CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

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Title: HFC-23 destruction project

Version: 1.0

Date: 11 September 2010

A.2. Description of the project activity:

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The HCFC-22 production plant was constructed between 1998 and 1999 and started operation in 1999. The plant has a production capacity of 20,000 tons HCFC-22 per year. The plant is not a swing plant, i.e. it has never produced CFCs.

HFC-23 is an undesirable by-production in the production of HCFC-22 and is currently released to the atmosphere. There are no regulations or economic incentives other than the CDM in the host country to abate the HFC-23. The purpose of the project is to collect all of the waste stream of HFC-23 from the HCFC-22 production process and to decompose it in an incinerator installed at the project site. In the incinerator, the HFC-23 will be decomposed into CO2, HCl and HF. The flue gases will be further cleaned before release to the atmosphere.

In 2009, the reactor of the plant as well as process control equipment were exchanged. This exchange was necessary due to the normal deterioration of the reactor. It is not related to the CDM project activity and the CDM project activity has no impact on the lifetime of the plant or reactor, i.e. the reactor would also have been exchanged at the same point in time in the absence of the project activity.

The project promotes sustainable development by sharing 50% of the revenues from selling CERs with local non-governmental organization in the province where the project is located. The revenues will be used for environmental and social projects. The flue gases are cleaned before release into the atmosphere and no significant other negative environmental impacts are expected from the project activity.

Please note that this project is an example project for the purpose of illustrating the situation of a project activity in which the methodology requires clarification. Please note further that the form F-CDM-AM-Subm only requires to provide a PDD for an *example* project.

A.3. Project participants:

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Forum Umwelt & Entwicklung (to be referred to as FUE hereafter) / Deutscher Naturschutzring (DNR)
Koblenzer Str. 65, 53173 Bonn, Germany

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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India; This is an *example* project as required in the form F-CDM-AM-Subm. The project can be located in any region/state/province.

A.4.1.1. Host Party(ies):

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This is an *example* project to illustrate the situation of a project activity in which the methodology requires clarification, as required by the form F-CDM-AM-Subm. The project can be located in any host country.

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

>>
This is an *example* project to illustrate the situation of a project activity in which the methodology requires clarification, as required by the form F-CDM-AM-Subm. The project can be located in any region/state/province.

A.4.1.3. City/Town/Community etc.:

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This is an *example* project to illustrate the situation of a project activity in which the methodology requires clarification, as required by the form F-CDM-AM-Subm. The project can be located in any city/town/community.

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

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This is an example project to illustrate the situation of a project activity in which the methodology requires clarification, as required by the form F-CDM-AM-Subm. The project can be located in any physical location.

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

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This project falls into Category 11: “Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride”.

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

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The HFC-23 waste gas is collected from the HCFC-22 production process and subsequently stored. The HFC-23 is then fed into the incinerator together with fuel which support the combustion as well as air and steam. In the incinerator, the temperature will be about 1200-1400 degree Celsius. At this temperature the HFC-23 will be decomposed. The chemical reaction is as follows:

CHF3(HFC23)+H2O+1/2 O2 → CO2 +3HF
CHClF2(HCFC22)+H2O+1/2O2 → CO2 +2HF+HCl

The flue gases from this process will be sent to a neutralization process for cooling and neutralization of the acids with alkali. post-decomposition acid gases including HF, HCl, and CO_2, *etc.*, will be sent to the neutralization process for cooling and antacid with alkali. After neutralization and cleaning, the exhaust gases will be vented to the atmosphere. The wastewater is treated in a waste water treatment process.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

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Years	**Annual estimation of emission reductions in tonnes of CO_2e**
2011	1,308,669
2012	1,243,185
2013	1,180,976
2014	1,121,877
2015	1,065,733
2016	1,012,397
2017	961,727
Total estimated reductions (tonnes of CO_2e)	7,894,564
Total number of crediting years	7 years

For a detailed calculation, please see Section B.6.3

A.4.5. Public funding of the project activity:

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No public funding is involved in the project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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The methodology applied is version 5.2 of AM0001: “Incineration of HFC 23 waste streams”

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

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The methodology is applicable under the following conditions:

- The project activity is the destruction of HFC 23 (CHF_3) waste streams from an existing HCFC22 production facility;
- The HCFC-22 production facility has an operating history of at least three years between beginning of the year 2000 and the end of the year 2004 and has been in operation from 2005 until the start of the project activity;
- The HFC-23 destruction occurs at the same industrial site where the HCFC-22 production occurs (i.e. no offsite transport occurs); and
- Where no regulation requires the destruction of the total amount of HFC23 waste.

