CLEAN DEVELOPMENT MECHANISM

AM0035

Large-scale Methodology

SF_6 emission reductions in electrical grids

Version 02.0.0

Sectoral scope(s): 01 and 11

United Nations
Framework Convention on
Climate Change

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1. Introduction

1. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical projects	Recycling and/or leak reduction of SF_6 in an electricity grid
Type of GHG emissions mitigation action	(a) GHG emission avoidance. Avoidance of SF_6 emissions by recycling and/or leak reduction

2. Scope, applicability, and entry into force

2.1. Scope

2. The methodology is applicable to project activities that recycle SF_6 (Sulphur hexafluoride) and/or reduce SF_6 leaks at an electric utility.

2.2. Applicability

3. The following applicability conditions apply:

    (a) The project is implemented either in the entire electrical grid or a verifiable distinct geographic portion of an electrical grid of the electric utility;

    (b) Where documented proof is available to confirm that reduction in emissions of SF_6 from replaced or repaired equipment is not claimed by any other clean development mechanism (CDM) project. The designated operational entities (DOE) shall verify the documentation at validation as well as at verification.

2.3. Entry into force

4. The date of entry into force is the date of the publication of the EB 70 meeting report on the 23 November 2012.

3. Normative references

5. This methodology is based on the project activity “Reducing SF_6 Emissions in High-Voltage Transmission/Distribution Systems in Nigeria”, which baseline and monitoring methodology and project design document were prepared by Quality Tonnes and World Bank Carbon Finance Unit.

6. For more information regarding the proposal and its consideration by the Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM) please refer to the proposed new methodology “NM0135: SF_6 Emission Reductions for Electrical Grids” on <http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>.

7. This methodology also refers to the latest version of the following tool:

    (a) “Tool for the demonstration and assessment of additionality”.

3.1. Selected approach from paragraph 48 of the CDM modalities and procedures

8. “Actual or historical emissions, as applicable”.

4. Definitions

9. The definitions contained in the Glossary of CDM terms shall apply.

5. Baseline methodology

5.1. Project boundary

10. The physical boundary is the electrical grid or subset of electrical grid where the project activity of recycling and leak reduction program is implemented. The greenhouse gas included is SF_6, which is commonly used as an insulator in electrical transmission and distribution grids. If further emission reductions are achievable through improvement of efficiency in certain part of the grid even if SF_6 leak reduction and recycling was being implemented prior to the start of project activity, it can be included in the project boundary.

11. In defining the project boundary it shall be ensured that all quantity of SF_6 gas moving in and out of the project boundary shall be well documented and these documents made available for audit by the DOE. The DOE shall check that these documents are consistent with the financial accounts of the project participants.

Table 2. Emission sources included in or excluded from the project boundary

Source		Gas	Included	Justification/Explanation
Baseline	SF_6 emissions from utility equipment (trans-formers, circuit breakers, etc.	SF_6	Yes	The project activity is prevention of SF_6 release into atmosphere.
		CO_2	No	No CO_2 emissions occur
		CH_4	No	No CH_4 emissions occur
Project activity	SF_6 emissions from utility equipment (trans-formers, circuit breakers, etc.	SF_6	Yes	The project activity is prevention of SF_6 release into atmosphere.
		CO_2	No	No CO_2 emissions occur
		CH_4	No	No CH_4 emissions occur

5.2. Procedure for the selection of the most plausible baseline scenario

12. The methodology covers the following categories of SF_6 emissions reductions from the equipment within the project boundary:

(a) Recycling SF_6 encapsulated in existing equipment during repairs;

(b) Recycling SF_6 encapsulated in existing equipment during decommissioning; and

(c) Reduction in leaks by repairing the equipment;

(d) Recycling SF_6 encapsulated in existing equipment during routine inspection.

13. The baseline scenario shall be determined by analyzing the following potential alternatives:

    (a) Implementing the project activity without CDM; and

    (b) Continuation of the current practice, which shall be described in the CDM project design document (CDM-PDD).

