Climate project methodology № 0008

Renewable electricity generation for captive use and mini-grid

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Contents

1. Terms and Definitions

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

Backup power supply - supplying power to the electric grid loads for a specified length of time after it is disconnected from the power system /grid[2][3];

Battery Energy Storage System (BESS)[4] - a stationary system for storing and converting electrical energy back into electricity that contains the components necessary for this function, in particular a battery, an energy conversion system, and an energy management system[5][6];

Capacity addition - a capacity addition is an investment to increase the installed power generation capacity of existing power plants through: 1. the installation of a new power plants/units besides the existing power plants/units; or 2. the installation of new power plants/units, additional to the existing power plants/units. The existing power plants/units in the case of capacity addition continue to operate after the implementation of the project activity.

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. Project crediting period 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 industry[7][8].

Electricity consumers (Electricity users) - persons who purchase electricity for their own household and/or production needs[9].

Existing reservoir - a reservoir is to be considered as an "existing reservoir" if it has been in operation for at least three years before the implementation of the project activity.

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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] GOST R 58092.3.3-2023 Electric Energy Storage Systems. Planning and performance assessment of electrical energy storage systems

[3] Reference methodologies developed within the framework of the Clean Development Mechanism (ACM0002) use the following interpretation for this term: **Backup generator** - a generator that is used in the event of an emergency, such as power supply outage due to either main generator failure or captive failure or tripping of generator units, to meet electricity demand of the equipment at power plants site during emergency.

[4] This type of energy storage system assumes that the type of energy storage is realized based on batteries

[5] GOST R 54531-2011 Non-conventional technologies. Recommended and alternative energy sources. Terminology and Definitions

[6] Reference methodologies developed within the framework of the Clean Development Mechanism (ACM0002) use the following interpretation for this term: **Battery Energy Storage System (BESS)** - a rechargeable energy storage system consisting of batteries, battery chargers, controls, power conditioning systems and associated electrical equipment designed to store the electricity generated from the renewable energy plant(s).

[7] GOST 21027-2021. Interstate standard. Power systems. Terms and definitions.

[8] 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.

[9] Federal Law №. 35-FZ "On Electric Power Industry" dated March 26, 2003 (as amended and supplemented)

Geothermal power plant - a power plant that uses natural steam or thermal water with high thermal potential to generate electricity [10].

Greenfield power plant - a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity.

Hydroelectric power plant[11]**-** is a complex of structures and equipment that converts the gravitational energy of water into electrical energy.

Hydrogen energy storage system (HESS)[12] is an energy storage system (ESS) using hydrogen that consists of an electrolyser, a hydrogen storage tank and a fuel cell [13].

Installed capacity, rated capacity - the power with which the electrical installation, equipment can operate for a long time under nominal parameters and/or normal conditions[14]. 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[15].

Mini-grid - is a small-scale power system with a total capacity not exceeding 30 MW (i.e. the sum of installed capacities of all generators connected to such grid is equal to or less than 30 MW[16]) which is not connected to the Unified Energy System of Russia (i.e. is an isolated energy system[17]).

Modernization (fixed asset completion, equipping, replacement[18]**)**[19] **-** works caused by a change in the technological or service purpose of equipment, buildings, structures or other object of depreciable fixed assets, increased loads and (or) other new qualities7, i.e. it is the replacement of outdated equipment with new due to functional wear. Modernization of the electric power industry includes not only

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[10] GOST R 56909-2016 Non-conventional technologies. Geothermal energy. Terms and definitions.

[11] See GOST R 54531-2011 Non-conventional technologies. Renewable and alternative energy sources. Terms and definitions.

[12]See GOST R 58092.5.1-2018 (IECTS 62933-5-12017) Electric energy storage systems (EESS). Safety of systems operating as part of the grid. General requirements

[13] In the context of this methodology Hydrogen energy storage is a form of chemical energy storage in which electrical energy produced from renewable energy sources is converted into hydrogen produced from back-up electricity generation.

[14] 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.

[15] See GOST 19431-84. Energy and electrification. Terms and definitions.

[16] The project activity (AMS-I.F.) is included in the block of small-scale project activities in the field of renewable energy project activities with a maximum output capacity equivalent to up to 15 MW (or an appropriate equivalent) (decision 17/CP.7, paragraph 6 (c) (i)). The limit of 15 MW is revised to 30 MW for the Russian Federation, as at this stage it is not planned to introduce simplified procedures for registration of small-scale projects, as well as harmonization with national regulations, which define the group of small-scale generation as power plants with a capacity not exceeding 30 MW. At the same time, in order to distinguish the scope of application from RMS Methodology No. 0007 Production of grid-connected electricity from renewable sources, a small-scale network is identified, limited to a total capacity not exceeding 30 MW. In the methodology context: «Output» is the installed/rated capacity as indicated by the manufacturer of the equipment or plant, irrespective of the actual load factor of the plant. The installed/rated capacity of renewable electricity generating units that involve turbine generator systems shall be based on the installed/rated capacity of the generator. Projects may refer to MW(p), MW(e) or MW(th), where (p) stands for peak, (e) stands for electric and (th) stands for thermal. As MW(e) is the most common denomination, and MW(th) only refers to the production of heat which can also be derived from MW(e), MW define as MW(e) and otherwise to apply an appropriate conversion factor (FCCC/KP/CMP/2005/8/Add.1).

[17] An isolated energy system is a power system that does not have electrical connections for parallel operation with other power systems. (GOST 21027-2021. Interstate standard. Electric power systems. Terms and definitions)

[18] Reference methodologies developed within the framework of the Clean Development Mechanism (AMS-I.F., ACM0002) use the following interpretation for this term: **Replacement** - is an investment in new power plants/units that replaces one or several existing units at the existing power plant. The new power plants/units have the same or a higher power generation capacity than the plants/units that were replaced

[19] For the terms «Technical re-equipment», «Modernization», «Reconstruction» and «Overhaul», the definition of a single terminology in the regulatory documents of the Russian Federation is not established and there may be discrepancies depending on the objects subject to these types of work. Terminology in reference methodologies also does not coincide in full (indicated for each specific term). The term «Technical re-equipment» in the sense of use in the methodology is close to the term «Modernization». However, the Russian legal field divides these concepts. This methodology took into account the recommendations of RD 153-34.3-20.409-99 Guidelines on the definition of concepts and attribution of types of work and activities in the electrical networks of the Electric power industry to new construction, expansion, reconstruction and technical re-equipment.

decommissioning of old, physically and morally obsolete equipment, reconstruction of low-efficiency equipment and replacement of technologies with modern ones, but also the creation of fundamentally new equipment and energy technologies.

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 plant[20].

Overhaul[19][21] **-** repair in order to restore the usability (operability) of structures and equipment, as well as to maintain operational performance. During the retrofit of equipment, which is carried out to restore the usability and full or close to full resource of the object with the replacement or restoration of any of its parts, a complete disassembly of the unit, repair of basic and body parts and assemblies, replacement or restoration of all worn-out parts and assemblies to new and more modern, assembly, regulation and testing of the unit can be carried out. During the retrofit of the equipment, its functional purpose should not be changed. The purpose of the equipment retrofit is to restore its technical and economic characteristics to values close to the initial ones[22].

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[23].

Reconstruction[19] **-** is the reconstruction of existing fixed assets connected to the improvement of production and its technical and economic indicators and carried out under the project of reconstruction of fixed assets in order to increase production capacity, improve quality and change the nomenclature of production. The reconstruction of existing energy enterprises includes the reconstruction of existing workshops and facilities for the main, auxiliary and maintenance purposes of power plants, thermal and electrical networks associated with the improvement of production, increasing the technical and economic level, changing the main technical and economic indicators. The objects of electrical networks are subject to reconstruction, as a rule, having an unsatisfactory condition of building structures and structures due to the development of a standard service life, due to various natural disasters[24] that do not meet the requirements of sanitary standards and ecology.

