Climate project methodology No. 0015

Grid connection of isolated electricity systems

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Contents

1. Terms and definitions

For the purpose of this methodology, the following definitions apply[1]:

Combined generation (CG) emission factor[2] 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).

Connected electricity system is an electricity system[3] that is connected by transmission lines to the project electricity system.

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[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.
[3] A connected electricity system may include an interconnected energy system.

Crediting period is 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) is 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 industry[4,5].

Energy district is a set of electricity system facilities located in the territory it serves[6].

Grid power plant is 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 grid power plants, while power plants that serve only captive consumers and do not supply electricity to the grid are not considered grid power plants.

Installed capacity, rated capacity is the power with which the electrical installation or equipment can operate for a long time under nominal parameters and/or normal conditions[7]. 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 units[8].

Interconnected electricity system / grid is 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 systems[9]. In the context of this methodology, the term interconnected electricity system is used for any size electricity system that is connected to a previously isolated electricity system by interconnection, and in doing so corresponds essentially to the definition of an "interconnected electricity system".

Interconnection is a section of a power transmission line directly connecting power plants or substations of different power systems[10].

Isolated power system is a power system that has no electrical connections for parallel operation with other power systems[11,12]. Under this methodology, an isolated power system is an electricity system supplying electricity to household users, and if applicable, industries and

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[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 center without significant transmission constraints. The project electricity system is essentially an interconnected electricity system of the scale defined by the project developer.
[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. In the context of this project activity, interconnection is considered to be used to deliver electricity from the main grid to a previously isolated network.
[11] See GOST 21027-2021.
[12] In this methodology, an isolated power system can be represented by isolated power plant(s).

commercial areas that is not connected to any other electrical network[13] and meets one of the following conditions:

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

- any grid with a maximum installed capacity of 1000 MW, where at least 80% of the installed capacity is based on fossil fuel sources.

Net electricity generation is the difference between the total quantity of electricity generated by the power plant and the auxiliary electricity consumption of the power plant[14].

Operating generation (OG) emission factor[15] 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 electricity system (Dispatch control) is the electric power system operation mode control arrangement, which implies that the technological mode or operational state of electric power industry facilities and consumer power receiving installations equipment and devices can only be changed at the command of the appropriate dispatch center or directly by the dispatch center[16] using remote control means.

Possible generation (PG) emission factor[17] is the emission factor that refers to the group of prospective power plants whose construction and future operation would be affected by the proposed project activity.

Power intersystem transfer is the active power transmitted through the interconnection[18].

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 19431-84[19,20].

Previously isolated grid is a grid, which has no interconnection with any grid prior to the implementation of the project activity, and which is being connected to the main grid in the course of the project activity.

Project electricity system is defined by the spatial extent of power plants, which are physically connected through transmission and distribution lines to project facilities[21] and are under operational and technological dispatch control[22].

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[13] For example, national/regional or interconnected power system or an individual power district.
[14] For example, for pumps, fans, controls 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** 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 centers are required to comply with orders of the national dispatch center.

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 19431-8412[23].

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

This methodology is unaffected by any greenhouse gases (GHG) programs[24]. If a GHG program[25] is applied, the requirements of this program supplement the requirements of the methodology. This methodology is 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 system[26].

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. The estimated emission factors 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.

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[23] See GOST 24291-90.

[24] Greenhouse gas program, GHG program means a 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 Federal Law No. 34-FZ of 06.03.2022 "On conducting an experiment to limit greenhouse gas emissions in certain regions of the Russian Federation", Federal Law No. 296-FZ of 02.07.2021 "On limiting greenhouse gas emissions", Order No. 248 of the Ministry of Economic Development of Russia of 11.05.2022 "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".

[26] The methodology is applied to the connection of one or more isolated power systems. The expansion of the 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).