5.2.1. Step 1: assessment of national policy/regulations on SF_6

14. List national or regional policies/regulation that either require reduction of SF_6 emissions from the power sector or prescribe maintenance standards that affects SF_6 release to atmosphere.

    (a) If such policies exist, assess the enforcement of the policies;

    (b) If above-mentioned policies/regulations exist and are enforced, then the project activity implemented without CDM is the baseline scenario.

5.2.1.1. Step 2: assess if implementation of SF_6 recycling in any part of its electrical grid is being undertaken

    (a) Identify and list the level and extent of SF_6 recycling being undertaken within the region or country where the project activity is implemented;

    (b) If some utilities do undertake SF_6 recycling, are there factors that prevent the implementation of the same activity within the project boundary of the project activity. If not then the project activity implemented without CDM is the baseline scenario. If factors do prevent implementation of the same activity then documented evidence for these factors preventing implementation shall be reported in the CDM-PDD and validated by the DOE.

15. This methodology is applicable only if the baseline scenario is continuation of the current practice.

5.3. Additionality

16. Additionality shall be demonstrated using the latest version of the latest version of the “Tool for the demonstration and assessment of additionality”. In addition, it must be shown that no sectoral or regional/national-level policies exist that require the recycling or leak management of SF_6 in electric utility infrastructure.

17. The barriers listed below should be evaluated as part of the application of the latest version of the “Guidelines for objective demonstration and assessment of barriers”:

    (a) Investment barriers, other than the economic/financial barriers, for example:

        (i) Real and/or perceived risks associated with the technology or process are too high to attract investment;

        (ii) Funding is not available for innovative projects;

    (b) Technological barriers, for example:

(i) Skilled and/or properly trained labour to operate and maintain the technology is not available, leading to equipment disrepair and malfunctioning;

(c) Barriers due to prevailing practice, for example:

(i) Developers lack familiarity with state-of-the-art technologies and are reluctant to use them;

(ii) The project is the "first of a kind";

(iii) Management lacks experience using state-of-the-art technologies, so that the project receives low priority by management;

(iv) Perceived technical and financial risks to enterprises (fears that a new technology may not work, could interrupt production, take time to perfect, or will not actually result in financial savings);

(v) Real and perceived insignificance of many investments – for example, if energy efficiency (or SF_6) projects are relatively small and the value of the savings achieved typically is only a small percentage of enterprise operating costs.

18. These identified barriers are to be considered only if they would prevent potential project proponents from carrying out the proposed project activity were it not registered as a CDM activity.

5.4. Baseline emissions

19. The baseline emissions are the total SF_6 emitted from both leaks and non-recycling of SF_6 during repair and maintenance of the equipment in the baseline. Project participants may use any of the standards listed in appendix 2 of this methodology or equivalent national standards to handle the SF_6 and the equipment using it.

20. The methodology provides two options to determine baseline emissions depending on the availability of historical information.

5.4.1. Option 1: historical data is available

21. The calculations of SF_6 emitted shall be made in accordance with the 2006 IPCC SF_6 electric utility methodology guideline*s*, using the Tier 3 method.[1]

22. Data for at least three years prior to the start of the project shall be used to establish the baseline. The data shall be based on inventory and all the purchase records and use

[1] The 2006 IPCC Guidelines for National Greenhouse Gas Inventories, in its Volume 3 (Industrial Processes and Product Use), chapter 8, outlines a methodology to determine SF_6 emissions from individual utilities as part of a methodology to calculate the national level emissions of SF_6. Generally, emissions estimates developed using the Tier 3 method, which is implemented at the facility level, will be the most accurate, and as such should be used or otherwise well justified. Simply put, if a utility purchased 2000 kg of SF_6 in the baseline year to recharge leaking circuit breakers, but is able to reduce those purchases to 1000 kg the following year by recycling SF_6 before maintenance and repairing leaks, the utility can claim 1000 kg of emissions reductions.

data according to the steps described below. In order to be conservative, the year with the lowest SF_6 emissions of the three or more years will be taken for the baseline.

