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Climate project methodology № 0016

Rewetting of drained temperate peatlands

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1. Terms and Definitions

The baseline scenario is the use of the territory in the absence of special activities to reduce emissions - Climate Projects. The baseline scenario is used to calculate incremental emission reductions from the Climate Project, that is, the number of emission reduction units that could, in principle, be transferred to the Climate Project client.

A mire massif is a part of the earth's surface occupied by a swamp, the boundaries of which represent a closed contour and are drawn along the line of zero depth of the peat deposit.

A mire microlandscape is a part of a mire massif that is homogeneous in terms of the nature of the vegetation cover, the surface microrelief and the water-physical properties of the active horizon and is represented by one plant association, a group of plant associations similar in floristic composition and structure, or a complex of various plant associations regularly alternating in space.

Wetlands - areas of raised and low bogs, peatlands or water bodies - natural or artificial, permanent or temporary, stagnant or flowing, fresh, brackish or saline, including marine areas, the depth of which at low tide does not exceed six meters.

Water regime - change in time levels, costs and volumes of water in water bodies and soils .

Rewetting is an increase in excess water in previously drained areas and the changes it causes in soil and vegetation with the deterioration of the reclamation network. Resumption of peat formation processes in depleted or decommissioned areas of peat deposits as a result of their watering (restoration of the catchment area, blocking of channels and raising the level of groundwater).

Hydrological forecast - scientifically based prediction of the expected hydrological regime.

Hydrological regime - a set of regularly repeating changes in the state of a water body, inherent in it and distinguishing it from other water bodies.

Bottom line of workable peat reserve is a conditional boundary drawn on the plan of a peat deposit along the depth of a peat deposit, within which it is economically feasible to develop a peat deposit.

The active horizon of a bog is a layer of active water exchange in a bog, which is transitional from a peat deposit to the surface of a living vegetative moss cover and moss and woody-moss microlandscapes or to the surface of dense plexuses of rhizomes in the herbaceous, reed, woody-herbal and woody groups of microlandscapes.

Channel - an artificial open water conduit in an earthen excavation or embankment.

Collector (main ditch) - open conductive canals that collect water from field channels and divert it to main canals or directly to water intakes.

Field channel is open dehumidifiers used to collect and drain water from a peat deposit.

Main discharge channel - open canal that collect water from collectors and divert it to water intakes.

Climate project - a set of measures to reduce (prevent) greenhouse gas emissions or increase the absorption of greenhouse gases.

Measures to reduce the fire hazard - measures to improve the accessibility of remote areas, the creation of additional water reservoirs to extinguish fires, the creation of other infrastructure for the prompt extinguishing of fires in the territory of peat deposits.

Modeling of the hydrological process - the creation of models that reproduce certain aspects of the hydrological process.

The zero boundary of the peat deposit is the boundary of the wedging out of the peat deposit.

Sampling of peat deposit is a set of works to determine the qualitative characteristics of a peat deposit.

The project scenario is the use of the territory in the implementation of special activities to reduce emissions - Climate projects. The project scenario is used to calculate the effectiveness of the implementation of the Climate Project, that is, the number of emission reduction units that, in principle, can be transferred to the client of the Climate Project.

Implementer of the Climate Project to Reduce Greenhouse Gas Emissions (Implementer of the Climate Project to Reduce GHG Emissions) - an individual or an organization that, on the basis of scientific research, forecasts , develops and implements measures for the rewetting of drained peatlands aimed at reducing greenhouse gas emissions .

A stratum is a spatial unit of a peat deposit identified during the survey and mapping of the territory of the Climate Project, which has homogeneous indicators in terms of such characteristics as: residual peat layer, peatland water level, vegetation cover, and, consequently, a homogeneous level of greenhouse gas emissions.

Peat is an organic rock that forms as a result of the death and incomplete decay of bog plants in conditions of increased moisture with a lack of oxygen and a content of no more than 50% of mineral components per dry matter.

Peat deposit - a natural bedding of certain types of peat from the surface to the mineral bottom of a peat deposit or underlying lacustrine or organo-mineral deposits.

Peatland - a geological formation consisting of layers of one or more types of peat, characterized in its natural boundaries by excessive moisture, specific vegetation cover and which, in terms of size and peat reserves, can be an object of industrial or agricultural use.

Carbon pool - the volume of a certain substance (peat, woody vegetation, etc.) within the project area, in which the total carbon content and its dynamics are calculated during the Baseline and Project scenarios.

The milling method of peat extraction is layer-by-layer milling of a peat deposit with field drying and peat harvesting.

Ecosystem services are beneficial effects resulting from the functioning of ecosystems.

GEST (Greenhouse Gas emission Site Type) is a homogeneous area of the surface with the same greenhouse gas emission factors.

List of abbreviations

GHG - greenhouse gases
PWL – peatland water level
CU – carbon unit

2. Scope and applicability

2.1. Scope

Wetlands include various types of terrestrial ecosystems, including bogs and fens, which differ in many factors, but are united by excessive moisture. In this regard, it should be noted that this methodology covers only peat deposits, as part of wetlands, previously degraded by drained.

