Climate project methodology № 0007

Grid-connected electricity generation from renewable sources

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1. Terms and Definitions

1. The following definitions apply for the purpose of this methodology[1]:

(a) **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];

(b) **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];

(c) **Capacity addition -** a capacity addition is an investment to increase the installed power generation capacity of existing power plants through: (i) the installation of a new power plants besides the existing power plants; or (ii) the installation of new power plants, additional to the existing power plants. The existing power plants in the case of capacity addition continue to operate after the implementation of the project activity;

(d) **Connected electricity system -** is an electricity system[7] that is connected by transmission lines to the project electricity system;

(e) **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;

(f) **Geothermal power plan -** a power plant that uses natural steam or thermal water with high thermal potential to generate electricity[8];

(g) **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;

(h) **Grid power plant -** a power plant that supplies electricity to an electricity grid and, if applicable, to specific consumers. This means that power plants supplying electricity to the grid and specific captive consumers at the project are considered as a grid power

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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 realised on the basis of accumulator batteries

[5] GOST R MEK 62485-5-2021 Secondary batteries and battery installations. Safety requirements Part 5. Safe operation of stationary lithium-ion batteries

[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] A connected electricity system can be, among other things, an interconnected electricity system or a separate energy district.

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

plant, while power plants that serve only captive consumers and do not supply electricity to the grid are not considered as a grid power plant;

(i) **Grid / Electric power system -** electric power industry facilities and power receiving installations of electric power consumers connected by a common operating mode in a single technological process of production, transmission and consumption of electric power under conditions of centralised operational dispatch control in the electric power industry[9] [10];

(j) **Hydrogen energy storage system (HESS)**[11] **-** an energy storage system using hydrogen that consists of an electrolyser, a hydrogen storage tank and a fuel cell[12];

(k) **Installed power, rated power -** the power with which the electrical installation, equipment can operate for a long time under nominal parameters and/or normal conditions[13]. 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[14] [15];

(l) **Interconnected electricity system -** several territorial electricity systems located within the territory of one country and united by a common mode of operation, having a common (centralised) operational dispatch control as the highest level of control in relation to the dispatch centres of its constituent energy systems[16];

(m) **Modernization (fixed asset completion, equipping, replacement**[17]**) -** 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 qualities[18], i.e. it is the replacement of outdated equipment with new due to functional wear. Modernization of the electric power industry includes not only decommissioning of old, physically and morally obsolete equipment, reconstruction of low-efficiency equipment

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[9] GOST 21027-2021. Electric power systems. Terms and definitions.

[10] Reference methodologies developed within the framework of the Clean Development Mechanism (ACM0002) 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.

[11] 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.

[12] In the context of this methodology, Hydrogen energy storage system 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.

[13] 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.

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

[15] Reference methodologies developed within the framework of the Clean Development Mechanism (ACM0002) use the following interpretation for this term: **Installed power generation capacity (or installed capacity or nameplate capacity)** - the installed power generation capacity of a power unit is the capacity, expressed in Watts or one of its multiples, for which the power unit has been designed to operate at nominal conditions. The installed power generation capacity of a power plant is the sum of the installed power generation capacities of its power units.

[16] GOST 21027-2021. Electric power systems. Terms and definitions.

[17] Reference methodologies developed within the framework of the Clean Development Mechanism (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.

[18] 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.

and replacement of technologies with modern ones, but also the creation of fundamentally new equipment and energy technologies;

(n) **Net electricity generation** - the difference between the total amount of electricity produced by the power plant and the additional electricity consumption of the power plant[19];

(o) **Operation of energo-system / dispatch control** - organisation of control over the electric power regime of the power system, when the technological mode of operation or operational state of electric power facilities, power receiving installations of electric power consumers, equipment and devices are changed only by dispatch command of the dispatcher of the relevant dispatching centre or by direct impact on the technological mode of operation or operational state of dispatching facilities using remote control means[20];

(p) **Overhaul**[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];

(q) **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] [24];

(r) **Project electricity system** - is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that are covered by either single or layered dispatch area;

(s) **Reconstruction** - 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[18]. The reconstruction of existing energy enterprises includes the reconstruction of existing workshops and facilities for the main, auxiliary and maintenance purposes of power

[19] For example, for pumps, fans, controls, etc.

[20] GOST P 57114-2016. Unified energy system and isolated power systems. Electric power systems. Operational dispatch control in the electric power industry and operational and technological control. Terms and definitions.

[21] Reference methodologies developed within the framework of the Clean Development Mechanism (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 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).

[23] 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 (ACM0002) use the following interpretation for this term: **Power plant/unit** - a power plant/unit is a facility that generates electric power. Several power units at one site comprise one power plant, whereas a power unit is characterized by the fact that it can operate independently from other power units at the same site. Where several identical power units (i.e. with the same capacity, age and efficiency) are installed at one site, they may be considered as one single power unit.

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[25] that do not meet the requirements of sanitary standards and ecology;

(t) **Renewable energy sources**[26] **-** solar energy, wind energy, water energy (including wastewater energy), except for cases when such energy is used at hydro-storage 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 (including plants specially grown for energy production, including trees, for energy production, as well as production and consumption wastes, except for wastes obtained in the process of using hydrocarbon raw materials and fuels), biogas, gas emitted by production and consumption wastes at the landfills of such wastes, gas generated at coal mines[27];

(u) **Solar power plant -** a power plant designed to convert the energy of solar radiation into electrical energy[28];

(v) **Technical re-equipment**[18] **-** 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[29];

(w) **Tidal power station -** a hydroelectric power station that uses the energy of sea tides[30];

(x) **Wind electrical power station**[31] **-** 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

2. 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[32] generation projects that include:

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[25] Reference methodologies developed within the framework of the Clean Development Mechanism (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.