23. The yearly emissions of SF_6 of year *y* are estimated using the following equation:

$$AE_X = DI_X + AI_X - SI_X + REC_X - NEC_X \quad \text{Equation (1)}$$

Where:

AE_X	=	Annual SF_6 emissions in year *x* prior the implementation of the project activity (kg SF_6)
DI_X	=	Decrease in inventory during the year (kg SF_6)
AI_X	=	Additions to inventory during the year (kg SF_6)
SI_X	=	Subtractions from inventory during the year (kg SF_6)
REC_X	=	Retired Equipment Capacity expressed as nameplate capacity of retired equipment (kg SF_6)
NEC_X	=	New Equipment Capacity expressed as nameplate capacity of new equipment (kg SF_6)

24. The baseline emissions of SF_6 are estimated using the following equation:

$$BE_y = min(AE_{X-1}; AE_{X-2}; AE_{X-3}) \times \frac{GWP_{SF6}}{1000} \quad \text{Equation (2)}$$

Where:

BE_y	=	Baseline emissions during the year *y* (t CO_2/yr)
AE_{X-1} AE_{X-2} AE_{X-3}	=	Annual SF_6 emissions in in the three years prior the implementation of the project activity(kg SF_6)
GWP_{SF6}	=	Global warming potential of SF_6 (t CO_2e/tSF_6)

25. Note: any force majeure events that affect the measurement of inventory will be factored out of the baseline. This will be done in a conservative manner as follows: if a piece of SF_6 containing equipment is destroyed by a force majeure event, releasing all of its SF_6, the project developer will calculate the inventory change as an emissions-neutral event. This means that the nameplate capacity of the old equipment will be calculated as equal to the new equipment. This is conservative, since it assumes that all the SF_6 in the name plate capacity of the equipment destroyed was actually present at the time of destruction (i.e. no leaks).

26. The data inventory should be maintained using the same or a similar format to that provided in appendix 1 to this methodology.

27. The inventory estimates shall be cross-checked with estimation of emissions based on the: (i) inventory of all SF_6 containing equipment within the project boundary; and (ii) all actions used to reduce SF_6 emissions. This is called the order of magnitude test and is described in the monitoring methodology section.

5.4.2. Option 2: no historical data is available

28. In case that there is no historical information available, project proponents shall identify all the devices that use SF_6 in the project activity and estimate a conservative baseline emissions using default factor for SF_6 emissions in the absence of the project activity.

29. The baseline emissions of SF_6 are estimated using the following equation:

$$BE_y = E_{rate} \times \frac{GWP_{SF6}}{1000} \sum_{1}^{N} C_i \quad \text{Equation (3)}$$

Where:

BE_y	=	Baseline emissions during the year *y* (t CO_2/yr)
E_{rate}	=	Default baseline emission rate
C_i	=	Nameplate capacity for the gas insulated equipment (kg SF_6)
GWP_{SF6}	=	Global warming potential of SF_6 (t CO_2e/tSF_6)

5.5. Project emissions

$$PE_y = \left(DI_y + AI_y - SI_y + REC_y - NEC_y\right) \times \frac{GWP_{SF6}}{1000} \quad \text{Equation (4)}$$

Where:

PE_y	=	Project emissions during the year *y* (t CO_2/yr)
DI_y	=	Decrease in inventory in year *y* (kg SF_6)
AI_y	=	Additions to Inventory in year *y* (kg SF_6)
SI_y	=	Subtractions from inventory in year *y* (kg SF_6)
REC_y	=	Retired Equipment Capacity, expressed as nameplate capacity of retired equipment, in year *y* (kg SF_6)
NEC_y	=	New Equipment Capacity, expressed as nameplate capacity of new equipment, in year *y* (kg SF_6)
GWP_{SF6}	=	Global warming potential of SF_6 (t CO_2e/tSF_6)

30. The inventory estimates shall be cross-checked with estimation of emissions based on the: (i) inventory of all SF_6 containing equipment within the project boundary; and (ii) all actions used to reduce SF_6 emissions. This is called the order of magnitude test and is described in the monitoring methodology section.