The project meets all of these conditions:

- The proposed project is to decompose the HFC23 (CHF3) waste streams from the existing HCFC-22 production facility;
- The plant started operation in 1999 and continuously operated between the year 2000 and the end of the year 2004 and has been in operation from 2005;
- The HFC-23 destruction occurs at the same industrial site where the HCFC-22 production occurs; and
- In the host country, no regulation requires the destruction of the total amount of HFC23 waste.

B.3. Description of the sources and gases included in the project boundary:

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The project boundary includes the industrial site of the NOWIFA Fluorocarbon Chemicals plant, including the HCFF-22 production facility and the HFC-23 destruction unit.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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Currently, no regulations are in place which require the destruction of HFC-23. Furthermore, the operator of the plant has no incentives to destroy the HFC-23, as this will involve costs but not generate any revenues. The continued release of HFC-23 is also not restricted by any other regulations of the host

country. This means that, according to the underlying methodology, the baseline scenario is the continuation of release of HFC-23 to the atmosphere.

B.5. 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 (assessment and demonstration of additionality):

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According to the methodology, the project activity is deemed additional if the quantity of HFC 23 emitted to the atmosphere is lower than the baseline quantity. This applies to the proposed project activity as it will destroy all HFC-23 generated (except for very small quantities due to incomplete combustion).

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Emission Reduction

Waste HFC 23 is typically released into the atmosphere. Thus any HFC 23 not recovered for sale and not destroyed to meet regulatory requirements is assumed to be released to the atmosphere.

The greenhouse gas emission reduction achieved by the project activity is the quantity of waste HFC 23 actually destroyed less the greenhouse gas emissions generated by the destruction process less leakage due to the destruction process. Specifically, the greenhouse gas emission reduction (ER_y) achieved by the project activity during a given year (y) is equal to the quantity of HFC 23 waste from HCFC22 production facility (Q_HFC23_y) destroyed by the project activity less the baseline HFC 23 destruction (B_HFC23_y) during that year multiplied by the approved Global Warming Potential[1] value for HFC23 (GWP_HFC23) less the greenhouse gas emissions generated by the destruction process (E_DP_y) less greenhouse gas leakage (L_y) due to the destruction process.

$$ER_y = (Q\_HFC23_y - B\_HFC23_y) * GWP\_HFC23 - E\_DP_y - L_y \qquad \textbf{(1)}$$

Where:

ER_y	is the greenhouse gas emission reduction measured in tonnes of CO_2 equivalents (tCO_2e),
Q_HFC23_y	is the quantity of waste HFC 23 destroyed during the year measured in metric tonnes,
B_HFC23_y	is the baseline quantity of HFC 23 destroyed during the year measured in metric tonnes.
GWP_HFC23	is the Global Warming Potential that converts 1 tonne of HFC 23 to tonnes of CO_2 equivalents (tCO_2e/tHFC 23). The approved Global Warming Potential value for HFC 23 is 11,700 tonnes CO_2e/tonne HFC 23 for the first commitment period under the Kyoto Protocol.

[1] For the first commitment period under the Kyoto Protocol, Global Warming Potential values used shall be those provided by the Intergovernmental Panel on Climate Change in its Second Assessment Report (“1995 IPCC GWP values”).

The emissions due to the destruction process (E_DP_y) and leakage (L_y) are both measured in tonnes of CO_2 equivalent. The quantity of waste HFC 23 destroyed (Q_HFC23_y) is calculated as the product of the quantity of waste HFC 23 supplied to the destruction process (q_HFC23_y) measured in metric tonnes and the purity of the waste HFC 23 (P_HFC23_y) supplied to the destruction process expressed as the fraction of HFC 23 in the waste [$Q\_HFC23_y = q\_HFC23_y * P\_HFC23_y$].