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

[27] This methodology only considers project activities involving renewable energy sources such as solar, wind, water, tidal, geothermal.

[28] 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 stations.

[29] 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)

[30] GOST R 55005-2012 Renewable energy. Geothermal power plants. Structures. Safety requirements. Basic provisions.

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

[32] 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.

Table 1. Methodology key elements

Typical projects	Overhaul, reconstruction, modernization/**t**echnical re-equipment or capacity addition to an existing power plant or construction and operation of a new power plant that uses renewable energy sources and supplies electricity to the grid. 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 grid by more-GHG-intensive means

Given methodology is unaffected by applying to GHG programs[33]. If a GHG program is applied[34], 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 of the Kyoto Protocol (ACM0002) and includes its adaptation to the current Russian regulations and standards.

2.1. Scope

3. This methodology applies to grid-connected renewable energy generation project activities that include[35]:

   (a) Construction and operation of a Greenfield power plant; or

   (b) Overhaul, reconstruction, modernization/technical re-equipment or capacity addition of an existing power plant.

4. Further, the methodology applies to grid-connected renewable energy generation project activities which integrate BESS / HESS to a Greenfield power plant or to an existing solar photovoltaic or wind power plant.

5. In case of changes in the cited acts of national legislation, this methodology shall be revised to reflect the relevant changes[36].

2.2. Applicability

6. This methodology is applicable to grid-connected renewable energy power generation project activities that:

   (a) Install a Greenfield power plant;

   (b) Involve a capacity addition to (an) existing plant(s);

   (c) Involve a overhaul of (an) existing operating plant(s);

[33] Greenhouse gas program; GHG program: A voluntary or binding international, national, or subnational system or scheme that inventories, accounts for, and manages GHG emissions, GHG uptake, emission reductions, or increases GHG uptake outside the boundaries of a GHG organization or project (GOST R ISO 14064-2021. National Standard of the Russian Federation. Greenhouse gases. Part 1-3)

[34] An example of GHG programs in Russia - GOST R ISO 14064-1-2021 (accounting and management of GHG emissions at the organization level), GOST R ISO 14064-2-2021 (accounting and management of GHG emissions at the project level), GOST R ISO 14067-2021 (carbon footprint of products); at the international level - the European Emissions Trading System (EU ETS), the Clean Development Mechanism (CDM), GHG reporting standard at the level of the organization / project / product lifecycle and corporate value chain (GHG Protocol), Carbon Verification Standard (Verified Carbon Standard, VCS), Gold Standard (Gold Standard), etc.

[35] Compliance with the requirements of this methodology can be claimed when all the requirements of this methodology are met, except for the recommendations specified in Sections 6, 7, and the risk management recommendations.

[36] The project developer should take into account that the normative documents cited in the text may be changed or cancelled.

(d) Involve a reconstruction of (an) existing plant(s); or

(e) Involve a modernization/technical re-equipment of (an) existing plant(s).

7. The methodology is applicable to project activities that may implement BESS or HESS[37] technologies for new renewable energy power plants or existing solar or wind power plants.

8. 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.

9. In case the project activity involves the integration of a BESS / HESS, the methodology is applicable to grid-connected renewable energy power generation project activities that:

(a) Integrate BESS / HESS with a Greenfield power plant;

(b) Integrate a BESS / HESS together with implementing a capacity addition to (an) existing solar photovoltaic or wind power plant(s);

(c) Integrate a BESS / HESS to (an) existing solar photovoltaic or wind power plant(s) without implementing any other changes to the existing plant(s);

(d) Integrate a BESS / HESS together with implementing a overhaul of (an) existing solar photovoltaic or wind power plant(s).

Table 2. Combinations of renewable energy technologies and mode of BESS / HESS applicable for integration

Renewable Energy Technology / **Mode of installation of BESS / HESS**	**Solar photovoltaic or wind**	**Other renewable technologies**
BESS / HESS + (a) Greenfield plant(s)	Eligible	Eligbile
BESS / HESS+ capacity addition to existing plant(s)	Eligible	Not eligible
BESS / HESS with no other changes to the existing plant(s)	Eligible	Not eligible
BESS / HESS + overhaul to existing plant(s)	Eligible	Not eligible

10. The methodology is applicable under the following conditions:

(a) For wind power plants, geothermal power plants, solar power plants, wave power plants or tidal power plants;

(b) In the case of capacity additions, overhauls, reconstructions or modernizations/technical re-equipment (except for wind, solar, wave or tidal power capacity addition projects) 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;

[37] 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.

(c) In case of Greenfield project activities applicable under paragraph 9 (a) above, the project participants shall demonstrate that the BESS / HESS was an integral part of the design of the renewable energy project activity (e.g. by referring to feasibility studies or investment decision documents);

(d) 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 (using fossil fuel or electricity from the grid) in addition to or instead of the BESS or HESS[38], the relevant GHG emissions from the backup power generator[39] (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 7.1.3 ниже. 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 per cent of the electricity generated by the project renewable energy plant during a monitoring period[40]. During the time periods (e.g. week(s), months(s)) when the BESS / HESS consumes more than 2 per cent 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).

11. The methodology is not applicable to:

(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;

(b) Biomass fired power plants.

12. In the case of overhauls, reconstructions, modernizations/technical re-equipment, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.