5.6. Leakage

31. There is no consideration of leakage as leakage is not likely to occur.

5.7. Emission reductions

32. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{Equation (5)}$$

Where:

ER_y	=	Emission reductions during the year *y* (t CO_2/yr)
BE_y	=	Baseline emissions during the year *y* (t CO_2/yr)
PE_y	=	Project emissions during the year *y* (t CO_2/yr)

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

33. Project proponents shall use the latest version of the tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" when considering the necessary changes in the 2nd and 3rd crediting period.

5.9. Data and parameters not monitored

34. In addition to the parameters listed in section 5.9, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

Data / Parameter table 1.

Data / Parameter:	GWP_{SF6}
Data unit:	t CO_2e/tSF_6
Description:	Global warming potential for 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 table 2.

Data / Parameter:	E_{rate}
Data unit:	-
Description:	Default baseline emission rate

Source of data:	The default baseline emission rate will vary every year. In year 2012 the rate will be 10% and then it will decrease every year until it reaches a final value of 1% in year 2021. The value of 1% will remain constant after 2021, as provided in the following table: **Year** / **E_{rate} value** 2012 / 10% 2013 / 9% 2014 / 8% 2015 / 7% 2016 / 6% 2017 / 5% 2018 / 4% 2019 / 3% 2020 / 2% 2021 / 1%
Measurement procedures (if any):	None
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Year	E_{rate} value
2012	10%
2013	9%
2014	8%
2015	7%
2016	6%
2017	5%
2018	4%
2019	3%
2020	2%
2021	1%

6. Monitoring methodology

6.1. Monitoring procedures

35. The methodology is based on a mass-balance approach following 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 8, using the Tier 3 method. The project developer must document changes in SF_6 inventories in a baseline year (at least three years of data required with the lowest of the three years being the baseline) that would point to its use to recharge equipment due to leaks and emissions during maintenance. The reduced demand of SF_6, as identified from the data provided in the inventory during project crediting period, will be used to calculate the reduction of emissions resulting from repaired leaks and recycling.

36. The following steps are followed in estimating the SF_6 needed every year and, hence, the emissions:

(a) Estimate the net decrease in the amount of SF_6 inventory over the baseline year;

(b) Add the amount purchased including SF_6 contained in purchased equipment;

(c) Subtract any SF_6 returned to supplier;

(d) Add any recycled SF_6 returned to inventory;

(e) Subtract any SF_6 sent to recycling firms, sold to other entities, destroyed by the utility; or installation, or returned to the supplier;

(f) Add the nameplate capacity of the retired equipment;

(g) Subtract nameplate capacity of new equipment.

6.2. Good records required for the effective management of SF_6 inventories

37. The following should be recorded:

(a) The location and identification reference of the equipment;

(b) The manufacturer and type of the equipment;

(c) The quantity of SF_6 installed in each item when first commissioned;

(d) The quantity of SF_6 added;

(e) Any quantity of SF_6 recovered during servicing, maintenance and final disposal;

(f) Establish and maintain a current and complete GIS equipment inventory, which includes the following information for each piece of equipment:

(i) Manufacturer serial number;

(ii) Equipment type (e.g. circuit breaker, transformer, etc.);

(iii) Seal type (hermetic or non-hermetic);

(iv) Equipment manufacturer name;

(v) Date equipment was manufactured;

(vi) Equipment voltage capacity;

(vii) Equipment SF_6 nameplate capacity;

(viii) A chronological record of the dates on which SF_6 was transferred into or out of active GIS equipment;

(ix) The amount of SF_6 transferred into or out of the active GIS equipment;

(x) Equipment status (active or inactive);

(xi) Equipment location;

(g) Establish and maintain a current and complete inventory of gas containers;

(h) Retain SF_6 gas and equipment purchase documentation (such as contracts, material invoices, receipts, etc.).

