Approved baseline and monitoring methodology AM0079

"Recovery of SF_6 from Gas insulated electrical equipment in testing facilities"

I. SOURCE, DEFINITIONS AND APPLICABILITY

Sources

This baseline and monitoring methodology is based on the following proposed new methodology:

- NM0251 "Prevention of SF_6 venting following tests of Gas insulated electrical equipment", prepared by EcoSecurities.

This methodology refers to the latest approved versions of the following tools:

- Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion;
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption;
- Combined tool to identify the baseline scenario and demonstrate additionality.

For more information regarding the proposed new methodologies and the tools as well as their consideration by the Executive Board please refer to <http://cdm.unfccc.int/goto/MPappmeth>.

Selected approach from paragraph 48 of the CDM modalities and procedures

"Existing actual or historical emissions, as applicable"

Definitions

For the purpose of this methodology, the following definitions apply:

Recovery. Recovery means the collection and storage of fluorinated greenhouse gases from, for example, machinery, equipment and containers.[1]

Reclamation. Reclamation means the reprocessing of a recovered fluorinated greenhouse gas in order to meet a specified standard of performance.[2]

Test. A series of operations used to determine if an apparatus (e.g. a circuit breaker) complies with certain standards for operating performance. Tests are performed as part of a certification process or as part of development stage testing.

[1] REGULATION (EC) No 842/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on certain fluorinated greenhouse gases.

[2] REGULATION (EC) No 842/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on certain fluorinated greenhouse gases.

Testing Item. Each separate operation that together compose the series of operations making up a test.

Electrical Test. A test that examines the electrical functionality of a gas insulated electrical equipment (GIEE) and requires the equipment to be filled with SF_6 gas; restricted to any test involving short-circuit, capacitive current switching, load current switching, inductive current switching or switching operations.

Applicability

This methodology applies to projects where SF_6 emissions are reduced by implementing recovery of used SF_6 gas that would be vented after the testing of gas insulated electrical equipment (GIEE) at a testing facility, called the *SF_6 recovery site*. This methodology applies when the recovered gas is then reclaimed at an SF_6 production facility, called the *SF_6 reclamation site*. This methodology applies to projects that involve installation of recovery systems at the SF_6 recovery site and transport of used SF_6 to an existing SF_6 production facility for the purpose of its reclamation.

The methodology is applicable under the following conditions:

- The SF_6 recovery site uses SF_6 in the testing of gas insulated electrical equipment (GIEE) (e.g. circuit breaker, switchgear). Such tests are performed as part of a certification or rating process, or during development or production of new electrical equipment;
- The testing considered for the project is Electrical Tests of medium and high voltage rated equipment (>1 kV);
- Before the project, SF_6 gas used in the equipment for tests is vented following testing.
- There is no option to reuse the vented SF_6 in the SF_6 recovery site;
- The recovered gas is reclaimed by using it as a feedstock in the production of new SF_6 on the premises of an existing SF_6 production facility;
- Reclaimed SF_6 is a minor component of the total SF_6 production of the SF_6 reclamation site (less than 5% of total production);
- Issuance requests shall be formulated for periods of at least one year as the procedures to remove the possibility of gaming are designed on a yearly basis;
- The testing is performed at the request of a client according to a national or international standard, and the facility operator has no discretion in the type or frequency of tests.

In addition, the applicability conditions included in the tools referred to above apply.

Finally, this methodology is only applicable if the application of the procedure to identify the baseline scenario results in a baseline involving the venting of SF_6 as the most plausible scenario for the SF_6 recovery site.

II. BASELINE METHODOLOGY PROCEDURE

Identification of the baseline scenario

Project proponents shall apply the following steps to identify the baseline scenario:

Use the "Combined tool to identify the baseline scenario and demonstrate additionality", taking into account the specifications below, to determine the most plausible baseline scenario for management of used SF_6 gas at the SF_6 recovery site and to demonstrate the additionality of the project activity.

Baseline Alternatives

The baseline must be determined for the management of used SF_6 gas at the SF_6 recovery site.

Consider at least the following alternatives for managing used SF_6 gas at the SF_6 recovery site:

(a) Continuation of current practice, which shall be described in the CDM PDD.
(b) Capture and incineration of used SF_6.
(c) Capture and reclamation of used SF_6 at the chosen SF_6 reclamation site (the project activity without CDM).
(d) Capture and transport of used SF_6 to other facilities for reclamation.

Consistency with mandatory applicable laws and regulations

During baseline alternative selection, eliminate any options that do not comply with existing laws and regulations.

Additionality

Additionality will be demonstrated using the latest version of the "Combined tool to identify the baseline scenario and demonstrate additionality". The demonstration of additionality must take into account the entire activity within the project boundary, including the recovery, transport, and reclamation facilities.

If the investment analysis of the combined tool is applied, it should consider the costs and benefits of the baseline alternatives for used SF_6 gas. For example following costs can be included for CDM project activity at both the sites; SF_6 recovery site and SF_6 reclamation site.

- Cost to install SF_6 recovery system;
- Increased O&M costs at reclamation site;
- Savings on raw materials to produce SF_6 at reclamation site (including raw materials such as anhydrous hydrogen fluoride (AHF) and molten sulphur);
- The transportation costs.

Project boundary

The spatial extent of the project boundary encompasses:

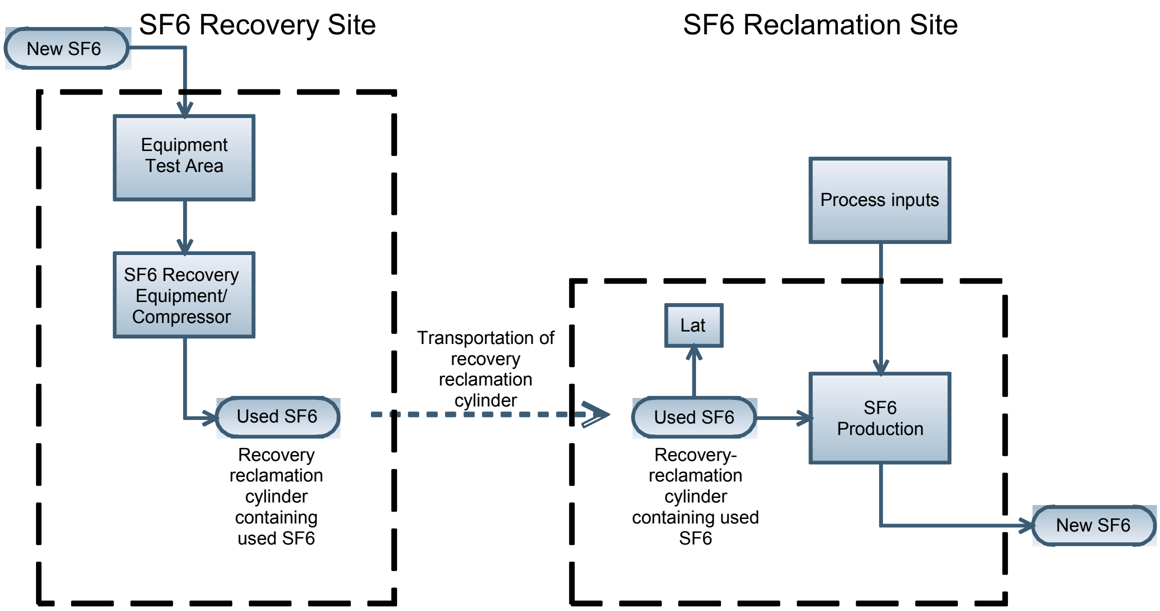
The SF_6 recovery site

- The locations where test equipment is filled with SF_6, where this equipment is tested, and where the gas is vented (in the baseline scenario) and recovered (in the project scenario);
- All equipment for recovery of used SF_6;
- The dedicated recovery cylinders in which used SF_6 is stored.