This methodology is used to develop and implement climate projects to reduce GHG emissions by rewetting drained peatlands.

The boundaries of the project must be clearly defined on the ground and correspond to the territory of the peat deposit used for economic purposes.

The climate project must comply with Article 9 of Federal Law No. 296-FZ dated July 2, 2021 “On Limiting Greenhouse Gas Emissions”, as well as the criteria established by Order of the Russian Ministry of Economic Development No. 248 dated May 11, 2022 “On Approval of Criteria and Procedure for Classifying Projects Implemented by Legal Entities , individual entrepreneurs or individuals, to the Climate Projects, the form and procedure for submitting a report on the implementation of the Climate Project.

All activities implemented within the framework of the Climate Project must not contradict with the current legislation of the Russian Federation and, first of all, the Land Code of the Russian Federation, the Forest Code of the Russian Federation and the Water Code of the Russian Federation.

The application of the Methodology makes it possible to assess the effectiveness of the implementation of the Climate Project, including determining the net benefit, which is the amount of GHG emission reduction expressed in the form of verified CU equal to one tone of CO2 equivalent.

The effectiveness of the Climate Project is assessed based on calculations for the following parameters:

- amount of GHG emissions;
- reduction of fire danger, reduction in the number of fires, as well as the volume of burnt peat;
- acceleration of self-restoratioin processes of disturbed peatlands;
- increase in carbon absorption due to the resumption of the peat-forming process;
- contributing to the restoration and maintenance of biodiversity.

Additional positive social effects from the implementation of design solutions are also possible, related to the specifics of the infrastructure of a particular area, its economic and sanitary and hygienic features, determined taking into account the prospects and directions for the development of the area where the Climate Project is implemented.

As part of the implementation of the Climate Project, additional benefits can be proved and calculated, which can be expressed in the form of sustainable development indices, including benefits from the improvement and sustainable development of ecosystem services (water quality, restoration and conservation of biodiversity, etc.).

To justify the expediency of implementing the Climate Project, a comparison is made of the amount of GHG emissions in the Baseline and Project scenarios. The project is considered effective if the estimated emission value (gross emission reduction) in the Project Scenario is reduced by at least 5% compared to the Baseline Scenario.

This effect is calculated by subtracting the GHG emissions in the Baseline scenario from the GHG emissions of the Project scenario.

The methodology presents the activities to be carried out within the framework of the Climate Project, as well as how to calculate the net benefit of the project from the reduction of GHG emissions, represented by the value of NEP^{RDP}, which is calculated using the following formula:

$$NEP^{RDP} = GHG^{BL} - GHG^{PS} - GHG^{L} + FRP \quad (1)$$

where

NEP^{RDP}*– total reduction (+) or increase (-) of GHG emissions as a result of the implementation of the Project scenario, tCO2-eq. ;*

GHG^{BL}*– amount of GHG emissions in the Baseline scenario, tCO2-eq. ;*

GHG^{PS}*– amount of GHG emissions in the Project scenario, tCO2-eq. ;*

GHG^{L}*– leakages as a result of the implementation of the Project scenario, tCO2-eq. ;*

FRP – additional reduction of GHG emissions by preventing fires in the project area, tCO2-eq. (2.9).

The methodology provides that the direct implementer of the Climate Project can act as an independent organization and in this case act as a recipient of carbon credits, as well as a representative of the interests of the customer(s) who are the target recipients of carbon credits. To register the rights to carbon units obtained as a result of the successful implementation of the project, a fundamental Agreement between the Customer/buyer of carbon units and the direct implementer of the Climate Project can be executed. At the same time, the Customer/purchaser of carbon credits is the main guarantor and financial source of all work within the framework of the Climate Project for the entire period of its operation. Also, this agreement may provide for a different procedure for the distribution of received carbon units.

2.2. Features of the territory of drained peatlands

Peat is a product of incomplete decomposition of plant mass under conditions of excessive moisture and insufficient aeration and is an organic soil of marsh, lacustrine or alluvial marsh genesis, containing in its composition by weight 50% or more of organic matter, represented mainly by plant residues.

Possessing useful properties, peat is widely used in various economic spheres, including agriculture and energy, and its deposits, located mainly in wetlands, both previously and currently, are developed industrially by draining huge area.

As a result of economic use, peat bogs and their individual components have been disturbed to varying degrees. In particular, changes could affect - biological diversity and habitats of rare and unique species of flora and fauna, water regime, determined by excess water, as well as peat resources, determined by peat reserves of various types, types and characteristics.

Drainage activities contributed to the emergence and development of a number of negative processes in these areas, such as peat mineralization, disruption of the functioning of unique mire landscapes, the creation of fire hazardous conditions, a decrease in the stability of ecosystems, a decrease in biodiversity, and a violation of the habitat of unique species of flora and fauna.