3. All fossil fuel fired power plants in the isolated system are 100% displaced.

4. The project developer has the necessary data to accurately determine the most likely scenario in the absence of project activity and calculate power generation emission factors from the interconnected power system[27] and the previously isolated grid.

In case of changes to the applicable acts of national legislation, this methodology is subject to revision in order to take into account the relevant changes[28].

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 undergoing the project activity.

For the project activity, project developer shall account for CO_2 emissions from the increase (due to the project activity) of electricity generation in power plants connected to the grid and emissions related to SF_6 used for electrical insulation in new power transmission and distribution equipment (see Table 2).

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_2O	No	Excluded for simplification
Project activity	Power generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification
		N_2O	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), the project documentation should include a description of procedures for eliminating the possibility of double counting[29] of GHG emission reductions potentially achieved as a result of project activities, enshrined in contractual agreements.

[27] Taking into account the electricity generation structure by generation sources.
[28] The project developer should keep in mind that the normative documents referred to 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.

3. Baseline methodology

The baseline[30] is set conservatively[31] for a business-as-usual activity, taking into account all existing policies and measures, but not considering additional project activities (Business-as-usual model).

The project developer may use one of the following approaches to determine the baseline with justification for the appropriateness of the choices[32]:

1) best available technologies[33] 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 projects is provided below in Section 3 and Appendix 1.

The baseline scenario[34] involves continuing power generation based on fossil fuel combustion (less efficient technologies) in an isolated electricity system[35]. The baseline scenario should be identified taking into account all realistic, plausible and credible alternative scenarios to the electricity supply to the isolated communities/areas/territories/facilities.

For the baseline determination, project developer needs to consider only the CO_2 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 projects, a baseline approach based on existing actual or historical emissions should be used.

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

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[30] Greenhouse gas baseline, GHG baseline means 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.
[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 means a 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.

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 district[37] 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 constraints[39]. In determining electricity systems, the project developer should document and justify their assumptions in the project design document (PDD).

Electricity transfers from the connected electricity systems to the project electricity system are defined as electricity imports, and electricity transfers to the 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 the transmission capacity[40] 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 using the same method as for the OG imports below.

To determine the operating generation (OG) emission factor, use one of the following options to determine the CO_2 emission factor(s) for net electricity imports ($COEF_{i,j,imports}$) from a connected electricity system:

1. 0 tCO_2/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 a connected electricity system located in another country, the emission factor is 0 tons CO_2 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.

The project developer has the right to use methodologies and CO_2 emissions factors legislatively approved in the Russian Federation[41]. In this case, the project developer must

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[36] See also **Project electricity system** and **Operation of electricity 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 the connected electricity system, both 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 factor can be developed.
[40] Transmission capacity of a link is 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 Order No. 371 of the Ministry of Natural Resources and Environment of the Russian Federation dated 27.05.2022 "On approval of methods for quantitative determination of greenhouse gas emissions and greenhouse gas removals", Order No. 15-r of the Ministry of Natural Resources and Environment of the Russian Federation dated 16.04.2015 "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), Order No. 330 of the Ministry of Natural

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 No. 248 of the Ministry of Economic Development of Russia dated 11.05.2022[42]. The approaches proposed in this methodology are consistent with the standardized approach applied at the international level[43].

3.1 Baseline emissions

Baseline emissions (BE_y, tCO_2) are the product of the baseline emission factor ($EF_{bl,yp}$, tCO2/MWh) and electricity supplied to the isolated system by the interconnected grid in the project activity (EG_y, MWh).

$$BE_y = EG_y \times EF_{bl,yp} \tag{3.1}$$

Where:

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

The baseline emission factor[44] 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 electricity unit (tCO_2/MWh) of all generating units displaced in the isolated system using data for the most recent three years before the connection to the grid:

$$EF_{bl,ini} = \frac{\sum_{i,j} F_{i,j,bl} \times COEF_{i,j}}{\sum_{j} GEN_{j,bl}} \tag{3.2}$$

Where:

$EF_{bl,ini}$ Baseline emission factor of the isolated system (tCO_2e/MWh) at the time of the interconnection to the grid

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Resources and Environment of the Russian Federation dated 29.06.2017 "On approval of guidelines for quantifying the volume of indirect energy emissions of greenhouse gases".