Renewable energy sources[25]**-** solar energy, wind energy, water energy (including sewage energy), except for cases when such energy is used in hydroelectric power plants, tidal energy, wave energy of water bodies, including reservoirs, rivers, seas, oceans, geothermal energy using natural underground heat carriers, low potential heat energy of land, air, water using special heat carriers, biomass, which includes plants, including trees, grown specifically for energy production, as well as production and consumption wastes, with the exception of wastes resulting from the use of hydrocarbon raw materials and fuels,

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[20] For example, for pumps, fans, controlling etc.

[21] Reference methodologies developed within the framework of the Clean Development Mechanism (AMS-I.F., ACM0002) use the following interpretation for this term: **Retrofit** - is an investment to repair or modify existing operating power plants/units, with the purpose to increase the efficiency, performance or power generation capacity of the plants/units, without adding new power plants/units. A retrofit restores the installed power generation capacity to or above its original level. Retrofits shall only include measures that involve capital investments and not regular maintenance or housekeeping measures.

[22] Order of the Ministry of Energy of the Russian Federation No. 1013 dated 25.10.2017 «On Approval of Requirements for Ensuring the Reliability of Electric Power Systems, Reliability and Safety of Electric Power Facilities and Power Receiving Installations «Rules for the Organization of Maintenance and Repair of Electric Power Facilities» (with amendments and additions)

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

[24] Reference methodologies developed within the framework of the Clean Development Mechanism (AMS-I.F., ACM0002) use the following interpretation for this term: **Rehabilitation (or refurbishment)** - is an investment to restore the existing power plants/units that was severely damaged or destroyed due to foundation failure, excessive seepage, earthquake, liquefaction, or flood. The primary objective of rehabilitation or refurbishment is to restore the performances of the facilities. Rehabilitation may also lead to increase in efficiency, performance or power generation capacity of the power plants/units with/without adding new power plants/units

[25] See Federal Law No. 35-FZ dated 26.03.2003 (ed. 02.11.2023) "On Electric Power Industry"

biogas, gas emitted by production and consumption wastes in landfills for such wastes, and gas produced in coal mines[26].

Reservoir - an artificial reservoir formed by a water-retaining structure, filling a cavity or a collapsed area with water for the purpose of storing water and/or regulating runoff with special structures, creating a backup[27].

Small hydroelectric power plant[28] - is a hydroelectric power plant with an installed capacity of up to 30 MW.

Solar power plant - a power plant designed to convert the energy of solar radiation into electrical energy[29].

Technical re-equipment - is a set of measures to improve the technical and economic indicators of fixed assets or their individual parts based on the introduction of advanced equipment and technology, mechanization and automation of production, modernization and replacement of obsolete and physically worn-out equipment with new, more efficient equipment[30].

Tidal power station - a hydroelectric power station using the energy of sea tides[31].

Wind electrical power station[32] - a power plant consisting of two or more wind turbines designed to convert wind energy into electrical energy and transmit it to the consumer.

2. Scope and applicability

The methodology is designed to be applied by the project developers, validation and verification bodies and other stakeholders. This methodology applies to grid-connected renewable energy generation projects that include:Table 1. Methodology key elements

Typical projects	Overhaul, reconstruction, modernization/ technical re-equipment or capacity addition to an existing power plant or construction and operation of a new power plant to produce electricity using renewable energy technologies such as photovoltaic, hydro, tidal/wave, wind, geothermal[33] that supply electricity to captive user(s)[34] Battery energy storage system (BESS) or Hydrogen energy storage system (HESS) can be integrated under certain conditions
Type of GHG emissions mitigation action	Renewable energy: Displacement of electricity that would be provided to the captive user(s) by more-GHG-intensive means

[26] Only renewable energy project activities such as solar, wind, hydro, tidal and geothermal are considered in this methodology.
[27] See GOST R 70214-2022. Hydraulic engineering. Basic concepts. Terms and definitions.
[28] See GOST R 54531-2011.
[29] GOST R 54531-2011 Non-conventional technologies. Renewable and alternative energy sources. Terms and definitions. GOST R 70787-2023 Unified energy system and isolated energy systems. Renewable energy sources. Technical requirements for photovoltaic solar plants.
[30] The Tax Code of the Russian Federation (Part Two) of 05.08.2000 No. 117-FZ (ed. of 18.03.2023) (with amendments and additions, intro. effective from 01.04.2023)
[31] See GOST R 55005-2012 Renewable energy. Geothermal power plants. Structures. Security requirements. The main provisions.
[32] See GOST R 54531-2011.
[33] According to the Federal Law 26.03.2003 № 35-FZ (ed. 04.08.2023) "On Electric Power Industry", nuclear power is not included in the list of renewable energy sources. The methodology has a restriction on the applied technologies for electricity generation from renewable energy sources, see Sections 2.1 and 2.2.
[34] In the context of this methodology, an electricity captive user is defined as any person(s) who purchases electricity for their own household and/or production needs without the purpose of resale. It is assumed that within the boundaries of the project activities, the number of electricity captive user(s) is accurately identified, and may be as low as one. The maximum possible number of connected electricity captive user(s) is limited by the maximum capacity of the generating facility, which does not exceed 30 MW, and its ability to provide captive user(s) with the required amount of capacity according to the concluded power supply contracts (sale and delivery of electricity (capacity)). Does not applicable to participants of the wholesale electricity and power market

Given methodology is unaffected by applying to the greenhouse gases (GHG) programs[35]. If a GHG program[36] 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 (AMS-I.F.) and includes its adaptation to the current Russian regulations and standards.

2.1. Scope

This methodology comprises renewable energy generation units, such as photovoltaic, tidal/wave, hydro-, wind and geothermal that supply electricity to captive user(s)[37].

The methodology applies to captive user(s) renewable energy generation project activities that include:

1. construction and operation of a Greenfield power plant; or
2. overhaul, reconstruction, modernization or capacity addition of an existing power plant;
3. integrate BESS or HESS to a Greenfield power plant or integrate BESS or HESS to an existing solar photovoltaic or wind power plant.

The project activity will displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit, i.e. in the absence of the project activity, the captive user(s) would have been supplied electricity from one or more sources listed below:

1. a national or a regional grid;
2. a fossil fuel fired captive power plant[38];
3. a carbon intensive mini-grid[39].

2.2. Applicability

The methodology is applicable to solar, wind, small hydroelectric, tidal and geothermal power plants.

Small hydroelectric power plants that satisfy at least one of the following conditions are eligible to apply this methodology:

1. the project activity is implemented in an existing reservoir with no change in the volume of reservoir[40];
2. no dam construction or flooding of the territory is required for the project activity of new small hydroelectric power plant construction[41].

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[35] 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).

[36] 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"

[37] Compliance with the requirements of this methodology may be claimed if all the requirements of this methodology are met, except for recommendation requirements, as well as risk management recommendations

[38] Under such situations, the consumers of the captive electricity should be also connected to the grid.

[39] Incl. Technologically isolated territorial electric power system (TITEPS) (see GOST R 57114-2016) with the total capacity not exceeding 30 MW.

[40] This type of activity is possible for projects for overhaul, reconstruction, modernization/technical re-equipment or capacity addition of an existing power plant

[41] i.e. the construction of small hydroelectric power plant allows for water energy conversion without construction of a dam and flooding of the territory

Combined heat and power (co-generation) systems, as well as installations for the production renewable energy from biomass[42] are not considered in this methodology.

The methodology is applicable when the captive user(s) does not receive electricity from renewable energy sources directly in the baseline scenario.

The methodology is applicable to renewable electricity generation project activities, with delivery of electricity to captive user(s), involving:

1. install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield power plant);

2. involve a capacity addition to (an) existing plant(s)[43],

3. involve an overhaul[44] of (an) existing plant(s); or

4. involve a modernization[45] /technical re-equipment, reconstruction of (an) existing plant(s).

In the case of project activities that involve the electrical capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 30 MW and should be physically distinct[46] from the existing units.

In the case of overhaul or modernization (technical re-equipment, reconstruction), the total output of the overhauled or replacement unit shall not exceed the limit of 30 MW.