From the point of view of the implementation of the Climate Project for the rewetting of drained peatlands, the main goal of such projects is to preserve the carbon accumulated in peat and prevent its mineralization, accompanied by increased carbon emissions into the atmosphere. Achieving this goal is possible with a change in the hydrological regime of peatlands and, in particular, an increase in PWL, which favors the creation of anaerobic conditions under which the process of decomposition of peat organic matter in the active horizon is significantly reduced.

Thus, all actions within the framework of the implementation of the Climate Project should be aimed at changing the hydrological regime of drained peatlands. These actions should be systematic and scientifically based.

The indicated result is achieved through the implementation of complex and interrelated measures to regulate the modern hydrological regime of peatlands in the direction of "zero" PWL. The lowering of the open water level in the disturbed areas, as well as the coverage of the water surface with moisture-loving plants, are also taken into account within this methodology, since they contribute to the reduction of methane emissions and the accumulation of carbon in the phytomass .

It should be noted that rewetting degraded peatlands is not the same as protecting intact bogs and fens.

When choosing a territory for the implementation of the Climate Project for the rewetting drained peatlands, it is necessary to be guided by the following criteria:

1. the availability of reliable data indicating explored peat reserves that meet the characteristics of the deposit, that is, suitable for involvement in industrial development in the past or present period of time;
2. location in the temperate climate zone;
3. using this territory no later than two years before the implementation of the Climate Project of economic activities, including:
    a. peat extraction (milling fields are the priority);
    b. forestry (when indicating the inappropriateness of these works on peat soils);
    c. agriculture (when indicating the inappropriateness of these works on peat soils)
4. the presence of peat deposits of more than 50 cm in an area of at least 80% of the Climate Project territory;
5. the presence of a functioning drainage system that maintains the peatland mainly in a drained state;
6. lack of current and planned economic use.

To confirm the compliance of the territory for the implementation of the Climate Project, an assessment is carried out in accordance with the unified form "General description of the territory of the Climate Project" (Appendix 1).

2.3. Determination of project boundaries. Land relations and land use

One or more land plots located in the same locality may be suitable for the implementation of the Climate Project. Each site must have clear geographical coordinates. Thus, all land plots must be marked off and put on cadastral registration in accordance with the legislation of the Russian Federation.

The implementation of the Climate Project is possible only in relation to those land plots that are used by the project implementer:

- on the right of ownership;
- under the terms of a land lease agreement;
- under the terms of a land sublease agreement. In this case, all documents defining the relationship between the subtenant, the tenant and the owner of the land must be provided;
- on the basis of other documents securing the right of the implementer to use the territory of the Climate Project, including those taking into account the special legal status of the Climate Projects, determined by the legislation of the Russian Federation.

All land relations must be formalized in accordance with applicable law and confirmed by relevant title documents.

In the absence of rights to a land plot, it is allowed to start design work with the simultaneous registration of rights to a land plot. In this case, it is necessary to preliminarily assess the existence or absence of the possibility of transferring the rights to the land plot to the implementer of the Climate Project. Documents confirming the passage of the procedure for transferring rights to a land plot must be attached to the project documentation. The absence of executed documents confirming the right of the implementer to the land plot entails the impossibility of direct implementation of the Climate Project.

In the event of a subsequent sale/assignment of the land lease rights, the buyer/acquirer of the rights must be informed of the purpose of the land use and it must not change during the entire duration of the project, i.e. 100 years. To fix this goal, the new owner of the land plot and the tenant/subtenant are recommended to formalize and sign their intentions to follow the goals of the Climate Project in the form of a legally binding document.

At the same time, the land plot on which the Climate Project is being implemented can also be used for other economic purposes that do not harm the main goal of the Climate Project (not increase GHG emissions) and do not contradict the Project scenario. Such activities can be - recreational activities, including ecological and educational tourism, research activities, hunting and fishing, cultivation of moisture-loving crops, etc.

To describe the project implementation area, cartographic material at a scale of 1:5000 - 1:10000 is used [1]to represent the plan of the land plot, as well as cartographic material at a scale of 1:25000 for the general plan for the location of the Climate Project territory. The description of the cartographic material provides data on the area of location, neighboring settlements, types of land use and land users, engineering networks and existing engineering infrastructure.

[1] [1] The scale of the cartographic material can be changed depending on the area of the project area

Cartographic material is also presented in digital format in the form of GIS layers with reference to the area in the GSK-2011/ WGS -84 systems to accurately determine the location of land plots.

When developing design documentation for the Climate Project, it is necessary to take into account the hydrological connection with the adjacent territories, which involves an assessment of the possible negative impact of the design work on the territories adjacent to the boundaries of the Climate Project.

If there is such an influence, when designing the work, a buffer zone should be provided, which is included in the boundaries of the Climate Project. At the same time, no work is envisaged to change the hydrological regime in such a zone. The main purpose of the buffer zone is to reduce the possible negative impact of design work on the territories adjacent to the boundaries of the Climate Project.