The SF_6 reclamation site

- The dedicated recovery cylinders in which used SF_6 is stored;
- The laboratory where recovered gas is tested for SF_6 content;
- Connectors, pipe work and other equipment used to transfer and measure the used SF_6 from the recovery cylinders to the SF_6 production line.

In the figure below, the Project boundary covers everything inside the dashed lines:



The greenhouse gases included in or excluded from the project boundary are shown in Table 1.

Table 1: Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	venting of used gas	CO_2	No	Not relevant
		CH_4	No	Not relevant
		SF_6	Yes	Only source of emissions
Project activity	SF_6 emitted during reclamation	CO_2	No	Not relevant
		CH_4	No	Not relevant
		SF_6	Yes	Only source of emissions
	Exceptional SF_6 emissions	CO_2	No	Not relevant
		CH_4	No	Not relevant
		SF_6	Yes	Only source of emissions
	Electricity use of recovery equipment	CO_2	Yes	Main source of emissions
		CH_4	No	Negligible
		N_2O	No	Negligible
	Energy used at reclamation site prior to reclamation	CO_2	Yes	Main source of emissions
		CH_4	No	Negligible
		N_2O	No	Negligible

Baseline emissions

Baseline emissions are determined as follows.

Step 1: Baseline venting of SF_6

SF_6 relative cap

Baseline emissions are capped relative to the historic venting of SF_6. SF_6 venting is estimated *ex-ante* using the methods described below to determine $V_{SF6,hist.}$

Sub-step 1(a): Determine $V_{SF6,hist}$* (historical *annual venting of SF_6)

The estimated historical annual SF_6 venting ($V_{SF6,hist}$) of the SF_6 recovery site for one year historical data, the data should be of most recent available year but no later than 1 January 2008. $V_{SF6,hist}$ is calculated as the sum of the used SF_6 gas vented for each testing item t in the historical year. $V_{SF6,hist}$ is to be calculated *ex-ante*; however, it is to be updated each year according to the monitoring of $w_{SF6,BL,y}$.

$$V_{SF6,hist} = w_{SF6,hist} \sum_{t} TI_{SF6,used,t} \quad \textbf{(1)}$$

Where:

$V_{SF6,hist}$	=	Historical annual venting of SF_6, in tonnes SF_6
$TI_{SF6,used,t}$	=	Used gas vented during eligible testing item *t*, tonnes gas (see Sub-step 1(b))
$w_{SF6,hist}$	=	Concentration of SF_6 expected in used gas in the historical period, tonnes SF_6/tonnes gas

Sub-step 1(b): Determine $TI_{SF6,used,t}$ (Used gas vented during eligible testing items t)

Testing of equipment may be comprised of one or several testing items performed on different subparts of a single equipment. Records, in the form of direct measurements or other indirect data to estimate SF_6 emissions are required for each testing item to be included in the historical baseline determined *ex-ante*. Two different methods are described in this section to determine or estimate the used SF_6 gas vented, $TI_{SF6,used,t}$, for each testing item *t*.

Method 1. Records of gas use (preferred)

If the SF_6 recovery site has historical records of SF_6 gas vented for the testing instance *t* in the form of measurements of SF_6 filled into the equipment prior to or used gas removed after the test that complies with the monitoring requirements stated in section "Data and Parameters not Monitored", then $TI_{SF6,used,t}$ is to be taken from the monitored data.

Method 2. Reconstruction based on Manufacturer Specification/ Nameplate or estimated equipment capacity

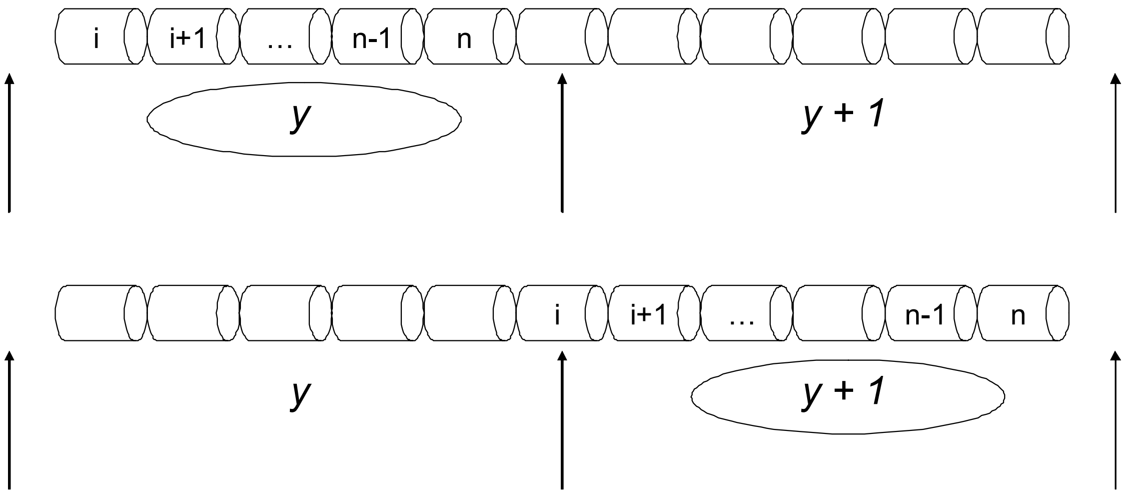
If the SF_6 recovery site does not have monitored data of used gas vented for testing item *t*, then $TI_{SF6,BL,t}$ shall be reconstructed using the procedure described in Annex A. Note that, for the purpose of conducting Step 3 below, the procedure described in Annex A needs to be conducted even when the record of gas use is available.

Step 2: Annual SF_6 reclamation during the project activity

Next, amount of SF_6 reclaimed as a result of the project activity shall be monitored annually. For this purpose, monitored data from project year *y* to determine SF_6 reclaimed in that year shall be used. Given the nature of the project activity, the unit used as a basis for calculation is the recovery-reclamation cylinder *i*. Note that recovery-reclamation cylinder *i* refers to each cycle that a cylinder goes through (i.e. from the moment the cylinder is taken to the recovery site until the moment the gas contained in the cylinder has been injected into the reclamation facility) and not the physical cylinder.[3]

Only those cylinders that complete the recovery-reclamation process in year *y* can be included in the calculation of emissions avoided in year *y*. If a recovery cylinder has not completed the recovery-reclamation process in the crediting year *y*, then it must be included in the year *y+1*, as illustrated below.

[3] In some cases the same physical cylinder may be used for more than one recovery-reclamation cycle in the crediting period *y*. However, if a cylinder is reused, it will have to be clearly labelled in each recovery-reclamation cycle.