6.3. SF_6 inventory measurement procedures

(a) Establish and adhere to written procedures to track all gas containers as they are leaving and entering storage;

(b) Weigh all gas containers on a scale that is certified by the manufacturer to be accurate to within one per cent of the true weight;

(c) Establish and maintain a log of all measurements required;

(d) Record the scale calibration methods used;

(e) Retain all documents and records required for a minimum of three years;

(f) Use of sealed pressure systems, where available;

(g) Human resources:

(i) Ensure that only certified personnel are used for any activity involving the recovery of SF_6;

(ii) Make sure all personnel (both in-house and contractors) working on switchgear containing SF_6 understand the environmental impacts of emitting SF_6 to the atmosphere. Initial filling of equipment is an area where significant emissions can occur. Ensure all personnel are properly trained to minimize emissions, especially on initial filling of equipment.

6.4. Linkage between project activities and emission reduction results

38. An order of magnitude check[2] shall be performed each year.

39. To implement this order of magnitude check a continuous and detailed record of all repairs, rehabilitations, and recycling included in the project activity shall be recorded. For each activity, the documentation should cover the equipment involved, the type of action, and the estimated amount of SF_6 involved. An example below presents the data to be stored for an order of magnitude test.

Table 3. Data to be stored for an order of magnitude test

Description of project activities	Description of equipment involved in the activity (including nameplate capacity of SF_6)	Force majeure event	Best estimate of SF_6 inventory increase (+) or decrease (-): Please include reasons for estimates
Recycled SF_6 from decommissioned Circuit breaker	GE High Voltage Circuit Breaker 250 kV 250kg SF_6 Capacity		+250kg Based on number of tanks filled
Repair SF_6 leak in High Voltage Circuit Breaker	ABB High Voltage Circuit Breaker 500kV 500kg SF_6 capacity		-25kg Based on estimate of gas injected into circuit breaker following the repair

[2] Described in Chapter 8, Volume 3, of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Description of project activities	**Description of equipment involved in the activity (including nameplate capacity of SF_6)**	**Force majeure event**	**Best estimate of SF_6 inventory increase (+) or decrease (-): Please include reasons for estimates**
Performed Basic Maintenance on Circuit Breaker requiring removal of SF_6	Pars Switch High Voltage Circuit breaker 145kV 250kg SF_6 capacity		+250kg - 250kg = 0 SF_6 was recycled from unit and returned after the maintenance was complete. In the baseline scenario this would have likely resulted in a -250kg, since the SF_6 would have been vented before the repair and replaced with new SF_6
Replaced High Voltage Circuit breaker	Previous: ABB High voltage 250kV SF_6 100kg New: ABB High Voltage 250kV SF_6 25kg	Yes- Lightening and fire destroyed old unit	+100kg leaked +25kg new entering inventory This action would be conservatively factored out of the emission reduction results for the year

40. The order of magnitude estimate results in a range for SF_6 emissions. This range shall be compared with the results from the mass balance approach described in the baseline methodology. If the mass balance estimate lies outside the range, the reason for differences should be identified and explained. If the difference cannot be explained, CERs for that period cannot be claimed. The data required for order of magnitude test and explanation of any differences with mass balance approach should be documented as part of the monitoring plan and annual monitoring reports submitted for verification.