The size of the buffer zone should be scientifically justified depending on the specific situation and the hydrological connection with the adjacent territories.

Buffer zone GHG fluxes are also calculated and accounted for in both the Baseline and Project scenarios.

In the absence of a negative impact of project work on neighboring territories adjacent to the boundaries of the Climate Project, a buffer zone is not provided. In this case, the project documentation should contain a justification for the absence of such an impact based on actual data on the hydrology and hydrogeology of the project area.

2.4. Assessment of the compliance of the territory with the goals of an effective Climate Project

2.4.1. Primary assessment of the peatland

In order to confirm the suitability of the territory for the implementation of the Climate Project, as well as for preliminary calculations of the GHG reduction potential, an initial assessment of the peat deposit or its part should be carried out according to the following program:

1. Office work:
    a. collection of stock and archival information about the peat deposit;
    b. collection of retrospective remote sensing data confirming the economic use of the territory;
    c. drawing up a map/scheme with the allocation of homogeneous areas of the surface of a peat deposit on it - bog micro-landscapes (landscape units), characterized by homogeneous vegetation, residual peat thickness and PWL and, as a result, one indicator of the intensity of GHG emissions;
    d. retrospective analysis of the number of fires and their area of distribution over the previous 10-20 years;

2. Field work:
   a. Verification of homogeneous areas of the surface of a peat deposit in the field;
   b. Probing of a peatland to determine the residual thickness of peat within the boundaries of all homogeneous areas of the surface of a peatland (for more details, see p. 2.4.2);
   c. Determination of PWL in all homogeneous areas of the surface of a peat deposit;
   d. Botanical description of all homogeneous areas of the surface of a peatland with the identification of the main types of vegetation.
3. Analytical work carried out as a result of Office (item 1) and Field (item 2) work:
   a. Mapping of all mire micro-landscapes;
   b. Drawing up a map/scheme showing areas with the same residual peat thickness;
   c. Drawing up a map of the PWL;
   d. Compilation of a map with the number of outbreaks and the area of distribution of fires over the past 10 years
   e. Drawing up a map of the current state of the drainage network with a general characteristic of the channels - type (kart , gross , main, trapping), the presence of open water (open water or an overgrown channel), the main parameters of cross sections, etc.

Based on the data obtained, the preliminary potential of the selected territory for reducing GHG emissions as a result of the implementation of the Climate Project is calculated. Also, for each mire microlandscape, a biodiversity assessment can be carried out.

2.4.2. Peatland sampling (determination of residual peat capacity)

The design documentation for the Climate Project should provide information on the depth of the residual peat layer. These works must be carried out on the date of the survey as part of the development of project documentation in order to obtain and use up-to-date and reliable information. Measurement of the residual thickness of peat (probing) should be carried out systematically and evenly throughout the entire project area. The result of these works is a map of the territory with selected areas with the same average thickness of the residual peat layer.

The final data are applied to the cartographic material, as well as separate areas with the same thickness of the residual peat layer, their area and, as a result, the volume of the residual peat layer throughout the project area are indicated in the thematic GIS layers. Systematic and periodic sounding of the peatland is substantiated based on the following factors: the availability of detailed exploration data of the peatland, the degree of development of the peatland, the coefficient of variation of the bottom of the peatland (if such data are available), the total area of the project area, the presence of isolated areas within the boundaries of the project area and other critical factors affecting the residual depth of peat.

From the total volume of peat, the volumes of all types of drainage channels present, located in the project boundary, and not occupied by peat, are subtracted. For this purpose, regular measurements of the cross sections of all types of channels (field, gross, main) are carried out and their lengths are determined, which is eventually converted into volumes not occupied by peat.

The sounding of the peat deposit should be updated at least before the verification procedure by an independent validation and verification body. For these purposes, it is recommended to select key points evenly distributed throughout the project area, in which it is necessary to compare the initial data and the situation at the time of verification.

2.5. Carbon pools

For a reliable calculation of GHG emissions in the Baseline and Project scenarios, it is necessary to take into account the accumulated carbon not only in peat, but also in other carbon pools. The list of carbon pools with recommendations for inclusion in the overall calculation of GHG flows is presented in Table 2.1. Carbon pools may be considered insignificant and may be excluded from the overall GHG flow calculation if their value does not exceed 5% of the total GHG flow in the project.

