AM0035

Large-scale Methodology

SF6 emission reductions in electrical grids

Version 02.0.0

Sectoral scope(s): 01 and 11

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

Table . Methodology key elements

|  |  |
| --- | --- |
| Typical projects | Recycling and/or leak reduction of SF6 in an electricity grid |
| **Type of GHG emissions mitigation action** | 1. GHG emission avoidance.   Avoidance of SF6 emissions by recycling and/or leak reduction |

1. Scope, applicability, and entry into force
   1. Scope
2. The methodology is applicable to project activities that recycle SF6(Sulphur hexafluoride) and/or reduce SF6 leaks at an electric utility.
   1. Applicability
3. The following applicability conditions apply:
   1. The project is implemented either in the entire electrical grid or a verifiable distinct geographic portion of an electrical grid of the electric utility;
   2. Where documented proof is available to confirm that reduction in emissions of SF6 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.
   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.
5. Normative references
6. This methodology is based on the project activity “Reducing SF6 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.
7. 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: SF6 Emission Reductions for Electrical Grids”  
   on <http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>.
8. This methodology also refers to the latest version of the following tool:
   1. “Tool for the demonstration and assessment of additionality”.
   2. Selected approach from paragraph 48 of the CDM modalities and procedures
9. “Actual or historical emissions, as applicable”.
10. Definitions
11. The definitions contained in the Glossary of CDM terms shall apply.
12. Baseline methodology
    1. Project boundary
13. 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 SF6, 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 SF6 leak reduction and recycling was being implemented prior to the start of project activity, it can be included in the project boundary.
14. In defining the project boundary it shall be ensured that all quantity of SF6 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 | SF6 emissions from utility equipment (trans-formers, circuit breakers, etc. | SF6 | Yes | The project activity is prevention of SF6 release into atmosphere. |
| CO2 | No | No CO2 emissions occur |
| CH4 | No | No CH4 emissions occur |
| Project activity | SF6 emissions from utility equipment (trans-formers, circuit breakers, etc. | SF6 | Yes | The project activity is prevention of SF6 release into atmosphere. |
| CO2 | No | No CO2 emissions occur |
| CH4 | No | No CH4 emissions occur |

* 1. Procedure for the selection of the most plausible baseline scenario

1. The methodology covers the following categories of SF6 emissions reductions from the equipment within the project boundary:
   1. Recycling SF6 encapsulated in existing equipment during repairs;
   2. Recycling SF6 encapsulated in existing equipment during decommissioning; and
   3. Reduction in leaks by repairing the equipment;
   4. Recycling SF6 encapsulated in existing equipment during routine inspection.
2. The baseline scenario shall be determined by analyzing the following potential alternatives:
   1. Implementing the project activity without CDM; and
   2. Continuation of the current practice, which shall be described in the CDM project design document (CDM-PDD).
      1. Step 1: assessment of national policy/regulations on SF6
3. List national or regional policies/regulation that either require reduction of SF6 emissions from the power sector or prescribe maintenance standards that affects SF6 release to atmosphere.
   1. If such policies exist, assess the enforcement of the policies;
   2. If above-mentioned policies/regulations exist and are enforced, then the project activity implemented without CDM is the baseline scenario.
      * 1. Step 2: assess if implementation of SF6 recycling in any part of its electrical grid is being undertaken
   3. Identify and list the level and extent of SF6 recycling being undertaken within the region or country where the project activity is implemented;
   4. If some utilities do undertake SF6 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.
4. This methodology is applicable only if the baseline scenario is continuation of the current practice.
   1. Additionality
5. 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 SF6 in electric utility infrastructure.
6. 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”:
   1. Investment barriers, other than the economic/financial barriers, for example:
      1. Real and/or perceived risks associated with the technology or process are too high to attract investment;
      2. Funding is not available for innovative projects;
   2. Technological barriers, for example:
      1. Skilled and/or properly trained labour to operate and maintain the technology is not available, leading to equipment disrepair and malfunctioning;
   3. Barriers due to prevailing practice, for example:
      1. Developers lack familiarity with state-of-the-art technologies and are reluctant to use them;
      2. The project is the “first of a kind”;
      3. Management lacks experience using state-of-the-art technologies, so that the project receives low priority by management;
      4. 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);
      5. Real and perceived insignificance of many investments – for example, if energy efficiency (or SF6) projects are relatively small and the value of the savings achieved typically is only a small percentage of enterprise operating costs.
7. 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.
   1. Baseline emissions
8. The baseline emissions are the total SF6 emitted from both leaks and non-recycling of SF6 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 SF6 and the equipment using it.
9. The methodology provides two options to determine baseline emissions depending on the availability of historical information.
   * 1. Option 1: historical data is available
10. The calculations of SF6 emitted shall be made in accordance with the 2006 IPCC SF6 electric utility methodology guideline*s*, using the Tier 3 method.[[1]](#footnote-1)
11. 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 data according to the steps described below. In order to be conservative, the year with the lowest SF6 emissions of the three or more years will be taken for the baseline.
12. The yearly emissions of SF6 of year *y* are estimated using the following equation:

|  |  |
| --- | --- |
|  |  |

Where:

|  |  |  |
| --- | --- | --- |
|  | = | Annual SF6 emissions in year *x* prior the implementation of the project activity (kg SF6) |
|  | = | Decrease in inventory during the year (kg SF6) |
|  | = | Additions to inventory during the year (kg SF6) |
|  | = | Subtractions from inventory during the year (kg SF6) |
|  | = | Retired Equipment Capacity expressed as nameplate capacity of retired equipment (kg SF6) |
|  | = | New Equipment Capacity expressed as nameplate capacity of new equipment (kg SF6) |

1. The baseline emissions of SF6 are estimated using the following equation:

|  |  |
| --- | --- |
|  |  |

Where:

|  |  |  |
| --- | --- | --- |
|  | = | Baseline emissions during the year *y* (t CO2/yr) |
|  | = | Annual SF6 emissions in in the three years prior the implementation of the project activity(kg SF6) |
|  | = | Global warming potential of SF6 (t CO2e/tSF6) |

1. 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 SF6 containing equipment is destroyed by a force majeure event, releasing all of its SF6, 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 SF6 in the name plate capacity of the equipment destroyed was actually present at the time of destruction (i.e. no leaks).
2. The data inventory should be maintained using the same or a similar format to that provided in appendix 1 to this methodology.
3. The inventory estimates shall be cross-checked with estimation of emissions based on the: (i) inventory of all SF6 containing equipment within the project boundary; and (ii) all actions used to reduce SF6 emissions. This is called the order of magnitude test and is described in the monitoring methodology section.
   * 1. Option 2: no historical data is available
4. In case that there is no historical information available, project proponents shall identify all the devices that use SF6 in the project activity and estimate a conservative baseline emissions using default factor for SF6 emissions in the absence of the project activity.
5. The baseline emissions of SF6 are estimated using the following equation:

|  |  |
| --- | --- |
|  |  |

Where:

|  |  |  |
| --- | --- | --- |
|  | = | Baseline emissions during the year *y* (t CO2/yr) |
|  | = | Default baseline emission rate |
|  | = | Nameplate capacity for the gas insulated equipment (kg SF6) |
|  | = | Global warming potential of SF6 (t CO2e/tSF6) |

* 1. Project emissions

|  |  |
| --- | --- |
|  |  |

Where:

|  |  |  |
| --- | --- | --- |
|  | = | Project emissions during the year *y* (t CO2/yr) |
|  | = | Decrease in inventory in year *y* (kg SF6) |
|  | = | Additions to Inventory in year *y* (kg SF6) |
|  | = | Subtractions from inventory in year *y* (kg SF6) |
|  | = | Retired Equipment Capacity, expressed as nameplate capacity of retired equipment, in year *y* (kg SF6) |
|  | = | New Equipment Capacity, expressed as nameplate capacity of new equipment, in year *y* (kg SF6) |
|  | = | Global warming potential of SF6 (t CO2e/tSF6) |

1. The inventory estimates shall be cross-checked with estimation of emissions based on the: (i) inventory of all SF6 containing equipment within the project boundary; and (ii) all actions used to reduce SF6 emissions. This is called the order of magnitude test and is described in the monitoring methodology section.
   1. Leakage
2. There is no consideration of leakage as leakage is not likely to occur.
   1. Emission reductions
3. Emission reductions are calculated as follows:

|  |  |
| --- | --- |
|  |  |

Where:

|  |  |  |
| --- | --- | --- |
|  | = | Emission reductions during the year *y* (t CO2/yr) |
|  | = | Baseline emissions during the year *y* (t CO2/yr) |
|  | = | Project emissions during the year *y* (t CO2/yr) |