[42] Order No. 248 of the Ministry of Economic Development of Russia dated 11.05.2022 "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".

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

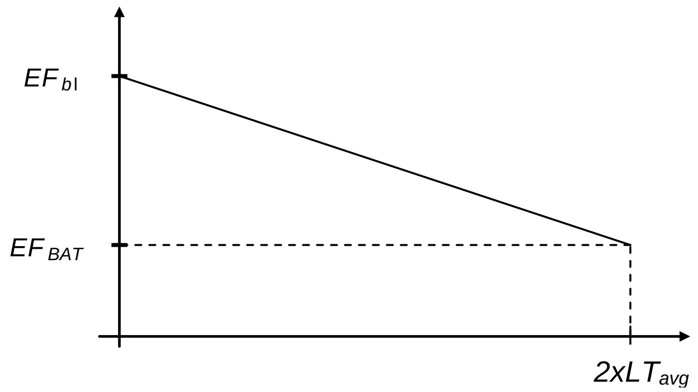
[44] The initial baseline emission factor at the beginning of the project activity ($EF_{bl,ini}$) is calculated as the generation weighted average emissions per electricity unit (tCO_2/MWh) in the most recent three years before the connection to the grid of all generating units displaced in the isolated system for a demand up to the maximum supply capacity at the time 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 shall 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.

$F_{i,j,bl}$	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 the implementation of the proposed project

CO_2 emission factor from fuel combustion shall be calculated in accordance with the methodological guidelines provided in Order No. 371 of the Ministry of Natural Resources and Environment of the Russian Federation dated 27.05.2022[45].

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 1).

Figure 1. Baseline emission factor adjustment for a demand higher than the supply capacity at the time of the interconnection isolated grid



The residual life and lifetime decrease of the existing equipment is accounted for as follows:

$$S_{yp} = S_{ini} - S_{ini}\frac{yp}{(2 \times LT_{avg})}, if\ yp \leq 2 \times LT_{avg} \tag{3.3}$$

$$S_{yp} = 0, if\ yp \geq 2 \times LT_{avg} \tag{3.4}$$

$$LT_{avg} = \frac{\left(\sum S_{ini} \times LT_{i,ini}\right)}{\sum S_{ini}} \tag{3.5}$$

Where:

S_{yp}	Power that would be supplied in the baseline scenario to the previously isolated system in project year *yp* (MW) if the equipment in the system were not replaced at the end of its lifetime
S_{ini}	Equipment power supply capacity in the isolated system (MW) at the time of the interconnection to the grid

[45] Order No. 371 of the Ministry of Natural Resources and Environment of the Russian Federation dated 27.05.2022 “On approval of methodologies for quantifying greenhouse gas emissions and removals of greenhouse gases”.

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 increase in demand for electricity is accounted for as follows:

$$EF_{bl,yp} = EF_{bl,ini,}\ if\ S_{yp} > 0\ and\ S_{yp} > D_{yp} \quad (3.6)$$

$$EF_{bl,yp} = \frac{EF_{bl,ini} \times S_{yp} + EF_{BAT} \times (D_{yp} - S_{yp})}{D_{yp}} \quad (3.7)$$

$$EF_{bl,yp} = EF_{BAT}, \qquad if\ S_{yp} = 0 \quad (3.8)$$

Where:

$EF_{bl,yp}$	Baseline emission factor (tCO_2e/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_2e/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

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 with a maximum of two renewable periods of 5 years each, 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 31 December 2025, and no earlier than 2 years prior to applying for validation for projects validated after 1 January 2026.