Box 1. Example of order of magnitude check

Based on the mass balance formulas, the emission reductions are estimated to be 1,500 kg of SF_6 (35,850 t CO_2e) in a given year during the crediting period. Typically, an order of magnitude test as described in this methodology provides a range of emissions reductions rather than a precise number. In this example, if the order of magnitude test yielded a range of 1,050 kg to 1,950 kg of savings (i.e. 1,500 kg ±30%), then this check would confirm the mass balance estimate, since the mass balance estimate was within the range. In other words, if the mass balance estimate falls within the range of the order of magnitude check, then this validates the mass balance estimate and certified emission reductions (CERs) can be issued accordingly. If the order of magnitude check leads to an estimate of 100 to 300 kg emissions reductions, then clearly something is wrong. Because the mass balance estimate is higher than the range from the order of magnitude check, no CERs would be awarded to the project. If the order of magnitude check range is higher than the mass balance estimate of 1,500 kg (e.g. in the range of 2,000-3,000 kg), then the lower 1,500 kg figure would be used in order to be conservative

6.5. Data and parameters monitored

Data / Parameter table 3.

Data / Parameter:	C_i
Data unit:	kg SF_6
Description:	Nameplate capacity for the gas insulated equipment
Source of data:	Nameplate or purchase orders
Measurement procedures (if any):	-
Monitoring frequency:	At the time of purchase
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	DI_x, DI_y
Data unit:	kg SF_6
Description:	Decrease in inventory during the year
Source of data:	Project inventory records
Measurement procedures (if any):	Based on number of cylinders in inventory at start and end of year
Monitoring frequency:	DI_x at start and end of year for at least three years prior to project start; DI_y at start and end of each year during project operation

QA/QC procedures:	Metering will rely on the simple counting of cylinders. The cylinders are filled using meters with 99% accuracy, and are double checked by weighing cylinders on scales with 99% accuracy. QA/QC will also include checking purchase records by trained staff. There will be little or no chance for human error given the simple nature of the measuring process and the double checks undertaken. All meters and scales will be calibrated as per manufacturers' recommendations
Any comment:	Number can be negative

Data / Parameter table 5.

Data / Parameter:	AI_x, AI_y
Data unit:	kg SF_6
Description:	Additions to inventory during the year
Source of data:	Project inventory, purchase records, and supplier and recycler receipts
Measurement procedures (if any):	This includes purchased cylinders, SF_6 included in new equipment, and SF_6 returned from recyclers (where the equipment are sent out of the project boundary for recycling)
Monitoring frequency:	Continuous, as and when purchases or receipt of equipment/recycled SF_6 is realized
QA/QC procedures:	Metering will rely on the simple counting of cylinders. The cylinders are filled using meters with 99% accuracy, and are double checked by weighing cylinders on scales with 99% accuracy. QA/QC will also include checking purchase records by trained staff. There will be little or no chance for human error given the simple nature of the measuring process and the double checks undertaken. All meters and scales will be calibrated as per manufacturers' recommendations
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	SI_x, SI_y
Data unit:	kg SF_6
Description:	Subtractions from inventory during the year
Source of data:	Supplier receipts and purchase records
Measurement procedures (if any):	This includes cylinders sold back to supplier or equipment sent for recycling contained SF_6
Monitoring frequency:	Continuous, as purchases or changes in equipment happen

QA/QC procedures:	Metering will rely on the simple counting of cylinders. The cylinders are filled using meters with 99% accuracy, and are double checked by weighing cylinders on scales with 99% accuracy. QA/QC will also include checking purchase records by trained staff. There will be little or no chance for human error given the simple nature of the measuring process and the double checks undertaken. All meters and scales will be calibrated as per manufacturers' recommendations
Any comment:	-

Data / Parameter table 7.

Data / Parameter:	REC_x, REC_y
Data unit:	kg SF_6
Description:	Retired equipment capacity in a given year
Source of data:	Nameplate of equipment or manufacturer's specifications
Measurement procedures (if any):	Nameplate capacity of equipment retired will be recorded
Monitoring frequency:	Continuous, as equipment is retired
QA/QC procedures:	Inventories will be maintained and regularly checked
Any comment:	-

Data / Parameter table 8.

