

DRAFT. FOR PUBLIC STAKEHOLDER CONSULTATION.

Climate project methodology № 0015

Grid connection of isolated electricity systems

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Contents

1. Terms and Definitions	2
2. Scope and applicability	5
2.1. Scope	5
2.2. Applicability	5
2.3. Project boundary	6
3. Baseline methodology	6
4. Project crediting period	9
5. Additionality	9
6. Monitoring plan requirements	10
7. Project scenario	10
8. Leakage assessment	12
9. Non-permanence risk analysis	13
10. Methods to prevent double counting, negative impacts on the environment and society	13
11. Update of the baseline at the renewal of the crediting period	13
12. Normative references	14
Appendix 1. Approach to determining the baseline scenario	16
Appendix 2. Approach for calculation the baseline emission factor	17
Appendix 3. Data and parameters monitored / not monitored	20
Appendix 4. The approach to estimate project emissions	23
A4.1 Calculation the operating generation emission factor	23
A4.2 Calculation the possible generation emission factor	26
A4.3 Calculation the project emission factor	27
A4.4 Calculation of project emissions	27
Appendix 5. Risk management	28
Appendix 6. Assessment of the validity of the original/current baseline at the renewal of the crediting period	28

1. Terms and Definitions

For the purpose of this methodology, the following definitions apply¹:

Combined generation (CG) emission factor² - is the result of a weighted average of two emission factors pertaining to the electricity system - the operating generation (OG) and the possible generation (PG).

¹ When using the regulations and sets of rules referenced in this methodology, it is recommended to check the validity of reference documents in the public information system - on the official website of the federal executive body in the field of standardization on the Internet or according to the annual information index «National Standards»

² See also The **Combined margin (CM) emission factor**, TOOL07 Methodological tool. Tool to calculate the emission factor for an electricity system. Version 07.0. CDM Methodology

Connected electricity system - is an electricity system³ that is connected by transmission lines to the project electricity system.

Crediting period – the period in which verified and certified GHG emission reductions or increases in net anthropogenic GHG removals by sinks attributable to a climate project activity, as applicable, can result in the issuance of carbon units. The time period that applies to a crediting period for a climate project activity, and whether the crediting period is renewable or fixed, is determined in accordance with Section 4 of this methodology.

Electric power system (grid) - a set of electric power industry facilities and power receiving installations of electric power consumers, connected by a common mode of operation in a single technological process of production, transmission and consumption of electric energy under conditions of centralized operational dispatch control in the electric power industry⁴⁵.

Energy district - a set of electricity system facilities located in the territory it serves⁶.

Grid power plant - a power plant that supplies electricity to an electricity grid and, if applicable, to specific consumers. This means that power plants supplying electricity to the grid and specific captive consumers at the project are considered as a grid power plant, while power plants that serve only captive consumers and do not supply electricity to the grid are not considered as a grid power plant.

Installed capacity, rated capacity - the power with which the electrical installation, equipment can operate for a long time under nominal parameters and/or normal conditions⁷. Expressed in watts or one of its multiples, for which the power unit has been designed to operate at nominal conditions. The structure of the installed capacity of power plants is a shared distribution of the total installed capacity of power plants by their types or by types of units⁸.

Interconnected energy system - a set of several territorial electric power systems located within the same country and united by a common mode of operation, which has a common (centralized) operational dispatch control as the highest level of control in relation to the dispatch centers of its constituent power systems⁹.

Interconnection - a section of power transmission line directly connecting power plants or substations of different power systems¹⁰.

Isolated power system - a power system that has no electrical connections for parallel operation with other power systems¹¹¹². Under this methodology, isolated grid system is an electricity system supplying electricity to household users, and if applicable, industries and commercial areas that is not connected to any other electrical network¹³ and meet one of the following conditions:

- any grid where 65 % of the power installed capacity is based on fossil fuel sources;

³ A connected electricity system may include an interconnected energy system

⁴ See GOST 21027-2021. Interstate standard. Power systems. Terms and definitions.

⁵ Reference methodologies developed within the framework of the Clean Development Mechanism use the following interpretation for this term: **Grid** - is an electricity network, including transmission and distribution lines and power plants. The spatial extent of the grid includes the power plants that are physically connected through transmission and distribution lines that can be dispatched by a dispatch centre without significant transmission constraints.

⁶ See GOST R 53905-2010. Energy Saving. Terms and Definitions.

⁷ See GOST R 57114-2016. Unified energy system and isolated power systems. Electric power systems. Operational dispatch management in the electric power industry and operational and technological management. Terms and definitions.

⁸ See GOST 19431-84. Energy and electrification. Terms and definitions.

⁹ See GOST 21027-2021.

¹⁰ See GOST 21027-2021.

¹¹ See GOST 21027-2021.

¹² In this methodology, an isolated power system can be represented by isolated power plant(s)

¹³ For example, national/regional or interconnected power system or an individual power district

- any grid with a maximum power installed capacity of 1000 MW and at least 80 % of the power installed capacity is based on fossil fuel sources - solid, liquid or gaseous.

Net electricity generation - refers to the difference between the total quantity of electricity generated by the power plant and the auxiliary electricity consumption of the power plant¹⁴.

Operating generation (OG) emission factor¹⁵ - is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed project activity.

Operation of energo-system (Dispatch control) - organization of electric power system operation mode control, when the technological mode or operational state of electric power industry facilities, consumer power receiving installations equipment and devices is changed only at the control command of the appropriate dispatch center or by direct influence on the technological mode or operational state of the dispatch objects using remote control means from the dispatch center¹⁶.

Possible generation (PG) emission factor¹⁷ - is the emission factor that refers to the group of prospective power plants whose construction and future operation would be affected by the proposed CDM project activity.

Power intersystem transfer - is the active power transmitted through the interconnection¹⁸.

Power plant - is a power plant designed for the production of electrical energy, containing a construction part, energy conversion equipment and necessary auxiliary equipment according to GOST 19431-84¹⁹²⁰.

Previously isolated grid - is a grid that has no interconnection with any grid prior to the implementation of the project activity and which is being connected to a main grid as a result of the project activity.

Project electricity system - defined by the spatial extent of power plants, physically connected through transmission and distribution lines to project activities²¹ and under operational and technological dispatch control²².

Transmission line - is an electric installation consisting of wires, cables, isolating elements and supporting structures designed to transmit electric energy between two points of the power system with possible intermediate withdrawal according to GOST 19431-84¹²²³.

¹⁴ For example, for pumps, fans, controlling etc.

¹⁵ See also The **Operating margin (OM)** emission factor, TOOL07 Methodological tool. Tool to calculate the emission factor for an electricity system. Version 07.0. CDM Methodology

¹⁶ See GOST R 57114-2016

¹⁷ See also The **Build margin (BM)** emission factor, TOOL07 Methodological tool. Tool to calculate the emission factor for an electricity system. Version 07.0. CDM Methodology

¹⁸ See GOST 21027-2021

¹⁹ See GOST 24291-90 Interstate standard. The electrical part of the power plant and the electrical network. Terms and definitions.

²⁰ Reference methodologies developed within the framework of the Clean Development Mechanism use the following interpretation for this term: **Power plant/unit** - a power plant/unit is a facility that generates electric power. Several power units at one site comprise one power plant, whereas a power unit is characterized by the fact that it can operate independently from other power units at the same site. Where several identical power units (i.e. with the same capacity, age and efficiency) are installed at one site, they may be considered as one single power unit.

²¹ For example, the renewable power plant location or the consumers

²² Reference methodologies for this term distinguish single or layered dispatch area. An example of a layered dispatch area is where regional dispatch centres are required to comply with orders of the national dispatch centre.

²³ See GOST 24291-90.

2. Scope and applicability

The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical projects	Expansion of an interconnected grid to supply electricity generated by more-efficient, less-carbon-intensive means to an isolated electric power system
Type of GHG emissions mitigation action	Displacement of a more-GHG-intensive output: Displacement of electricity that would be provided by more-GHG-intensive means

Given methodology is unaffected by applying to the greenhouse gases (GHG) programs²⁴. If a GHG program²⁵ is applied, then the requirements of this program supplement the requirements of the methodology. This methodology is prepared based on the existing methodology developed under the Clean Development Mechanism (AM0045) and includes its adaptation to the current Russian regulations and standards.