The additionality and baseline shall be evaluated at the beginning of the crediting period and confirmed or revised at the beginning of the next 5-year phase if the project is implemented in three 5-year phases.

5. Additionality

Additionality shall be demonstrated using Guidelines No. 001 “Demonstration of the additionality of the project activity”[46] taking into account the specifics outlined in this section.

[46] Implemented climate projects that are used for issuing carbon units within the territory of the Russian Federation must comply with Article 9 of Federal Law No. 296-FZ dated 02.07.2021 “On Limiting Greenhouse Gas Emissions”, as well as the criteria established in accordance with Order No. 248 of the Ministry of Economic Development of Russia dated 11.05.2022 "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".

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 No. 001 should be applied taking into account the following:

- 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 No. 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 No. 001 are used.

Barrier Analysis. If this step is used, the procedures in Guidelines No. 001 apply. Provide transparent and documented evidence, and offer conservative interpretations of this 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 such as financing and/or institutional arrangements that could help to overcome the identified barriers during the crediting period. The project developer should describe such instruments, indicate the period of their implementation, and 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 2. Some parameters need to be monitored continuously during the crediting period, others 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 the inventory, identification and description of measurement equipment used; description of quality assurance/quality control procedures applied to monitoring; organizational procedures; calibration and verification of measurement equipment; storage of records.

All data collected as part of monitoring should be archived electronically and kept for at least 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, and source data should be documented electronically and attached to the PDD. 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 by the project:

- 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 to during the validation and verification procedure:

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

The data and parameters monitored / not monitored in the course of the project activity are given in Appendix 2.

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 SF_6 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 developer must document and justify in the PDD the applied algorithms for the validation and verification body. The project developer has the right to use methodologies and CO_2 emission factors legislatively approved within the territory of the Russian Federation[47]. 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 for projects that are implemented and used for issuing carbon units within the territory of the Russian Federation are established in Order No. 248 of the Ministry of Economic Development of Russia dated 11.05.2022[42]. The approaches proposed in this methodology are consistent with the standardized approach applied at the international level[43].

7.1 Project emissions

The project emissions are calculated as follows:

$$PE_y = (EG_y \times EF_p) \times (TL + 1) + PE_{SF6,y} \quad (7.1)$$

Where:

PE_y	Project emissions in year y (t CO_{2e}/ year)
EG_y	Electricity supplied to the isolated system by the grid in year y (MWh)
EF_p	Emission factor for electricity generation (t CO_2/MWh)
TL	Incremental transmission losses (1.0 ≥ TL ≥ 0.0) of the project activity over and above those in the isolated area

[47] See Order No. 371 of the Ministry of Natural Resources and Environment of the Russian Federation dated 27.05.2022 “On approval of methodologies for quantifying greenhouse gas emissions and removals of greenhouse gases”, Order No. 15-r of the Ministry of Natural Resources and Environment of the Russian Federation dated 16.04.2015 "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), Order No. 330 of the Ministry of Natural Resources and Environment of the Russian Federation dated 29.06.2017 "On approval of guidelines for quantifying the volume of indirect energy emissions of greenhouse gases".

$PE_{SF6,y}$	Emissions of sulphur hexafluoride (SF_6) used for electrical insulation in new power transmission and distribution equipment as part of the project activity during the year *y* (t CO_{2e})

Project emissions are calculated using most recent historical information on the interconnected grid operating power plants and those under construction.

Emissions related to SF_6 use during the year *y* ($PE_{SF6,y}$, tCO_{2e}) are calculated according to the equation in Section 7.1.1.