If the unit added has both renewable and non-renewable components[47], the eligibility limit of 30 MW applies only to the renewable component.

In the case of capacity additions, overhauls, reconstructions or modernization/re-equipment small hydroelectric and geothermal power plant the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, overhaul, or reconstruction of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.

The methodology is applicable to project activities that may implement BESS or HESS[48] technologies for new renewable energy power plants or existing solar or wind power plants.

The technology for hydrogen production by water electrolysis using the reserve amount of electricity produced by the renewable energy plant shall be implemented in case of HESS. Hydrogen storage can be realised in compressed or solid-phase bound form, electricity generation - using electrochemical generators (fuel cells) or hydrogen incineration plants.

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[42] Identification of emissions sources and leakage emissions for project activities using biomass requires special accounting and monitoring procedures, including leakage analysis resulting from the redirection of biomass from other applications to the project. These procedures are not considered in the methodology, and the use of biomass is excluded.
[43] See **Capacity addition** in Section 1.
[44] See **Overhaul** in Section 1
[45] See Modernization / **Technical re-equipment** in Section 1
[46] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility
[47] e.g. a wind/diesel unit
[48] This methodology considers an energy storage system as an efficient source of electric energy capable of compensating, within the amount of energy stored in it, for the shortfall in generation capacity during peak demand for electricity consumption and then replenishing the amount of energy given up, e.g., regulating variable generation at a wind power plant, smoothing out sharp power fluctuations that may occur in power systems with a high amount of solar power, storing energy generated during a load dip. The type of energy storage system is determined by the climate project developer based on the options allowed by this methodology.

In case the project activity involves the integration of a BESS or HESS, the methodology is applicable to renewable energy power generation project activities with delivery of electricity to to captive user(s) that:

1. integrate BESS / HESS with a Greenfield power plant;
2. integrate a BESS / HESS together with implementing a capacity addition to (an) existing solar photovoltaic or wind power plant(s);
3. integrate a BESS / HESS to (an) existing solar photovoltaic or wind power plant(s) without implementing any other changes to the existing plant(s);
4. integrate a BESS / HESS together with implementing an overhaul, reconstructions or modernization/re-equipment of (an) existing solar photovoltaic or wind power plant(s).

In case of Greenfield project activities, the project developer shall demonstrate that the BESS or HESS was an integral part of the design of the renewable energy project activity[49].

This type of project activity assumes that the BESS is to be charged with electricity or the HESS is to utilise electricity for electrolysis generated from the associated renewable energy power plant(s). In situations where project design assumes the use of a backup power generator[50] (using fossil fuel or electricity from the grid) in addition to or instead of the BESS or HESS, the relevant GHG emissions from the backup power generator[51] (emissions from fossil fuel combustion or from the grid) should be taken into account. In such cases, the corresponding GHG emissions shall be accounted for as project emissions following the requirements under section 7 below. The charging of BESS using the grid or using fossil fuel electricity generator or use electricity from grid or a backup power generator for water electrolysis for HESS shall not amount to more than 2% of the electricity generated by the project renewable energy plant during a monitoring period[52]. During the time periods[53] when the BESS / HESS consumes more than 2% of the electricity for charging or for water electrolysis, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned periods of the monitoring period. This shall be transparently reflected in the project design documentation (PDD).

In case of changes the cited acts of national legislation, this methodology is subject to revision in order to take into account the relevant changes[54].

2.3. Project boundary

The boundary of the project activity (including territorial boundaries) includes industrial, commercial facilities consuming energy generated by the generating facilities. In the case of electricity generated and supplied to distributed captive user(s) (e.g. residential captive user(s)) via mini/isolated grid the project boundary may be confined to physical, geographical site of renewable generating units. The boundary also extends to the project power plant and all power plants connected physically to the electricity system to which the project power plant is connected.

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 2.

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

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[49] e.g. by referring to feasibility studies or investment decision documents

[50] For example, to provide safety in case RES, BESS or HESS do not provide the required level of electricity generation capacity

[51] A backup generator in the context of the methodology is a generator that ensures uninterrupted power supply during emergency situations. A backup generator cannot be used to charge the BESS or electrolyse water to produce hydrogen for the HESS in the event of unfavourable weather conditions

[52] The 2% limit is retained in the methodology for comparability with international practice for climate projects of this type. Using the BESS or HESS for more than 2% with electricity generated by burning fossil fuels or from the grid is contrary to the objective of reducing the carbon intensity of electricity generated

[53] e.g. week(s), months(s)

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

Source		GHG	Included	Justification/explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		NO_2	No	Minor emission source
Project activity	For dry or flash steam geothermal power plants, emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam, fugitive emissions of hydrocarbons such as n-butane and isopentane (working fluid) contained in the heat exchangers	CO_2	Yes	Main emission source
		CH_4	Yes	Main emission source
		NO_2	No	Minor emission source
		Refrigerants that are GHGs	Yes	Main emission source (if applicable according to the project documentation)
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		NO_2	No	Minor emission source
	Charging of BESS or HESS using electricity from the grid or from fossil fuel backup electricity generators	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		NO_2	No	Minor emission source

The project documentation shall include a description of the procedures for eliminating the possibility of double counting55 of GHG emission reductions potentially achieved as a result of project activities, including double usage in different decarbonisation instruments (e.g renewable energy certificates).

3. Baseline methodology

The baseline[56] is set conservatively[57] 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[58]:

1) best available technologies[59] that represent an economically feasible and environmentally sound course of action;

[55] 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

[56] Greenhouse gas baseline, GHG baseline - quantitative reference(s) of GHGemissions and/or GHGremovals 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)

[57] 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.

[58] 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.

[59] If there are reference documents of the best available technologies (BAT) applicable to the conditions of the planned project, the relevant information and technical BAT reference documents are used

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 in Section 3.

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)[60]. The approaches proposed in this methodology are consistent with the standardized approach applied at the international level[61].

Project developer has the right to use methodologies and CO_2 emissions factors legislatively approved within the territory of the Russian Federation[62]. 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.

3.1. Identification of the baseline scenario

The possible options for the baseline scenarios are summarized in the following:

1. Baseline scenario[63] for *Greenfield power plant* with or without a BESS / HESS is that the electricity delivered to captive user(s) by the project activity would have otherwise been generated by the operation of grid-connected power plants, a fossil fuel fired captive power plant or a carbon intensive mini-grid.
2. Baseline scenario for *capacity addition* is: 1. capacity addition to existing solar photovoltaic or wind power plant (unit) with or without a BESS / HESS connected to captive user(s); or 2. an integration of a BESS / HESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s). The baseline scenario is the existing facility that would continue to supply electricity to captive user(s), a captive power plant, mini-grid at historical levels, until the time at which the generation facility would likely be modernized or overhauled. Electricity delivered by the added capacity would have otherwise been generated by the operation of grid-connected/ captive power plants/ a carbon intensive mini-grid and by the addition of new generation sources. From overhaul or modernization point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.
3. Baseline scenario for *overhaul, reconstruction or modernization/technical re-equipment* an existing plant that involve retrofit, rehabilitation, replacement of an existing facility, the baseline scenario is the continuing operation of the existing plant. In this case, historical electricity generation data is used (to determine the electricity generation of the existing plant in the baseline

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[60] 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"
[61] Methodology AMS-I.F.: Renewable electricity generation for captive use and mini-grid. Version 5.0. CDM Methodology
[62] 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"
[63] 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)

scenario), assuming that the historical situation observed prior to the implementation of the project activity would continue.
If it is certain that a power plant is scheduled for overhaul, reconstruction or modernization/technical re-equipment in the absence of project activities, then from that point on it is assumed that the baseline scenario corresponds to the project activity and no emission reductions will occur.

4. If the project activity is overhaul to an existing solar photovoltaic or wind power plant and an integration of a BESS / HESS, the project activity provides the possibility of supplying additional electricity to the grid using the same existing power generation capacity. This allows for a higher power plant load factor over the year, enabling more electricity supply to the grid from project activity renewable power plant as compared to the situation prior to the installation of the BESS / HESS. As a result, project activities will potentially replace an equivalent amount of electricity generation from the grid, or from a fossil fuel fired captive power plant, or a carbon intensive mini-grid.