2.1. Scope

This methodology applies to project activities that expand an interconnected grid to supply electricity generated from more efficient and/or less carbon-intensive sources to an isolated electric power system²⁶.

2.2. Applicability

The methodology is applicable to project activities consisting of:

1. the expansion of an interconnected electricity grid to isolated systems;
2. the displacement of power generation in isolated systems by more efficient, less carbon intensive power generation from the interconnected grid.

The methodology is applicable under the following conditions:

1. emission factors estimated take into account the increase of demand of the isolated systems and the remaining lifetime of the equipment;
2. renewable energy based electricity generation in the isolated systems is not displaced and its operation is not significantly affected;
3. all fossil fuel fired power plants in the isolated system are 100% displaced;

²⁴ Greenhouse gas programme, GHG programme - voluntary or mandatory international, national or subnational system or scheme that registers, accounts or manages GHG emissions, GHG removals, GHG emission reductions or GHG removal enhancements outside the organization or GHG project (ISO 14064-2:2019 | Greenhouse gases, Part 2).

²⁵ The GHG program in Russia currently includes the Federal Law of 06.03.2022 № 34-FZ "On conducting an experiment to limit greenhouse gas emissions in certain regions of the Russian Federation", the Federal Law of 02.07.2021 № 296-FZ "On limiting greenhouse gas emissions", the Order of the Ministry of Economic Development of Russia from 11.05.2022 № 248 "On approval of the criteria and procedure for assigning projects implemented by legal entities, individual entrepreneurs or individuals to climate projects, the form and procedure for presenting climate projects"

²⁶ The methodology is applied to the connection of one or more isolated power systems. The expansion of interconnected energy system through the extension of transmission lines has the potential to displace electricity supply from more carbon-intensive generation in isolated systems (isolated grids or individual plants in isolated regions).

4. the project developer has available data to accurately determine the most likely scenario in the absence of project activity and calculate power generation emission factors from the interconnected power system²⁷ and the previously isolated grid.

In case of changes the cited acts of national legislation, this methodology is subject to revision in order to take into account the relevant changes²⁸.

2.3. Project boundary

The spatial extent of the project boundary includes all power plants physically connected to the previously isolated region (isolated power system or isolated individual plant) and all power plants physically connected to the electricity system under the project activity.

For the project activity, project developer shall account for CO₂ emissions from the increase (due to the project activity) of electricity generation in power plants connected to the grid and emissions related to SF₆ used in the new equipment of the project activity.

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

Source		GHG	Included	Justification
Baseline	Power generation	CO ₂	Yes	Main emission source
		CH ₄	No	Excluded for simplification
		N ₂ O	No	Excluded for simplification
Project activity	Power generation	CO ₂	Yes	Main emission source
		CH ₄	No	Excluded for simplification
		N ₂ O	No	Excluded for simplification
	Emissions from the new equipment	SF ₆	Yes	Emissions of SF ₆ used for electrical insulation in new power transmission and distribution equipment

If the facilities within the project boundary as specified in this methodology are owned by different legal entities (or are under the operational management of different legal entities), then the project documentation should include a description of procedures for eliminating the possibility of double counting²⁹ in GHG emission reductions potentially achieved as a result of project activities, enshrined in contractual agreements.

3. Baseline methodology

The baseline³⁰ is set conservatively³¹ for a business-as-usual activity, taking into account all existing policies and measures, but not considering additional project activities (Business-as-usual model).

²⁷ Taking into account the electricity generation structure by generation sources

²⁸ The project developer should keep in mind that the normative documents given in the text can be changed or canceled

²⁹ Double counting: accounting for GHG emissions or removals more than once. Double counting can occur between organizations, i.e. two or more reporting organizations take ownership of the same GHG emissions or removals. Double counting can also occur inside an organization when GHG emissions or removals are taken into account in different categories (this type of double counting should not occur). (ISO/TR 14069:2013 Greenhouse gases - Quantification and reporting of greenhouse gas emissions for organizations - Guidance for the application of ISO 14064-1). See also GOST R ISO 14080-2021. National Standard of the Russian Federation. Greenhouse gas management and related activities. A system of approaches and methodological support for the implementation of climate projects

³⁰ Greenhouse gas baseline, GHG baseline - quantitative reference(s) of GHG emissions and/or GHG removals that would have occurred in the absence of a GHG project and provides the baseline scenario for comparison with project GHG emissions and/or GHG removals (ISO 14064-2:2019 Greenhouse gases - Part 2)

³¹ Calculation of the baseline is considered conservative if the final estimate of emission reductions resulting from project activities will not be overestimated. If there is any doubt, the project developer should better understate the baseline projection.

The project developer may use one of the following approaches to determine the baseline with justification for the appropriateness of the choices³²:

- 1) best available technologies³³ that represent an economically feasible and environmentally sound course of action;
- 2) an ambitious benchmark approach where the baseline is set at least at the average emission level of the 20% best performing comparable activities providing similar outputs and services in a defined scope in similar social, economic, environmental and technological circumstances;
- 3) an approach based on existing actual or historical emissions, adjusted downwards by at least 5%, unless otherwise specified in the project methodology.

The approaches above provide a framework for general understanding of the ways in which baselines can be defined. A detailed approach to determining the baseline for this type of project is provided below in Section 3 and Appendices 1, 3.

The baseline scenario³⁴ involves continuing power generation based on fossil fuel combustion (less efficient technologies) in an isolated electricity system³⁵. The baseline scenario should be identified taking into account all realistic, plausible and credible alternative scenarios to the electricity supply of the isolated communities/areas/territories/facilities.

For the baseline determination, project developer needs to consider only the CO₂ emissions from electricity generation in fossil fuel fired plants in the isolated system, which are displaced by the project activity, taking into account the increase of the demand and the remaining lifetime of the equipment.

For this type of project, a baseline approach based on existing actual or historical emissions.

The baseline emission factor is calculated as the generation weighted average emissions per electricity unit in the most recent three years before the connection to the grid of all generating units displaced in the isolated system (i.e., historical emissions). Greenhouse gas emission reductions will be achieved by the displacement of carbon intensive power generation in isolated system by more efficient, less carbon intensive power generation from the interconnected grid.

To determine the possible generation (PG) and operating generation (OG) emission factors, the *project electricity system*³⁶ is defined by the spatial extent of the power plants in the corresponding energy district³⁷ that can be dispatched without significant transmission constraints. *Connected electricity system*³⁸ is defined as an electricity system that is connected by transmission lines to the project electricity system and in which power plants can be dispatched without significant transmission constraints³⁹. In determining electricity systems, the

³² Approaches to determining baselines are given in Action taken by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its third session (FCCC/PA/CMA/2021/10/Add.1, Article 6, paragraph 4, p. 34, para. 36). URL: https://unfccc.int/sites/default/files/resource/cma2021_10a01E.pdf.

³³ If there are guides of the best available technologies (BAT) applicable to the conditions of the planned project, the relevant information and technical BAT guides are used

³⁴ Baseline scenario - hypothetical reference case that best represents the conditions most likely to occur in the absence of a proposed GHG project (ISO 14064-2:2019 Greenhouse gases - Part 2)

³⁵ The isolated system can be either an isolated grid or an individual isolated power plant

³⁶ See also **Project electricity system** and **Operation of energo-system (Dispatch control)** in Section 1

³⁷ See **Energy district** in Section 1

³⁸ Could be a national or regional interconnected energy system

³⁹ If it is demonstrated that there are no significant transmission constraints between the project electricity system and connected electricity system, then both the electricity systems together represent a single project electricity system and a common grid emission factor can be developed. When transmission constraints exist, no common grid emission actor can be developed

project developer should document and justify his assumptions in the project design document (PDD).

Electricity transfers from connected electricity systems to the project electricity system are defined as electricity imports and electricity transfers to connected electricity systems are defined as electricity exports.

For the purpose of determining the possible generation (PG) emission factor the spatial extent is limited to the project electricity system, except where recent or likely future additions to transmission capacity⁴⁰ enable significant increases in imported electricity. In such cases, the transmission capacity may be considered as a possible generation (PG) source, with the emission factor determined as for the OG imports below.