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:

$$if\ EG_y \leq EG_{max}, \qquad BE_y = EG_y \cdot EF_{bl} \tag{7.2}$$

$$if\ EG_y > EG_{max}, \qquad BE_y = EG_{max} \cdot EF_{bl} + \left(EG_y - EG_{max}\right) \cdot EF_{bl,over} \tag{7.3}$$

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}	Maximum supply capacity of the isolated system at the time of interconnection to the grid (MWh)

7.1.1 Emissions of SF_6 used for electrical insulation in the new power transmission and distribution equipment

Emissions of SF_6 used for electrical insulation in new power transmission and distribution equipment as part of the project activity during the year y ($PE_{SF6,y}$), in tons of CO_{2e}, are calculated as follows:

$$PE_{SF6,y} = M_{SF6,y} \times GWP_{SF6} \tag{7.4}$$

Where:

$M_{SF6,y}$	Average quantity of SF_6 leaks in the equipment during year *y* in tons of SF_6. The value shall be determined using the equipment manufacturer's information and/or the amount of SF_6 injected in the equipment during maintenance
GWP_{SF6}	Global warming potential of sulphur hexafluoride (GWP = 23 900)

7.1.2 The emission factor for electricity generation

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).

$$EF_p = W_{OG} \times EF_{OG,y} + W_{PG} \times EF_{PG,y} \tag{7.5}$$

Where:

W_{OG}	Weighting factor for operating generation (%)
$EF_{OG,y}$	Operating generation emission factor in year *y* (t CO_2/MWh)
W_{PG}	Weighting factor for possible generation (%)
$EF_{PG,y}$	Possible generation emission factor in year *y* (t CO_2/MWh)

The project emission factor EF_p is calculated as the weighted average of the operating generation emission factor ($EF_{OG,y}$) and the possible generation emission factor ($EF_{PG,y}$).

The weights w_{OG} and w_{PG}, by default, equal 50% each (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.

For 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.

7.1.2.1 Calculation the operating generation emission factor

The operating generation (OG) emission factor is calculated using one of the following methods:

1. simple operating generation emission factor[48];

2. simple adjusted operating generation emission factor[49];

3. operating generation emission factor based on dispatch data analysis[50];

4. average operating generation emission factor[51].

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 (tCO_2/MWh) of all generation sources serving the project electricity system, not including low-operating cost and must run power plants (LMCR

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[48] 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.
[49] 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.
[50] 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.
[51] This method is used if it is impossible to apply the first three methods for calculating the operating generation emission factor.

power plants[52]). The simple operating generation emission factor is calculated using data on the net electricity generation and the CO_2 emission factor of each power unit[53]:

$$EF_{OG,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}} \qquad (7.6)$$

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*)

The CO_2 emission factor for fuel combustion shall be calculated in accordance with the methodological guidelines provided in Order No. 371 of the Ministry of Natural Resources and Environment of the Russian Federation dated 27.05.2022[54].

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 ($EF_{grid,OG\text{-}adj,y}$) is a variation of the simple OG, where the power plants/units (including imports) are divided into low-cost/must-run power sources (*k*) and other power sources (*m*). Like the simple OG, it is calculated based on the net electricity generation of each power unit in the project electricity system and the emission factor for each power unit, as follows:

$$EF_{OG,simple-adjusted,y} = \left(1-\lambda_y\right)\frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}} + \lambda_y \cdot \frac{\sum_{i,k} F_{i,k,y} \cdot COEF_{i,k}}{\sum_k GEN_{k,y}} \qquad (7.7)$$

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

[52] 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.
[53] Applies both when some power units in the project boundaries are low-cost/must-run units and some are not, and when the power plants belong to the group of low-cost/must-run units, or when all power units in the project boundaries do not belong to the group of low-cost/must-run units.
[54] Order No. 371 of the Ministry of Natural Resources and Environment of the Russian Federation dated 27.05.2022 “On approval of methodologies for quantifying greenhouse gas emissions and removals of greenhouse gases”.

