760 / 1000) * 50\% = 88 \text{ tonnes of NG}$$

-The selected technology requires 20 kilograms (“kg”) of NG per hour and the burner will be operating 50% of the year hours. Thus, the annual gas consumption estimated for the project was **88 tonnes of NG**.

-Q_NG will be measured monthly ex-post.

CO2 – Emission Factor for Gas Consumption (“E_NGv”):

$$= (51.55 * 15.33 * 0.995 * 44 / 12) / 1000 = 2.88 \text{ tCO}_2/\text{tNG}$$

-The **2.88 tCO₂/tNG** – E_NGY calculated for the project used the following default parameters:

-“The Net calorific Value for pipeline quality NG is $0.3454 * 10^7$ J/m³; applying a default methane density of 670 grams per m³, this translates into 51.55 TJ/Kilotonne”³⁰

-15.33 is the IPCC-1996 for tC/TJ

-0.995 is the IPCC-1996 for selected combustion efficiency or oxidation factor.

-44/12 is the mass conversion of tCO₂ per tC.

-This E_NGY value will be used for the 21-year crediting period.

Annual Electricity Consumption Estimation (“Q_F1”):

$$= 10 * 8760 * 50\% / 1000 = 44 \text{ MWh}$$

-The selected technology requires 10 KW-average and the burner will be operating 50% of the year; thus the annual gas consumption estimated for the project was **44 MWh**.

-Q_F1 will be measured monthly ex-post.

CO2 – Emission Factor for Electricity consumption (“E_F1”):

$$= 0.744 \text{ tCO}_2/\text{MWh}$$

-It was decided to use the E_F1 used in the Antonio Moran Wind Power Plant Project in the Patagonia Region (0.744tCO₂/MWh) in the project for conservatism even though the project will buy electricity from the National Interconnected System, because the Patagonia Region has a higher emission factor than the National Interconnected System.

- This E_F1 value will be used for the 21-year crediting period.

³⁰ The World Bank Greenhouse Gas Assessment Handbook, 1998 p.26.

Annex 4

San Luis Province in the Pedernera Department



Source: The sponsor.

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Annex 5
THE MONITORING PLAN

I. Emissions Reductions Calculation Procedure and Required Spreadsheets (“ERCP”)

The ERCP must be used in conjunction with section D of the PDD. There will be only 1 spreadsheet to be reviewed by the verifier: FIASA AM0001.xls, which will be composed by 2 worksheets:

-Worksheet # 1: Data gathered from meters - The ERCP manager should organize in a column the parameters measured taken from the meters and at the same time indicate the date of calibration and recording.

-Worksheet#2: Organized Data, Processed Data and Results - Composed by one table only (of similar format to table 1 bellow, but containing monthly data organized in rows instead of yearly data); the ERCP manager should calculate ERs (tCO₂e) by following AM0001. At the end of the year (June 30th), once the yearly ERs calculation is completed, “FIASA AM0001 at June.xls” should become “FIASA AM0001 at yearly period in question.xls” and ERs must be rounded down to the nearest integer.

Worksheet 2 – Table 1 (format example)

1	2	3	4	5	6	7	8
Years	HFC23 (tonness)	tCO ₂ or ERs	Baseline Emissions	EDPy (tCO ₂)	Ly	Pj Emissions + Leakage	ERs
2006	61.31	717,286	-	172	16	188	717,098
2007	122.61	1,434,572	-	343	33	376	1,434,196
2008	122.61	1,434,572	-	343	33	376	1,434,196
2009	122.61	1,434,572	-	343	33	376	1,434,196
2010	122.61	1,434,572	-	343	33	376	1,434,196
2011	122.61	1,434,572	-	343	33	376	1,434,196
2012	122.61	1,434,572	-	343	33	376	1,434,196
2013	122.61	1,434,572	-	343	33	376	1,434,196
2014	122.61	1,434,572	-	343	33	376	1,434,196
2015	122.61	1,434,572	-	343	33	376	1,434,196
2016	122.61	1,434,572	-	343	33	376	1,434,196
2017	122.61	1,434,572	-	343	33	376	1,434,196
2018	122.61	1,434,572	-	343	33	376	1,434,196
2019	122.61	1,434,572	-	343	33	376	1,434,196
2020	122.61	1,434,572	-	343	33	376	1,434,196
2021	122.61	1,434,572	-	343	33	376	1,434,196
2022	122.61	1,434,572	-	343	33	376	1,434,196
2023	122.61	1,434,572	-	343	33	376	1,434,196
2024	122.61	1,434,572	-	343	33	376	1,434,196
2025	122.61	1,434,572	-	343	33	376	1,434,196
2026	122.61	1,434,572	-	343	33	376	1,434,196
2027	61.31	717,286	-	172	16	188	717,098
	2,574.87	30,126,014	-	7,213	684	7,898	30,118,116 1,434,196

Source: Own production.