To determine the operating generation (OG) emission factor, use one of the following options to determine the CO₂ emission factor(s) for net electricity imports (COEF_{i,j,imports}) from a connected electricity system:

1. 0 tCO₂/MWh;
2. the emission factor(s) of the specific power plant(s) from which electricity is imported, if and only if the specific plants are clearly known;
3. the average emission rate of the exporting grid, if and only if net imports do not exceed 20% of total generation in the project electricity system;
4. the emission factor of the exporting grid, determined as described in Section 7 below, if net imports exceed 20% of the total generation in the project electricity system.

For imports from connected electricity system located in another country, the emission factor is 0 tons CO₂ per MWh.

Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the project emission rate.

The approach to determining the baseline scenario is provided Appendix 1.

Project developer has the right to use methodologies and CO₂ emissions factors legislatively approved within the territory of the Russian Federation⁴¹. In this case, the Project Developer must independently determine the most relevant approach and the level at which the methods will be applied, document and justify the applied algorithms for the validation and verification body. The minimum requirements for determining the baseline for climate projects that are implemented and used for issuing carbon units within the territory of the Russian Federation are established in Order of the Ministry of Economic Development of Russia (11.05.2022 № 248)⁴². The approaches proposed in this methodology are consistent with the standardized approach applied at the international level⁴³.

⁴⁰ Transmission capacity of a link - the maximum power that can be transmitted through a power transmission line, allowed by the conditions of the stability of the power system and the allowable current load

⁴¹ See the Order of the Ministry of Natural Resources of the Russian Federation (27.05.2022 № 371) "On approval of methodologies for quantifying greenhouse gas emissions and removals of greenhouse gases", Order of the Ministry of Natural Resources of the Russian Federation (16.04.2015 № 15-r) "On approval of guidelines for conducting a voluntary inventory of greenhouse gas emissions in the constituent entities of the Russian Federation", the IPCC Guidelines (2006), the Order of the Ministry of Natural Resources and Ecology of the Russian Federation (29.06.2017 № 330) "On approval of guidelines for quantifying the volume of indirect energy emissions of greenhouse gases"

⁴² Order of the Ministry of Economic Development of Russia (11.05.2022 № 248) "On approval of the criteria and procedure for classifying projects implemented by legal entities, individual entrepreneurs or individuals as climate projects, the form and procedure for submitting a report on the implementation of a climate project"

⁴³ Methodology AM0045: Grid connection of isolated electricity systems. Version 3.0. CDM Methodology

Baseline emissions

Baseline emissions (BE_y , tCO₂) are the product of the baseline emission factor ($EF_{bl,yp}$, tCO₂/MWh) and electricity supplied to the isolated system by the grid in the project activity (EG_y , MWh).

$$BE_y = EG_y \times EF_{bl,yp} \quad (3.1)$$

Where:

EG_y Electricity supplied to the isolated system by the grid in the year yp (MWh)

Approach for calculation the baseline emission factor is provided Appendix 2.

4. Project crediting period

The starting date of project activities is not regulated.

A crediting period for emission reduction projects is a maximum of 5 years renewable a maximum of twice, or a maximum of 10 years with no option of renewal.

The crediting period begins no earlier than 5 years prior to applying for validation for projects validated until December 31, 2025, and no earlier than 2 years prior to applying for validation for projects validated after January 1, 2026.

The additionality and baseline shall be evaluated at the beginning of the crediting period and confirmed or reevaluated at the beginning of the next 5-year phase if the project is conducted 3 times 5 years each.

5. Additionality

Additionality shall be demonstrated using Guidelines №001 Demonstration of the additionality of the project activity⁴⁴ taking into account the specifics outlined in this section.

Existing measures and government programs relevant to this project activity should be clearly identified in the PDD and included in the assessment of the additionality. Guidelines №001 applied taking into account:

- for investment analysis: describe any specific financing and/or subsidizing mechanisms to which such projects are eligible as introductory background information.

Identification of alternatives to the project activity consistent with current laws and regulations is performed in accordance with Guidelines №001.

Investment Analysis. Determine whether the proposed project activity, without the revenue from the sale of carbon units, is economically or financially less attractive than other alternatives. To conduct the investment analysis, the analysis options 1.2 or 1.3 of Guidelines № 001 are used.

Barrier Analysis. If this step is used, the procedures in Guidelines № 001 apply. Provide transparent and documented evidence, and offer conservative interpretations of this

⁴⁴ Implemented climate projects that are used for issuing carbon units within the territory of the Russian Federation must comply with Article 9 of the Federal Law (02.07.2021 №296-FZ) "On Limiting Greenhouse Gas Emissions", as well as the criteria established in accordance with the Order of the Ministry of Economic Development of Russia (11.05.2022 № 248) "On approval of the criteria and procedure for classifying projects implemented by legal entities, individual entrepreneurs or individuals as climate projects, the form and procedure for submitting a report on the implementation of a climate project".

documented evidence, as to how it demonstrates the existence and significance of the identified barriers.

It is necessary to check whether there are planned instruments as financing and/or institutional arrangements that could help to overcome the identified barriers during the crediting period. Such instruments should be described, indicate the period of their implementation, give a conservative evaluation of the sufficiency / insufficiency of these mechanisms to overcome the identified barriers during the crediting period. The application of financial and/or institutional arrangements should be monitored during the project lifetime.

6. Monitoring plan requirements

100% of the data should be monitored if not indicated otherwise in the tables in Appendix 3. Some parameters either need to be monitored continuously during the crediting period or need to be calculated only once for the crediting period, depending on the data.

All measurements should be conducted with calibrated measurement equipment according to relevant industry standards. The project developer should include in the PDD information on the data quality assurance system used. It may be data concerning inventory, identification and description of measurement equipment used; description of quality assurance/quality control procedures within monitoring; organizational procedures; calibration and verification of measurement equipment; storage of records.

All data collected as part of monitoring should be archived electronically and be kept at least for two years after the end of the last crediting period.

If the project developer expects to use different types of data (measurements, default values), it is necessary to document the options used. The calculation of the parameters, emission factors, source data should be documented electronically that should be attached to the Project design document. The documentation should include all data used to calculate the emission factors and other parameters. The data should be presented in a manner that enables reproducing of the calculation.

Important parameters that are monitored:

- electricity supplied by the grid to the isolated system (EG_y);
- grid emission factor of the interconnected grid; the data used to recalculate possible generation (PG) and operating generation (OG) emission factors, if needed;
- specific financing mechanisms and/or institutional arrangements to which such projects are eligible and which can help overcome the identified barriers during the crediting period.

The following parameters should be paid attention during the validation and verification procedure:

- grid emission factor of isolated system before start of the project;
- electricity supplied to isolated system before start of the project (three years of historic data required).

The data and parameters monitored / not monitored as a result of the project activity are given in Appendix 3.

7. Project scenario

The emissions from the project activity are those resulting from electricity generated due to the project activity by the operation of existing grid-connected power plants and by the addition of

new generation sources. Additionally, emissions related to SF₆ use and potentially higher transmission losses than the grid average are taken into account.

The project scenario assumes displacement of fossil-fuel fired power plants in the isolated grid by expansion of an interconnected grid to the isolated electricity system.

The project emissions are calculated as follows:

$$PE_y = (EG_y \times EF_p) \times (TL + 1) + PE_{SF_6,y} \quad (7.1)$$

Where:

PE_y	Project emissions in year y (t CO _{2e} / year)
EG_y	Electricity supplied to the isolated system by the grid in the year y (MWh)
EF_p	Emission factor for electricity generation (t CO ₂ /MWh)
TL	Incremental transmission losses ($1.0 \geq TL \geq 0.0$) of the project activity over and above those in the isolated area
$PE_{SF_6,y}$	Emissions related to SF ₆ used in the new equipment of the project activity during the year y, (tonn CO _{2e})

For the calculation of the project emissions, the combined generation (CG) emission factor of the interconnected grid. The approach to estimate project emissions is described in Appendix 4.