Data / Parameter:	NEC_x, NEC_y
Data unit:	kg SF_6
Description:	New equipment capacity in a given year
Source of data:	Nameplate of equipment
Measurement procedures (if any):	Nameplate capacity of new equipment will be recorded
Monitoring frequency:	Continuous, as equipment is retired
QA/QC procedures:	Inventories will be maintained and regularly checked
Any comment:	-

Appendix 1. A typical SF_6 reporting form

Table 1. Process diagram

Annual reporting form

Name:		Company Name:	
Title:		Month or Year:	
Phone:		Date Completed:	

Change in inventory (SF_6 contained in cylinders, not electrical equipment)

Inventory (in cylinders, not equipment)	AMOUNT (kg)	Comments
1. Beginning of Year		
2. End of Year		
A. Change in Inventory (1 - 2)	-	

Purchases/acquisitions of SF_6

	AMOUNT (kg)	Comments
3. SF_6 purchased from producers or distributors in cylinders		
4. SF_6 provided by equipment manufacturers with/inside equipment		
5. SF_6 returned to the site after off-site recycling		
B. Total Purchases/Acquisitions (3+4+ 5)	-	

Sales/disbursements of SF_6

	AMOUNT (kg)	Comments
6. Sales of SF_6 to other entities, including gas left in equipment that is sold		
7. Returns of SF_6 to supplier		
8. SF_6 sent to other facilities		
9. SF_6 sent off-site for recycling		
C. Total Sales/Disbursements (6+7+8+ 9)	-	

Annual reporting form

Change in nameplate capacity

	AMOUNT (kg)	Comments
10. Total nameplate capacity (proper full charge) of new equipment		
11. Total nameplate capacity (proper full charge) of retired or sold equipment		
D. Change in Capacity (10 - 11)		

Total annual emissions

	kg SF_6	Tonnes CO_2 equiv. (kglbs. SF_6x1000x23,900/1000)
E. Total Emissions (A+B-C-D)	-	-

Appendix 2. Standards related to SF_6 handling

1. Project participants may follow the standards mentioned below or the equivalent national standards when applying the methodology, this is not mandatory:

Table 1. Standards related to SF_6 handling

Standard Code	**Description**
Handling and recycling SF_6	
IEC 60480	Guidelines for the checking and treatment of sulfur hexafluoride (SF_6) taken from electrical equipment and specification for its re-use
Cigré. SF_6 handling guide Nº 276	Avoid SF_6 handling losses due to stat-of-the-art handling
Cigré. SF_6 recycling guide. Nº 234	Assure long term use of SF_6

High-voltage switchgear and controlgear	
IEC 62271-1	Common specifications for SF_6-insulated and air-insulated high-voltage switchgear and control gear
IEC 62271-200	High-voltage switchgear and control gear – Part 200: AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV
IEC 62271-203	High-voltage switchgear and control gear Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV (Revision published in 9/2011)
IEC 62271-303	High-voltage switchgear and control gear – Part 303: Use and handling of sulphur hexafluoride (SF_6) (Revision in progress: IEC 62271-4)
IEEE C37.122.3-2011	Guide for Sulphur Hexaflouride (SF_6) Gas Handling for High-voltage (over 1000Vac) Equipment

Reporting SF_6 bank, emissions and recovery	
ENA-ER S38	Engineering recommendation in reporting SF_6 bank, emissions and recovery

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Document information

Version	*Date*	*Description*
02.0.0	23 November 2012	EB 70, Annex 15 The revision: (a) Clarifies that enhanced SF_6 recovery is allowed as baseline scenario; (b) Incorporates procedures to determine baseline emissions in case of lack of historical information; (c) Adds a provision for the inclusion of recycling of SF_6 during routine inspection as a project activity.
01.0.0	29 September 2006	EB 26, Annex 2 Initial adoption.

Decision Class: Regulatory
Document Type: Standard
Business Function: Methodology
Keywords: Sulphur hexafluoride