-Column 2’s limit is set as 3% times the actual production of HCFC22 at the plant – However, the HCFC22 to be registered annually should not exceed 4,087 tHCFC22 -set as cut off value

-Column 3: Is column 2 times 11,700.

-Column 4: Quantitative Limit of HFC23 given by regulations, monitored as indicated in section D.

-Column 5: Is the project emissions calculated as: $EDPy = ND_HFC23 * GWP_HFC23 + Q_NGy * E_NGy + Q_HFC23 * EF$; where $E_NGy = 2.88 tCO_2/tNG$ and $E=0.62857$.

-Column 6: Is the project leakage calculated as: $Ly = Q_Fy * E_F$, where Q_F1 is the quantity of electricity bought from the grid, and E_F1 the applicable grid emission factor; where E_F1 equal to 0.744 tCO₂/MWh is set for the project operating life.

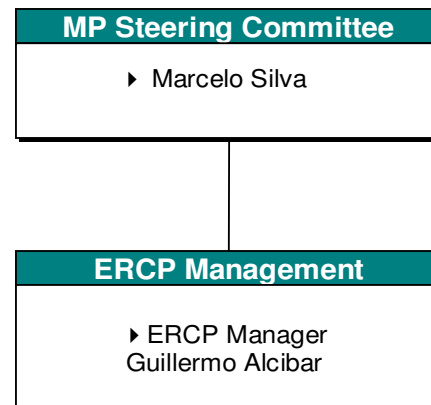
-Column 7: Is the sum of column 5 plus column 6.

-Column 8: Is the difference of column 3 minus column 4 minus column 7.

II. The ERCP Organizational Structure and Quality Assurance and Control Procedure

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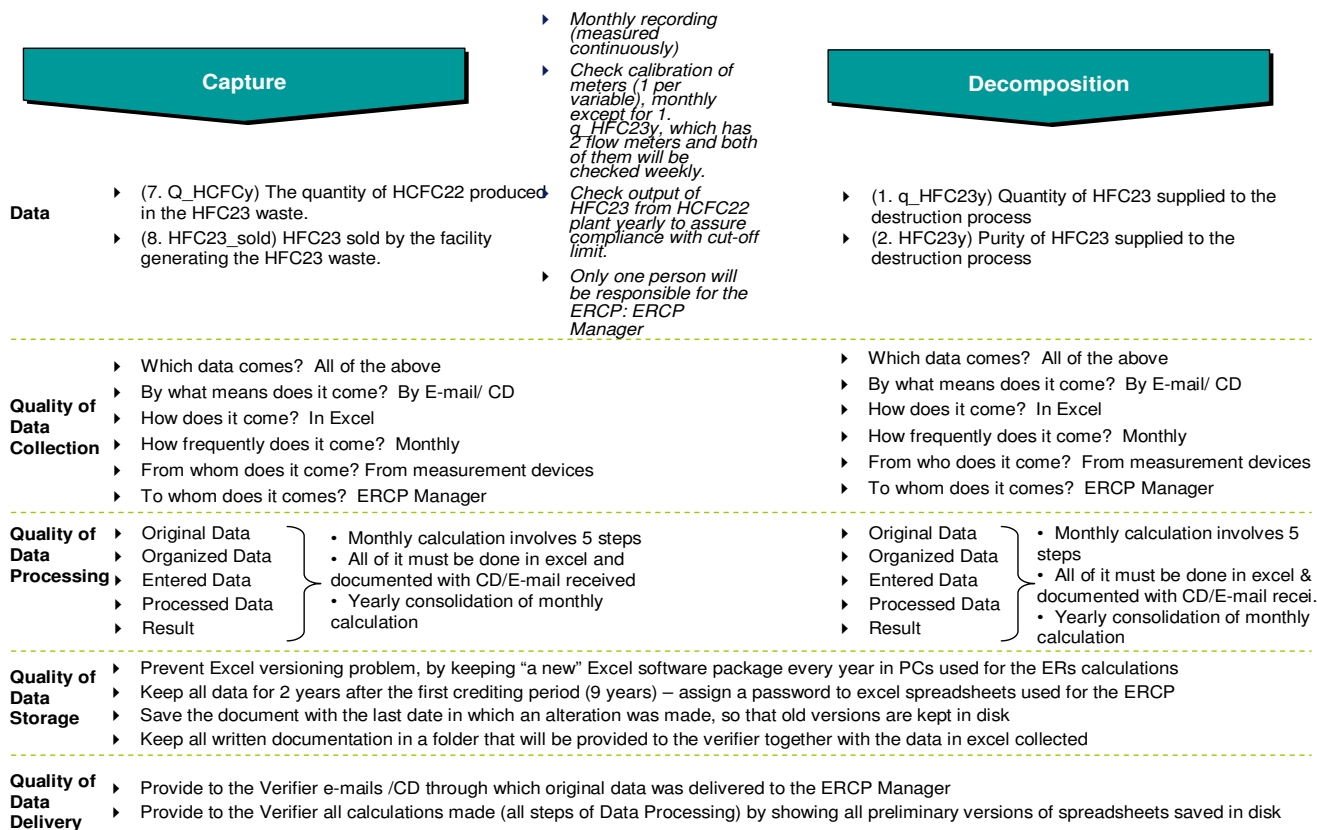
ERCP Organizational Structure