Project developer must document and justify in the PDD the applied algorithms for the validation and verification body. Project developer has the right to use methodologies and CO₂ emissions factors legislatively approved within the territory of the Russian Federation⁴⁵. In this case, the Project Developer must independently determine the most relevant approach and the level at which the methods will be applied, document and justify the applied algorithms for the validation and verification body.

The minimum requirements for determining the project emissions are implemented and used for issuing carbon units within the territory of the Russian Federation are established in Order of the Ministry of Economic Development of Russia (11.05.2022 № 248)⁴². The approaches proposed in this methodology are consistent with the standardized approach applied at the international level⁴³.

Emission reductions

The project activity mainly reduces carbon dioxide through substitution of isolated systems electricity generation with fossil fuel fired power plants by electricity supplied by an interconnected grid. The emission reduction ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

$$ER_y = BE_y - PE_y - L_y \quad (7.2)$$

⁴⁵ See the Order of the Ministry of Natural Resources of the Russian Federation (27.05.2022 № 371) "On approval of methodologies for quantifying greenhouse gas emissions and removals of greenhouse gases", Order of the Ministry of Natural Resources of the Russian Federation (16.04.2015 № 15-r) "On approval of guidelines for conducting a voluntary inventory of greenhouse gas emissions in the constituent entities of the Russian Federation", the IPCC Guidelines (2006), the Order of the Ministry of Natural Resources and Ecology of the Russian Federation (29.06.2017 № 330) "On approval of guidelines for quantifying the volume of indirect energy emissions of greenhouse gases"

Where:

ER_y	Emission reductions in year y (t CO ₂ /y)
BE_y	Baseline Emissions in year y (t CO ₂ /y)
PE_y	Project emissions in year y (t CO ₂ /y)
L_y	Leakage emissions in year y (t CO ₂ /y)

Risk management

As part of the project implementation, it is recommended to develop a risk assessment system with a description of the most likely risks that may arise at all stages of the climate project. For such an assessment, the project developer should develop a detailed matrix with the following information, as a minimum:

1. the main stages of the implementation of the climate project;
2. description of the risks that may arise at each stage of the climate project;
3. description of the probability of occurrence of risks (for this, the rating options "low, medium, high" or any other understandable numerical scales can be used);
4. description of the impact of each risk on the results of the entire project (for this, the rating options "low, medium, high" or any other understandable numerical scales can be used);
5. description of the period of influence of each risk on the entire climate project;
6. description of the developed measures to minimize or avoid each type of risks;
7. description of the time period required for the implementation of each measure that reduces or prevents the occurrence of risks is indicated.

The recommended table for completion, reflecting the result of the risk management measures is given in Appendix 5.

8. Leakage assessment

According to the Order of the Ministry of Economic Development of Russia dated 11.05.2022 №248⁴⁶ project activities should not lead to an aggregate increase in greenhouse gas emissions or reduce their absorption levels outside the scope of such activities. At the same time it is necessary to consider and fully account for if project leaks⁴⁷ exist in accordance.

Project developer must independently determine the most relevant methods will be applied to estimate leakage, document and justify the applied algorithms for the validation and verification body, including the approaches applied at the international level.

The project developer shall indicate in the PDD which leakage sources are included. If emission sources are not considered, the project developer shall provide proper justification in the PDD.

Possible emissions potentially giving rise to leakage in the context of electrification projects are emissions arising due to transmission lines construction. Leakages⁴⁸ related to deforestation in the construction of interconnection lines are calculated as follows:

⁴⁶ Appendix № 1 to the order of the Ministry of Economic Development of Russia of May 11, 2022 № 248, paragraph "B"

⁴⁷ Leakage for a project activity - the net change of anthropogenic emissions by sources of GHGs which occurs outside the project boundary, and which is measurable and attributable to the climate project activity, as applicable (CDM-EB07-A04-GLOS Glossary CDM terms. Version 11.0)

⁴⁸ Change of carbon stocks as a result of clearing biomass.

$$L_1 = A_{def} \times L_C \quad (8.1)$$

Where:

L_1	Leakage emissions to be accounted in the first year of project crediting period
A_{def}	Area of land deforested, hectares
L_C	Carbon stock per unit area (above ground, below ground, soil carbon, litter and dead biomass), tonn of CO ₂ per hectare

Leakage from deforestation is a one-time emission. If the estimated leakage from deforestation is below 1% of the project's estimated emission reductions over the first crediting period, then the leakage shall not be accounted. Otherwise the total leakage estimated will be fully deducted from the emissions reductions in the first verification period.

Project developer do not need to consider other emission sources as leakage in applying this methodology⁴⁹.

9. Non-permanence risk analysis

Not applicable to the project activity.

10. Methods to prevent double counting, negative impacts on the environment and society

Climate project should demonstrate its compliance with all legal requirements in the jurisdiction where it is located (including but not limited to the Reference list methodologies). Project developer should question whether there is a risk that their project might result in negative impacts for local communities, biodiversity and the environment. Such projects should not cause an increase in atmosphere, soil, surface and ground water pollution as well as lead to any community conflicts, land tenure issues, forceful evictions, human rights violations, or worsened health and wellbeing due to restricted access to a forest or nature area.

Efforts should be made to avoid double counting⁵⁰ between project areas (project boundaries), between company reporting and reporting on the project, between the reporting of different companies, between the subjects of the Russian Federation and different countries in the case of international transfer of carbon units. In the latter case, it is necessary to demonstrate that the carbon units transferred at the international level are excluded from the accounting of the quantitative goals of the defined at the national level contribution of the Russian Federation.

11. Update of the baseline at the renewal of the crediting period

At the renewal of crediting period the project is subject to verification with elements of validation and a technical assessment by a validation and verification body to determine necessary updates to the baseline, the additionality and the quantification of emission reductions.

The renewal of the crediting period of a registered project activity shall only be granted if The Project developer can provide evidence that the original project baseline is still valid or has been updated taking account of new data where applicable.

Project developer shall update those sections of the project design document relating to the baseline, estimated emission reductions and the monitoring plan using an approved baseline and monitoring methodology: the latest approved version of a baseline and monitoring

⁴⁹ It is assumed that possible emissions giving rise to leakage in the context of electrification projects are very small and, therefore, compared to the potential emission reductions, negligible.

⁵⁰ The definition is given in the notes in section 2.3

methodology, applied in the original PDD of the registered project activity, shall be used whenever applicable.

The demonstration of the validity of the original baseline or its update does not require a reassessment of the baseline scenario, but rather an assessment of the emissions which would have resulted from that scenario. The additionality at the renewal of the crediting period is checked for compliance to the criteria under Guidelines №001 Demonstration of the additionality of the project activity at the date of the beginning of the new crediting period.

If a review or update of the baseline of a registered project has been made, the Project developer must justify the validation and verification body of the need to deviate from the approved methodology in order to extend the credit period.

Assessment the validity of the original/current baseline and to update the baseline at the renewal of a crediting period. A stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period (see Appendix 6).

12. Normative references

1. AM0045: Grid connection of isolated electricity systems. Version 3.0. CDM Methodology
2. Order of the Ministry of Economic Development of Russia dated May 11, 2022 № 248 "On approval of the criteria and procedure for classifying projects implemented by legal entities, individual entrepreneurs or individuals, as climate projects, the form and procedure for reporting on the implementation of a climate project" (Registered with the Ministry of Justice of Russia on May 30, 2022 № 68642)
3. GOST R ISO 14064-1-2021. National Standard of the Russian Federation. Greenhouse gases. Part 1. Requirements and Guidance for Quantification and Reporting of Greenhouse Gas Emissions and Absorption at the Organization Level (approved and enacted by Rosstandart Order No. 1029-st dated 30.09.2021);
4. GOST R ISO 14064-2-2021. National Standard of the Russian Federation. Greenhouse gases. Part 2. Requirements and Guidelines for Quantification, Monitoring and Reporting Documents for Projects to Reduce Greenhouse Gas Emissions or Increase Their Absorption at the Project Level (approved and enacted by Order No. 1030-st of Rosstandart dated September 30, 2021);
5. GOST R ISO 14064-3-2021. National Standard of the Russian Federation. Greenhouse gases. Part 3. Requirements and Guidance for Validation and Verification of Greenhouse Gas Statements (approved and enacted by Rosstandart Order No. 1031-st of 30.09.2021);
6. GOST R ISO 14065-2014 National Standard of the Russian Federation. Greenhouse gases. Requirements for greenhouse gas validation and verification bodies for their application in accreditation or other forms of recognition (approved and enacted by Order of Rosstandart of 26.11.2014 № 1869-st);
7. GOST R ISO 14080-2021. National Standard of the Russian Federation. Greenhouse Gas Management and Related Activities. System of approaches and methodological support for the implementation of climate projects (approved and enacted by Order of Rosstandart No. 1033-st dated 30.09.2021);
8. Order of the Ministry of Natural Resources of Russia dated May 27, 2022 № 371 "On approval of methods for quantitative determination of greenhouse gas emissions and greenhouse gas removals" (from March 1, 2023, except for certain provisions, coming into force on March 1, 2024);