The destruction process uses fuel (e.g., natural gas), steam and/or electricity. The steam and electricity are assumed to be purchased, so the emissions associated with these energy sources are included in the leakage calculation.[2] The emissions due to the destruction process (E_DP_y) are the emissions due to the fossil fuel use, the emissions of HFC 23 not destroyed and the greenhouse gas emissions of the destruction process. Thus:

$$E\_DP_y = ND\_HFC23_y * GWP\_HFC23 + Q\_FF_y * E\_FF_y + Q\_HFC23_y * EF \qquad \textbf{(2)}$$

Where:

ND_HFC23_y	is the quantity of HFC 23 not destroyed during the year,
Q_FF_y	is the quantity of fossil fuel used by the destruction process during the year measured in cubic metres or tons , and
E_FF_y	is the emissions factor for fossil fuel combustion measured in tonnes CO_2 equivalent per unit of fossil fuel (t CO_2e/m^3 or ton). If natural gas is used, the value of E_FF_y will vary by region and over time[3], but is of the order of 0.00188 tCO_2e/m^3.

The quantity of HFC 23 not destroyed (ND_HFC23_y) is typically small[4]; the monitoring plan provides for its periodic on site measurement. Theoretically HFC 23 can also leak to the water effluent and then escape to the atmosphere. This possibility is ignored because it is infinitesimally small; the solubility of HFC 23 is 0.1% wt at 25°C water.

The thermal destruction process converts the carbon in the HFC 23 into CO_2, which is released to the atmosphere. The quantity of CO_2 produced by the destruction process is the product of the quantity of waste HFC 23 (Q_HFC23_y) destroyed and the emission factor (EF). The emission factor is calculated as follows:

$$EF = \frac{44}{\text{molecular weight of HFC 23} \Big/ \text{number of C in a molecule of HFC 23}} = \frac{44}{70 \big/ 1} = 0.62857 \qquad \textbf{(3)}$$

[2] If the steam and/or electricity was generated within the project boundary, the associated emissions would be included in the equation for the emissions due to the destruction process.

[3] In the example of the proposed Ulsan project activity it is of the order of 0.00188 tCO_2e/m^3.

[4] In the example of the proposed Ulsan project activity the quantity of HFC 23 not destroyed is estimated at 0.001% of the quantity of HFC 23 supplied to the destruction process.

The thermal destruction process also produces a small quantity of N_2O emissions. The N_2O emissions, on a CO_2 equivalent basis, are a small fraction of the CO_2e emissions and are therefore ignored.

Baseline

The baseline quantity of HFC 23 destroyed is the quantity of the HFC 23 waste stream required to be destroyed by the applicable regulations. If the entire waste stream is destroyed, Q_HFC23_y is the total amount of HFC 23 waste generated and the quantity required to be destroyed by the applicable regulations is:

$$B\_HFC23_y = Q\_HFC23_y * r_y \qquad \textbf{(4)}$$

Where:

r_y is the 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 HFC 23 waste, the typical situation in non-Annex B Parties, $r_y = 0$. Absent regulations on HFC 23 emissions, the HFC 23 waste is typically released to the atmosphere so the baseline is zero destruction.

To exclude the possibility of manipulating the production process to increase the quantity of waste, the quantity of HFC 23 waste (Q_HFC23_y) is limited to a fraction (w) of a maximum quantity of HCFC22 production at the originating plant that is eligible for crediting ($Q\_HCFC_{y,max}$).

$$Q\_HFC23_y \leq Q\_HCFC_{y,max} * w \qquad \textbf{(5)}$$

Where:

$Q\_HCFC_{y,max}$ = Maximum annual production of HCFC-22 at the originating plant that is eligible for crediting (metric tones per year)

w = Waste generation rate (HFC 23[5])/(HCFC 22) for the originating plant (metric tons of HFC23 per metric tons of HCFC22)

The maximum annual HCFC-22 production quantity that is eligible for crediting ($Q\_HCFC_{y,max}$) is the lower value between

(a) the actual HCFC-22 production in year y (Q_HCFC_y); and
(b) the maximum historical annual HCFC-22 equivalent production level (Q_HCFCe_{Hist}) at this plant (in tonnes of HCFC22) during any of the last three (3) years between beginning of the year 2000 and the end of the year 2004. Q_HCFCe_{Hist} includes the actual HCFC-22 production plus an HCFC-22 production equivalent to the CFC production at swing plants adjusted appropriately to account for the different production rates of HCFC22 and CFCs.