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

1. 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.
   1. Data and parameters not monitored
2. 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: | *GWPSF6* |
| Data unit: | t CO2e/tSF6 |
| Description: | Global warming potential for SF6 |
| 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: | *Erate* |
| 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:   |  |  | | --- | --- | | 1. Year | Erate 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: | - |

1. Monitoring methodology
   1. Monitoring procedures
2. 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 SF6 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 SF6, 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.
3. The following steps are followed in estimating the SF6 needed every year and, hence, the emissions:
   1. Estimate the net decrease in the amount of SF6 inventory over the baseline year;
   2. Add the amount purchased including SF6 contained in purchased equipment;
   3. Subtract any SF6 returned to supplier;
   4. Add any recycled SF6 returned to inventory;
   5. Subtract any SF6 sent to recycling firms, sold to other entities, destroyed by the utility; or installation, or returned to the supplier;
   6. Add the nameplate capacity of the retired equipment;
   7. Subtract nameplate capacity of new equipment.
   8. Good records required for the effective management of SF6 inventories
4. The following should be recorded:
   1. The location and identification reference of the equipment;
   2. The manufacturer and type of the equipment;
   3. The quantity of SF6 installed in each item when first commissioned;
   4. The quantity of SF6 added;
   5. Any quantity of SF6 recovered during servicing, maintenance and final disposal;
   6. Establish and maintain a current and complete GIS equipment inventory, which includes the following information for each piece of equipment:
      1. Manufacturer serial number;
      2. Equipment type (e.g. circuit breaker, transformer, etc.);
      3. Seal type (hermetic or non-hermetic);
      4. Equipment manufacturer name;
      5. Date equipment was manufactured;
      6. Equipment voltage capacity;
      7. Equipment SF6 nameplate capacity;
      8. A chronological record of the dates on which SF6 was transferred into or out of active GIS equipment;
      9. The amount of SF6 transferred into or out of the active GIS equipment;
      10. Equipment status (active or inactive);
      11. Equipment location;
   7. Establish and maintain a current and complete inventory of gas containers;
   8. Retain SF6 gas and equipment purchase documentation (such as contracts, material invoices,receipts, etc.).
   9. SF6 inventory measurement procedures
   10. Establish and adhere to written procedures to track all gas containers as they are leaving and entering storage;
   11. 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;
   12. Establish and maintain a log of all measurements required;
   13. Record the scale calibration methods used;
   14. Retain all documents and records required for a minimum of three years;
   15. Use of sealed pressure systems, where available;
   16. Human resources:
       1. Ensure that only certified personnel are used for any activity involving the recovery of SF6;
       2. Make sure all personnel (both in-house and contractors) working on switchgear containing SF6 understand the environmental impacts of emitting SF6 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.
   17. Linkage between project activities and emission reduction results
5. An order of magnitude check[[2]](#footnote-2) shall be performed each year.
6. 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 SF6 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 SF6) | Force majeure event | Best estimate of SF6 inventory increase (+) or decrease (-):  Please include reasons for estimates |
| Recycled SF6 from decommissioned Circuit breaker | GE High Voltage Circuit Breaker 250 kV 250kg SF6 Capacity |  | +250kg Based on number of tanks filled |
| Repair SF6 leak in High Voltage Circuit Breaker | ABB High Voltage Circuit Breaker 500kV  500kg SF6 capacity |  | -25kg Based on estimate of gas injected into circuit breaker following the repair |
| Performed Basic Maintenance on Circuit Breaker requiring removal of SF6 | Pars Switch High Voltage Circuit breaker 145kV 250kg SF6 capacity |  | +250kg - 250kg = 0  SF6 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 SF6 would have been vented before the repair and replaced with new SF6 |
| Replaced High Voltage Circuit breaker | Previous: ABB High voltage 250kV  SF6 100kg  New: ABB High Voltage 250kV  SF6 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 |