9. IPCC 2006. Guidelines for National Greenhouse Gas Inventories of the Intergovernmental Panel on Climate Change, 2006 / Edited by S. Iggleston, L. Buendia, K. Miwa, T. Ngara and K. Tanabe. // T.1-5. - IGES// Hayyam. 2006.
10. TOOL01 Methodological tool. Tool for the demonstration and assessment of additionality. Version 07.0.0. CDM Methodology
11. TOOL05 Methodological tool. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation. Version 03.0. CDM Methodology
12. TOOL07 Methodological tool. Tool to calculate the emission factor for an electricity system. Version 07.0. CDM Methodology
13. Methodological Tool. Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period. Version 03.0.1. CDM Methodology
14. GOST 21027-2021. Interstate standard. Electric power systems. Terms and Definitions.
15. GOST 19431-84. Energy and electrification. Terms and definitions.
16. GOST 24291-90 Interstate standard. The electrical part of the power plant and the electrical network. Terms and definitions.
17. GOST R 57114-2016. Unified energy system and isolated power systems. Electric power systems. Operational dispatch management in the electric power industry and operational and technological management. Terms and definitions.

Appendix 1. Approach to determining the baseline scenario

The baseline scenario is determined through the following steps:

1. identification of realistic and credible alternative scenarios that are consistent with applicable mandatory laws and regulations:
 - 1.1. alternatives may include:
 - 1.1.1. the proposed project activity undertaken without being registered as a project activity;
 - 1.1.2. the proposed project activity, implemented at a later point in time and undertaken without being registered as a project activity;
 - 1.2. the alternative scenarios to the project activity shall be in compliance with all applicable mandatory legal and regulatory requirements in determining a baseline scenario⁵¹, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate air pollution;
2. identification of barriers and assessment of alternative scenarios that are not prevented by these barriers:
 - 2.1. establish a complete list of barriers that would prevent alternative scenarios to occur in the absence of the project activities (see Guidelines №001 Demonstration of the additionality of the project activity);
 - 2.2. project activity undertaken without being registered as a project activity is one of the considered alternatives, therefore, any barrier that may prevent the proposed project activity to occur shall be included in the list of identified barriers. The project developer should transparently identify which alternatives are prevented by at least one of the barriers previously identified and eliminate those alternatives from further consideration. All alternatives shall be compared to the same set of barriers;
 - 2.3. if there is only one alternative scenario that is not prevented by any of the identified barrier, then this alternative scenario is identified as the baseline scenario;
 - 2.4. where more than one credible and plausible alternative remains, project developer shall, as a conservative assumption, use the alternative baseline scenario that results in the lowest baseline emissions as the most likely baseline scenario, or conduct an investment analysis (see Guidelines №001 Demonstration of the additionality of the project activity);
3. investment analysis:
 - 3.1. conduct an investment analysis, consistent with the Guidelines №001 Demonstration of the additionality of the project activity. The most economically attractive alternative is deemed as the most plausible baseline scenario;
 - 3.2. national/regional/sectoral policies: If regulations are introduced mandating the interconnection of isolated power systems, such isolated systems cannot be considered in the proposed project activities and must be excluded from the project boundary. The project developer should document in the PDD all cases that may apply to this situation. Project developer should identify all the instruments that can potentially remove the

⁵¹ See Annex 3 of the 22nd Executive Board meeting report: "Clarifications on the consideration of national and/or sectoral policies and circumstances in baseline scenarios."

barriers that prevent the scenario “the project activity undertaken without being registered as a project” and consider that from the time the identified barriers are overcome with the help of one or a combination of these instruments (financing and/or institutional arrangements), the project scenario undertaken without being registered (if it is the most economically or financially attractive scenario among the remaining scenarios) becomes the baseline scenario.

Appendix 2. Approach for calculation the baseline emission factor

The baseline emission factor⁵² of the isolated system at the time of the interconnection to the grid ($EF_{bl,ini}$) is calculated as the generation weighted average emissions per unit electricity (tCO₂/MWh) of all generating units displaced in the isolated system using data for the most recent three years before the connection to the grid:

$$EF_{bl,ini} = \frac{\sum_{i,j} F_{i,j,bl} \times COEF_{i,j}}{\sum_j GEN_{j,bl}} \quad (A2.1)$$

Where:

$EF_{bl,ini}$	Baseline emission factor of the isolated system (tCO ₂ e/MWh) at the time of the interconnection to the grid
$F_{i,j,bl}$	Amount of fuel i (in mass or volume unit) consumed by relevant power sources j in the most recent three years
$COEF_{i,j}$	CO ₂ emission factor for fuel type i (tCO ₂ /mass or volume unit of the fuel), taking into account the carbon emission factor of the fuels (tCO ₂ /TJ) used by relevant power sources j , net calorific value of the fuel (TJ/mass of volume unit) and the oxidation factor of the fuel i
$GEN_{j,bl}$	Electricity (MWh) delivered to the isolated system by source j in the most recent three years prior to implementation of the proposed project

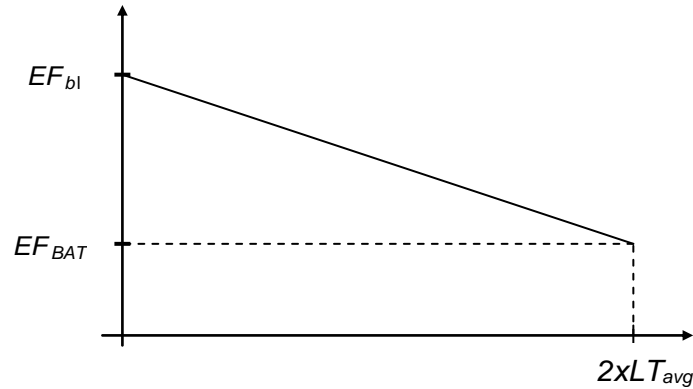
Calculation of the CO₂ emission factor from fuel combustion shall be calculated in accordance with the methodological guidelines provided in the Order of the Ministry of Natural Resources of the Russian Federation of 27.05.2022, № 371⁵³.

⁵² The initial baseline emission factor at the beginning of the project activity ($EF_{bl,ini}$) is calculated as the generation weighted average emissions per electricity unit (tCO₂/MWh) in the most recent three years before the connection to the grid of all generating units displaced in the isolated system for a demand up to maximum supply capacity at the moment of the interconnection of the isolated system to the grid. During the crediting period, in the case of a demand over the maximum supply capacity at the time of the interconnection to the grid, a trend towards the best available technologies emission factors for the kind of technology used in the system shall be used to calculate the emission factor $EF_{bl,y}$ of the baseline scenario for year y . The remaining lifetime of the equipment also be considered for the determination of $EF_{bl,y}$. The equipment that reaches its end-lifetime is replaced in the baseline scenario by the best available technologies in the system at the beginning of the project activity so that there is a trend towards the emission factors of the best available kind of technologies used in the system. It is assumed that for the equipment that has not already reached its end-lifetime, the efficiency of electricity generation and the composition of fossil fuels fired in the most recent three years before the connection of the isolated system to the grid would not change significantly over the crediting period. The emission factor of the best available technology for the kind of technology used in the system is also considered fixed during all the crediting period and equal to its value at the beginning of the project activity.