In case where two or more HCFC-22 production lines are operated at one industrial site, the limit to Q_HCFC_y should be applied to the total production at the industrial site and calculated for all production

[5] The quantity of HFC 23 used to calculate this coefficient is the sum of HFC 23 recovered for sale plus the waste HFC 23.

lines together. In this case, the historical annual production of the industrial site in a particular year corresponds to the sum of the production in all production lines at the industrial site during that year. Q_HCFCe_{Hist} then corresponds to the maximum of the annual production in all production lines ($Q\_HCFCe_{Hist,x}$). A production line that has not produced HCFC-22, but only CFCs, during the period 2000 to 2004 shall not be included in the project boundary and shall not be eligible for claiming credits for emissions reduction using this methodology

The CFC production at swing plants should be included as an equivalent HCFC-22 production in Q_HCFCe_{Hist} only for those production lines and only for those years in which HCFC-22 was actually produced in that production line, i.e. the production of CFC-11 and CFC-12 should not be included for those years where no HCFC-22 production occurred in that production line.

The production of CFC-11 and CFC-12 should be included in Q_HCFC_y in each relevant historical year x by adjusting the production of CFC-11 and CFC-12 to an equivalent HCFC-22 production level, as follows:

$$Q\_HCFCe_{Hist} = MAX\left[Q\_HCFCe_{Hist,x}\right] \quad \textbf{(5a)}$$

$$HCFCe_{Hist,x} = Q\_HCFC_{Hist,x} + Q\_HCFC_{Hist,swing,x} \quad \textbf{(5b)}$$

$$Q\_HCFC_{Hist,swing,x} = \frac{C_{HCFC-22}}{C_{CFC}} \cdot Q_{CFC,Hist,x} \quad \textbf{(5c)}$$

Where:

$Q\_HCFCe_{Hist,x}$	=	Actual HCFC-22 production during the year *x* (t HCFC-22 / yr)
$Q\_HCFC_{Hist,swing,x}$	=	Production of CFC-11 and CFC-12 in the swing plant during the year x, adjusted to an equivalent level of HCFC-22 production (t HCFC-22e / yr)
$C_{HCFC-22}$	=	HCFC-22 production capacity of the facility (tons of HCFC-22 per hour)
C_{CFC}	=	CFC production capacity of the facility (tons of CFC-11 and CFC-12 per hour)
x	=	Any of the last three years between beginning of the year 2000 and the end of the year 2004
$Q_{CFC,Hist,x}$	=	Production of CFC-11 and CFC-12 in the swing plant during the year x (tons of CFC-11 and CFC-12 / yr)

The HCFC-22 and CFC production capacities of the facility ($C_{HCFC-22}$ and C_{CFC}) should be determined based on historical data from the period 2000 to 2004, by dividing the quantity of HCFC-22 or CFCs produced during a representative time period by that time period. The production capacities should be determined for all production lines separately. Furthermore, both production capacities (for HCFC-22 and the CFC production) should be determined for time periods where the production line was operating at the same load. Where such historic data is not available, project participants may undertake respective measurements of the HCFC-22 and CFC production capacity at the facility at full load operation. The ratio of $C_{HCFC-22}$ / C_{CFC} should not exceed the ratio of the molecular weight of HCFC-22 (86.47) to the molecular weight of the mixture of CFC-11 (137.38) and CFC-12 (120.91) produced in the production line.