$COEF_{i,k}$	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* (%) when low-cost/must-run sources generate electricity

The parameter λ_y is defined as follows:

$$\lambda_y(\%) = \frac{Number\ of\ hours\ per\ year\ when\ LCMR\ sourses\ generate\ electricity}{8760\ hours\ per\ year} \quad (7.8)$$

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 the highest to the 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 the total annual generation (MWh) from low-cost/must-run resources (i.e. $GEN_{k,y}$).

3. Supplement the load duration curve. Plot a horizontal line across the 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 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 estimated number of hours divided by 8760.

3. Operating generation emission factor based on dispatch data analysis

The dispatch data analysis OG emission factor ($EF_{OG,DD,y}$) is determined based on the data received from 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:

$$EF_{OG,DD,y} = \frac{EF_{OG,y}}{EG_y} \quad (7.9)$$

Where:

EG_y	Generation as part of the project activity (MWh) in year *y*
$EF_{OG,y}$	CO_2 emission factor (tCO_2) associated with the operating generation calculated as:

$$EF_{OG,y} = \sum_{h} EG_h \cdot EF_{DD,h} \quad (7.10)$$

Where:

EG_h	Generation as part of the project activity (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 the project electricity system dispatch order during hour *h* calculated as:

$$EF_{DD,y} = \frac{\sum_{i,n} F_{i,n,h} \cdot COEF_{i,n,h}}{\sum_{n} GEN_{n,h}} \quad (7.11)$$

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 dispatch system. To determine the set of plants (n), obtain from the 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 of operation within the framework of the project activity (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 the 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 3.2 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.

7.1.2.2 Calculation of 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:

$$EF_{PG,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_{m} GEN_{m,y}} \quad (7.12)$$

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 recently[55].

The project developer should use the sample group that accounts for the larger annual generation.

[55] Identify the date when the power units started to supply electricity to the grid. If none of the power units in the group started to supply electricity to the grid more than 10 years ago, use that group to calculate the possible generation emission factor.

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

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), calculated as follows:

$$ER_y = BE_y - PE_y - L_y \qquad (7.13)$$

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.

The recommended table for completion, reflecting the outcomes of the risk management measures is given in Appendix 3.

8. Leakage assessment

According to Order No. 248 of the Ministry of Economic Development of Russia dated 11.05.2022[56], 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 any project leakage[57] if it exists.

The project developer shall independently determine the most relevant methods to assess the 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. Leakages[58] related to deforestation during the construction of interconnection lines are calculated as follows:

$$L_1 = A_{def} \times L_C \tag{8.1}$$

Where:

L_1	Leakage to be accounted for in the first year of the project crediting period
A_{def}	Area of land deforested, hectares
L_C	Carbon stock per unit of area (above ground, below ground, soil carbon, litter and dead biomass), tons 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, the leakage shall be ignored. Otherwise, the total leakage estimated will be fully deducted from the emissions reductions in the first verification period.

The project developer does not need to consider other emission sources as leakage in applying this methodology[59].

9. Non-permanence risk analysis

Not applicable to the project activity.

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

The 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). The project developer should minimize the 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 or lead to any community

[56] Appendix № 1 to the order of the Ministry of Economic Development of Russia dated 11.05.2022 № 248, paragraph "c"

[57] Leakage (for a project activity) means 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).

[58] Change of carbon stocks as a result of clearing biomass.

[59] 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.

conflicts, land tenure issues, forceful evictions, human rights violations, or worsened health and wellbeing due to restricted access to a forest or natural area.

Efforts should be made to avoid double counting[60] between project areas (project boundaries), between company reporting and reporting on the project, between the reporting of different companies, between the constituent entities 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 contribution of the Russian Federation defined at the national level.

11. Recommendations for updating or keeping the baseline unchanged at the renewal of the crediting period and project activity

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.

The project developer shall update the 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 the baseline and monitoring 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 with the criteria under Guidelines No. 001 “Demonstration of the additionality of the project activity” at the date of the beginning of the new crediting period.

If the baseline of a registered project has been revised or updated, the project developer must justify the need to deviate from the approved methodology to the validation and verification body in order to extend the crediting period.