13. In case of changes in the cited acts of national legislation, this methodology shall be revised to reflect the relevant changes[41].

2.3. Project boundary

14. The boundary of the project activity (including territorial boundaries) includes industrial and commercial facilities that consume electricity generated by the generating facilities. The boundary also includes the project power plant and all power plants physically connected to the grid to which the project power plant is connected.

15. The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 3.

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

[39] 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

[40] 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.

[41] The project developer should take into account that the normative documents cited in the text may be changed or cancelled.

16. The project documentation shall include a description of the procedures for eliminating the possibility of double counting[42] of GHG emission reductions potentially achieved as a result of project activities, including double usage in different decarbonisation instruments (e.g renewable energy certificates).

Table 3. Emission sources included in or excluded from the project boundary

<table>
<tr><th colspan="2">Source</th><th>Gas</th><th>Included</th><th>Justification/explanation</th></tr>
<tr><td rowspan="3">Baseline</td><td rowspan="3">CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity</td><td>CO_2</td><td>Yes</td><td>Main emission source</td></tr>
<tr><td>CH_4</td><td>No</td><td>Minor emission source</td></tr>
<tr><td>N_2O</td><td>No</td><td>Minor emission source</td></tr>
<tr><td rowspan="10">Project activity</td><td rowspan="4">For 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</td><td>CO_2</td><td>Yes</td><td>Main emission source</td></tr>
<tr><td>CH_4</td><td>Yes</td><td>Main emission source</td></tr>
<tr><td>Refrigerants[43]</td><td>Yes</td><td>Main emission source (if applicable according to the project documentation)</td></tr>
<tr><td>N_2O</td><td>No</td><td>Minor emission source</td></tr>
<tr><td rowspan="3">CO_2 emissions from combustion of fossil fuels for electricity generation in wind power plants, solar thermal power plants</td><td>CO_2</td><td>Yes</td><td>Main emission source</td></tr>
<tr><td>CH_4</td><td>No</td><td>Minor emission source</td></tr>
<tr><td>N_2O</td><td>No</td><td>Minor emission source</td></tr>
<tr><td rowspan="3">Charging of BESS or water electrolysis for HESS using electricity from the grid or from fossil fuel backup electricity generators</td><td>CO_2</td><td>Yes</td><td>Main emission source</td></tr>
<tr><td>CH_4</td><td>No</td><td>Minor emission source</td></tr>
<tr><td>N_2O</td><td>No</td><td>Minor emission source</td></tr>
</table>

3. Baseline methodology

17. The baseline[44] is set conservatively[45] for a business-as-usual activity, taking into account all existing policies and measures, but not considering additional project activities (Business-as-usual model).

18. The project developer may use one of the following approaches to determine the baseline with justification for the appropriateness of the choices[46]:

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[42] 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

[43] GWP - global warming potential. For GWP coefficients the latest version of GOST R 56267-2014 is to be used. In case of adoption of new legislations and national standards with updated GWPs, the updated versions shall be applied.

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

[45] 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.

(a) best available technologies[47] that represent an economically feasible and environmentally sound course of action;

(b) 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;

(c) an approach based on existing actual or historical emissions, adjusted downwards by at least 5%, unless otherwise specified in the project methodology.

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

20. 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)[48]. The approaches proposed in this methodology are consistent with the standardized approach applied at the international level[49].

21. Project developer has the right to use methodologies and CO_2 emissions factors legislatively approved within the territory of the Russian Federation[50]. 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

3.1.1. Baseline scenario for Greenfield power plant

22. If the project activity is the installation of a Greenfield power plant with or without a BESS / HESS as described under paragraph 6(a) or paragraph 9(a), the baseline scenario is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

3.1.2. Baseline scenario for capacity addition to an existing renewable energy power plant or integration of a BESS / HESS to an existing solar photovoltaic or wind power plant

23. If the project activity is a capacity addition with or without a BESS / HESS to an existing grid-connected renewable energy power plant as described under paragraph 6(b) or paragraph 9(b) or is 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) as described under paragraph 9(c), the baseline scenario is the existing facility that would continue to supply

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[46] 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.

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

[48] 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"

[49] Methodology ACM0002. Large-scale Consolidated Methodology. Grid-connected electricity generation from renewable sources.Version 21.0. CDM Methodology

[50] 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"

electricity to the grid at historical levels, until the time at which the generation facility would likely be modernized or overhauled ($DATE_{BaselineOverhaul}$), and electricity delivered to the grid by the added capacity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.

3.1.3. Baseline scenario for overhaul, reconstruction or modernization/technical re-equipment of an existing power plant

24. If the project activity is overhaul, reconstruction or modernization/technical re-equipment of an existing plant as described under paragraph 6(c) or paragraph 6(d) or paragraph 6(e), the following step-wise procedure corresponding to the Guidelines №001 to identify the baseline scenario shall be applied, including Step 1 (Identify realistic and credible alternative baseline scenarios for power generation), Step 2 (Barrier Analysis), Step 3 (Investment Analysis).

25. Considered options of Step 1 of Guidelines №001 shall include:

(a) The project activity not implemented as a climate project;

(b) The continuation of the current situation, that is to use all power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance. The additional power generated under the project would be generated in existing and new grid-connected power plants in the electricity system; and

(c) All other plausible and credible alternatives to the project activity that provide an increase in the power generated at the site, which are technically feasible to implement. This includes, inter alia, different levels of modernization/technical re-equipment, overhaul and/or reconstruction at the power plants. Only alternatives available to project participants shall be taken into account.