The emissions avoided in year *y* from each cylinder *i*, $CA_{i,y}$ is determined ex-post based on the minimum among the following:

Where:

$MR_{Gas,i,y}$	=	Mass of used gas recovered into cylinder *i* at the SF_6 recovery site in year *y*
$MS_{Gas,i,y}$	=	Mass of used gas stored in recovery cylinder *i* in year *y*, tonnes gas
$MI_{Gas,i,y}$	=	Mass of used gas from cylinder *i* which is injected for reclamation process in year *y*, tonnes gas
i	=	Sub-index used for each cylinder that completed a recovery-reclamation cycle included in the estimation of emissions avoided for the year *y*

Take the minimum of the three to determine the cylinder minimum for each cylinder *i*:

$$CA_{i,y} = MIN\{MR_{Gas,i,y}, MS_{Gas,i,y}, MI_{Gas,i,y}\} \quad (2)$$

Where:

$CA_{i,y}$	=	Cylinder minimum for cylinder *i* in year *y*, tonnes gas

Determine the quantity of SF_6 reclaimed during the year *y*:

$$EA_y = \sum_i CA_{i,y} * w_{SF6,i} \quad (3)$$

Where:

EA_y	=	Quantity of SF_6 reclaimed during the year *y*, tonnes SF_6
$w_{SF6,i}$	=	Concentration of SF_6 in the cylinder *i*, tonnes SF_6/tonnes gas

Step 3: Establish the discount factor for number of testing

Thirdly, the cylinder minimum obtained as per Step 2 shall be discounted for any possible increase in the number of testing per equipment compared with the historic baseline period. In order to address this, the following steps shall be taken.

Sub-step 3(a)

Define the maximum number of equal range, in KV, categories that contain at least 5 equipments both of the historic and project samples. For example, if the number of categories is 5, and the equipments ranging from 50kV to 500kV are tested in the historic baseline period and the equipments ranging from 100kV to 800kV are tested in the project year, then the range shall be set at 50kV to 800kV, and the categories should be: 50 to 200kV, 201 to 350kV, 351 to 500kV, 501 to 650kV, and 651 to 800kV. If less than 5 equipments are tested either in the historic or project period, then there shall be one category.

Sub-step 3(b)

Derive the average number of *eligible* testing items where venting occurred per equipment in category k in the baseline ($NT_{BL,k}$), by using the database compiled when determining $TI_{SF6,used,t}$.

Sub-step 3(c)

Derive the average number of *total* testing items where recovery was done per equipment in the project in category k in the year y, ($NT_{PJ,k,y}$) by using the testing records from the project year.

Sub-step 3(d)

Calculate the ratio of number of eligible testing items for each category k as follows:

$$RT_{k,y} = \frac{NT_{BL,k}}{NT_{PJ,k,y}} \tag{4}$$

Where:

$RT_{k,y}$	=	Ratio of number of eligible testing items in category k (maximum value is set at 1)
$NT_{BL,k}$	=	Average number of eligible testing items where venting occurred per equipment in the baseline, for category k
$NT_{PJ,k,y}$	=	Average number of total testing items where recovery was done per equipment in the project, for category k

Obtain discount factor for testing, DFT_y:

$$DFT_y = \frac{\sum_k \left(Q_{SF6,k,y} * RT_{k,y}\right)}{Q_{SF6,y}} \tag{5}$$

$$Q_{SF6,k,y} = \sum_j Q_{SF6,k,j,y} \quad \textbf{(5.1)}$$

$$Q_{SF6,y} = \sum_k Q_{SF6,k,y} \quad \textbf{(5.2)}$$

Where:

DFT_y	=	Discount factor for testing in year y
$Q_{SF6,k,y}$	=	Total amount of SF_6 filled in the testing of equipments in category k in year y, tonnes SF_6
$Q_{SF6,y}$	=	Total amount of SF_6 filled in testing of all equipments in the project activity in year y, tonnes SF_6
$RT_{k,y}$	=	Ratio of number of eligible testing items in category k (maximum value is set at 1)
$Q_{SF6,k,j,y}$	=	Amount of SF_6 that is filled into equipment j of category k in year y at the SF_6 recovery site, tonnes SF_6

Step 4: Calculate the baseline emissions

Calculate baseline emissions as the minimum between the quantity of SF_6 reclaimed during the year, discounted for number of testing, and the best estimate of historical annual emissions $V_{SF6,hist}$, determined in Step 1.

$$BE_y = MIN\{V_{SF6,hist}, DFT_y * EA_y\} * GWP_{SF6} \quad \textbf{(6)}$$

Where:

BE_y	=	Baseline emissions year y, tCO_2e
DFT_y	=	Discount factor for testing in year y
EA_y	=	Quantity of SF_6 reclaimed during the year y, tonnes SF_6
$V_{SF6,hist}$	=	Historical annual baseline venting of SF_6, tonnes SF_6
GWP_{SF6}	=	Global warming potential of SF_6, tCO_2e / tonnes SF_6

Project emissions

Project emissions include used SF_6 emitted during reclamation and any exceptional emissions at the SF_6 reclamation site.

Step 1: Used SF_6 emitted during reclamation

Project proponents shall identify every point in the production of SF_6 at the SF_6 reclamation site, after the point of injection of used SF_6, where SF_6 gas is emitted (for example, a purge gas outlet). During the project year y, a mass balance of inputs and products should be carried out (this should take into account *inter alia*: anhydrous hydrogen fluoride (AHF), molten sulphur, recycled SF_6 and finished products), and any discrepancy shall be proportionately allocated in the following manner.

$$PE_{RCL,y} = GWP_{SF6} \cdot \sum_{i=1}^{n} \left(FE_{PJ,i,y} - FE_{hist} \right) \cdot P_{SF6,y} \quad \textbf{(7)}$$

and

$$FE_{PJ,i,y} = 1 - P_{SF6,y} / Q_{SF6,i,y} \quad \textbf{(8)}$$

$$FE_{hist} = 1 - P_{SF6,hist} / Q_{SF6,hist} \quad \textbf{(9)}$$

Where:

$PE_{RCL,y}$	=	Project emissions from the emission of SF_6 during reclamation in the year *y*, tCO_2e
GWP_{SF6}	=	Global warming potential of SF_6, tCO_2e / t SF_6
$FE_{PJ,i,y}$	=	SF_6 emitted during reclamation of used SF_6 as compared to total production during the reclamation period of cylinder *i* in project year *y*, by comparing the discrepancy of the inputs and products
FE_{hist}	=	SF_6 emitted during production of SF_6 in the baseline as compared to total production of SF_6 during the baseline period, by comparing the discrepancy of the inputs and product
$P_{SF6,y}$	=	Production of SF_6 during the project year *y*, tonnes SF_6
$P_{SF6,hist}$	=	Production of SF_6 during the historical period, tonnes SF_6
$Q_{SF6,i,y}$	=	Theoretical production of SF_6 during the reclamation period of cylinder *i* in project year *y*, in tonnes SF_6, as obtained by a stoichiometric calculation based on the consumption data of reclaimed SF_6, AHF, molten sulphur and any other inputs
$Q_{SF6,hist}$	=	Theoretical production of SF_6 during the historical period, tonnes SF_6, as obtained by a stoichiometric calculation based on the consumption data of AHF and molten sulphur and any other inputs
i	=	Sub-index used for each cylinder that completed a recovery-reclamation cycle included in the estimation of emissions avoided for the year *y*
n	=	Number of cylinders that completed a recovery-reclamation cycle in the year *y*. Only these cylinders are eligible to be included in the estimation of emissions avoided for the year *y*

Step 2: Electricity use of recovery equipment

Emissions as a result of electricity consumption at the testing facility ($PE_{TF,y}$) and reclamation facility ($PE_{RF,y}$)due to the use of recovery equipment shall be taken into account, according to "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". Since emissions due to electricity consumption of these facilities are assumed to be small, electricity consumption can be approximated by the rated capacity of the operating equipment multiplied by operating hours of the facility.

Step 3: Exceptional Project Emissions

It is unlikely but not impossible that an exceptional event at the SF_6 reclamation site, for example an accident or emergency plant shutdown, could lead to the emission of SF_6 injected for reclamation.