3.2 Baseline emissions

Option 1. For a *mini-grid system* where all generators use exclusively fossil fuel, the baseline emissions are the annual electricity generated by the renewable energy unit times an emission factor for a modern generating unit of the relevant capacity operating at optimal load on the fossil fuel type most commonly used in the climate project region. The calculation of emissions must be carried out in accordance with the guidelines set out in the Order of the Ministry of Natural Resources of the Russian Federation dated 27.05.2022 No. 371 (combustion of the relevant type of fossil fuel).

Option 2. Baseline emissions for *other electricity systems* include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. It assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants, or a captive power plant, or mini-grid (other than described in *Option 1*).

Baseline emissions are the product of amount electricity displaced with the electricity produced by the renewable generating unit and an emission factor:

$$BE_y = EG_{BL,y} \times EF_{CO2,y} \tag{3.1}$$

Where:

BE_y	Baseline emissions in year *y* (t CO_2)
$EG_{BL,y}$	Quantity of net electricity displaced as a result of the implementation of the project activity in year *y* (MWh)
$EF_{CO2,y}$	Emission factor CO_2 (t CO_2/MWh). If in the baseline scenario the electricity is supplied by the grid, it is recommended to use the approach for determining the grid emission factor from Appendix 1. In case captive use, it is recommended to use the approach for determining the indirect energy emission factor from Appendix 2. For the baseline scenario, which foresees electricity generation by a captive fossil fuel-fired power plant, the baseline emission factor should be calculated in accordance with the methodological guidelines of MNR Order No. 371 of 27.05.2022 (taking into account the combustion of the relevant fuel type). For a mini-grid other that described in *Option 1*, the emission factor is defined as the weighted average emissions for the current generation (see Appendix 1).

For project activities that displace electricity consumed from the electric grid and from a fossil fuel fired on-site captive power plant, the baseline emission factor shall reflect the emissions intensity of the grid and the captive power plant in the baseline scenario, i.e. the weighted average emission factor for the displaced electricity is calculated using values based on the historical (prior three year ratio) of electricity from captive plants and the grid[64]. For new facilities, the most conservative (lowest) of the emission factor for the two power sources should be used.

3.2.1 Approach for calculation quantity of net electricity displaced as a result of the implementation of the project activity

The calculation of $EG_{BL,y}$ is different for greenfield plants, capacity additions, overhaul, and modernization/technical re-equipment an existing facility.

1. *Greenfield power plant*

If the project activity is the installation of a greenfield power plant, then:

$$EG_{BL,y} = EG_{BL,facility,y} \tag{3.2}$$

Where:

$EG_{BL,facility,y}$	Quantity of net electricity generation supplied by the project plant/unit in year *y* (MWh)

2. Capacity addition in wind, solar, wave or tidal power plants

In the case of wind (with or without a BESS / HESS), solar (with or without a BESS / HESS), wave or tidal power plants/units, it is assumed that the addition of new capacity does not significantly affect the electricity generated by existing plants/units. In this case, the electricity by the added power plants/units shall be directly metered and used to determine $EG_{BL,y}$.

$$EG_{BL,y} = EG_{BL\_Add,y} \tag{3.3}$$

Where:

$EG_{BL\_Add,y}$	Quantity of net electricity generation in year *y* by the project plant/unit that has been added under the project activity (MWh)

3. *Capacity addition in small hydroelectric or geothermal power plants*

In the case of small hydroelectric or geothermal power plants/units, the addition of new power plants/units may significantly affect the electricity generated by the existing plants/units. For example, a new hydro turbine installed at an existing dam may affect the power generation by the existing turbines. Therefore, the approach below for overhaul, reconstruction or modernization/technical re-equipment projects shall be used for capacity addition in small hydroelectric power plants and geothermal power plants. $EG_{facility,y}$ corresponds to the net electricity generation by the existing plants/units and the added plants/units together constituting "project plants/units". A separate metering of electricity by the added plants/units is not necessary under this option.

4. *Overhaul, reconstruction or modernization/technical re-equipment in small hydroelectric, solar, wind, geothermal, wave and tidal plants*

In the case of overhaul, reconstruction or modernization/technical re-equipment in small hydroelectric, solar (with or without a BESS / HESS), wind (with or without a BESS / HESS), geothermal, wave and

[64] For example, if in the baseline 80 % of annual electricity requirement was met by grid import and the remaining by captive generation, the weighted average emission factor ($EF_{electricity}$) would be 0.8 EF_{grid} + 0.2 $EF_{captive}$

tidal plants where power generation can vary significantly from year to year, due to natural variations in the availability of the renewable source (e.g. varying rainfall, wind speed or solar radiation), the use of few historical years to establish the baseline electricity generation can involve a significant uncertainty.

The elimination of uncertainty is performed by adjusting the historical electricity generation by its standard deviation. This ensures that the baseline electricity generation is established in a conservative manner and that the calculated emission reductions are attributable to the project activity. Without this adjustment, the calculated emission reductions could mainly depend on the natural variability observed during the historical period rather than the effects of the project activity. The baseline energy generation $EG_{BL,y}$ corresponding to the net increase in electricity production associated with the project is thus calculated as follows:

$$EG_{BL,y} = \begin{cases} \max(EG_{BL,facility,y} - (EG_{historical} + \sigma_{historical}), 0), & \text{until } DATE_{BaselineOverhaul} \\ 0, & \text{after } DATE_{BaselineOverhaul} \end{cases} \quad (3.4)$$

Where:

$EG_{BL,facility,y}$	Quantity of net electricity generation supplied by the project plant in year y (MWh/yr)
$EG_{historical}$	Annual average historical net electricity generation by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity and determined per the procedure prescribed under section 5. below (MWh)
$\sigma_{historical}$	Standard deviation of the annual average historical net electricity supplied by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh)
$DATE_{BaselineOverhaul}$	Point in time when the existing equipment would need to be replaced in the absence of the project activity (date). This parameter does not apply to reconstruction projects

5. *Determination of $EG_{historical}$*

Average of historical net electrical energy levels delivered by the existing facility, spanning all data from the most recent available year (or month, week or other time period) to the time at which the facility was constructed, retrofit, or modified in a manner that significantly affected output (i.e. by 5 % or more), shall be used.

To determine $EG_{historical}$, project developer may choose between two historical periods. The use of the longer time period may result in a lower standard deviation and the use of the shorter period may allow a better reflection of the (technical) circumstances observed during the more recent years.

a) The three last calendar years (in case of small hydroelectric power plants five years) prior to the implementation of the project activity; or

b) The time period from the calendar year following $DATE_{hist}$, up to the last calendar year prior to the implementation of the project, as long as this time span includes at least three calendar years (in case of small hydroelectric power plants five years), where $DATE_{hist}$ is latest point in time between:

- the commissioning of the plant/unit;
- if applicable: the last capacity addition to the plant/unit; or
- if applicable: the last overhaul or reconstruction of the plant/unit.

In case of reconstruction where the power plant/unit did not operate for last three (in case of small hydroelectric power plants five years) calendar years before the rehabilitation starts, $EG_{historica}l$ is equal to zero.

6. *Determination of $DATE_{BaselineOverhaul}$*

In order to estimate the point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity ($DATE_{BaselineOverhaul}$), project developer may take into account the typical average technical lifetime of the type equipment[65], which shall be determined and documented in PDD.

The point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity should be chosen in a conservative manner that is, if a range is identified, the earliest date should be chosen.

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 activity[66] 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. Renewable energy generation facilities that have been selected on a competition basis and/or supported under capacity delivery agreement programmes or other state support measures and programmes for renewable energy generation facilities do not meet the additionality conditions under this project activity.