3.1.4. Baseline scenario for overhaul of an existing solar photovoltaic or wind power plant

26. If the project activity is overhaul to an existing solar photovoltaic or wind power plant as described under paragraph 9(d), 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. This potentially displaces an equivalent amount of electricity generation in the grid, which may comprise many fossil fuel plants. The baseline scenario shall be determined following the same procedure as in the case of an overhaul, reconstruction or modernization/technical re-equipment of an existing power plant, described above in 3.1.3.

3.2. Baseline emissions

27. Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology 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. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \qquad \text{Equation (1)}$$

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using Appendix 6 (t CO_2/MWh)

3.2.1. Calculation of quantity of net electricity generation

28. The calculation of $EG_{PJ,y}$ is different for Greenfield plants, capacity additions, overhauls, reconstructions, and modernizations/technical re-equipment. These cases are described as follows:

3.2.1.1. Greenfield power plants

29. If the project activity is the installation of a Greenfield power plant with or without the BESS / HESS, as described under paragraph 6(a) or paragraph 9(a) then:

$$EG_{PJ,y} = EG_{facility,y} \quad \text{Equation (2)}$$

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year *y* (MWh/yr)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant to the grid in year *y* (MWh/yr)

3.2.1.2. Capacity addition to wind, solar, wave or tidal plant

30. In the case of wind, solar, wave or tidal power plants or solar, or wind power plants with the BESS / HESS as described under paragraph 6(b) or paragraph 9(b) or paragraph 9(c), it is assumed that the addition of new capacity does not significantly affect the electricity generated by existing plants. In this case, the electricity fed into the grid by the added power plants shall be directly metered and used to determine $EG_{PJ,y}$.

$$EG_{PJ,y} = EG_{PJ\_Add,y} \quad \text{Equation (3)}$$

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year *y* (MWh/yr)
$EG_{PJ\_Add,y}$	=	Quantity of net electricity generation supplied to the grid in year *y* by the project plant that has been added under the project activity (MWh/yr)

3.2.1.3. **Overhaul, reconstruction or modernization**/technical re-equipment **of an existing renewable energy power plant**

31. If the project activity is the overhaul, reconstruction or modernization/technical re-equipment of an existing grid-connected renewable energy power plant as described under paragraph 6(c) or paragraph 6 (d) or paragraph (e), or overhaul of an existing solar or wind power plant with the BESS / HESS as described under paragraph 9(d), the methodology uses historical electricity generation data to determine the electricity generation by the existing plant in the baseline

scenario, assuming that the historical situation observed prior to the implementation of the project activity would continue.

32. The power generation from renewable energy power projects 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 therefore involve a significant uncertainty. The methodology addresses this uncertainty 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.

33. $EG_{PJ,y}$ is calculated as follows:

$$EG_{PJ,y} = EG_{facility,y} - (EG_{historical} + \sigma_{historical}); until\ DATE_{BaselineOverhaul}$$ Equation (4)

and

$$EG_{PJ,y} = 0; on/after\ DATE_{BaselineOverhaul}$$ Equation (5)

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year *y* (MWh/yr)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plants to the grid in year *y* (MWh/yr)
$EG_{historical}$	=	Annual average historical net electricity generation delivered to the grid by the existing renewable energy power plants that was operated at the project site prior to the implementation of the project activity (MWh/yr)
$\sigma_{historical}$	=	Standard deviation of the annual average historical net electricity generation delivered to the grid by the existing renewable energy power plants that was operated at the project site prior to the implementation of the project activity (MWh/yr)
$DATE_{BaselineOverhaul}$	=	Point in time when the existing equipment would need to be replaced in the absence of the project activity (date). This only applies to overhaul or modernization/technical re-equipment projects

34. In case $EG_{facility,y} < (EG_{historical} + \sigma_{historical})$ in a year *y* then:

$$EG_{PJ,y} = 0$$ Equation (6)

35. To determine $EG_{historical}$, project participants may choose between two historical periods. This allows some flexibility: 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.

36. Project participants may choose among the following two-time spans of historical data to determine $EG_{historical}$:

(a) The five last calendar 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 five calendar years, where $DATE_{hist}$ is latest point in time between:

(i) The commissioning of the plant;

(ii) If applicable: the last capacity addition to the plant; or

(iii) If applicable: the last overhaul or reconstruction of the plant.

37. In case of reconstruction where the power plant did not operate for last five calendar years before the reconstruction starts, $EG_{historical}$ is equal to zero.

3.2.2. Calculation of $DATE_{BaselineOverhaul}$

38. In order to estimate the point in time when the existing equipment would need to be modernized/overhauled in the absence of the project activity ($DATE_{BaselineOverhaul}$), project participants may take into account the typical average technical lifetime of the type equipment[51], which shall be determined and documented as in Appendix 5.

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

4. Project crediting period

40. The starting date of project activities is not regulated.

41. 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.

42. 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.

43. 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

44. Additionality shall be demonstrated using Guidelines №001 Demonstration of the additionality of the project activity[52], taking into account the specifics outlined in this section.

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[51] Determined in the relevant regulatory legal acts of the Russian Federation or documentation for each type of technical equipment.

[52] The climate project implemented in the Russian Federation shall 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". Guidelines №001 has a framework character, giving a general understanding for ways and approaches to demonstrate the additionality of project activities. Methodology (sections 5.1 and 5.2) gives a more specific approach to the Guidelines's statements in relation to this type of project activity.

45. 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.