⁵³ The Order of the Ministry of Natural Resources of the Russian Federation (27.05.2022 № 371) “On approval of methodologies for quantifying greenhouse gas emissions and removals of greenhouse gases”

In order to calculate the baseline emission factor of the project the lifetime decrease of the existing equipment and the potential demand increase must be taken into account (see Figure A1).

Figure A1. Baseline emission factor adjustment for a demand higher than the supply capacity at the time of the interconnection isolated grid



Accounting for residual life and lifetime decrease of the existing equipment is performed as follows:

$$S_{yp} = S_{ini} - S_{ini} \frac{yp}{(2 \times LT_{avg})}, \text{ if } yp \leq 2 \times LT_{avg} \quad (\text{A2.2})$$

$$S_{yp} = 0, \text{ if } yp \geq 2 \times LT_{avg} \quad (\text{A2.3})$$

$$LT_{avg} = \frac{(\sum S_{ini} \times LT_{i,ini})}{\sum S_{ini}} \quad (\text{A2.4})$$

Where:

S_{yp}	Power that would be supplied in the baseline scenario to previously isolated system in project year yp (MW) if the equipment in the system were not replaced at the end of their lifetime
S_{ini}	Equipment power supply capacity in the isolated system (MW) at the time of the interconnection to the grid
yp	Number of years since the isolated system was interconnected to the grid (project year)
LT_{avg}	Average remaining lifetime of the equipment used in the isolated system at the time of the interconnection, weighted with the supply capacity of the equipment at the beginning of the project activity
$LT_{i,ini}$	Life time of equipment i (years) used in the isolated grid, estimated at the time of isolated system being connected to the grid

The potential demand increase for electricity is accounted as follows:

$$EF_{bl,yp} = EF_{bl,ini}, \text{ if } S_{yp} > 0 \text{ and } S_{yp} > D_{yp} \quad (\text{A2.5})$$

$$EF_{bl,yp} = \frac{EF_{bl,ini} \times S_{yp} + EF_{BAT} \times D_{yp} - S_{yp}}{D_{yp}} \quad (A2.6)$$

$$EF_{bl,yp} = EF_{BAT}, \quad \text{if } S_{yp} = 0 \quad (A2.7)$$

Where:

$EF_{bl,yp}$	Baseline emission factor (tCO ₂ e/MWh) of the project previously isolated system at year yp
D_{yp}	Power electricity demand (MW) of the project previously isolated system at year yp
EF_{BAT}	Baseline emission factor (tCO ₂ e/MWh) for the best available kind of technology in the isolated system; using the lowest CO ₂ emission factor at the beginning of the project activity

Appendix 3. Data and parameters monitored / not monitored

General parameters to be monitored / not monitored as a result of climate project implementation activities.

Table A4.1. Data and parameters not monitored

No	Data / Parameter	Data unit	Description	Source of data	Measurement procedures (if applicable)	Comment
1	$COEF_{ij}$	tCO ₂ / mass or volume unit	CO ₂ emission coefficient of each fuel type i consumed by the power plants j of the isolated system in the baseline scenario. This is estimated as product of carbon content of the fossil fuel per unit energy, NCV, and oxidation factor	Latest local statistics or IPCC	Not applicable	Obtained at the validation. Publicly available official data. Default data and literature statistics are used to check the local data. Plant or country-specific values are preferred to IPCC default values
2	$COEF_{i,IMPORTS}$	tCO ₂ / mass or volume unit	CO ₂ emission coefficient of each fuel type i (if imports occur)	Latest local statistics or IPCC	Not applicable	Updated yearly. Publicly available official data. Default data and literature statistics are used to check the local data. Plant or country-specific values are preferred to IPCC default values
3	$COEF_i$	tCO ₂ / mass or volume unit	CO ₂ emission coefficient of each fuel type i	Latest local statistics or IPCC	Statistical data	Updated yearly. Plant or country-specific values are preferred to IPCC default values. Publicly available official data. Default data and literature statistics are used to check the local data
4	$GEN_{j,bl}$	MWh	Electricity supplied to the isolated system in the baseline scenario by power generation source j during the last three years before the beginning of the project activity	Historic records based on electricity meters recording	At the validation. Directly measured or publicly available official data. Double check by receipt of sales/payment. Default data and literature statistics are used to check the local data	Based on the most recent statistics available at the time of PDD submission. Double check by receipt of sales/payment
5	$F_{ij,bl}$	Mass or volume	Amount of fossil fuel consumed by each power plant of the isolated system in the baseline scenario during the last three years before the beginning of the project activity	Historic records of the isolated system	At the validation. Directly measured or publicly available official data. Default data and literature statistics are used to check the local data	Based on the most recent statistics available at the time of PDD submission. Obtained from producers, dispatch centers, electricity agencies or literature
6	LT_{avg}	years	LT_{avg} is the average remaining lifetime of the equipment estimated using formulae 4 defined in the baseline emission section above	Project activity	Once at the validation	An expert assessment is used
7	EF_{BAT}	tCO _{2e} / MWh	EF_{BAT} is the baseline emission factor (in tCO _{2e} / MWh) for the most efficient kind of technology displaced in the isolated system	Project activity	At the validation. Measurements and calculation. Directly measured or publicly available official data	-
8	$EF_{bl,ini}$	tCO _{2e} / MWh	$EF_{bl,ini}$ is the baseline emission factor (in tCO _{2e} / MWh) of the isolated electricity system at the time of the interconnection to the grid	Project activity	At the validation. Calculated	-
9	A_{def}	hectares	Area of land deforested in the construction of the interconnection lines	Project activity	At the validation. Topographical characterization and/or engineering plants and/or maps. Directly measured or publicly available official data	-
10	TL	%	Additional transmission losses	Project activity	Yearly. Directly measured or publicly available data	-

No	Data / Parameter	Data unit	Description	Source of data	Measurement procedures (if applicable)	Comment
11	S _{ini}	MW	Equipment power supply capacity in the isolated system (in MW) at the time of the interconnection to the grid	Nameplate of the equipment	At the validation	-
12	LT _{i,ini}	years	Lifetime of equipment i at the time it is replaced by the grid.	Project site	-	-
13	L _c	tCO ₂ / hectare	Carbon stock per area (above ground, below ground, soil carbon, litter and dead biomass)	-	-	-

Table A4.2. Data and parameters monitored

No	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Comment
1	EF _{OG,y}	tCO ₂ / MWh	CO ₂ operating generation emission factor of the grid	Project activity	Calculated	Yearly	-	-
2	EF _{PG,y}	tCO ₂ / MWh	CO ₂ possible generation emission factor of the grid	Project activity	Calculated	Yearly	-	-
3	EF _p	tCO ₂ / MWh	CO ₂ emission factor of the grid	Project activity	Calculated	Yearly	-	Calculated as indicated in "Tool to calculate emission factor for an electricity systems"
4	F _{i,j,y}	Mass of volume	Amount of fossil fuel i consumed by each power plant j during year y.	Latest local statistics	Statistical data	Yearly	Directly measured or publicly available official data. Default data and literature statistics are used to check the local data	Obtained from producers, dispatch centers, electricity agencies or literature
5	GEN _{ij/k,y}	MWh	Electricity generation of each power plant	Latest local statistics	Statistical data	Yearly	Directly measured or publicly available official data. Double check by receipt of sales/payment. Default data and literature statistics are used to check the local data	Obtained from producers, dispatch centers, electricity agencies or literature (information of renewable energy based electricity generation, which shall not be displaced in the isolated system, if any, must be included to verify if its operation is not significantly affected)
6	Plant Name	Text	Name of each plant included in the project boundary	Latest local statistics	Statistical data	Yearly	Publicly available official data	Identification of plants (j, k or n) obtained from producers, dispatch centers, electricity agencies or literature
7	Merit Order	Text	Merit order of dispatch of each plant included in the project boundary	Latest local statistics	Statistical data	Yearly	Publicly available official data	Merit order obtained from producers, dispatch centers, electricity agencies or literature