The project proponent must record the date and time of any such exceptional event that occurs in year *y* that results in the exceptional emission of SF_6. The SF_6 quantity ($EXC_{SF6,y}$) from any reclamation that coincides with the event must be considered as project emissions ($PE_{EXC,y}$). For example, if a recovery cylinder of used gas was being reclaimed when the event occurred, then the amount of gas extracted from the cylinder between 5 hours prior to the exceptional event and the time that the injection line was closed must be considered as $EXC_{SF6,y}$.

$$PE_{EXC,y} = GWP_{SF6} \cdot EXC_{SF6,y} \quad \textbf{(10)}$$

Where

$PE_{EXC,y}$	=	Project emissions from exceptional event(s) at the SF_6 reclamation site in year *y*, tCO_2e
GWP_{SF6}	=	Global warming potential of SF_6, t CO_2e / t SF_6
$EXC_{SF6,y}$	=	Quantity of SF_6 which was being injected to the reclamation facility during exceptional events occurred in year *y*, tonnes SF_6

Step 4: Total Project Emissions

The project emissions in year *y* are the sum of the two potential sources.

$$PE_y = PE_{RCL,y} + PE_{TF,y} + PE_{RF,y} + PE_{EXC,y} \quad \textbf{(11)}$$

Where:

PE_y	=	Project emissions in year *y*, tCO_2e
$PE_{RCL,y}$	=	Project emissions from emission of SF_6 during reclamation in year *y*, tCO_2e
$PE_{TF,y}$	=	Project emissions as a result of increased electricity consumption at the testing facility attributable to project activity in year *y*, tCO_2e (Refer the “data monitored” section)
$PE_{RF,y}$	=	Project emissions as a result of increased electricity consumption at the reclamation facility attributable to project activity in year *y*, tCO_2e (Refer the “data monitored” section)
$PE_{EXC,y}$	=	Project emissions from exceptional event(s) at the SF_6 reclamation site in year *y*, tCO_2e

Leakage

Leakage emissions attributable to the project activity could result from the following:

(a) Transportation of the cylinders from the SF_6 recovery site to the SF_6 reclamation site ($LE_{trans,y}$);

$$\text{If } \frac{(LE_{Trans,est})}{(BE_y - PE_y)} \leq 0.1\% \tag{12}$$

$LE_{Trans,est}$ = Estimated annual emissions from transport of the cylinders from the SF_6 recovery site to the SF_6 reclamation site, tCO_2e (Refer the "data not monitored" section)

Then the leakage emissions associated with the Project are deemed to be negligible compared to the range of uncertainty of the GWP estimate, and they can be ignored during the crediting period ($LE_y = 0$).

In the case that the estimated leakage emissions do not fulfil the above condition, use the following to calculate LE_y each year:

$$LE_y = LE_{Trans,y} \tag{13}$$

Where:

LE_y = Leakage emissions in year y, tCO_2e
$LE_{Trans,y}$ = Emissions from transport of the cylinders from the SF_6 recovery site to the SF_6 reclamation site in year y, tCO_2e (Refer the "data monitored" section)

Emission reductions

The emission reductions in each year of the project activity are the baseline emissions minus any project emissions and leakage emissions.

$$ER_y = BE_y - PE_y - LE_y \tag{14}$$

Where:

ER_y = Emission reductions due to the project activity in year y, tCO_2e
BE_y = Baseline emissions year y, tCO_2e
PE_y = Project emissions in year y, tCO_2e
LE_y = Leakage emissions in year y, tCO_2e

Changes required for methodology implementation in 2nd and 3rd crediting periods

Project participants shall update those sections of the CDM-PDD relating to the baseline. Furthermore, common practice analysis should be reassessed, if the common practice test does not result in the choice of alternative (a) “Continuation of current practice” the crediting period cannot be renewed.

Data and parameters not monitored

The provisions on data and parameters not monitored are described in the tables below.

A) Parameters related to Baseline Emissions

ID Number:	01
Parameter:	GWP_{SF6}
Data unit:	tCO_2e/tSF_6
Description:	Global warming potential of SF_6
Source of data:	IPCC 2nd assessment report
Measurement procedures (if any):	23,900 for the first commitment period
Any comment:	Shall be updated according to any future COP/MOP decisions

ID Number:	02
Parameter:	$w_{SF6,hist}$
Data unit:	tonnes SF_6 / tonnes gas
Description:	Concentration of SF_6 in used gas in the baseline
Source of data:	Records of the SF_6 recovery site
Measurement procedures (if any):	If the SF_6 recovery site keeps record of the concentration of SF_6 in the gas vented in the baseline, $w_{SF6,hist}$ is calculated as an average of measurements for at least one year’s historical data, which shall be fixed for the crediting period
Any comment:	If such data is not available, then $w_{SF6,BL,y}$ shall be usd as a substitute

ID Number:	03
Parameter:	$TI_{SF6,used,t}$
Data unit:	tonnes gas
Description:	Used gas vented during eligible testing item *t* for the historical baseline year
Source of data:	records of the SF_6 recovery site
Measurement procedures (if any):	Method 1: Measurements of filling: Use the value resulting from measurement by a flow meter that was subject to calibration according to manufacturer recommendations or better. Provide the records described in Annex A Steps 1 and 4 Method 2: Follow procedures described in Annex A and provide all "CDM Records" as required by the procedure Project proponents should clearly state which method is used for each testing item *t*.All testing records of the baseline year(s) are to be made available to the validator, and a summary of these to the UNFCCC at request for registration; however, these are not published online due to business interests of the third party testing institute (the SF_6 recovery site).Testing records should be available in electronic records and/or paper
Any comment:	Uncertainty for Method 1 is low since it relies on actual measurements of SF_6 gas quantities Uncertainty for Method 2: When using manufacturer specification/ nameplate as the source of SF_6 capacity, manufacturer specifications imply the minimum gas required to meet equipment performance requirements. Consequently, the use of this method implies a low estimate. Therefore uncertainty of the SF_6 quantity per equipment is low When using estimated equipment capacities, an uncertainty explanation is to be included

ID Number:	04
Parameter:	*Decision flow chart for the destination of removed* SF_6
Data unit:	dimensionless
Description:	A decision flow chart to determine instances where used gas was legitimately vented in the past
Source of data:	Use the default provided here
Measurement procedures (if any):	Apply the default *Decision flow chart for the destination of removed* SF_6 provided in Annex A The Decision flow chart should reflect or be more conservative than the current practice at the recovery site as documented in response to the Identification of the baseline scenario section
Any comment:	

ID Number:	05
Parameter:	k
Data unit:	dimensionless
Description:	Sub-index used for equipment categories
Source of data:	N/A
Measurement procedures (if any):	Equipment is assigned to a category according to historical or project testing records of the equipment voltage rating
Any comment:	See Step 3 of baseline emissions

ID Number:	06
Parameter:	$NT_{BL,k}$
Data unit:	dimensionless
Description:	Average number of eligible testing items where venting occurred per equipment in the baseline, for category k
Source of data:	Records of the SF_6 recovery site
Measurement procedures (if any):	Use the database compiled when determining $TI_{SF6,used,t}$ For each equipment in the database, assign the equipment to a category k. Count the number of eligible testing items where venting occurred for each equipment. For each category k, make an average of the counts for equipment in that category to derive $NT_{BL,k}$.
Any comment:	See Step 3 of baseline emissions

B) Parameters related to Project emissions

ID Number:	07
Parameter:	$P_{SF6,hist}$
Data unit:	tonnes SF_6
Description:	Production of SF_6 during the historical period, tonnes SF_6
Source of data:	Records of the SF_6 reclamation site
Measurement procedures (if any):	Production or sales records
Any comment:	