Table 2.1. Major carbon pools

Pools of carbon	Included?	Justification/Explanation
Above ground woody living and dead biomass	Yes	If there is woody vegetation within the project boundary, it is a significant carbon pool. It is necessary to take into account the dynamics of woody vegetation in the Baseline Scenario, including the risks of its destruction. It is also necessary to take into account the impact of design decisions on the dynamics of tree vegetation in the Project scenario, and also take into account that project activities may not affect existing tree vegetation. It is also necessary to take into account the above-ground woody biomass, which may appear in the Project scenario as a moisture-loving forest stand, which will lead to an increase in carbon sequestration in the Project scenario.
Above ground non-wood living and dead biomass	Optional	This pool is included in the project only if the GEST classification is carried out by land cover types. In such cases, changes in the lower vegetation layers are included in the NEE (or NEP) estimates depending on the site type (GEST)
Underground biomass	Yes	If there is woody vegetation within the project boundary, it is a significant carbon pool. Underground biomass dynamics in the Baseline Scenario must be taken into account. It is also necessary to take into account the impact of design decisions on the dynamics of belowground biomass in the Project scenario, and also take into account that project activities may not affect the existing belowground biomass.
Forest litter	Optional	Forest litter is included only if it is included in the GEST model
Timber	Optional	Optional carbon pool
Dead wood and deadwood	Optional	Optional carbon pool
Soil organic carbon	Yes	The main carbon stock accounted for in both the Baseline and Project scenarios. The content of organic carbon is estimated in peat
Dissolved organic carbon (DOC)	Yes	The main carbon stock accounted for in both the Baseline and Project scenarios. The amount of dissolved carbon in swamp waters is estimated

2.6. Carbon stock estimate

To assess the change in carbon stocks in the Baseline and Project scenarios, an approach based on the calculation of its total stock in the peat of the project area is applied (Formula 2).

$$C_{i,Tp}^{PS-BL} = \sum_{i=1}^{Mps}\left(C_{i,Tp}^{PS} \times S_{i,Tp}^{PS}\right) - \sum_{i=1}^{Mbl}\left(C_{i,Tp}^{BL} \times S_{i,Tp}^{BL}\right) \quad (2)$$

$$C_{i,Tp}^{PS} = Depth_{peat,i,Tp}^{PS} \times VC_{peat} \times 10 \quad (3)$$

$$C_{i,Tp}^{BL} = Depth_{peat,i,Tp}^{BL} \times VC_{peat} \times 10 \quad (4)$$

$$Depth_{peat,i,Tp}^{PS} = Depth_{peat,i,T0}^{PS} - \sum_{t=1}^{T=p} Rate_{peatloss,i,t}^{PS} \quad (5)$$

$$Depth_{peat,i,Tp}^{BL} = Depth_{peat,i,T0}^{BL} - \sum_{t=1}^{T=p} Rate_{peatloss,i,t}^{BL} \quad (6)$$

Where:

$C_{i,Tp}^{PS-BL}$ – *difference between peat carbon stocks under the project scenario and the Baseline scenario at Tp , t;*

$C_{i,Tp}^{PS}$– *peat carbon* stock *in the Project scenario in stratum i at Tp , t/ha;*

$C_{i,Tp}^{BL}$– *peat carbon* stock *in the Basline Scenario in stratum i at Tp , t/ha;*

$Depth_{peat,i,Tp}^{PS}$- *peat depth above the average annual PWL in the Project scenario in stratum i at Tp , m;*

$Depth_{peat,i,Tp}^{BL}$ *is the depth of peat above the average annual PWL in the Baseline Scenario in stratum i at Tp , m;*

$Depth_{peat,i,T0}^{PS}$- *peat depth above the average annual PWL in the Project scenario in stratum i at the beginning of the project , m;*

$Depth_{peat,i,T0}^{BL}$- *peat depth above annual PWL in the Baseline Scenario in stratum i at the beginning of the project , m;*

$Rate_{peatloss,i,t}^{PS}$- *rate of peat loss due to precipitation, fires, mineralization in the Project scenario in stratum i at time t; alternatively, a conservative (high) value that is constant over time can be used; m/year;*

$Rate^{BL}_{peatloss,i,t}$- *rate of peat loss due to precipitation, fires, mineralization in the Baseline Scenario in stratum i at time t; alternatively, a conservative (high) value that is constant over time can be used; m/year;*

VC_{peat} *- volumetric carbon content in peat, kg/m* ^{3} *;*

$S^{PS}_{i,Tp}$- *area of the stratum i at Tp in the Project scenario, ha;*

$S^{BL}_{i,Tp}$- *area of the stratum i at Tp in the Baseline Scenario, ha;*

i – 1, 2, 3, ...(M ps or M bl) strata of the peat deposit in the Project or Baseline scenarios of the project;

Tp – period of project implementation;

T0 is the year of the start of the project implementation.

Being a product of incomplete decomposition of plant residues, peat retains carbon, being in a waterlogged state. With a decrease in the level of swamp waters, the processes of peat decomposition resume and the accumulated carbon is released into the atmosphere. This process is significantly accelerated by fires and smoldering peat. Thus, the layer of peat located above the level of swamp waters decreases annually. The designed measures should be aimed at slowing down and (or) preventing the processes of peat decomposition, which requires the calculation of the rate of peat mineralization:

$$T_i^{BL} = Depth^{BL}_{peat,i,Tp} \div Rate^{BL}_{окс.m,i}, \quad (7)$$

Where:

T_i^{BL}– *time for complete mineralization of the residual peat layer in stratum j under the Baseline scenario, years* ;

$Depth^{BL}_{peat,i,Tp}$– *residual layer of peat in stratum j under the Baseline scenario, m*;

$Rate^{BL}_{окс.m,i}$*is the rate of peat loss as a result of decomposition processes, as well as fires under the Baseline scenario in stratum j, m/year* ;

i - *homogeneous areas of the project area with the same residual peat thickness*.