No	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Comment
8	GEN _{ij/k,y} IMPORTS	MWh	Electricity imports quantity to the project electricity system	Latest local statistics	Statistical data	Yearly	Directly measured or publicly available official data. Default data and literature statistics are used to check the local data.	Obtained from producers, dispatch centers, electricity agencies or literature
9	M _{SF6,y}	tonnes of SF ₆	SF ₆ leaks in the new equipment of the project activity during year y in mass unit.	Project activity	Extra amount of SF ₆ injected in the equipment to maintain their operation standards each year	Yearly	Directly measured or publicly available data.	Equipment manufacturer's information can also be used to cross-check
10	Public policies	-	Verification and evaluation of financial and institutional arrangements that could help the implementation of the project	Project activity-	-	At every verification	-	Based on publicly available official data and/ or literature
11	D _{yp}	MW	Power demand of the project activity scenario	Project activity	-	Yearly	Directly measured or publicly available official data	Based on the most recent statistics available at the time of PDD submission. Obtained from producers, dispatch centers, electricity agencies or literature
12	S _{yp}	MW	Power supply of the displaced power plants in isolated area in the baseline scenario	Project activity	Calculated	Yearly	Calculated	Based on the average remaining lifetime of the equipment
13	yp	Years	Number of years since the isolated area is connected to the grid.	Project site	Record the date when each isolated system included in the project boundary is connected to the grid. Then, yp is determined counting the number of years from the date of connection to the year y in the crediting period	-	-	The project may include different isolated areas being connected to the grid at different years within the crediting period

Appendix 4. The approach to estimate project emissions

The project emissions are calculated as follows:

$$PE_y = (EG_y \times EF_p) \times (TL + 1) + PE_{SF6,y} \quad (A4.1)$$

Where:

TL Incremental transmission losses ($1.0 \geq TL \geq 0.0$) of the project activity over and above those in the isolated area

Emissions related to SF₆ used in the new equipment of the project activity during the year *y* ($PE_{SF6,y}$), in tonnes of CO_{2e}, are calculated as follows:

$$PE_{SF6,y} = M_{SF6,y} \times GWP_{SF6} \quad (A4.2)$$

Where:

$M_{SF6,y}$ Average quantity of SF₆ leaks in the equipment during year *y* in tonnes of SF₆. The value shall be determined using the equipment manufacturer's information and/or amount of SF₆ injected in the equipment during maintenance

GWP_{SF6} Global warming potential of sulphur hexafluoride (GWP = 23 900)

Determination of the emission factor for electricity generation (EF_p) in the case of electricity consumption from the interconnected grid is calculated using the cogeneration emission factor (CG).

$$EF_p = W_{OG} \times EF_{OG,y} + W_{PG} \times EF_{PG,y} \quad (A4.3)$$

Where:

W_{OG} Weighting factor for operating generation (%)

$EF_{OG,y}$ Operating generation emission factor in year *y* (t CO₂/MWh)

W_{PG} Weighting factor for possible generation (%)

$EF_{PG,y}$ Possible generation emission factor in year *y* (t CO₂/MWh)

A4.1 Calculation the operating generation emission factor

Calculate the operating generation (OG) emission factor, based on one of the following methods:

1. Simple operating generation emission factor⁵⁴;
2. Simple adjusted operating generation emission factor⁵⁵;

⁵⁴ This method is preferable if aggregate data on annual electricity generation, fuel consumption, and fuel type(s) are available for each power plant in the project electricity system and the proportion of power generation by low-operating cost and must run power plants (LMCR power plants) is less than 50% over the past 5 years for the project electricity system and the average load of LMCR is less than the average lowest annual load of the electricity system (the minimum recorded value of hourly load in MW in a grid over a calendar year) over 3 years

⁵⁵ This method is preferable if hourly dispatch data on electricity generation, fuel consumption, and fuel type(s) are available for each power plant of the project electricity system; the proportion of power generation by LMCR is more than or equal to 50% over the past 5 years for the project electricity system; the average load of LMCR is more than or equal to the minimum average annual load of the electricity system over 3 years

3. Dispatch data analysis operating generation emission factor⁵⁶;

4. Average operating generation emission factor⁵⁷.

1. Simple operating generation emission factor

The simple operating generation emission factor ($EF_{OG,simple,y}$) is calculated as the generation weighted average emission per electricity unit (tCO₂/MWh) of all generation sources serving the project electricity system, not including low-operating cost and must run power plants (LCMR power plants⁵⁸). The simple operating generation emission factor is calculated using data on the net electricity generation and a CO₂ emission factor of each power unit⁵⁹:

$$EF_{OG,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}} \quad (A4.4)$$

Where:

$F_{i,j,y}$	Amount of fuel i (in mass or volume unit) consumed by relevant power sources j in year(s) y
$COEF_{i,j}$	CO _{2e} coefficient of fuel i (tCO _{2e} /mass or volume unit of the fuel), taking into account the carbon dioxide equivalent emission potential of the fuels used by relevant power sources j (analogous for sources k) and the percent oxidation of the fuel in year(s) y
$GEN_{j,y}$	Electricity (MWh) delivered to the grid by source j (analogous for sources k)

Calculation of the CO₂ emission factor from fuel combustion shall be calculated in accordance with the methodological guidelines provided in the Order of the Ministry of Natural Resources of the Russian Federation of 27.05.2022, № 371⁶⁰.

The simple operating generation emission factor can be calculated using either of the two following data vintages for years(s) y :

- a 3-year average, based on the most recent statistics available at the time of PDD submission, or
- the year in which project generation occurs, if $EF_{OG,simple,y}$ is updated based on ex post monitoring.

2. Simple adjusted operating generation emission factor

The simple adjusted OG emission factor ($EF_{grid,OG-adj,y}$) is a variation of the simple OG, where the power plants/units (including imports) are separated in low-cost/must-run power sources (k) and other power sources (m). As under the simple OG, it is calculated based on the net electricity

⁵⁶ This method is preferable if hourly dispatch data on electricity generation, fuel consumption, and fuel type(s) are available for each power plant of the project electricity system

⁵⁷ This method is used if it is impossible to apply the first three methods for calculating the operating generation emission factor

⁵⁸ Low-cost/must-run (LCMR) resources - are defined as power plants with low marginal generation costs or dispatched independently of the daily or seasonal load of the grid. They include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If a fossil fuel plant is dispatched independently of the daily or seasonal load of the grid and if this can be demonstrated based on the publicly available data, it should be considered as a low-cost/must-run. Electricity imports shall be treated as one LCMR power plant

⁵⁹ Applies both when some power units in the project boundaries are low-cost/must-run units and some are not so when the power plants belong to the group of low-cost/must-run units or if all power units in the project boundaries do not belong to the group of low-cost/must-run units

⁶⁰ The Order of the Ministry of Natural Resources of the Russian Federation (27.05.2022 № 371) "On approval of methodologies for quantifying greenhouse gas emissions and removals of greenhouse gases"

generation of each power unit in the project electricity system and an emission factor for each power unit, as follows:

$$EF_{OG, simple-adjusted, y} = (1 - \lambda_y) \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}} + \lambda_y \cdot \frac{\sum_{i,k} F_{i,k,y} \cdot COEF_{i,k}}{\sum_k GEN_{k,y}} \quad (A4.5)$$

Where:

$F_{i,k,y}$	Amount of fuel i (in mass or volume unit) consumed by relevant power plants/units k in year(s) y
$COEF_{i,k}$	CO _{2e} coefficient of fuel i (tCO _{2e} /mass or volume unit of the fuel), taking into account the carbon dioxide equivalent emission potential of the fuels used by relevant power plants/units k and the percent oxidation of the fuel in year(s) y
$GEN_{k,y}$	Electricity (MWh) delivered to the grid by power plants/units k
λ_y	The share of hours in year y (%) for which low-cost/must-run sources generate electricity

The parameter λ_y is defined as follows:

$$\lambda_y(\%) = \frac{\text{Number of hours per year for which LCMR sources generate electricity}}{8760 \text{ hours per year}} \quad (A4.6)$$

Where λ_y should be calculated as follows:

1. Plot a Load Duration Curve. Collect chronological load data (MW) for each hour of a year, and sort load data from highest to lowest MW level. Plot MW against 8760 hours in the year, in descending order.
2. Organize Data by Generating Sources. Collect data for, and calculate total annual generation (MWh) from low-cost/must-run resources (i.e. $GEN_{k,y}$).
3. Fill Load Duration Curve. Plot a horizontal line across load duration curve such that the area under the curve (MWh) equals the total generation (MWh) from LCMR resources (i.e. $GEN_{k,y}$).
4. Determine the «Number of hours per year for which LCMR sources generate electricity». First, locate the intersection of the horizontal line plotted in step 3 and the load duration curve plotted in step 1. The number of hours (out of the total of 8760 hours) to the right of the intersection is the number of hours for which low-cost/must-run sources are generate electricity. If the lines do not intersect, then one may conclude that LCMR sources do not generate electricity and λ_y is equal to 0. λ_y is the calculated number of hours divided by 8760.