ID Number:	08
Parameter:	$Q_{SF6,hist}$
Data unit:	tonnes SF_6
Description:	Theoretical production of SF_6 during the reclamation period of cylinder *i* in project year *y*, in tonnes SF_6, as obtained by a stoichiometric calculation based on the consumption data of reclaimed SF_6, AHF, molten sulphur and any other inputs
Source of data:	Records of the SF_6 reclamation site
Measurement procedures (if any):	Purchase or production records of AHF and sulphur as well as records of production, taking into account inventory change
Any comment:	Production of SF_6 shall be estimated on the basis of AHF and sulphur used, and not consumed by any other products

C) Parameters related to Leakage

ID Number:	09
Parameter:	$LE_{Trans,est}$
Data unit:	tCO_2e
Description:	Estimated annual emissions from transport of the cylinders from the SF_6 recovery site to the SF_6 reclamation site
Source of data:	project proponent
Measurement procedures (if any):	Estimate based on the “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” or on the “Baseline emissions accounting method” of AMS-III.C. Emission reductions by low-greenhouse gas emitting vehicles
Any comment:	

III. MONITORING METHODOLOGY

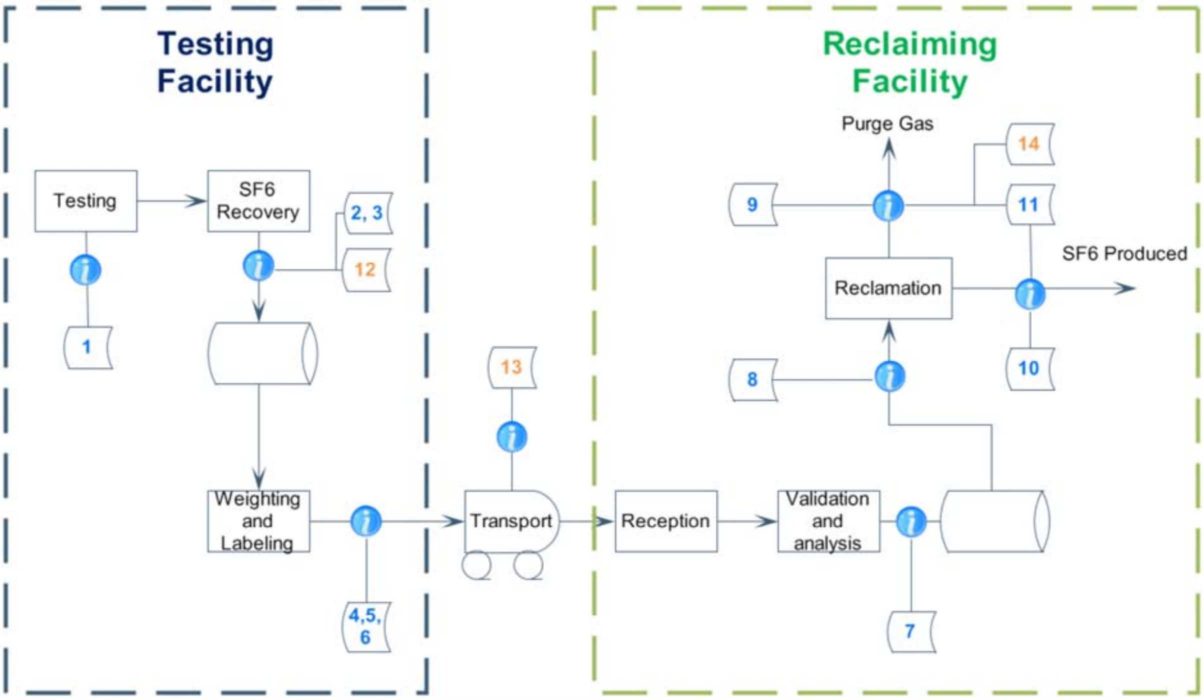
All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

In addition, the monitoring provisions in the tools referred to in this methodology apply.

The monitoring plan described in the PDD should address the following:

- Data collection;
- Data archiving;
- Responsibility for each component of the monitoring plan;
- Ultimate responsibility for monitoring of the CDM project.

The following figure illustrates schematically the monitoring system for baseline and project emissions:



Project Monitoring Plan

Number	Code	Description	Purpose / Use	Location
1	$Q_{SF6,k,j,y}$	Mass of SF_6 that is filled into equipment *j* in year *y* at the SF_6 recovery site	Baseline Emissions	SF_6 recovery site
2	$NT_{PJ,k,y}$	Average number of total testing items where recovery was done per equipment in the project, for category *k*	Baseline Emissions	SF_6 recovery site
3	$MR_{Gas,i}$	Mass of used gas that is recovered into cylinder *i* at the SF_6 recovery site	Baseline Emissions	SF_6 recovery site
4	*i*	Sub-index used for each cylinder that completed a recovery-reclamation cycle included in the estimation of emissions avoided for the year *y*	Baseline Emissions	SF_6 recovery site, SF_6 reclamation site
5	*n*	Number of cylinders that completed a recovery-reclamation cycle in the year *y*. Only these cylinders are eligible to be included in the estimation of emissions avoided for the year *y*	Baseline Emissions	SF_6 recovery site, SF_6 reclamation site

6	$MS_{Gas,i}$	Mass of used gas stored in recovery cylinder *i* during the year *y*	Baseline Emissions	SF_6 recovery site
7	$w_{SF6,i}$	Concentration of SF_6 in the cylinder i.	Baseline Emissions	SF_6 reclamation site / Laboratory
8	$MI_{Gas,i}$	Mass of used gas from cylinder *i* which is injected for reclamation	Baseline Emissions	SF_6 reclamation site
9	$EXC_{SF6,y}$	Quantity of SF_6 which was being injected to the reclamation facility during exceptional events occurred in year *y*	Project Emissions	SF_6 reclamation site
10	$P_{SF6,i,y}$	Production of SF_6 during the reclamation period of cylinder *i*, in year *y*	Project Emissions	SF_6 reclamation site
11	$FE_{PJ,i,yi}$	SF_6 emitted during reclamation of SF_6 as compared to total production during the reclamation period of cylinder *i* in project year *y*	Project Emissions	SF_6 reclamation site
12	$LE_{Rcv,y}$	Emissions caused by electricity use of recovery equipment in year *y*	Leakage	SF_6 recovery site
13	$LE_{Trans,y}$	Emissions from transport of the cylinders from the recovery site to the site of reclamation in year *y*	Leakage	Transport
14	$LE_{Rcl,y}$	Emissions from energy used at site of reclamation attributable to the project activity in year *y*	Leakage	SF_6 reclamation site

Data and parameters monitored

The provisions on data and parameters monitored are described in the tables below

Data / Parameter:	GWP_{SF6}
Data unit:	tCO_2e/tSF_6
Description:	Global warming potential of SF_6
Source of data:	IPCC
Measurement procedures (if any):	23,900 for the first commitment period. Shall be updated according to any future COP/MOP decisions
Monitoring frequency:	
QA/QC procedures:	
Any comment:	