Determination of the volumetric content of carbon in peat is carried out on the basis of measurements carried out in the project area. Measurements must be carried out in accordance with the methods approved in the Russian Federation.

Calculations based on estimates of carbon content in other non-peat pools are calculated according to appropriate methodologies [32-34]. Further, these values are added to the total carbon stock in peat.

2.7. Sources of greenhouse gases

Sources of GHG emissions are listed in Table. 2.2.

Table 2.2. Sources of GHG

	Source	Gas	Included?	Justification/Explanation
Baseline Scenario	Emissions from open water surfaces of canals and flooded areas	CH_4	Yes	Important source of methane emissions
	Changes in carbon pool stocks in biomass	CO_2	Yes	Potential important source considered under carbon pools
	Mineralization of drained peat	CO_2	Yes	Potential important source considered under carbon pools
		CH_4	Yes	Potential important source considered under carbon pools
		N_2O	No	Excluded according to insignificant quantity
	Burning of biomass	CO_2	Yes	Potential important source considered under carbon pools
		CH_4	No	Excluded according to insignificant quantity
		N_2O	No	Excluded according to insignificant quantity
	Peat burning	CO_2	Yes	Fires occurring in the Baseline Scenario are accounted for using the standard approach
		CH_4	No	Excluded according to insignificant quantity
		N_2O	No	Excluded according to insignificant quantity
Project Scenario	Emissions from open water surfaces of canals and flooded areas	CH_4	Yes	An important source of emissions that can be reduced in the Project scenario
	Methane production from trench spaces	CH_4	Yes	Potentially important emission source in the project in areas with low salinity and fresh water
	Peat accumulation in the Project scenario	CO_2	Yes	Potential important source considered under carbon pools
	Burning of biomass	CO_2	Yes	Potential important source considered under carbon pools
		CH_4	No	Excluded according to insignificant quantity
		N_2O	No	Excluded according to

	Source	Gas	Included?	Justification/Explanation
				insignificant quantity
	Combustion of fossil fuels when using vehicles and equipment in project activities	CO_2	No	Excluded according to insignificant quantity
		CH_4	No	Excluded according to insignificant quantity
		N_2O	No	Excluded according to insignificant quantity[2]
	Peat burning	CO_2	Yes	Fires that occurred in the Project Scenario are accounted for using the *FRP fire hazard reduction method*
		CH_4	No	*the FRP* fire hazard reduction method
		N_2O	No	*the FRP* fire hazard reduction method

To obtain GHG fluxes for a specific project, the Climate Project developer can make direct measurements of GHG fluxes, such as closed chamber measurements and eddy covariance. The methods and equipment used should be in accordance with international standards for use as set out in the relevant scientific literature. To improve the accuracy and reliability of the data, measurements should be carried out year-round for at least 3 consecutive years after the start of the Climate Project in order to take into account weather variability and its impact on biogeochemical transformation processes. Measurements are recommended to be carried out at least at the sites described in section 6.

2.8. General Approach for Calculating Greenhouse Gas Fluxes

The method for calculating GHG flows is based on the GEST method [3], which uses indirect indicators of emission factors and, first of all, homogeneous vegetation in the project area.

To improve the accuracy and reliability of this approach, when determining the levels of GHG fluxes, it is necessary to take into account such factors of drained peatlands as the residual thickness of peat and PWL, which may also be unevenly distributed over the territory of the Climate Project. To take into account these factors, areas with uniform characteristics in terms of surface topography, peat thickness and PWL (mire microlandscapes) are identified in the project area. Combining the obtained data with land cover classes, one obtains the total amount of data that affects the GHG emission factors, which makes it possible to create

[2] The use of transport and equipment is expected only in the first year of implementation of design solutions. Therefore, GHG emissions in the overall balance are considered negligible

homogeneous spatial units - strata used for further calculations of GHG flows and their changes as a result of the implementation of the Climate Project.

The plan for such work includes:

- classification of data into homogeneous land cover classes, including homogeneous vegetation classes (GEST), open water surfaces, channels and ditches, roads, etc.;
- definition of homogeneous classes of vegetation (GEST) according to existing catalogs (IPCC) and giving them certain emission factors;
- combination of homogeneous vegetation classes (GEST) with areas with the same residual thickness of peat and PWL, and combining them into strata characterized by homogeneous coefficients (range of coefficients) of GHG fluxes;
- development of regression models linking GHG flows and average annual PWL. This will allow three-way cross-validation of independent datasets:
    1. flow data associated with vegetation types,
    2. flow data related to PWL,
    3. vegetation types associated with PWL.