In the case of construction of a new power plant ("Greenfield power plant") or overhaul of an existing solar or wind power plant with BESS / HESS, in order to assess the economic attractiveness of the project activity, the project developer shall use the maximum possible tariff it can obtain by supplying electricity and/or tariffs established in accordance with the legislation of the Russian Federation[67]. to assess the

[65] Defined in the relevant regulatory legal acts of the Russian Federation or documentation (passports) for each type of technical equipment

[66] 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".

[67] Prices (tariffs) and (or) ceiling levels are set by the regulatory authorities in accordance with the goals and principles of state regulation Federal Law (26.03.2003 № 35-FZ) "On Electric Power Industry" and regulatory legal acts, including those establishing the rules for the functioning of wholesale and retail markets. For example, Resolution of the Government of the Russian Federation (29.12.2011 №1178 (rev. dated 31.08.2023)) "On Pricing in the Field of Regulated Prices (Tariffs) in the Electric Power Industry", Resolution of the Government of the Russian Federation (4.05.2012 №442) "On the Functioning of Retail Markets", Order of the Federal Tariff Service (28.03.2013 №313) "On Approval of the Regulations for Setting Prices (Tariffs) and (or) their Limit Levels, providing for the procedure for registration, acceptance for consideration and issuance of refusals to consider applications for setting prices (tariffs) and (or) their limit levels, and the form of decision-making by the

economic attractiveness of the project activity. Only in exceptional cases, when the project developer can justify the provision of load/consumption data and the structure of electricity generation under the project activity, other tariffs may be applied.

5.1. Simplified procedure to demonstrate additionality

Project activities are deemed automatically additional if:

1. The following grid-connected electricity generation technologies are considered:

– Solar photoelectric generation;
– Wind technologies;
– Hydropower (only in terms of small hydroelectric power plants corresponding to the application area of this methodology);
– Tidal and wave technologies;
– Geothermal technologies.

2. Following conditions are demonstrated:

– At the time of PDD application the percentage share of total installed capacity of the specific technology in the total installed grid connected power generation capacity is equal to or less 2%;

The project developer shall provide transparent and documented evidence and justification that the above conditions are fulfilled and applicable to the technology of the project activity. If there are doubts about the evidence provided in the PDD, the validation and verification body has the right to additionally request, and the project developer is obliged to provide all necessary evidence, including the extended additionality justification in accordance with Guidelines №001 on additionality justification of project activities.

6. Monitoring plan requirements

100% of the data should be monitored if not indicated otherwise in the table 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 made with measurement equipment complying with the normative documents for ensuring the uniformity of measurements [68].

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.

The calculation of the parameters, emission factors, source data should be documented electronically that should be attached to the Project design document (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.

The data and parameters monitored as a result of the project activity are given in Appendix 3. If necessary, during crediting period, the project developer may increase the frequency of issuing a monitoring plan for parameters that are not regularly monitored.

7. Project scenario

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

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executive authority of the constituent entity of the Russian Federation in the field of state regulation of prices (tariffs) and (or) their limit levels"

[68] RD 34.09.101-94. Standard Instruction for Electricity Metering in Production, Transmission and Distribution" (approved by the Ministry of Fuel and Energy of the Russian Federation on 02.09.1994) (ed. on 22.09.1998, amended on 13.11.2010)

Economic Development of Russia (11.05.2022 № 248)[60]. The approaches proposed in this methodology are consistent with the standardized approach applied at the international level[61].

For most types of renewable energy projects, except as noted below, project emissions $PE_y = 0$.

In the case of small hydroelectric power plants, since the methodology only considers project activities that are carried out in an existing reservoir without changing the reservoir volume or constructing a new dam-less small hydroelectric power plants and flooding the area, emissions from such project activities for small hydroelectric power plants are equal to zero.

The project emissions are calculated as follows:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{BESS\_HESS,y} \quad 7.1$$

Where:

PE_y	Project emissions in year *y* (t CO_2e/yr)
$PE_{FF,y}$	Project emissions from fossil fuel consumption in year *y* (t CO_2/yr)
$PE_{GP,y}$	Project emissions from the operation of geothermal power plants in year *y* (t CO_2e/yr)
$PE_{BESS\_HESS,y}$	Project emissions from charging of a BESS or water electrolysis for HESS using electricity from the grid or from fossil fuel backup electricity generators (t CO_2e/yr)

7.1. Emissions from fossil fuel combustion ($PE_{FF,y}$)

For project activities that use fossil fuels to generate electricity (the installation has both renewable and non-renewable system components), CO_2 emissions from the combustion of fossil fuels should be accounted for as project emissions ($PE_{FF,y}$).

For all project activities generating electricity from renewable energy sources, the emissions associated with the use of fossil fuels for emergency power supply can be neglected.

If project design documentation assumes the use of a backup power generator (which uses fossil fuel or electricity from the grid) in addition to or instead of the BESS or HESS, the relevant GHG emissions from the backup power generator from fossil fuel combustion should be calculated as project emissions ($PE_{FF,y}$).

The calculation of CO_2 emissions from on-site consumption of fossil fuels by the project activity must be carried out in accordance with the guidelines set out in the Order of the Ministry of Natural Resources of the Russian Federation dated 27.05.2022 No. 371.

The project developer should consider the project emissions associated with charging the BESS or water electrolysis for HESS using backup generators and calculate them using the approach outlined in Section 7.3 below.

7.2. Emissions from geothermal power plants ($PE_{GP,y}$)

This section applies to all types of geothermal power plants and relies on accounting for emissions along the entire process chain in accordance with the design documentation [69].

When implementing projects with geothermal power plants, project developers shall take into account the physical and chemical characteristics of the geothermal heat transfer fluid used and take into account possible emissions of greenhouse gases contained in such heat transfer fluid at all process steps from the well to the turbines according to the technological scheme defined in the design documentation , as well

[69] The following definition is applicable in this case. Design documentation - documentation containing materials in text form and in the form of maps (schemes) and defining architectural, functional-technological, structural and engineering solutions to ensure construction, reconstruction of capital construction objects, their parts, capital repairs. Town-planning Code of the Russian Federation of 29.12.2004 № 190-FZ (ed. of 04.08.2023), Art. 48

as for geothermal power plants of binary cycle take into account possible leakages of the second circuit heat transfer fluid, if such second circuit heat transfer fluid is used in the geothermal power plant.

Non-condensable gases in geothermal reservoirs usually consist mainly of CO_2 and H_2S. They also contain a small quantity of hydrocarbons, including predominantly CH_4. In dry or flash steam geothermal power projects[70], non-condensable gases flow with the steam into the power plant. A small proportion of the CO_2 is converted to carbonate/bicarbonate in the cooling water circuit. In addition, parts of the non-condensable gases are re-injected into the geothermal reservoir.

As a conservative approach, this methodology assumes (if appropriate detailed calculations have not been made on the basis of 1) physical and chemical characteristics of the geothermal heat transfer medium supplied to the steam turbine, and 2) technological solutions applied at the project geothermal power plant according to the project documentation[69]) that all non-condensable gases entering the power plant in dry or flash steam geothermal technologies are discharged to atmosphere via the cooling tower. Fugitive CO_2 and CH_4 emissions due to well testing and well bleeding are not considered, as they are negligible.

$PE_{GP,y}$ is calculated based on the project documentation according to the specifics of the technological scheme of electricity generation applied at the project geothermal power plant and physical and chemical characteristics of the geothermal heat carrier used.

For dry steam, flash steam and binary cycle geothermal power plants, the calculation formulas are given below.