Data / Parameter:	$w_{SF6,hist,y}$
Data unit:	tonnes SF_6/ tonnes gas
Description:	Concentration of SF_6 in used gas in the baseline, to be used as a substitute for $w_{SF6,hist}$ (in equation 1)where the record of the concentration of SF_6 in the gas vented in the baseline is not available
Source of data:	Laboratory test results
Measurement procedures (if any):	Estimated for each project year *y* using the average concentration of SF_6 in the gas recovered in year *y* in the 50% of cylinders *i* that represent the most conservative (contaminated) measurements. Thus, for a year with 6 cylinders, the average would be of the three measurements with the lowest SF_6 concentration
Monitoring frequency:	Yearly
QA/QC procedures:	see $w_{SF6,i}$
Any comment:	This variable does not exist in equations, however provided in monitoring table to be used as substitute to the variable $w_{SF6,hist}$ (in equation 1), for the cases where the record of the concentration of SF_6 in the gas vented in the baseline is not available

Data / Parameter:	$Q_{SF6,k,j,y}$
Data unit:	tonnes SF_6
Description:	Mass of SF_6 that is filled into equipment *j* of category *k* in year *y* at the SF_6 recovery site
Source of data:	Records from the SF_6 recovery site
Measurement procedures (if any):	Measure with a mass flow meter the quantity of gas filled into each equipment *j* tested under the project activity.
Monitoring frequency:	One measurement for each time filling occurs
QA/QC procedures:	Meter subject to calibration according to sector, national or international standards
Any comment:	The equipment records associated with the test records are used to determine to which category *k* the filling measurement corresponds

Data / Parameter:	$MR_{Gas,i,y}$
Data unit:	tonnes gas
Description:	Mass of used recovered into cylinder *i* at the SF_6 recovery site in year *y*
Source of data:	Records from the SF_6 recovery site
Measurement procedures (if any):	To be measured with a mass flow meter the quantity of gas going from the tested equipment to the recovery cylinder *i* For each gas recovery associated with cylinder *i*, the project proponent shall keep records with respect to equipment type, manufacturer, kV voltage rating, equipment compartments, phase, and reference to records that show the test was performed at the request of a client
Monitoring frequency:	Continuous while a cylinder *i* is attached for recovery purposes
QA/QC procedures:	Flow meter shall be subjected to calibration according to national or international standards as specified by the manufacturer Data must be recorded in such a way that it can be determined which quantity of gas was recovered for each testing item resulting in SF_6 being recovered
Any comment:	

Data / Parameter:	$NT_{PJ,k,y}$
Data unit:	N/A
Description:	Average number of total testing items where recovery was done per equipment in the project, for category *k*
Source of data:	Records from the SF_6 recovery site
Measurement procedures (if any):	Use the testing records compiled during the project year For each equipment from which used gas was recovered, assign the equipment to a category *k*. Count the number of testing items where gas was recovered for each equipment For each category *k*, make an average of the counts for equipment in that category to derive $NT_{PJ,k,y}$
Monitoring frequency:	Compiled at least once per year
QA/QC procedures:	
Any comment:	

Data / Parameter:	*i*
Data unit:	-
Description:	Sub-index used for each cylinder that completed a recovery-reclamation cycle included in the estimation of emissions avoided for the year *y*
Source of data:	Records from the SF_6 recovery site and SF_6 reclamation site
Measurement procedures (if any):	Each recovery cylinder should be clearly identified and marked so that it can be uniquely identified and associated with gas recovery operations ($MR_{gas,i}$), gas weight ($MS_{Gas,i}$), $w_{SF6,i}$, and gas injected ($MI_{gas,i}$)
Monitoring frequency:	-
QA/QC procedures:	When used gas is filled into a recovery cylinder, weighed, and sent for reclaiming, the activity should be noted using the cylinder identification information
Any comment:	Recovery cylinders must be visibly distinguishable from new gas cylinders. Records from both sites should coincide An individual cylinder may be used more than one time per year, i.e. it may go through the recovery-reclamation process more than once. However, the labelling will show the unique identity of each cylinder as it is involved in one recovery-reclamation process

Data / Parameter:	*n*
Data unit:	-
Description:	Number of cylinders that completed a recovery-reclamation cycle in the year *y*. Only these cylinders are eligible to be included in the estimation of emissions avoided for the year *y*
Source of data:	Records from the SF_6 recovery site and SF_6 reclamation site
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	The appropriate site must keep record of each cylinder *i* for which recovery has been completed, for which reclamation has been completed, and the cylinder *i* identification information
Any comment:	Records from both sites should coincide. In the case in which a cylinder has not completed reclamation in year *y*, it will have to be accounted in year *y+1* as mentioned in Step 2 of baseline emissions

Data / Parameter:	$MS_{Gas,i,y}$
Data unit:	tonnes gas
Description:	Mass of used gas stored in recovery cylinder *i* in year *y*
Source of data:	Records from SF_6 recovery site
Measurement procedures (if any):	Measuring device: weigh scale Mass is the weight of the cylinder *i* at the beginning of the recovery cycle (when the cylinder *i* is empty) minus the weight of the cylinder *i* at the end of the recovery cycle (when the cylinder *i* is ready to be sent to reclamation).
Monitoring frequency:	Calculated once per cylinder
QA/QC procedures:	Weigh scale shall be subjected to calibration according to national or international standards as specified by the manufacturer. Data must be recorded in such a way that it can be determined which quantity of gas was recovered for each testing item resulting in SF_6 being recovered. The monitored values should be kept along with: a) Date and time when the measurement was taken b) Cylinder *i* identification information
Any comment:	

Data / Parameter:	$w_{SF6,i}$
Data unit:	tonnes SF_6/ tonnes gas
Description:	Concentration of SF_6 in the cylinder *i*
Source of data:	laboratory test result
Measurement procedures (if any):	The proportion must be measured for each cylinder of used gas collected, using a laboratory test Gas chromatography is an appropriate method to determine $w_{SF6,i}$
Monitoring frequency:	Once per cylinder
QA/QC procedures:	Test according to ASTM D2685 or other applicable national or international standards
Any comment:	Given that the recovery and reclamation process are batch processes, and that the concentration of SF_6 in the used gas remains constant after recovery and before reclamation, $w_{SF6,c}$ needs to be measured only once per cylinder to determine the proportion of SF_6 in the gas contained in that cylinder The PDD should include the minimum specification for used SF_6 gas reclamation at the SF_6 reclamation site

Data / Parameter:	$MI_{Gas,i,y}$
Data unit:	tonnes gas
Description:	Mass of used gas from cylinder *i* which is injected for reclamation process in year *y*
Source of data:	Records from SF_6 reclamation site
Measurement procedures (if any):	To be measured with a mass flow meter measuring the quantity of gas going from the recovery cylinder *i* to the SF_6 production process (injection)
Monitoring frequency:	Continuous while a cylinder *i* is attached for reclamation purposes
QA/QC procedures:	Flow meter shall be subjected to calibration according to national or international standards as specified by the manufacturer Data must be recorded in such a way that it can be determined which quantity of gas was recovered for each testing item resulting in SF_6 being recovered
Any comment:	

Data / Parameter:	$P_{SF6,i,y}$
Data unit:	tonnes SF_6
Description:	Production of SF_6 during the reclamation period of cylinder *i*, in year *y*
Source of data:	Records from SF_6 reclamation site
Measurement procedures (if any):	This shall be measured using the customary method at the SF_6 producer site, unless that does not fulfil the frequency requirements further described here, in which case the frequency must be increased The measurement period is the period in which cylinder *i* is connected for gas reclamation, as measured in days
Monitoring frequency:	Production should be measured at least daily. Daily measurements are sufficient given the expected duration of injection of used gas from one cylinder *i*.
QA/QC procedures:	SF_6 production is the core business of the SF_6 producer so the producer's own QA/QC procedures for these measurements are assumed to be sufficient
Any comment:	