Assessment of the validity of the original/current baseline and updates to the baseline at the renewal of a crediting period. The procedure to assess the validity of 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 if the current baseline is not valid anymore for the next crediting period (see Appendix 4).

12. Normative references

1. AM0045: Grid connection of isolated electricity systems. Version 3.0. CDM Methodology.
2. Order No. 248 of the Ministry of Economic Development of Russia dated 11.05.2022 "On approval of the criteria and procedure for classifying projects implemented by legal entities, individual entrepreneurs or individuals, as climate projects, the form and

[60] The definition is given in the notes in section 2.3.

procedure for reporting on the implementation of a climate project" (registered with the Ministry of Justice of Russia on 30.05.2022, No. 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 Documentation for Projects to Reduce Greenhouse Gas Emissions or Increase Their Absorption at the Project Level (approved and enacted by Rosstandart Order No. 1030-st dated 30.09.2021).
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 dated 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 Rosstandart Order No. 1869-st dated 26.11.2014).
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 Rosstandart Order No. 1033-st dated 30.09.2021).
8. Order No. 371 of the Ministry of Natural Resources and Environment of Russia dated 27.05.2022 "On approval of methods for quantitative determination of greenhouse gas emissions and greenhouse gas removals" (from 1 March 2023, except for certain provisions, coming into force on 1 March 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. ACM0002: Grid-connected electricity generation from renewable sources. Version 21.0. CDM Methodology.
11. TOOL01 Methodological tool. Tool for the demonstration and assessment of additionality. Version 07.0.0. CDM Methodology.
12. TOOL05 Methodological tool. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation. Version 03.0. CDM Methodology.
13. TOOL07 Methodological tool. Tool to calculate the emission factor for an electricity system. Version 07.0. CDM Methodology.
14. 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.
15. GOST 21027-2021. Interstate standard. Electric power systems. Terms and Definitions.
16. GOST 19431-84. Energy and electrification. Terms and definitions.
17. GOST 24291-90 Interstate standard. The electrical part of the power plant and the electrical network. Terms and definitions.
18. 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.
19. GOST 21027-2021. Interstate standard. Electric power systems. Terms and definitions.
20. GOST R 53905-2010. Energy Saving. 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 scenario[61], 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 No. 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, the 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 No. 001 “Demonstration of the additionality of the project activity”).

3. Investment analysis:

    3.1. Conduct an investment analysis, consistent with Guidelines No. 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. The project developer should identify all the instruments that can potentially remove the

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[61] 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 assume that from the time the identified barriers are removed 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. Data and parameters monitored / not monitored

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

Table A2.1. Data and parameters not monitored

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures (if applicable)	Comment
1	$COEF_{i,j}$	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	$F_{i,j,bl}$	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 formula 4 defined in the baseline emission section above	Project activity	Once at the validation	An expert assessment is used
7	EF_{BAT}	$tCO2_e$ / 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	-

№	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 A2.2. Data and parameters monitored

№	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	$GEN_{i/j/k,y}$	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

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Comment
8	$GEN_{i/j/k,y\ IMPORTS}$	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	$M_{SF6,\ y}$	tons of SF_6	SF_6 leaks in the new equipment of the project activity during year y in mass units	Project activity	Equipment manufacturer's information and/or the 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 3. Risk management

Table A3.1. 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 4. Assessment of the validity of the original/current baseline at the renewal of the crediting period

This appendix describes a procedure to be used to assess 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 demonstrated that the policies are systematically not enforced and that non-compliance with those policies is widespread in the country or region, 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, the current baseline needs to be updated for the subsequent crediting period.

3. Assess whether the continuation of use of the current baseline equipment 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 without any investment and the project proponents or third party(ies) will undertake an investment later, but before the end of a crediting period, 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, such 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 the 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, the project developer should update all applicable data and parameters.