The historical production data of HCFC-22 and, in case of swing plants, of CFC-11 and CFC-12 in each production line and the determination of the CFC and HCFC-22 production capacities (C_{CFC} and $C_{HCFC-22}$) and the maximum annual HCFC-22 production quantity that is eligible for crediting ($Q\_HCFC_{y,max}$) should be documented transparently in the CDM-PDD.

The historical waste generation rate *w* shall be estimated for the three (3) most recent years of operation up to 2004. Direct measurement of HFC23 release is to be used where data are available, otherwise mass balance or other methods based on actual data[6] are to be used. Uncertainty in emission rate estimates shall be quantified and conservative emission rate estimates shall be used when calculating expected emission reductions.

The value of w is set at the lowest of the three historical annual values estimated as specified above and is not to exceed 3% (0.03 tonnes of HFC 23 produced per tonne of HCFC 22 manufactured).

If insufficient data is available for the calculation of HFC23 release for all three (3) most recent years of operation up to 2004, then the default value for *w* to be used is 1.5%.

The measurement procedures, calculations and assumptions used to determine *w* should be documented transparently in the CDM-PDD.

Leakage

Leakage is emissions of greenhouse gases due to the project activity that occur outside the project boundary. The sources of leakage due to the destruction process are:

- Greenhouse gas (CO_2 and N_2O) emissions associated with the production of purchased energy (steam and/or electricity)
- CO_2 emissions due to transport of sludge to the landfill

$$L_y = \sum_i (Q\_F_{i,y} * E\_F_{i,y}) + ET_y \qquad \textbf{(6)}$$

Where $Q\_F_{i,y}$ is the quantity of energy type F_i purchased for the destruction process during year y, $E\_F_{i,y}$ is the greenhouse gas emissions factor for energy type F_i during year y, and ET_y and the greenhouse gas emissions associated with sludge transport during year y.

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[6] The estimation may be based on the carbon efficiency and the fluorine efficiency of the process and normally the average of the two values shall be used unless there are overriding considerations (such as a much lower uncertainty of one of the two evaluations) that can be adequately documented. If HCFC22 leakage was not directly measured, the carbon and fluorine efficiencies may be used to determine both HFC23 waste and HCFC22 leakage. The DOE shall verify if the estimates obtained in this way can reasonably be used to calculate w or if it shall be considered that insufficient data are available to calculate HFC23 release for this plant (and therefore require the use of a default value of 1.5%).

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	**GWP_HFC23**
Data unit:	t CO_2e/t HFC-23
Description:	Global Warming Potential of HFC-23 valid for the commitment period
Source of data used:	Decision by COP3 valid for the first commitment period under the Kyoto Protocol
Value applied:	11,700 until the end of 2012, any value decided by COP/MOP for later periods
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the requirements of the Kyoto Protocol
Any comment:	The ex-ante calculation assumes the same value of 11,700 throughout the crediting period

Data / Parameter:	**Q_HCFC_{Hist}**
Data unit:	t HCFC-22 / yr
Description:	HCFC-22 production during the year *x* where *x* are any of the last three years between beginning of the year 2000 and the end of the year 2004
Source of data used:	Records by the plant
Value applied:	2002: 7,856 tons 2003: 6,895 tons 2004: 8,257 tons
Justification of the choice of data or description of measurement methods and procedures actually applied :	Production meters have been used. The data has been cross-checked with sales data.
Any comment:	-

Data / Parameter:	**w**
Data unit:	Metric tons of HFC-23 per metric tons of HCFC-22
Description:	Waste generation rate for the originating plant
Source of data used:	Default value provided by the methodology
Value applied:	1.5% (or other value, depending on the clarification sought)
Justification of the choice of data or description of measurement methods	Default value in the absence data from the originating plant

and procedures actually applied :	
Any comment:	-

Data / Parameter:	EF
Data unit:	tCO2/tHFC23
Description:	Emission factor of decomposing HFC23 to CO2
Source of data used:	Value provided by the methodology
Value applied:	0.62857
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value provided by the methodology
Any comment:	-