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

47. Project developer should provide transparent and documented evidence, and offer conservative interpretations of this documented evidence, as to how it demonstrates the existence and significance of the identified barriers.

48. 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[53] to assess 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.

5.1.1. Simplified procedure to demonstrate additionality

49. Project activities are deemed automatically additional if:

   (a) The following grid-connected electricity generation technologies are considered:

      (i) Solar photoelectric generation;

      (ii) Wind technologies;

      (iii) Tidal and wave technologies;

      (iv) Geothermal technologies.

   (b) Following conditions are demonstrated:

      (i) 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 than two per cent; or

50. 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.

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

6. Monitoring plan requirements

51. 100% of the data should be monitored if not indicated otherwise in the tables in Appendix 2 and 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.

52. All measurements should be made with measurement equipment complying with the normative documents for ensuring the uniformity of measurements[54].

53. 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.

54. The calculation of the parameters, emission factors, source data should be documented electronically that should be attached to the Project design document. The documentation should include all data used to calculate the emission factors and other parameters. The data should be presented in a manner that enables reproducing of the calculation.

55. Data and parameters not monitored and monitored during the project activity are listed in Appendix 2 and 3. If necessary, during the credit period, the project developer may increase the frequency of issuing a monitoring plan for parameters that are not regularly monitored.

7. Project Scenario

7.1. Project emissions

56. For most types of renewable energy power generation project activities, apart from the cases considered below, PE_y = 0. Some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{BESS\_HESS,y} \quad \text{Equation (7)}$$

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)

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

57. 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 ($PE_{FF,y}$).

58. For all renewable energy power generation project activities, emissions due to the use of fossil fuels for the emergency power supply can be neglected.

59. 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

[54] 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).

emissions from the backup power generator from fossil fuel combustion should be calculated as project emissions *($PE_{FF,y}$)*.

60. $PE_{FF,y}$ shall be calculated in accordance with the methodological guidelines set out in Order of the Ministry of Natural Resources of the Russian Federation (27.05.2022 №371) and Appendix 1.

61. 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.

7.1.2. Emissions from the operation of geothermal power plants due to non-condensable gases and/or working fluid ($PE_{GP,y}$)

62. 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[55].

63. 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[56], as well as for geothermal power plants of binary cycle[57] 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.

64. 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[58], 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.

65. 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) 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.

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[55] 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. Urban Planning Code of the Russian Federation of 29.12.2004 № 190-FZ (ed. of 04.08.2023), Art. 48

[56] Ibid.

[57] In binary geothermal technologies, the underground fluid is pumped back into the heat source without any impact on the atmosphere. In this case, non-condensable and other gases in the geothermal fluid are trapped and directed back to the heat source. However, there may be some physical leakage from the closed loop pipes and wells.

[58] 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.

66. $PE_{GP,y}$ 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.

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

(a) Project emissions from dry or flash steam geothermal power plants as a result of non-condensable gases emissions:

$$PE_{dry\ or\ flash\ steam,y} = \left(w_{steam,CO2,y} + w_{steam,CH4,y} \times GWP_{CH4}\right) \times M_{steam,y} \quad \text{Equation (8)}$$

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)

(b) Project emissions from binary geothermal power plants as a result of working fluid and non-condensable gases leakeage:

$$PE_{binary,y} = PE_{steam,y} + PE_{working\ fluid,y} \quad \text{Equation (9)}$$

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)

$$PE_{steam,y} = \left(M_{Inflow,y} - M_{outflow,y}\right) \times \left(w_{steam,CO2,y} + w_{steam,CH4,y} \times GWP_{CH4}\right) \quad \text{Equation (10)}$$

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 CO2e/t CH_4)

$$PE_{working\ fluid,y} = M_{working\ fluid,y} \times GWP_{working\ fluid}$$ Equation (11)

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

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

68. 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 ($EG_{BESS\_HESS,y}$).

69. 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 6.

70. 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 described in Appendix 1.

71. In line with the requirement under paragraph 9(d), the BESS charging or HESS hydrogen production using the grid or using fossil fuel backup electricity generator shall not amount to more than 2 per cent 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 per cent 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.

7.2. Emission reductions

72. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$ Equation (12)

Where:

ER_y	=	Emission reductions in year y (t CO_2e/yr)
BE_y	=	Baseline emissions in year y (t CO_2/yr)
PE_y	=	Project emissions in year y (t CO_2e/yr)

7.2.1. Estimation of emissions reductions prior to validation

73. Project participants shall prepare as part of the PDD an estimate of likely emission reductions from the proposed project activity during the crediting period. This estimate shall, in principle, employ the same methodology as selected above. Where the grid emission factor ($EF_{CM,grid,y}$) is determined before validation during monitoring, project participants may use models or other tools, approved by valid laws and regulations, to estimate the emission reductions prior to validation.

7.3. Risk management

74. 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:

(a) the main stages of the implementation of the climate project;

(b) description of the risks that may arise at each stage of the climate project;

(c) 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);

(d) 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);

(e) description of the period of influence of each risk on the entire climate project;

(f) description of the developed measures to minimize or avoid each type of risks;

(g) description of the time period required for the implementation of each measure that reduces or prevents the occurrence of risks is indicated.

75. The recommended table for completion, reflecting the result of the risk management measures is given in Appendix 7.

8. Leakage assessment

76. According to the Order of the Ministry of Economic Development of Russia dated 11.05.2022 №248[59] 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[60] exist in accordance.

77. 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.

78. 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.

79. Possible types of leakage:

(a) 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.