1. Project emissions from *dry or flash steam geothermal power plants* as a result of non-condensable gases emissions:

$$PE_{dry\ or\ flash\ steam,y} = \left(w_{steam,CO2,y} + w_{steam,CH4,y} \times GWP_{CH4}\right) \times M_{steam,y} \quad 7.2$$

Where:

$w_{steam,CO2,y}$	Average mass fraction of CO_2 in the produced steam in year y (t CO_2/t steam)
$w_{steam,CH4,y}$	Average mass fraction of CH_4 in the produced steam in year y (t CH_4/t steam)
GWP_{CH4}	Global warming potential of CH_4 valid for the relevant commitment period (t CO_2e/t CH_4)
$M_{steam,y}$	Quantity of steam produced in year y (t steam/yr)

2. Project emissions from *binary geothermal power plants* as a result of working fluid and non-condensable gases leakeage:

$$PE_{binary,y} = PE_{steam,y} + PE_{working\ fluid,y} \quad 7.3$$

Where:

$PE_{steam,y}$	Project emissions from the operation of binary geothermal power plants due to physical leakage of non-condensable gases in year y (t CO_2e/yr). In case the difference between steam inflow and outflow to the power plant is less than 1%, then the project participants are not required to account these project emissions
$PE_{working\ fluid,y}$	Project emissions from the operation of binary geothermal power plants due to physical leakage of working fluid contained in heat exchangers in year y (t CO2e/yr)

[70] In open-cycle geothermal technology, the underground geothermal fluid comes into contact with the atmosphere through a heat exchange process. In this process, non-condensable and other gases contained in the geothermal fluid are partially released to the atmosphere

$$PE_{steam,y} = (M_{Inflow,y} - M_{outflow,y}) \times (w_{steam,CO2,y} + w_{steam,CH4,y} \times GWP_{CH4}) \quad 7.4$$

Where:

$M_{inflow,y}$	Quantity of steam entering the geothermal plant in year y (t steam/yr)
$M_{outflow,y}$	Quantity of steam leaving the geothermal plant in year y (t steam/yr)
$w_{steam,CO2,y}$	Average mass fraction of CO_2 in the produced steam in year y (t CO_2/t steam)
$w_{steam,CH4,y}$	Average mass fraction of CH_4 in the produced steam in year y (t CH_4/t steam)
GWP_{CH4}	Global warming potential of CH_4 valid for the relevant commitment period (t CO_2e/t CH_4)

$$PE_{working\ fluid,y} = M_{working\ fluid,y} \times GWP_{working\ fluid} \quad 7.5$$

Where:

$M_{working\ fluid,y}$	Quantity of working fluid leaked/reinjected in year y (t working fluid/yr)
$GWP_{working\ fluid}$	Global Warming Potential for the working fluid used in the binary geothermal power plant

7.3. Emissions from charging of a BESS or water electrolysis for HESS using power from the grid or from fossil fuel electricity backup generators ($PE_{BESS\_HESS,y}$)

Under normal conditions, BESS shall be charged or HESS shall produce hydrogen from water electrolysis from the electricity generated by the associated renewable power plant. Exceptionally (in emergency cases), the BESS may be charged or HESS may produce hydrogen using grid electricity or electricity from fossil fuel backup generators ($PE_{BESS\_HESS,y}$).

In cases where BESS is charged or hydrogen is produced in HESS using grid electricity, the corresponding project emissions ($PE_{BESS\_HESS,y}$) may be calculated based on recommendations from Appendix 1.

In cases where BESS is charged or hydrogen is produced in HESS using electricity from fossil fuel backup generators, the corresponding project emissions ($PE_{BESS\_HESS,y}$) shall be calculated according to the methodological guidelines set out in the Order of the Ministry of Natural Resources of the Russian Federation № 371 27.05.2022, taking into account the volume of burnt fuel and the procedure.

In line with the requirement under paragraph 2.2, the BESS charging or HESS hydrogen production using the grid or using fossil fuel backup electricity generator shall not amount to more than 2% of the electricity generated by the project renewable energy plant during a monitoring period. During the periods where the BESS / HESS consumes more than 2% of the electricity for charging / hydrogen production, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned period.

7.4. Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (7.6)$$

Where:

ER_y	Emission reductions in year *y* (t CO_2e/y)
BE_y	Baseline Emissions in year *y* (t CO_2/y)

PE_y Project emissions in year y (t CO_2e/y)

7.5. 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 4.

8. Leakage assessment

According to the Order of the Ministry of Economic Development of Russia dated 11.05.2022 №248[71] 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 leaks[72] exist in accordance.

For this type of project, the project developer is not required to consider other sources of emissions as leakage: i.e., emissions potentially arising from activities such as power plant construction and emissions from fossil fuel use (e.g., mining, refining, transport, etc.) are not taken into account.

At the same time, if the project developer anticipates or knows of potential leakage due to project activities, they should independently determine the most appropriate methods to be used for leakage estimation, document and justify the algorithms to be used for the validation and verification body, including approaches applied internationally.

Possible types of leakage:

1. *Leakage due to equipment replacement/transfer*. If the project activity involves the replacement of equipment, the absence of leakage due to the possible reuse of the replaced equipment in another activity should be justified and documented. Disposal of the replaced equipment should be documented.
2. *Leakage from the combustion of fossil fuels outside the project boundary.* This type of leakage may occur in a situation where fossil fuels in the baseline scenario are displaced by renewable energy in the project activity, including underestimating the impact of project activities, resulting in increased electricity generation from other carbon-intensive facilities outside the project boundary.

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[71] Appendix № 1 to the order of the Ministry of Economic Development of Russia of May 11, 2022 № 248, paragraph "в"

[72] 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)

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.

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.

The project developer must certify that the project is not associated with the significant conversion or degradation of critical natural habitats, including those that are:

1. are protected by law;
2. formally proposed for protection;
3. are recognised by authoritative sources because of their high conservation value;
4. are recognised as protected by traditional local communities.

Project activities should also not lead to depletion of natural ecosystems, degradation of ecosystem functions of local biomes and freshwater ecosystems. The project developer must demonstrate that there will be no impact on the hydrological network or other impact on the hydrological regime of adjacent areas. Otherwise, the project activity is not considered a climate project and is not eligible for carbon crediting.

When preparing and implementing a climate project, the project developer is recommended to take into account the sustainable development goals in accordance with GOST R ISO 14080-2021.

The project developer should document in the PDD and provide information to the validation and verification body on the risk that the project may lead to negative impacts. For this type of projects, it is also necessary to consider the negative environmental impacts of the project from the dismantling, recycling and disposal activities of the installed equipment after the project is completed.

Efforts should be made to avoid double counting[73] 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.

In order to prevent double counting, the results of projects registered in the National Registry cannot be re-registered in other registries. Validation and verification bodies are recommended during the validation procedure of the climate project to exclude double counting of the same project in the National Register, taking into account the submitted applications from different legal entities, as well as subsequently (stage of implementation of the climate project) to monitor the number of carbon credits discharged in order to prevent double discharge of carbon credits for the same reduction (avoidance) of GHG emissions.

[73] The definition is given in the notes in section 2.2

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 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 5).

12. Normative references

1. AMS-I.F.: Renewable electricity generation for captive use and mini-grid. Version 5.0. 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. GOST R ISO 14066-2013. National Standard of the Russian Federation. Greenhouse gases. Requirements for competence of greenhouse gas validation and verification groups (approved and enacted by Order of Rosstandart of 17.12.2013 № 2274-st);
9. 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);
10. 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.
11. 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"
12. ACM0002: Grid-connected electricity generation from renewable sources. Version 21.0. CDM Methodology
13. AMS-I.A. Electricity generation by the user. Version 19.0. CDM Methodology
14. AMS-I.D. Grid connected renewable electricity generation. Version 18.0. CDM Methodology
15. TOOL01 Methodological tool. Tool for the demonstration and assessment of additionality. Version 07.0.0. CDM Methodology
16. TOOL03 Methodological tool. Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion. Version 03.0. CDM Methodology
17. TOOL05 Methodological tool. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation. Version 03.0. CDM Methodology
18. TOOL07 Methodological tool. Tool to calculate the emission factor for an electricity system. Version 07.0. CDM Methodology
19. 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
20. TOOL16: Project emissions from cultivation of biomass. Version 5.0. CDM Methodology
21. TOOL33: Default values for common parameters. Version 2.0. CDM Methodology
22. FCCC/KP/CMP/2005/8/Add.1 Annex II Simplified modalities and procedures for small-scale clean development mechanism project activities, 30.03.2006
23. TOOL № 001. Demonstration of the additionality of the project activity
24. Federal Law No. 35-FZ "On Electric Power Industry" dated March 26, 2003 (as amended and supplemented)
25. GOST R IEC 62485-5-2021 Batteries and battery installations. Safety requirements. Part 5. Safety of stationary lithium-ion batteries.
26. GOST R 54531-2011 Non-conventional technologies. Renewable and alternative energy sources. Terms and definitions.
27. GOST R 58092.5.1-2018 (IECTS 62933-5-12017) Electric energy storage systems (EESS). Safety of systems operating as part of the grid. General requirements.
28. GOST R 56909-2016 Non-conventional technologies. Geothermal energy. Terms and definitions.
29. GOST R 58092.3.3- 2023 Electric energy storage systems. Design and evaluation of operating parameters.
30. GOST R 70787-2023 Unified energy system and isolated energy systems. Renewable energy sources. Technical requirements for photovoltaic solar plants.
31. GOST R 58092.3.2-2023 Electric energy storage systems. Design and evaluation of operating parameters. Applications with preferential power utilization and integration with renewable energy sources
32. GOST 21027-2021. Interstate standard. Electric power systems. Terms and Definitions.