Data / Parameter:	E_LPG
Data unit:	tCO2/Nm3
Description:	CO2 emission factor for LPG
Source of data used:	Specifications by the energy supplier
Value applied:	0.00813
Justification of the choice of data or description of measurement methods and procedures actually applied :	The fuel supplier provides the emission factor and conducts measurements by an independent laboratory. The highest value measured in the past then years is used as a conservative approach.
Any comment:	-

Data / Parameter:	E_Steam
Data unit:	t CO2 / t steam
Description:	CO2 emission factor of the steam
Source of data used:	Calculations by the project participants
Value applied:	0.429
Justification of the choice of data or description of measurement methods and procedures actually applied :	The steam is generated with coal. The value is based on continuous measurements by the project participants over one year. The highest measured value is used as a conservative approach.
Any comment:	-

Data / Parameter:	E_sludge
Data unit:	tCO2/t sludge

Description:	CO2 emission factor for the sludge
Source of data used:	Estimation by the project participants
Value applied:	0.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is a very minor source and the exact emissions are not known. As a very conservative and simplistic approach, an emission factor is used which is up to 50 times higher than the emission factor in other registered CDM projects.
Any comment:	-

Data / Parameter:	**E_NaOH**
Data unit:	tCO2/t NaOH
Description:	CO2 emission factor for NaOH
Source of data used:	Value provided by the fuel supplier
Value applied:	2.57
Justification of the choice of data or description of measurement methods and procedures actually applied :	The supplier of NaOH has undertaken a life cycle analysis of the emissions associated with its NaOH production, according to relevant ISO standards. The value represents the upper bound value for the range identified in the study.
Any comment:	-

Data / Parameter:	**E_wastewater**
Data unit:	tCO2/t wastewater
Description:	CO2 emission factor for waste water processing
Source of data used:	Value provided by the waste water treatment company supplier
Value applied:	0.0087
Justification of the choice of data or description of measurement methods and procedures actually applied :	The waste water is treated by a third company. This company has undertaken a detailed life cycle analysis of the emissions associated with treating its waste water. The value represents the upper bound value for the range identified in the study.
Any comment:	-

B.6.3. Ex-ante calculation of emission reductions:

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The plant expects to produce about 7,500 tons of HCFC-22 per year in 2011 which is the first year of the crediting period. Thereafter, the production is expected to decline due to the accelerated phase-out of HCFC-22 under the Montreal Protocol. It is expected that production will decline by about 5% per year.

The lowest historical waste generation rate of the plant is 1.8% for the period 2002 to 2004. However, it is not know at which rate the plant will operate after the replacement of the reactor in 2009, as such data is not yet available and may change over time. We assume here a value of 1.5% for the purpose of calculating baseline emissions, noting the outstanding clarification regarding the value to be used in the cases where key components of the plant are replaced or retrofitted. The efficiency of the destruction facility is approximately 99,5%. The leakage emissions are estimated to be about 1000 t of CO2 per year. Based on these ex-ante estimations, the expected emission reductions over the crediting period are illustrated in the following table.

			2011	2012	2013	2014	2015	2016	2017
A	HCFC-22 production		7500	7125	6769	6430	6109	5803	5513
B	Waste generation ratio		1,5%	1,5%	1,5%	1,5%	1,5%	1,5%	1,5%
C	HFC-23 destruction efficiency		99,50%	99,50%	99,50%	99,50%	99,50%	99,50%	99,50%
D	Leakage emissions (t CO2e)		1000	1000	1000	1000	1000	1000	1000
E	Emission reductions (t CO2e)	=A*B*C*11,700-D	1308669	1243185	1180976	1121877	1065733	1012397	961727

B.6.4 Summary of the ex-ante estimation of emission reductions:

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The following table shows a summary of the ex-ante estimation of emission reductions.