3. Dispatch data analysis operating generation emission factor

The dispatch data analysis OG emission factor ($EF_{OG,DD,y}$) is determined based on the project electricity system power units that are actually dispatched to control the mode of electricity generation during each hour h when the project activity generates electricity. This approach is not applicable to historical data and, thus, requires annual monitoring of $EF_{OG,DD,y}$.

The emission factor is calculated as follows:

$$EF_{OG,DD,y} = \frac{EF_{OG,y}}{EG_y} \quad (A4.7)$$

Where:

EG_y	Generation of the project (MWh) in year y
$EF_{OG,y}$	CO ₂ emission factor (tCO ₂) associated with the operating generation calculated as:

$$EF_{OG,y} = \sum_h EG_h \cdot EF_{DD,h} \quad (A4.8)$$

Where:

EG_h	Generation of the project (MWh) in each hour h
$EF_{DD,h}$	Hourly generation-weighted average emissions per electricity unit (tCO ₂ /MWh) of the set of power plants (n) in the top 10% of project electricity system dispatch order during hour h calculated as:

$$EF_{DD,y} = \frac{\sum_{i,n} F_{i,n,h} \cdot COEF_{i,n,h}}{\sum_n GEN_{n,h}} \quad (A4.9)$$

Where $F_{i,n,h}$, $GEN_{n,h}$ и $COEF_{i,n,h}$ are analogous to the variables described for the simple OG method above, but calculated on an hourly basis for the set of plants (n) falling within the top 10% of the system dispatch. To determine the set of plants (n), obtain from a dispatch center: a) the grid system dispatch order of operation for each power plant of the system; and b) the amount of power (MWh) that is dispatched from all plants in the project electricity system during each hour that the project activity is operating (GEN_h).

At each hour h, stack each plant's generation (GEN_h) using the merit-order. The set of plants (n) consists of those plants at the top of the stack (i.e., having the least merit), whose combined generation ($\sum GEN_h$) comprises 10% of total generation from all plants during that hour (including imports to the extent they are dispatched).

4. Average operating generation emission factor

The average operating generation (OG) emission factor ($EF_{OG,av,y}$) is calculated as the average emission rate of all power plants in the project electricity system, using equation A2.1 above, but including low-operating cost and must-run power plants. Either of the two data vintages described for the simple OG may be used.

A4.2 Calculation the possible generation emission factor

Calculate the possible generation (PG) emission factor ($EF_{PG,y}$) as the generation weighted average emission factor (tCO_{2e}/MWh) of a sample of power plants m, as follows:

$$EF_{PG,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_m GEN_{m,y}} \quad (A4.10)$$

Where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the dispatch data analysis OG method for plants m, based on the most recent information available on plants already built . The sample group m consists of either:

- the five power plants that have been built most recently, or

- the power plants capacity additions in the electricity system that comprise 20% of the system generation (MWh) and that have been built most recently⁶¹.

Project developer should use from these two options that sample group that comprises the larger annual generation.

Capacity additions from retrofits of power plants should not be included in the calculation of the possible generation emission factor.

A4.3 Calculation the project emission factor

Calculate the project emission factor EF_y , as the weighted average of the operating generation emission factor ($EF_{OG,y}$) and the possible generation emission factor ($EF_{PG,y}$) - see equation A4.3.

The weights are w_{OG} and w_{PG} , by default, are 50% (i.e., $w_{OG} = w_{PG} = 0,5$). Alternative weights can be used, as long as $w_{OG} + w_{PG} = 1$, and appropriate evidence justifying the alternative weights is presented.

If the previously isolated grid is connected to the energy district, which has an excess of electricity production and the availability of renewable energy capacity reserves for the hour of maximum load passing the power grid, the weight w_{PG} is taken as equal to 0.

Wind and solar power generation project activities $w_{OG} = 0,75$ and $w_{PG} = 0,25$ (owing to their intermittent and non-dispatchable nature) can be used for the first crediting period and for subsequent crediting periods.

A4.4 Calculation of project emissions

The project emissions are calculated according to Equation A4.1 using most recent historical information on operation and construction of power plants for the interconnected grid.

Emissions related to SF_6 use during the year y ($PE_{SF_6,y}$, tCO_{2e}), are calculated according to Equation A4.2.

In the case of a demand over the maximum supply capacity at the time of the interconnection to the grid, a trend towards the best available technologies emission factors ($EF_{bl,BAT}$) for the kind of technology displaced in the isolated system shall be used:

$$if\ EG_y \leq EG_{max}, \quad BE_y = EG_y \cdot EF_{bl} \quad (A4.11)$$

$$if\ EG_y > EG_{max}, \quad BE_y = EG_{max} \cdot EF_{bl} + (EG_y - EG_{max}) \cdot EF_{bl,over} \quad (A4.12)$$

Where:

BE_y	Baseline emissions in year y (tCO ₂)
EF_{bl}	Baseline emissions factor (tCO ₂ /MWh)
EG_y	Electricity supplied by the grid to the project activity in year y (MWh)
EG_{max}	the maximum supply capacity of the isolated system at the time of the interconnection to the grid (MWh)

⁶¹ Identify the date when the power units started to supply electricity to the grid. If none of the power units started to supply electricity to the grid more than 10 years ago, then use to calculate the possible generation emission factor

Appendix 5. Risk management

Table A5.1. Risk management

Stage of climate project implementation	Description of risk	Probability of occurrence	Impact on the project	Impact period	Risk minimization methods	Implementation period
		1. low 2. medium 3. high	1. low 2. medium 3. high	1. preparation period 2. 1-2 years after the implementation 3. the entire period of the climate project	Detailed description of mitigation measures for each risk	Description of the time frame for the implementation of these activities
		Scale from 1 to 5 or others	Scale from 1 to 5 or others			

Appendix 6. Assessment of the validity of the original/current baseline at the renewal of the crediting period

This appendix describes a procedure to the validity of the original/current baseline at the renewal of the crediting period.

Assessment of the validity of the original/current baseline at the renewal of the crediting period consists of two steps.

A. Assess the validity of the current baseline for the next crediting period.

1. Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies.

If the current baseline is not in compliance with the relevant mandatory national and/or sectoral policies or if it cannot be shown that the policies are systematically not enforced and that non-compliance with those policies is widespread in the country or region, then the current baseline needs to be updated for the subsequent crediting period.

2. Assess the impact of circumstances.

If the new circumstances make a continued validity of the current baseline not plausible, then the current baseline needs to be updated for the subsequent crediting period.

3. Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

If the baseline scenario of the project activity is the continuation of use of the current equipment(s) without any investment and the projects proponents or third party(ies) will undertake an investment later, but before the end of a crediting period, then the current baseline needs to be updated for that crediting period or the crediting of emission reductions should be limited to the period before the baseline equipment would cease its operation.

4. Assessment of the validity of the data and parameters.

If any of the data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, the current baseline **needs to be updated** for the subsequent crediting period.

If the application of p.1, 2, 3 and 4 confirmed that the current baseline as well as data and parameters are still valid for the subsequent crediting period, then this baseline, data and parameters **can be used for the renewed crediting period**. Otherwise, proceed to Step B.

B. Update the current baseline and the data and parameters.

This step is only applicable if any of the p. 1, 2, 3 and/or 4 showed that the current baseline needs to be updated.

a. Update the current baseline

Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.

b. Update the data and parameters

If the application of p.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project developer should update all applicable data and parameters.