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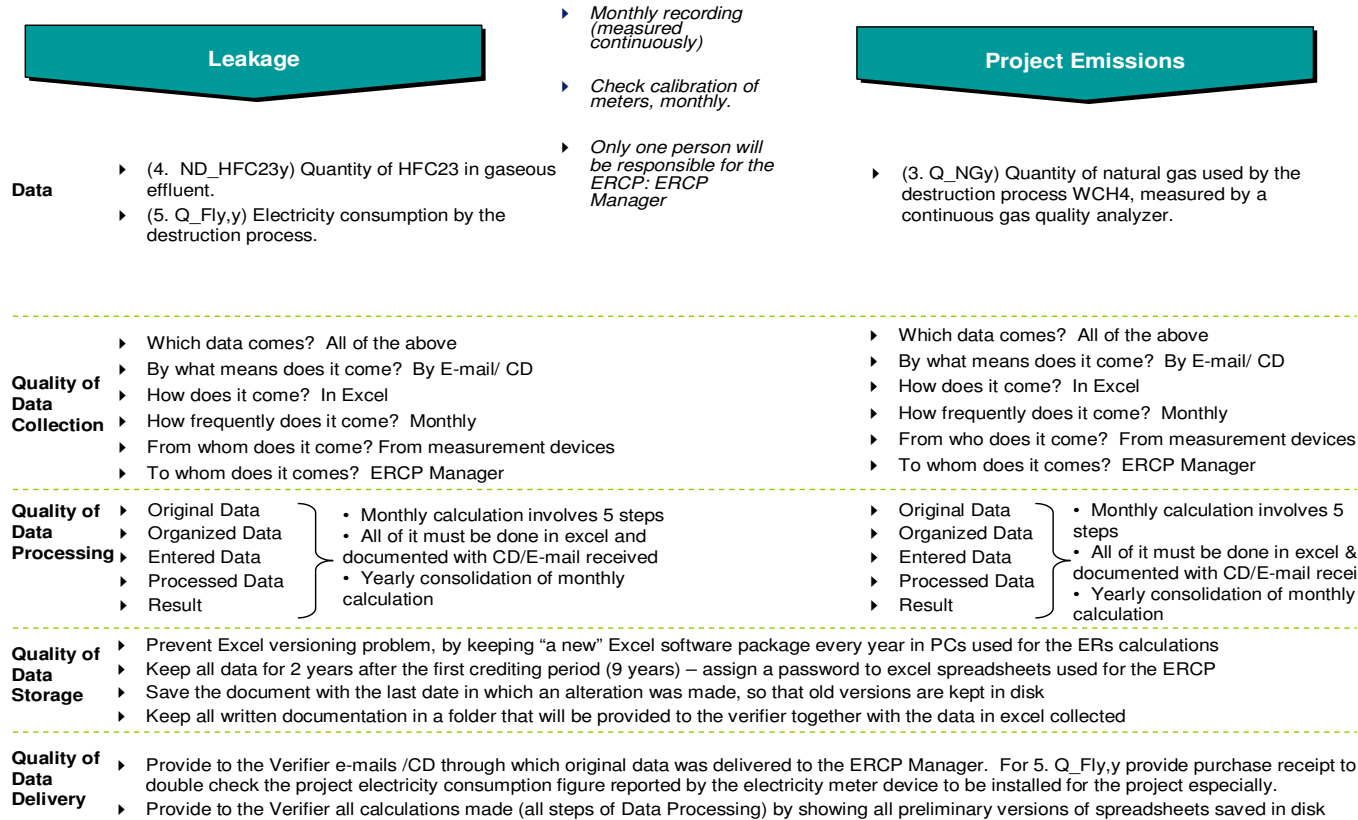
ERCP Quality Assurance and Control Procedure - I



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ERCP Quality Assurance and Control Procedure - II



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