In the absence of actual data on GHG fluxes for a specific area of implementation of the Climate Project, data on similar GESTs described in the peer-reviewed scientific literature can be used and their emission factors can be taken. This choice must be justified and confirmed during the verification procedure by an independent validation and verification body.

Depending on the availability of data, the actual PWL or PWL classes (0-10 cm, 11-20 cm, etc.) can be used.

It is recommended to measure PWL continuously during the entire project implementation period.

Based on regression models, it is possible to establish the values of emission factors within the boundaries of the project area, which will be used in subsequent calculations of GHG emissions ($GHG^{PS}_{WL-CO2,i,t}$, $GHG^{PS}_{WL-CH4,i,t}$) .

To assess the spatial distribution of GEST types, the Climate Project developer should proceed according to the following procedure:

1) map land cover classes using remote sensing techniques and select a mapping resolution. It is recommended to use a minimum mapping unit based on a stratum of at least 0.3 ha. Smaller areas with different vegetation are included in an adjacent mapping unit. It is possible to allocate smaller plots (0.1-0.3 ha) in the following cases:
    a. significant excess / decrease in surface level;
    b. forest areas,

c. areas with open water.

2) include areas of vegetation with an area of less than 0.3 ha with differences in soil relief of more than 1 decimeter (small-scale peat extraction sites, ridge-hollow and hilly complexes) in mosaic cartographic units with an area of more than 0.3 ha. Describe their relief (i.e. the ratio, extent and height of various elements).

3) mark the boundaries of cartographic units with GPS waypoints or track routes; it is also possible to plot the boundaries directly on a topographic map or aerial photograph (with GPS reference points).

4) designate sites on the ground (10×10 m) with characteristic uniform vegetation in each mapping unit to facilitate subsequent (post hoc) identification of GEST .

5) the layer of herbaceous vegetation of peatlands with a predominance of shrubs or trees should be classified as non-forest types of vegetation.

This procedure is used for both pre-project GEST spatial distribution and monitoring. Monitoring needs to assess whether the range of GEST, with their specific GHG emission levels, fully covers the types of vegetation expected in the Project scenario. If not, then the system should be expanded following the same procedure by collecting more literature or field data.

The development of GEST over time should be predicted (ex-ante) based on patterns of vegetation succession on drained and watered peatlands taken from scientific literature or peer review data, or GEST should be monitored (ex-post) for each site throughout the entire period of the Climate Project, by generating a GEST time series with reasonable length steps (eg 3-5 years) to account for the discrete nature of GEST. Table 2.3 provides an example of estimating GHG reductions from the transformation of different GESTs as a result of successional processes.

Table 2.3. Estimation of GHG emission reductions when converting different GESTs

The value of the emission factor for GEST $_1$ at t $_1$, *tCO2-eq./ha*g*	The value of the emission factor for GEST $_2$ at t $_2$, *tCO2-eq./ha*g*	Emission reduction, *tCO2-eq/ ha* year*
12.5	8.4	4.1
…	…	…

Similar transformation schemes for various GESTs should be developed for both the Baseline and Project scenarios, taking into account natural successional processes, and should be scientifically substantiated.

Determination of annual GHG emissions in the project area is carried out by interpolation according to the typical values of emissions of two neighboring GESTs in the time series. The interpolation can be linear, asymmetric or conservative. If the chosen interpolation method is not inherently conservative, the project developer must provide a convincing argument as to why the chosen method is applicable.

Thus, in order to calculate GHG emissions using the described method in the project area, the following actions must be performed:

1) identify all GEST types within the boundaries of the project area;
2) estimate the spatial distribution and area of each GEST ;
3) to determine the areal distribution of the residual power of peat;
4) determine the areal distribution of PWL;
5) determine annual GHG emissions for each GEST ;
6) combine the information from paragraphs 2, 3 and 4 into homogeneous strata. In this case, several GESTs can fall into one stratum ;
7) define a Project Scenario for GEST (a priori) or monitor GEST (retrospectively).
8) determine the annual GHG emissions for each stratum over the entire project crediting period.

The volumes of GHG emissions after the implementation of the design solutions of the Climate Project are estimated as follows:

$$GHG^{PS} = GHG^{rewetted} \tag{8}$$

In the case of additional GHG emission reductions from other actions determined by different methodologies [32-34], the total benefits are summed up.

$$GHG^{PS} = GHG^{rewetted} - GHG_{\text{других проектов}} \tag{9}$$

$$GHG_{i,t}^{rewetted} = S_{i,t}^{PS} \times (GHG_{GEST-CO2,i,t}^{PS} + GHG_{GEST-CH4,i,t}^{PS}) \tag{10}$$

Where:

$GHG_{i,t}^{rewetted}$ *– total GHG emissions at a certain GEST site per year, tCO2-eq./year;*

$S_{i,t}^{PS}$ *– total area of stratum i , ha;*

$GHG_{GEST-CO2,i,t}^{PS}$ *–* CO_2 *emissions from stratum i in the Project scenario, tCO2-eq./year ;*