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
2011	1,308,669
2012	1,243,185
2013	1,180,976
2014	1,121,877
2015	1,065,733
2016	1,012,397
2017	961,727

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**q_HFC23y**
Data unit:	t HFC-23/yr
Description:	Quantity of HFC-23 generated as a by-product at the HCFC-22 facility in year *y* and quantity of HFC-23 destroyed in year *y*
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See table in section B.6.3
Description of measurement methods and procedures to be applied:	Two flow meters are used for each parameter. The flow meters will be calibrated every six months by an officially accredited entity. The zero check on the flow meters will be conducted every week. If the zero check indicates that flow meter is not stable, an immediate calibration of the flow meter will be undertaken. Most of the time, under normal operation, both flow meters measure the same amount of HFC 23 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 the discrepancy is investigated and the fault remedied. The higher value of the two readings will always be used to estimate $Q_{HFC23,gen,y}$. Respectively, the lower value of the two readings will always be used to estimate $Q_{HFC23,destr,y}$. The lower / higher value should be chosen for each meter reading t: $Q_{HFC23,gen,y} = \sum_t MAX\left(Q_{HFC23,gen,meter\,1,t}; Q_{HFC23,gen,meter\,2,t}\right)$ $Q_{HFC23,destr,y} = \sum_t MIN\left(Q_{HFC23,destr,meter\,1,t}; Q_{HFC23,destr,meter\,2,t}\right)$ Purity of HFC 23 is 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.
QA/QC procedures to be applied:	A QA & QC organization will be formed and QA & QC procedures that are equivalent to JIS (Japanese Industrial Standard) in terms of equipment and analytical method will be set.
Any comment:	-

Data / Parameter:	$\mathbf{r_y}$
Data unit:	t HFC-23/yr
Description:	Quantity of HFC-23 that can be emitted in year *y* according to applicable regulations
Source of data to be used:	Relevant regulations
Value of data applied for the purpose of calculating expected	At the point of validation, there are no regulations

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**$Q_{HCFC22,y}$**
Data unit:	t HCFC-22/yr
Description:	Quantity of HCFC-22 produced in the facility in year *y*
Source of data to be used:	Measurements by the plant operator
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See table in section B.5
Description of measurement methods and procedures to be applied:	A volume flow meter will be installed
QA/QC procedures to be applied:	The measured data will be cross-checked with sales data
Any comment:	

Data / Parameter:	**P_HFC23y**
Data unit:	%
Description:	Purity of HFC23 supplied to the destruction process in year y
Source of data to be used:	Gas chromatography analysis
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100
Description of measurement methods and procedures to be applied:	Measured continuously by using gas chromatography analysis
QA/QC procedures to be applied:	As per the applicable standard for the gas chromatography analyser

Any comment:	-

Data / Parameter:	**Q_LPG**
Data unit:	Nm3
Description:	Quantity of LPG consumed by the destruction process in year y
Source of data to be used:	Measurement by the project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The ex-ante calculation is performed based on an aggregated estimate for leakage emissions.
Description of measurement methods and procedures to be applied:	Continuous measurement using a gas flow meter.
QA/QC procedures to be applied:	As per the applicable standard of the gas flow meter.
Any comment:	-

Data / Parameter:	**ND_HFC23y**
Data unit:	kg HFC23
Description:	Quantity of un-decomposed HFC23 in stack gaseous effluent in year y
Source of data to be used:	Measurements by the project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.5% of the HFC-23 generated
Description of measurement methods and procedures to be applied:	The HFC-23 in the stack gas will be measured continuously by gas chromatography.
QA/QC procedures to be applied:	As per the applicable standard for the gas chromatograph.
Any comment:	-

Data / Parameter:	**HFC23_soldy**
Data unit:	t HFC23
Description:	HFC23 sold by the project participants
Source of data to be used:	Records by the project participants
Value of data applied	0

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Any sales records will be maintained. However, it is not planned to sell any HFC-23.
QA/QC procedures to be applied:	Cross checked in the overall annual balance of HFC-23
Any comment:	-

Data / Parameter:	**Q_Elecy**
Data unit:	MWh/yr
Description:	Electricity consumption by the decomposition process in year y
Source of data to be used:	Measurements by the project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The ex-ante calculation is performed based on an aggregated estimate for leakage emissions.
Description of measurement methods and procedures to be applied:	Electricity meter
QA/QC procedures to be applied:	Cross-checks with invoices from the electricity supplying company
Any comment:	-