33. GOST R 55005-2012 Renewable energy. Geothermal power plants. Structures. Security requirements. The main provisions.
34. GOST R 70214-2022. Hydraulic engineering. Basic concepts. Terms and definitions.
35. GOST 19431-84. Energy and electrification. Terms and definitions.
36. GOST 24291-90 Interstate standard. The electrical part of the power plant and the electrical network. Terms and definitions.
37. 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.
38. The Tax Code of the Russian Federation (Part Two) of 05.08.2000 No. 117-FZ (ed. of 18.03.2023) (with amendments and additions, intro. effective from 01.04.2023)
39. Order of the Ministry of Energy of the Russian Federation No. 1013 dated October 25, 2017 "On Approval of Requirements for Ensuring the Reliability of Electric Power Systems, Reliability and Safety of Electric Power Facilities and Power Receiving Installations "Rules for the Organization of Maintenance and Repair of Electric Power Facilities" (with amendments and additions)

Appendix 1. Recommended approach for calculation of grid emissions factor (emission factor for an electricity system)

1. Currently, there are no legislatively approved grid emission factors for greenhouse gases (GHG) in the Russian Federation. This appendix, developed for climate project methodologies, provides a recommended approach for determining the grid emission factor and is one of the possible solutions to this problem. It is up to the project developer to determine the most relevant approach and sources of information, if available.

2. Association "NP Market Council (Sovet Rynka)" and JSC "ATS" have developed a concept for calculating and publishing greenhouse gas emission factors for the energy system of the Russian Federation[74]. Based on the results of the peer review, independent international auditors issued an assurance certificate, and this concept received a validation report[75].

Currently, the ATS website provides information on the greenhouse gas emission factor of the Russian energy grid system[76]. In the absence of the possibility of independent calculation of the grid emission factor, the project developer may be guided by the information of this resource.

3. If the initial data required to calculate the grid emission factor for the baseline and project scenarios is available, the climate project developer has the right to calculate it independently. In this case, it is recommended to use the Guidelines for the quantitative calculation of the volume of indirect energy emissions of greenhouse gases (Order of the Ministry of Natural Resources № 330 (29.06.2017)[77]) and the principles for calculating indirect energy emissions defined in GOST R ISO 14064-1-2021[78].

To determine the grid emission factor, a regional method for calculation of indirect energy emissions is used, which reflects the average intensity of greenhouse gas emissions at facilities generating electrical energy (within the boundaries of project activities) (Order of the Ministry of Natural Resources № 330).

According to GOST R ISO 14064-1-2021 (Appendix E), emissions from imported electricity must be calculated by the project developer using a location-based approach[79] by applying an emission factor that best characterizes the relevant electric power system, i.e. leased transmission line, local, regional or national grid average emission factor. The grid-averaged emission factors should refer to the emissions of the reporting year, if available, or otherwise the latest available year. Grid-averaged emission factors for imported electricity should be based on the average consumption pattern from the electric power system from which the electricity is consumed.

Grid emission factors may also include other indirect emissions associated with electricity generation, such as transmission and distribution losses.

The requirements and guidance described in ISO 14064-1-2021 for electricity also apply to consumed and transferred heat, steam, cooling air and compressed air.

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[74] The concept of calculation and publication of greenhouse gas emission factors for the energy system of the Russian Federation URL: https://www.np-sr.ru/sites/default/files/koncepciya_kev.pdf

[75] As part of the validation procedure, a detailed verification of the Concept was carried out for its compliance with the requirements of the international standards in the field of accounting and reporting on greenhouse gas emissions (TÜV AUSTRIA). Based on the results of the audit, the Concept was recognized by international experts as complying with high international standards and best international practices for calculating energy system emission factors. URL: https://www.np-sr.ru/sites/default/files/zaklyuchenie_o_validacii_koncepcii.pdf

[76] https://www.atsenergo.ru/results/co2all

[77] 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"

[78] 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 30.09.2021 №1029-st)

[79] The location-based approach is a method for quantifying indirect energy emissions based on average emission factors from energy production for a given geographic location, including local, regional or national boundaries

In case of energy from cogeneration facilities, it is necessary to use approaches to separate various forms of energy[80].

4. According to IEA (International Energy Agency) calculations, the energy grid emission factor in Russia is 350 g/kWh[81]. The factor reflects the average carbon intensity of electricity and heat generation for the Russian Federation. The use of this resource by the project developer is the least favoured of all options.

5. Methods and approaches applied project developer to the calculation of the grid emission factor should be documented and specified in the PDD. It is necessary to justify the chosen calculation methodology, disclose information about the source of the initial data used, transparently and accurately document your own procedure for calculating the grid emission factor, or describe the properties of the selected and applied grid emission factor.

[80] For example, calculation of specific fuel consumption in accordance with the "Guidelines for the distribution of specific fuel consumption in the production of electrical and thermal energy within combined generation of electrical and thermal energy, used for the purpose of tariff regulation in the heat supply", legislatively approved by the Order of the Ministry of Energy of the Russian Federation (12.09.2016 №952)

[81] https://www.iea.org/data-and-statistics/data-product/emissions-factors-2023#emissions-factors

Appendix 2. Recommended approach for calculation of indirect energy emissions factor for captive use and mini-grid

1. Calculation of the indirect energy emissions factor for captive use and mini-grid electricity consuming is carried out by the market approach (Order of the Ministry of Natural Resources of Russia №330 29.06.2017[82]).

2. The market approach is used when the electricity consumed is received under bilateral contracts for the sale of electricity, signed in accordance with the rules of the wholesale electricity and capacity market and the operation of retail electricity markets[83]. Market factors of indirect energy emissions are indicated in sales contracts, in retail electricity markets contracts; or provided in certificates confirming the volume of electricity production at generating facilities produced from renewable energy sources, information about which is entered in the register[84]; or calculated based on the volumes of electricity received from specific external generating facilities in accordance with the terms of sales contracts, retail market contracts or certificates for the reporting period. Methodological guidelines for the calculation are set out in the Order of the Ministry of Natural Resources of Russia №330 29.06.2017.

3. If the supplier of electricity under sales contracts, retail market contracts or certificates has several generating facilities[85], the market factor is determined only for the generating facility (or generating facilities) from which (or from which) electricity is received by the consumer.

4. If additional electrical energy is consumed under project activity, that was not declared by sales contracts, retail market contracts or certificates (undeclared balance of electricity, i.e. the amount of electricity consumed in excess of the established contract(s) and/or certificate(s)), then the volume of the undeclared balance of electrical energy is determined based on the information of electricity received from external generating facilities located in the regional energy system. Thus, indirect energy emissions from the consumption of electricity received under contracts and/or certificates are calculated based on the market approach, and indirect emissions from the consumption of undeclared balance of electricity - using location-based approach (see Appendix 1).