(b) 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

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

[60] 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)

project activities, resulting in increased electricity generation from other carbon-intensive facilities outside the project boundary.

80. 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

81. The section is not applicable to this methodology.

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

82. 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 proponent 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.

83. 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

(a) are protected by law;

(b) formally proposed for protection;

(c) are recognised by authoritative sources because of their high conservation value;

(d) are recognised as protected by traditional local communities.

84. 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.

85. 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.

86. 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.

87. The project developer should avoid double counting between project areas, 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 credits. In the latter case, it is necessary to demonstrate that the carbon credits 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.

88. 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.

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

89. The renewal of a crediting period shall be validated and approved following a technical assessment by a validation and verification body to determine necessary updates to the baseline, the additionality and the quantification of emission reductions.

90. 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.

91. Project developer shall update those sections of the project design document (PDD) 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.

92. 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.

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

94. **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 4).

12. Normative references

ACM0002. Large-scale Consolidated Methodology. Grid-connected electricity generation from renewable sources. Version 21.0. CDM Methodology

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.

Order of the Ministry of Economic Development of Russia № 248 11.05.2022 "On Approval of Criteria and Procedure for Attributing Projects Implemented by Legal Entities, Individual Entrepreneurs or Individuals to Climate Projects, Form and Procedure for Reporting on Climate Project Implementation" (Registered with the Ministry of Justice of Russia on 30.05.2022, № 68642).

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GOST R ISO 14064-2-2021. National standard of the Russian Federation. Greenhouse gases. Part 2. Requirements and Recommendations for documents on quantitative assessment, monitoring and reporting for projects to reduce greenhouse gas emissions or increase their absorption at the project level (approved and put into effect by the Order of Rosstandart of 30.09.2021 № 1030-st).

GOST R ISO 14064-3-2021. National standard of the Russian Federation. Greenhouse gases. Part 3. Requirements and Guidelines for validation and verification of greenhouse gas reporting (approved and put into effect by the Order of Rosstandart of 30.09.2021 № 1031-st).

GOST R ISO 14065-2014. National standard of the Russian Federation. Greenhouse gases. Requirements for bodies for validation and verification of greenhouse gases for their application

in accreditation or other forms of recognition (approved and put into effect by the Order of Rosstandart of 26.11.2014 № 1869-st).

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Order of the Ministry of Natural Resources of Russia №371 27.05.2022 "On Approval of Methodologies for Quantitative Determination of Greenhouse Gas Emissions and Greenhouse Gas Absorptions" (from 1 March 2023, except for certain provisions coming into force from 1 March 2024).

TOOL03 Methodological tool. Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion. Version 03.0. CDM Methodology

TOOL05 Methodological tool. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation.Version 03.0. CDM Methodology

TOOL07 Methodological tool. Tool to calculate the emission factor for an electricity system. Version 07.0. CDM Methodology

TOOL32 Methodological tool. Positive lists of technologies. Version 04.0. CDM Methodology

Methodological Tool. Tool to determine the remaining lifetime of equipment. Version 01. CDM Methodology

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

Federal Law № 35-FZ 26.03.2003 "On Electric Power Industry" (as amended and supplemented).

GOST R IEC 62485-5-2021 Batteries and battery installations. Safety requirements. Part 5. Safety of stationary lithium-ion batteries.

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

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.

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

GOST R 58092.3.3- 2023 Electric energy storage systems. Design and evaluation of operating parameters

GOST R 70787-2023 Unified energy system and isolated energy systems. Renewable energy sources. Technical requirements for photovoltaic solar stations.

GOST R 58092.3.2-2023 Electric energy storage systems. Design and evaluation of operating parameters. Applications with preferential power utilisation and integration with renewable energy sources.

Urban Planning Code of the Russian Federation of 29.12.2004 №190-FZ (ed. of 04.08.2023), Art. 48.

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).

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GOST R MEK 62485-5-2021 Secondary batteries and battery installations. Safety requirements Part 5. Safe operation of stationary lithium-ion batteries

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

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.

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

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

GOST R 70214-2022. Hydraulic engineering. Basic concepts. Terms and definitions.

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).

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)

Appendix 1. Calculation of CO_2 emissions from fossil fuel combustion

1. This tool provides procedures to calculate project and/or leakage CO_2 emissions from the combustion of fossil fuels. It can be used in cases where CO_2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. Methodologies using this tool should specify to which combustion process *j* this tool is being applied.

2. CO_2 emissions from fossil fuel combustion in process *j* are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

Where:

$PE_{FC,j,y}$	Are the CO2 emissions from fossil fuel combustion in process *j* during the year *y* (tCO2/yr)
$FC_{i,j,y}$	Is the quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit/yr)
$COEF_{i,y}$	CO_2 emission coefficient of fuel type *i* in year *y* (t CO_2/mass or volume unit)
i	Are the fuel types combusted in process *j* during the year *y*

3. The CO_2 emission coefficient $COEF_{i,y}$ can be calculated using one of the following two options. *Option A* should be the preferred approach if the necessary data is available.