1. The order of magnitude estimate results in a range for SF6 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

|  |
| --- |
| 1. Based on the mass balance formulas, the emission reductions are estimated to be 1,500 kg of SF6 (35,850 t CO2e) 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 |

* 1. Data and parameters monitored

Data / Parameter table 3.

|  |  |
| --- | --- |
| Data / Parameter: | *Ci* |
| Data unit: | kg SF6 |
| 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: | *DIx, DIy* |
| Data unit: | kg SF6 |
| 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: | *DIx* at start and end of year for at least three years prior to project start; *DIy* 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: | *AIx, AIy* |
| Data unit: | kg SF6 |
| 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, SF6 included in new equipment, and SF6 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 SF6 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: | *SIx, SIy* |
| Data unit: | kg SF6 |
| 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 SF6 |
| 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: | *RECx, RECy* |
| Data unit: | kg SF6 |
| 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: | *NECx, NECy* |
| Data unit: | kg SF6 |
| 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: | - |

1. A typical SF6 reporting form

Table 1. Process diagram

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Annual reporting form | |  |  |
| Name: |  | | Company Name: |  |
| Title: |  | | Month or Year: |  |
| Phone: |  | | Date Completed: |  |
|  | | **Change in inventory (SF6 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 SF6** | | | |
|  |  | | AMOUNT (kg) | Comments |
|  | 3. SF6 purchased from producers or distributors in cylinders | |  |  |
|  | 4. SF6 provided by equipment manufacturers with/inside equipment | |  |  |
|  | 5. SF6 returned to the site after off-site recycling | |  |  |
|  | B. Total Purchases/Acquisitions (3+4+ 5)5) | | - |  |
|  | **Sales/disbursements of SF6** | | | |
|  |  | | AMOUNT (kg) | Comments |
|  | 6. Sales of SF6 to other entities, including gas left in equipment that is sold | |  |  |
|  | 7. Returns of SF6 to supplier | |  |  |
|  | 8. SF6 sent to other facilities | |  |  |
|  | 9. SF6 sent off-site for recycling | |  |  |
|  | C. Total Sales/Disbursements (6+7+8+ 9)9) | | - |  |
|  | **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 SF6 | Tonnes CO2 equiv. (kglbs. SF6x1000x23,900/1000) |
|  | E. Total Emissions (A+B-C-D) | | - | - |

1. Standards related to SF6 handling
2. Project participants may follow the standards mentioned below or the equivalent national standards when applying the methodology, this is not mandatory:

Table . Standards related to SF6 handling

|  |  |
| --- | --- |
| Standard Code | Description |
| Handling and recycling SF6 | |
| IEC 60480 | Guidelines for the checking and treatment of sulfur hexafluoride (SF6) taken from electrical equipment and specification for its re-use |
| Cigré. SF6 handling guide Nº 276 | Avoid SF6 handling losses due to stat-of-the-art handling |
| Cigré. SF6 recycling guide. Nº 234 | Assure long term use of SF6 |
|  |  |
| High-voltage switchgear and controlgear | |
| IEC 62271-1 | Common specifications for SF6-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 (SF6) (Revision in progress: IEC 62271-4) |
| IEEE C37.122.3-2011 | Guide for Sulphur Hexaflouride (SF6) Gas Handling for High-voltage (over 1000Vac) Equipment |
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| Reporting SF6 bank, emissions and recovery | |
| ENA-ER S38 | Engineering recommendation in reporting SF6 bank, emissions and recovery |

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Document information

| Version | Date | Description |
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| 02.0.0 | 23 November 2012 | EB 70, Annex 15 The revision:   * 1. Clarifies that enhanced SF6 recovery is allowed as baseline scenario;   2. Incorporates procedures to determine baseline emissions in case of lack of historical information;   3. Adds a provision for the inclusion of recycling of SF6 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 | | |

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 SF6 emissions from individual utilities as part of a methodology to calculate the national level emissions of SF6. 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 SF6 in the baseline year to recharge leaking circuit breakers, but is able to reduce those purchases to 1000 kg the following year by recycling SF6 before maintenance and repairing leaks, the utility can claim 1000 kg of emissions reductions. [↑](#footnote-ref-1)
2. Described in Chapter 8, Volume 3, of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. [↑](#footnote-ref-2)