Data / Parameter:	**Q_Steamy**
Data unit:	t steam / yr
Description:	Steam consumption by the decomposition process in year y
Source of data to be used:	Measurements by the project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The ex-ante calculation is performed based on an aggregated estimate for leakage emissions.
Description of measurement methods and procedures to be applied:	Steam flow meters
QA/QC procedures to	Cross checks with fossil fuel consumption of the steam generation unit

be applied:	
Any comment:	-

Data / Parameter:	**Q_NaOH**
Data unit:	t NaOH/yr
Description:	NaOH consumption of the decomposition unit
Source of data to be used:	Records by the project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The ex-ante calculation is performed based on an aggregated estimate for leakage emissions.
Description of measurement methods and procedures to be applied:	Purchase records
QA/QC procedures to be applied:	Cross check with normal NaOH requirements for plausibility
Any comment:	-

Data / Parameter:	**Q_sludge_y**
Data unit:	t sludge / yr
Description:	Sludge generated from waste water processing
Source of data to be used:	Measurements by the waste water treatment company
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The ex-ante calculation is performed based on an aggregated estimate for leakage emissions.
Description of measurement methods and procedures to be applied:	Weigh meters
QA/QC procedures to be applied:	Cross check with previous records
Any comment:	-

Data / Parameter:	**$Q\_wastewater_y$**
Data unit:	t waste water
Description:	Quantity of waste water generated by the destruction facility
Source of data to be used:	Measurements by the project participants
Value of data applied	The ex-ante calculation is performed based on an aggregated estimate for leakage

for the purpose of calculating expected emission reductions in section B.5	emissions.
Description of measurement methods and procedures to be applied:	Flow meter
QA/QC procedures to be applied:	As per the applicable standard of the flow meter
Any comment:	-

Data / Parameter:	**NCV_LPG**
Data unit:	GJ / m3
Description:	Net calorific value of LPG
Source of data to be used:	2006 IPCC Guidelines
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The ex-ante calculation is performed based on an aggregated estimate for leakage emissions.
Description of measurement methods and procedures to be applied:	The upper bound of the default value provided in the 2006 IPCC Guidelines will be applied
QA/QC procedures to be applied:	Not applicable
Any comment:	-

Data / Parameter:	**EF_LPG**
Data unit:	t CO2 / GJ
Description:	Emission factor of LPG
Source of data to be used:	2006 IPCC Guidelines
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The ex-ante calculation is performed based on an aggregated estimate for leakage emissions.
Description of measurement methods and procedures to be applied:	The upper bound of the default value provided in the 2006 IPCC Guidelines will be applied
QA/QC procedures to	Not applicable

be applied:	
Any comment:	-

B.7.2. Description of the monitoring plan:

>>
The monitoring mainly involves the measurement of the quantity of HFC-23 that is generated at the facility and that is destroyed under the project activity.

The quantities of gaseous effluents (CO, HCl, HF, Cl2, dioxin and NOX) and liquid effluents (PH, COD, BOD, n-H (normal hexane extracts), SS (suspended solid), phenol, and metals (Cu, Zn, Mn and Cr) are measured every six months to ensure compliance with environmental regulations.

All data collected as part of monitoring should be archived electronically and be kept at least for two years after the end of the last crediting period. 100% of the data should be monitored if not indicated differently in the comments in the tables below.

The technical leader of the HFC-23 decomposition plant will have the responsibility for implementing all monitoring provisions. The data will be recorded both electronically and on paper. The shift-heads should check the records to ensure their accuracy. The administrative department of the company will be responsible for preparing the monitoring reports.

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

>>
11 September 2010 2010
Responsible entity: Forum Umwelt und Entwicklung

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
1 January 2011

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

>>
25 years

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

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

>>

1 January 2011 or the official registration date in UNFCCC, whichever is later

C.2.1.2. Length of the first crediting period:

>>

7 years (to be renewed up to 21 years in total)

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

Not applicable

C.2.2.2. Length:

>>

Not applicable

SECTION D. Environmental impacts

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D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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D.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:

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SECTION E. Stakeholders' comments

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

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E.2. Summary of the comments received:

>>

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

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Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION

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