4. **Option A.** The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on the chemical composition of the fossil fuel type *i*, using the following approach:

If $FC_{i,j,y}$ is measured in a mass unit:

$$COEF_{i,y} = w_{C,i,y} \times {}^{44}/_{12}$$

If $FC_{i,j,y}$ is measured in a volume unit:

$$COEF_{i,y} = w_{C,i,y} \times \rho_{i,y} \times {}^{44}/_{12}$$

Where:

$COEF_{i,y}$	CO_2 emission coefficient of fuel type *i* in year *y* (t CO_2/mass or volume unit)
$w_{C,i,y}$	Is the weighted average mass fraction of carbon in fuel type *i* in year *y* (tC/mass unit of the fuel)
$\rho_{i,y}$	Is the weighted average density of fuel type *i* in year *y* (mass unit/volume unit of the fuel)
i	Are the fuel types combusted in process *j* during the year *y*

5. **Option B.** The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on the net calorific value and CO_2 emission factor of the fuel type *i*, using the following approach:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:

$COEF_{i,y}$	CO_2 emission coefficient of fuel type *i* in year *y* (t CO_2/mass or volume unit)
$NCV_{i,y}$	Is the weighted average net calorific value of the fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	Is the weighted average CO2 emission factor of fuel type *i* in year *y* (tCO2/GJ)
i	Are the fuel types combusted in process *j* during the year *y*

Appendix 2. Data and parameters not monitored.

1. In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

№	Data / Parameter	Data unit	Description	Source of data	Value to be applied	Any comment
1.	GWP_{CH4}	t CO_2e/t CH_4	Global warming potential of methane valid for the relevant commitment period	IPCC	: 25 t CO2e/t CH4[61]	
2.	$EG_{historical}$	MWh/yr	Annual average historical net electricity generation delivered to the grid by the existing renewable energy power plant that was operated at the project site prior to the implementation of the project activity	Project activity site	Electricity meters	
3.	$\sigma_{historical}$	MWh/yr	Standard deviation of the annual average historical net electricity generation delivered to the grid by the existing renewable energy power plant that was operated at the project site prior to the implementation of the project activity	Calculated from data used to establish $EG_{historical}$	Parameter to be calculated as the standard deviation of the annual generation data used to calculate $EG_{historical}$ for overhaul, or reconstruction or modernization project activities	
4.	$DATE_{BaselineOverhaul}$	date	Point in time when the existing equipment would need to be replaced in the absence of the project activity	Project activity site	As per provisions in the methodology above	
5.	$DATE_{hist}$	date	Point in time from which the time span of historical date for overhaul, reconstruction or modernization/technical re-equipment project activities may start	Project activity site	$DATE_{hist}$ is the latest point in time between: (a) The commercial commissioning of the plant; (b) If applicable: the last capacity addition to the plant; or (c) If applicable: the last overhaul or reconstruction of the plant	

[61] The coefficient is presented in accordance with the latest version of GOST R 56267-2014. In case of adoption of new legislation and national standards with updated GWPs to be guided by the updated versions.

№	Data / Parameter	Data unit	Description	Source of data	Value to be applied	Any comment
6.	*The percentage share of total installed capacity of the specific technology*	%	The percentage share of total installed capacity of the specific technology in the total installed grid connected power generation capacity in the country	National statistics or other official data		
7.	*The total installed capacity of the technology*	%	the total installed capacity of the technology in the country	National statistics or other official data		
8.	$GWP_{working\ fluid}$	-	Global Warming Potential of the Working Fluid	IPCC 2014, GOST R 56267-2014		

Appendix 3. Data and parameters monitored.

1. 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. One hundred per cent of the data should be monitored if not indicated otherwise in the tables below. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

2. $EG_{facility,y}$, $EG_{PJ\_Add,y}$, $EG_{BESS\_HESS,y}$, $EF_{grid,CM,y}$ and $PE_{FF,y}$ should be determined based on Appendix 1 and 5.

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
9.	$w_{steam,CO2,y}$	t CO_2/t steam	Average mass fraction of carbon dioxide in the produced steam in year *y*	Project activity site	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). 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	At least every three months and more frequently, if necessary		Applicable to dry, flash steam and binary geothermal power projects
10.	$w_{steam,CH4,y}$	t CH_4/t steam	Average mass fraction of methane in the produced steam in year *y*	Project activity site	As per the procedures outlined for $w_{steam,CO2,y}$	As per the procedures outlined for $w_{steam,CO2,y}$		Applicable to dry, flash steam and binary geothermal power projects
11.	$M_{steam,y}$	t steam/year	Quantity of steam produced in year *y*	Project activity site	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*	Project activity site	The steam quantity entering the power plant 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	Continuous	The flow meter must be calibrated according to the national,	

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
					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		international, or manufacturer's instructions. The recorded data must be stored daily in a central database with backup	
13.	$M_{outflow,y}$	t steam/year	Quantity of steam leaving the geothermal plant in year *y*	Project activity site	The steam quantity entering the power plant 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	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 central database with backup	
14.	$M_{working\ fluid,y}$	t working fluid/year	Quantity of working fluid leaked/reinjected in year *y*	Project site	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. Assessment of the validity of the original/current baseline at the renewal of the crediting period

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

2. 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.

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

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

4. *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.

5. *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.

6. *Assess 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.

7. *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, national standards and circumstances that are applicable at the time of request for renewal of the crediting period.

8. *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.

Appendix 5. Assessment of the remaining lifetime of equipment

1. The tool provides guidance to determine the remaining lifetime of baseline or project equipment. The tool may, for example, be used for project activities which involve the replacement of existing equipment with new equipment or which overhaul existing equipment as part of energy efficiency improvement activities.

2. This tool provides procedures to determine the following parameter: **Remaining lifetime (RL).** The remaining lifetime of the equipment is the time for which the existing equipment can continue to operate before it has to be replaced/discarded for technical reasons, such as the age of the equipment, safety reasons, or deteriorated performance. The remaining lifetime is expressed in years or hours of operation.