Data / Parameter:	$P_{SF6,y}$
Data unit:	tonnes SF_6
Description:	Production of SF_6 during the reclamation year *y*
Source of data:	Records from SF_6 reclamation site
Measurement procedures (if any):	Production or sales records
Monitoring frequency:	Annual
QA/QC procedures:	SF_6 production is the core business of the SF_6 producer so the producer's own QA/QC procedures for these measurements are assumed to be sufficient
Any comment:	

Data / Parameter:	$Q_{SF6,i,y}$
Data unit:	tonnes SF_6
Description:	Theoretical production of SF_6 during the reclamation period of cylinder *i* in project year *y*, in tonnes SF_6, as obtained by a stoichiometric calculation based on the consumption data of reclaimed SF_6, AHF, molten sulphur and any other inputs
Source of data:	Records from SF_6 reclamation site
Measurement procedures (if any):	Purchase or production records of AHF and sulphur, taking into account inventory change
Monitoring frequency:	Annual
QA/QC procedures:	Purchase or production records of AHF and sulphur as well as records of production, taking into account inventory change.
Any comment:	Production of SF_6 shall be estimated on the basis of AHF and sulphur used, and not consumed by any other products

Data / Parameter:	$PE_{TF,y}$
Data unit:	tCO_2e
Description:	Project emissions as a result of increased electricity consumption at the testing facility attributable to project activity in year *y*
Source of data:	Records from SF_6 testing facility
Measurement procedures (if any):	Use “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, most recent version
Monitoring frequency:	Annual
QA/QC procedures:	See below
Any comment:	Electricity consumption can be approximated by the rated capacity of the operating equipment multiplied by operating hours of the facility

Data / Parameter:	$PE_{RF,y}$
Data unit:	tCO_2e
Description:	Project emissions as a result of increased electricity consumption at the reclamation facility attributable to project activity in year *y*
Source of data:	Records from SF_6 reclamation facility
Measurement procedures (if any):	Use “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, most recent version
Monitoring frequency:	Annual
QA/QC procedures:	See below
Any comment:	Electricity consumption can be approximated by the rated capacity of the operating equipment multiplied by operating hours of the facility

Data / Parameter:	$EXC_{SF6,y}$
Data unit:	tonnes SF_6
Description:	Quantity of SF_6 which was being injected to the reclamation facility during exceptional events occurred in year *y*
Source of data:	Records from SF_6 reclamation site
Measurement procedures (if any):	The project proponent must record the date and time of any exceptional event that occurs in year *y* that results in the unusual emission of SF_6 The SF_6 quantity ($EXC_{SF6,y}$) from any reclamation that coincides with the event must be considered as project emissions ($PE_{EXC,y}$) For example, if a cylinder of used gas was being reclaimed when the event occurred, then the total amount of gas from the cylinder between 5 hours prior to the event and until the time that the injection line was shut off must be considered as $EXC_{SF6,y}$ The total amount of gas is to be taken from the continuous measurement of the flow meter on the injection line used to determine $MI_{Gas,i}$
Monitoring frequency:	Quantity shall be determined for every exceptional event in year *y*
QA/QC procedures:	Furthermore, the project proponent may be asked by the verifier to demonstrate records of production of SF_6 in year *y* ($P_{SF6,y,i}$) to demonstrate the functioning of the SF_6 production at the SF_6 reclamation site during periods of reclamation, and a reason shall be given for any low production outliers that do not coincide with a recorded exceptional event
Any comment:	

Data / Parameter:	$LE_{Trans,y}$
Data unit:	tCO_2e
Description:	Emissions from transport of the cylinders from the recovery site to the site of reclamation in year *y*
Source of data:	Records from SF_6 recovery site or SF_6 reclamation site
Measurement procedures (if any):	Use the “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” or the “Baseline emissions accounting method” of AMS-III.C. Emission reductions by low-greenhouse gas emitting vehicles
Monitoring frequency:	
QA/QC procedures:	
Any comment:	Does not need to be monitored if it is demonstrated in the PDD that these emissions are marginal according to Step 1 of the leakage section

IV. REFERENCES AND ANY OTHER INFORMATION

Not applicable.

Annex A

Under Method 2, a best estimate of the historical baseline venting amount ($\boldsymbol{TI_{SF6,used,t}}$) per testing item is made by using historical records of testing to determine when venting must have occurred in the past, and then by assigning an SF_6 amount to each of the instances of venting based on either manufacturer specification/nameplate SF_6 capacities or a list of standard SF_6 capacities and information about the equipment as included in the historical records.

Step 1: Creation of CDM Records

Action: Gather the historical records of testing, where the tests were *Electrical Tests* performed on medium- and high-voltage rated equipment that uses SF_6 gas, as a part of a certification or rating process or during development or production, for the baseline year.

- These records must include, at a minimum, the following information about the test: reference to the client request for the test, list of the tests & testing items undertaken and their results, reference to the testing procedure/ standards followed (e.g. IEC 62271-200), reference to the report(s) produced for the client as a result;
- These records must include, at a minimum, information about the equipment tested: manufacturer, equipment type, kV voltage rating, equipment compartments, phase.

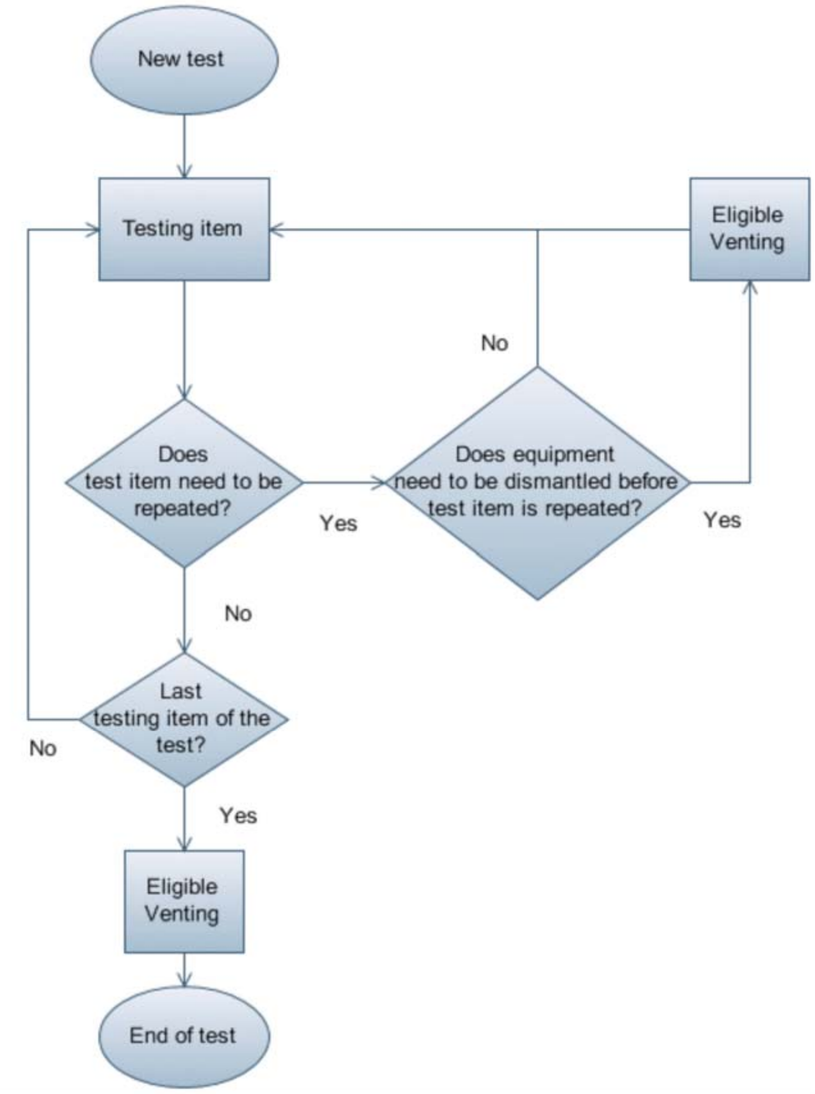
Create CDM Records: Create the following records to be made available at validation:

- Prepare an overview of where historical records are kept and in what form, for easy reference of the validating Designated Operational Entity (DOE);
- Database showing, at a minimum, a summary of all the information described under "Action" for every test and testing item *t* to be included in the historical baseline.