5. In the Russian Federation there are generating facilities that do not connected with the Unified Energy System of Russia - Technologically isolated territorial electric power system (TITEPS[86]). In such cases, calculation of indirect energy emissions should be based on the individual emission factors of all generating facilities included in isolated grid (the Order of the Ministry of Natural Resources of Russia №330 29.06.2017).

6. The project developer needs to ensure that the used approaches and data comply with the general requirements and guidance for considering imported electricity consumed for project activity set out in GOST R ISO 14064-1-2021[87] (Appendix E).

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[82] 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"

[83] Federal Law "On the Electric Power Industry" with amendments and additions (26.03.2003 №35-FZ)

84 Decree of the Government of the Russian Federation "On some issues related to the certification of volumes of electrical energy produced at generating facilities operating on the use of renewable energy sources" with amendments and additions (№117 17.02.2014)

[85] For example, hydropower stations or thermal power stations

[86] Technologically isolated territorial electric power system (TITEPS) - an electric power system located on the territory determined by the Government of the Russian Federation, which has no technological connection with the Unified Energy System of Russia (GOST R 57114-2016 Unified energy system and isolated operating energy systems. Electric power systems. Operational and dispatching management in the electric power industry and operational-technological management. Terms and definitions.)

[87] 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 30.09.2021 №1029-st)

7. Used input data sources, applied methods and approaches should be documented and specified in the PDD. It is necessary to justify the chosen calculation methodology, disclose information about the source of the initial data used, transparently and accurately document procedure for calculating indirect energy emission factor based on market approach.

Appendix 3. Data and parameters monitored

General parameters to be monitored as a result of climate project implementation activities.

Table A3.1. Data and parameters monitored

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Comment
1	$EF_{CO2,y}$	t CO_2/MWh	CO2 emission factor for the grid/minigrid/captive electricity in year y	Values provided by the fuel supplier in invoices is the preferred source.	As prescribed in section 3 and Appendixes 1 and 2	Monthly or in accordance with the electricity purchase schedule	-	See the guidelines set out in the Order of the Ministry of Natural Resources and Ecology of the Russian Federation dated 29.06.2017 № 330
2	-	t CO_2/MJ	CO_2 emission factor of fossil fuel type i	Values provided by the fuel supplier in invoices is the preferred source. In the absence of such data, it is necessary to use measurements by the project developer	Measurements should be undertaken in line with national or international fuel standards	Monthly or according to fuel purchase schedule	-	See the guidelines set out in the Order of the Ministry of Natural Resources of the Russian Federation dated 27.05.2022 No. 371
3	-	MJ per unit volume or mass unit	Net calorific value of fossil fuel type i	Values provided by the fuel supplier in invoices is the preferred source. In the absence of such data, it is necessary to use measurements by the project developer	Measurements should be undertaken in line with national or international fuel standards	Monthly or according to fuel purchase schedule	Verify if the values within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines	See the guidelines set out in the Order of the Ministry of Natural Resources of the Russian Federation dated 27.05.2022 No. 371
4	-	Mass or volume unit/y	Quantity of fossil fuel consumed in year y	Values provided by the fuel supplier in invoices is the preferred source. In the absence of such data, it is necessary to use measurements by the project developer	Measurements should be undertaken in line with national or international fuel standards	Monthly or according to fuel purchase schedule	Check consistency of the monitored records with the records from previous monitoring intervals. The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes	-
5	$EG_{BL,y}$	MWh/y	Quantity of net electricity displaced in year y	Electricity meter(s)	Measurements should be undertaken in line with national or international fuel standards It is recommended to monitored using bi-directional energy meter. Use electricity meters installed at the grid interface for electricity	Continuous monitoring, hourly measurement and at least monthly recording	-	-

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Comment
					export to grid and for supply to captive consumers use electricity meters installed at the entrance of the electricity consuming facility.			
6	$EG_{BL,facility,y}$	MWh	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	Electricity meter(s)	Measurements should be undertaken in line with national or international fuel standards It is recommended to monitored using bi-directional energy meter or calculated as difference between 1. the quantity of electricity supplied by the project plant/unit to the grid; and 2. the quantity of electricity the project plant/unit from the grid. In case it is calculated then the following parameters shall be measured: 1. the quantity of electricity supplied by the project plant/unit to the grid; and 2. the quantity of electricity delivered to the project plant/unit from the grid	Continuous monitoring, hourly measurement and at least monthly recording	-	-
7	$EG_{BL,add,y}$	MWh	Quantity of net electricity generation supplied to the grid in year y by the project plant/unit that has been added under the project activity	Electricity meter(s)	Measurements should be undertaken in line with national or international fuel standards If applicable, measurement results shall be cross checked with documents for sold/purchased electricity. This parameter should be either monitored using bi-directional energy meter or calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity the project plant/unit from the grid. In case it is calculated then the following parameters shall be measured: (a) The quantity of electricity supplied by the project plant/unit to the grid; and (b) The quantity of electricity delivered to the project plant/unit from the grid	Continuous monitoring, hourly measurement and at least monthly recording		Applicable to wind, solar, wave, tidal power plants/units.
8	$\sigma_{historical}$	MWh	Standard deviation of the annual average historical net electricity generation delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity	Calculated from data used to establish $EG_{historical}$	Calculated from data used to establish $EG_{historical}$ Parameter to be calculated as the standard deviation (for overhaul, reconstruction or modernization/technical re-equipment project activities)	-	-	-
9	$w_{steam,CO2,y}$	t CO_2/t steam	Average mass fraction of carbon dioxide in the produced steam in year y	Measurements at the site of project activities	Non-condensable gases sampling should be carried out in production wells and/or at the steam field-power plant interface using ASTM Standard Practice E1675 for Sampling 2-Phase Geothermal Fluid for Purposes of Chemical Analysis (as applicable to sampling single phase steam only).	At least every three months and more frequently, if necessary	-	Applicable to dry or flash steam geothermal power projects

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Comment
					The CO_2 and CH_4 sampling and analysis procedure consists of collecting non-condensable gases samples from the main steam line with glass flasks, filled with sodium hydroxide solution and additional chemicals to prevent oxidation. H_2S and CO_2 dissolve in the solvent while the residual compounds remain in their gaseous phase. The gas portion is then analyzed using gas chromatography to determine the content of the residuals including CH_4. All alkanes concentrations are reported in terms of methane			
10	$w_{steam,CH4,y}$	t CH_4/t steam	Average mass fraction of methane in the produced steam in year y	Measurements at the site of project activities	As per the procedures outlined for $w_{steam,CO2,y}$	As per the procedures outlined for $w_{steam,CO2,y}$	-	Applicable to dry or flash steam geothermal power projects
11	$M_{steam,y}$	t steam/year	Quantity of steam produced in year y	Measurements at the site of project activities	The steam quantity discharged from the geothermal wells should be measured with a Venturi flow meter (or other equipment with at least the same accuracy). Measurement of temperature and pressure upstream of the Venturi meter is required to define the steam properties. The calculation of steam quantities should be conducted on a continuous basis and should be based on national or international standards. The measurement results should be summarized transparently in regular production reports	Daily	-	Applicable to dry or flash steam geothermal power projects
12	$M_{inflow,y}$	t steam/year	Quantity of steam entering the geothermal plant in year y	Measurements at the site of project activities	As per the procedures outlined for $M_{steam,y}$	Continuous	The flow meter must be calibrated according to the national, international, or manufacturer's instructions. The recorded data must be stored daily in a database with backup	-
13	$M_{outflow,y}$	t steam/year	Quantity of steam leaving the geothermal plant in year y	Measurements at the site of project activities	As per the procedures outlined for $M_{steam,y}$	Continuous	The flow meter must be calibrated according to the national, international, or manufacturer's instructions. The recorded data must be stored daily in a database with backup	-
14	$M_{working\ fluid,y}$	t working fluid/year	Quantity of working fluid leaked/reinjected in year y	Measurements at the site of project activities	Measured via log books and maintenance reports of the plant	Annually	Measured from the amount of working flow reinjected to the binary system of the geothermal plant. Cross check with the purchase invoices	-

Appendix 4. Risk management

Table A4.1. 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 5. 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 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.