3. For project activities that involve several equipment, project participants can either determine the remaining lifetime for each equipment or determine the remaining lifetime as the most conservative of the individual remaining lifetimes of the equipment by applying any one of the options (a) to (c).

4. If the remaining lifetime of existing equipment, which would continue to operate in the baseline, is extended due to the implementation of a project activity, the crediting of emission reductions should be limited to the shortest estimated remaining lifetime of the baseline equipment. In other words, the earliest point in time when any of the existing equipment would need to be replaced or overhauled in the absence of the project activity should be used, unless the methodology specifies otherwise. Small equipment accessories/components such as small pumps, motors, valves etc. that are generally replaced as part of regular maintenance activities do not need to be included in the scope of determination of the remaining lifetime.

Option (a): Use manufacturer's information for the technical lifetime of equipment and compare to the date of first commissioning

5. In this option, the remaining lifetime is determined as a difference between the technical lifetime and the operational time.

6. This option can only be applied if:

   (a) Manufacturer's information for the technical lifetime of the equipment is available;

   (b) The project participants can demonstrate that the equipment has been operated and maintained according to the recommendations of the equipment supplier to ensure that the technical lifetime specified by the manufacturer is not reduced; and

   (c) There are no periodic replacement schedules or scheduled replacement practices specific to the industrial facility, that require early replacement of equipment before the expiry of the technical lifetime;

   (d) The equipment has no design fault or defect and did not have any industrial accident due to which the equipment can not operate at rated performance levels.

7. Documentation supporting these conditions should be provided, for example information on the operational history of the equipment.

8. The operational time shall be determined based on the operational history of the equipment from the date of its first commissioning.

9. In cases where the equipment was overhauled prior to the implementation of the project activity or energy efficiency improvement measures were undertaken which increased the remaining lifetime, the technical lifetime provided by the equipment supplier may not be valid anymore. In this case, project participants should follow one of the following approaches:

(a) If the overhaul was undertaken by the equipment manufacturer, the equipment manufacturer may provide a revised estimation of the technical lifetime;

(b) Apply the original technical lifetime provided by the equipment manufacturer at the time of equipment installation, as long as assuming a shorter lifetime is conservative (e.g. in the case of baseline equipment which is replaced under the project activity); choose other options provided in this tool to determine the remaining lifetime.

10. In case of relocated equipment (equipment which was already in operation at another site and which is transferred to the site of the project activity where it continues to operate), the operation history at the previous site(s) should be considered when establishing the operational time.

Option (b): Obtain an expert evaluation

11. In this option, an independent expert having relevant experience in evaluating the remaining lifetime for the type of equipment can be requested to determine the remaining lifetime of the equipment. The information that could be evaluated includes an analysis of

(a) The operational history of the equipment to identify the past performance, equipment overhauls, failures/accidents, capacity upgrades/degradations, replacements etc.;

(b) The current operation and maintenance practices;

(c) Documented specific sectoral/industry practices for replacements;

(d) Conducting tests on the equipment, such as magnetic particle examinations, ultrasonic testing, metallurgical analysis, etc.

12. The expert should document his methods and conclusions and provide an expert evaluation stating the estimated remaining lifetime of the equipment. All the relevant documentation should be presented to the DOE for validation.

Option (c): Use default values

13. In this option, project participants may use the following default values for the technical lifetime and determine the remaining lifetime as the difference of the technical lifetime and the operational time.

14. This option can only be applied if:

(a) The project participants can demonstrate that the equipment has been operated and maintained according to the recommendations of the equipment supplier;

(b) There are no periodic replacement schedules or scheduled replacement practices specific to the industrial facility, that require early replacement of equipment before the expiry of the technical lifetime; and

(c) The equipment has no design fault or defect and did not have any industrial accident due to which the equipment can not operate at rated performance levels.

15. Documentation supporting these conditions should be provided, for example information on the operational history of the equipment.

16. The operational time shall be determined based on the operational history of the equipment from the date of its first commissioning. In case of relocated equipment (equipment which was already in operation at another site and which is transferred to the site of the project activity where it continues to operate), the operation history at the previous site(s) should be considered when establishing the operational time.

17. For the technical lifetime, the following default values apply:

Equipment	**Default value for Technical lifetime**
Boilers	25 years
Steam Turbines	25 years
Gas turbines, upto 50 MW capacity	150,000 hours
Gas turbines, above 50 MW capacity	200,000 hours
Hydro turbines	150,000 hours
Electric Generators, air cooled	25 years
Electric generators, hydrogen cooled or water cooled	30 years
Wind turbines, onshore	25 years
Wind turbines, offshore	20 years
Diesel/oil/gas fired generator sets	50,000 hours
Transformers	30 years
Heaters, chillers, pumps, etc. used in HVAC systems	15 years
Solar panels	25 years

Appendix 6. 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[62]. Based on the results of the peer review, independent international auditors issued an assurance certificate, and this concept received a validation report[63].

   Currently, the ATS website provides information on the greenhouse gas emission factor of the Russian energy grid system[64]. 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 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)[65]) and the principles for calculating indirect energy emissions defined in GOST R ISO 14064-1-2021[66].

   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 (in project boundaries) (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[67] 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.

[62] 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

[63] 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

[64] https://www.atsenergo.ru/results/co2map

[65] 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".

[66] 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)

[67] 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[68].

4. According to IEA (International Energy Agency) calculations, the energy grid emission factor in Russia is 350 g/kWh[69]. 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 by the 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.

[68] 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)

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

Appendix 7. Risk management

Table A7.1. 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*			