Step 2: Use of Decision-making flowchart

Action: Use the default decision-making flowchart for the destination of used SF_6 gas in the baseline, as contained in this annex. This chart is used as a key to interpret the historical testing records to determine the destination for the used SF_6 gas. The flowchart indicates when eligible SF_6 venting would occur during a test. The eligible venting can be determined from examining the historical test records and comparing the record for each testing item to the flowchart. The output of the Decision-making flowchart will therefore be the destination of the SF_6 after each testing item (i.e., remained in equipment or vented).

The default decision making chart is shown below. For each testing record, project proponents should follow through the chart to the end to identify eligible venting events that occurred. The PDD shall describe the signals from the testing records that indicate when the conditions of the flow chart are fulfilled (to be used in the reconstruction), including the conditions that demonstrate that when a testing item needed to be repeated and when an equipment was dismantled.



Default decision-making flowchart

For any project, it can be assumed that gas is removed from equipment when a test is finished (all testing items of an equipment completed), or when a testing item must be repeated and the equipment must be dismantled prior to repetition. SF_6 gas used in a test may be contaminated to an unknown degree. The condition required to be met for above assumption is that the gas used during a test is not reused in further tests, since the SF_6 gas may be contaminated to an unknown degree, it will therefore not be reused in the absence of recovery and reclamation.

Examples of applying the Decision making flowchart are as follows:

Example 1: The testing record shows that one test comprising four testing items was performed on the equipment X. No testing items were repeated. Therefore, it is assumed that used SF_6 gas was removed (vented) once, after the last testing item of the test, from this equipment X.

Example 2: The testing record shows that one test comprising six testing items were performed on the equipment Z. The first testing item was invalid according to the record due to an assembly error. As a result the equipment was dismantled and then reassembled prior to repeating the testing item. Therefore, it is assumed that used SF_6 was removed twice, once after the invalid testing item 1 and once after the last testing item of the test.

In the case that the decision making for historical venting differs from the default, project proponents may submit an alternative method via a request for deviation or revision. The decision making flowchart should reflect the current practice at the recovery site as documented in response to the *identification of the baseline scenario* section.

Create CDM Records: Create the following records, as necessary to be made available at validation:

- The Decision making flow chart that was used for reconstructing the baseline;
- List of the signals from the testing records that indicate when the conditions of the flow chart are fulfilled (to be used in the reconstruction), so that an external party could find the same resulting historical baseline if they were to review all the historical year testing records.

Step 3: Establish SF_6 capacities

Action: Next, capacity of SF_6 in each of the equipment tested needs to be established, to derive both historic and current situations. For this purpose, the following options shall be pursued.

(a) Use the manufacturer specification or nameplate (if available);

(b) Use default capacities contained in Table B.1 and B.2 in Annex B of the methodology;

(c) Develop a procedure to determine default SF_6 capacities for the equipment covered by the project activity (this must be submitted as a request for deviation to the methodology).

The following guidelines apply when using the default capacities in Tables B.1 and B.2 from Annex B:

(1) For equipment of a rated voltage within the range of the default values provided, but not explicitly listed in the default table, the project proponent shall use the SF_6 capacity for the closest lower rated equipment. For instance, if the equipment is rated at 123kV, the default capacity corresponding to 84kV must be used;

(2) For voltage ratings that are outside the range of default values provided, the project proponent shall follow the procedure contained in Annex B to determine default SF_6 capacity, or use a default capacity of zero for lower ratings below the available range and the default capacity for highest rating available in table for higher ratings above the available range.

Create CDM Records: Create the following records to be made available at validation:

- The list of SF_6 capacities that were used for reconstruction of the historical baseline.

Step 4: Obtain $TI_{SF6,used,t}$, the used SF_6 gas vented during each testing item t

Action: For each test and testing item for which a record exists (Step 1), examine the testing item record and compare it to the Decision-making flowchart (Step 2) to determine the destination of used SF_6 at the end of each testing item.

Create CDM Records: Create the following records to be made available at validation:

- In the database described in Step 1, for every testing item *t* , add the result of the decision making flow chart (eligible or ineligible) and the signal in the testing record that provided this result. Indicate every testing item *t* that resulted in venting.

Step 5: Assign an SF_6 capacity

Action: For every testing item *t* that resulted in eligible venting, assign an SF_6 amount vented by assigning the corresponding SF_6 capacity (Step 3) for the equipment type in question. The equipment type in question is determined from the equipment characteristics included in the testing record.

Create CDM Records: Create the following records to be made available at validation:

- In the database described in Step 1, for every testing item *t* that resulted in venting, include the SF_6 capacity as derived from the default list from Step 3. For every entry, there should be enough information in the database to be able to select the SF_6 capacity shown from the list provided in Step 3.

Step 6: Sum

Sum all of the SF_6 capacities, following equation 1 (Determine $V_{SF6,hist}$). This equation also takes into account the SF_6 content of the used gas, thereby accounting for the decomposition of SF_6 during testing.

Annex B

Default SF_6 Capacity Tables & Procedure to Estimate SF_6 Capacity

All default values contained in Tables B.1 and B.2 below were determined in accordance to the procedures for estimating SF_6 capacity described in the following procedures for estimating equipment capacities. These procedures were developed by Kinectrics Ltd.,[4] an independent company specialised in electricity generation, transmission and distribution. SF_6 usage in equipment varies widely, depending on design and performance criteria, and these default values are considered at the low end of realistic values. However, in the absence of reliable, specific data, the below values are considered to be at the low end of realistic values.

Project proponents wishing to use figures other than the default provided below should submit a deviation from the methodology, complete with alternative default figures and approaches on obtaining the data, including documents which confirms that such alternatives also result in conservative estimation of baseline SF_6 emissions.

Table B.1: Values for Dead Tank Breakers

Rating	SF_6 filling amount of each compartment in kg			
kV	CB	ES_DS	Bushing	2 Bushings
72kV	6	0.3	0.2	0.4
84kV	6	0.3	0.2	0.4
145kV	6	0.3	0.5	1
170kV	6	1.1	0.5	1
245kV	18	1.1	1.5	3
252kV	18	1.1	1.5	3
300kV	18	1.1	1.7	3.4
362kV	18	1.1	4.1	8.2
420kV	72	3.3	6.6	13.2
550kV	72	3.3	7.7	15.4
800kV	115	5	18	36

[4] <http://www.kinectrics.com/en/testing/AboutKinectrics.html>.

Table B.2: Values for Live Tank Breakers

Rating	SF_6 filling amount in kg
kV	**CB**
72kV	1.5
84kV	1.5
145kV	2
170kV	2.5
245kV	4.8
252kV	4.8
300kV	5
362kV	8
420kV	8
550kV	10

CB: Circuit Breaker

ES : Earthing Switch

DS : Disconnected Switch

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History of the document

Version	Date	Nature of revision(s)
01	EB 46, Annex 4 25 March 2009	Initial adoption.