$GHG_{GEST-CH4,i,t}^{PS}$ *–* CH_4 *emissions from stratum i in the Project scenario, tCO2-eq./year ;*

i – 1, 2, 3, ...(M ps or M bl) strata of the peat deposit in the Project or Baseline scenarios of the project;

t – 1,2,3… Tr years that have passed since the beginning of the project activity

In the case of developing a regression model that links GHG flows and average annual PWL, it is possible to use the corresponding GHG emission factors and calculate the total GHG emissions using the following formula:

$$GHG_{i,t}^{rewetted} = S_{i,t}^{PS} \times (GHG_{WL-CO2,i,t}^{PS} + GHG_{WL-CH4,i,t}^{PS}) \quad (11)$$

Where:

$GHG_{i,t}^{rewetted}$ *– total GHG emissions at a certain GEST site per year, tCO2-eq./year;*

$S_{i,t}^{PS}$ *– total area of stratum i , ha;*

$GHG_{WL-CO2,i,t}^{PS}$ *– CO* $_2$ *emissions associated with the average annual PWL at start i in the Project scenario in year t , tCO2-eq./year ;*

$GHG_{WL-CH4,i,t}^{PS}$ *– CH* $_4$ *emissions associated with the average annual PWL at start i in the Project scenario in year t , tCO2-eq./year ;*

i – 1, 2, 3, ...(M ps or M bl) strata of the peat deposit in the Project or Baseline scenarios of the project;

t – 1,2,3… Tr years that have passed since the beginning of the project activity.

2.9. Assessing potential by reducing fire risk

Drained peat deposits are a source of increased fire danger.

Peat fires, which are the ignition of a peat bog, drained or natural, when its surface is overheated by the rays of the sun, forest fires, or as a result of careless handling of fire by people, are a kind of natural fires and can cause an emergency.

Prevention of this dangerous natural phenomenon is one of the priority tasks in the field of protection of the population and territories from emergency situations. To this end, state authorities and local governments are implementing a set of measures aimed at minimizing the risks of peat fires.

In this regard, when developing the Climate Project, it is necessary to assess the risks of peat fires in the territory where the Climate Project is being implemented.

The implementer of the Climate Project must take into account the potential for reducing GHG emissions through fire hazard reduction (*FRP*) and add it to the overall calculations in the form of a certain amount of tCO_2-eq., the emission of which is prevented by an effective Climate Project.

This potential is calculated based on the frequency and area of fires in the project area in the Baseline Scenario in order to avoid direct estimation of GHG emissions from fires in the Baseline and Project scenarios.

FRP fire mitigation potential is only applicable if peat fires do not occur in the Project scenario.

To determine the *FRP* value, it is first necessary to estimate the overall reduction in GHG emissions under the Project scenario. The standard value of *FRP* is taken at the level of 20% of the total reduction in GHG emissions, while it can be recalculated based on the conditions of a particular territory, both up and down. A project can only qualify for an *FRP* if the following conditions are met:

1) for a period of 10 to 15 years ending 2 years before the start date of the project, the total area of peat burnt areas exceeded 10% of the area of the project area (repeated fires in the same area increase the percentage). Appropriate evidence (official government data and/or remote sensing data) may be provided to confirm this information;

2) in the Baseline Scenario, the project area is currently and in the future at risk of peat fires, as evidenced by current and historical fire statistics and/or maps of their distribution in the project area, combined with information on current and future land use.

Thus, the calculation of *FRP* is made as follows:

If $S_{gary} / S_{project} \geq 0.1$

$$FRP = 0.20 \times \Delta GHG^{rewetted} \quad (12)$$

If $S_{gary} / S_{project} < 0.1$

$$FRP = 0 \quad (13)$$

Where:

FRP- fire hazard reduction potential, tCO2-eq. ;

0.20 - the standard value of the fire hazard reduction potential, can be changed both up and down, which must be confirmed by data for a specific area [3]*;*

$\Delta GHG^{rewetted}$ *- reduction of GHG emissions as a result of flooding up to a year Tp,* tCO_2*-eq.;*

S_{fire} *- total area of burnt areas, ha;*

$S_{Project}$ *- total area of the project area, ha.*

[3] To correctly justify an increase or decrease in this coefficient, actual data on fires in the project area for the last 10 years (at least), in particular, the number of identified outbreaks, the area of distribution and other available information, are used. Based on these data, the probability of occurrence of new hotspots and thus the probability of reducing GHG emissions can be calculated.

3. Baseline methodology

When determining the Baseline scenario, the Baseline is used [4], which is set in a conservative [5] way for the situation of the implementation of activities in the usual mode, including taking into account all existing policies and measures, but without taking into account additional project activities ("Business as usual" model).

An approach based on current (actual) or historical emissions adjusted downward by at least 5% is applied to the determination of the baseline, unless otherwise provided by the Project Methodology [6].

When determining the Baseline Scenario, a description of the use of the territory since at least 2000, ideally for the entire period of its economic use, is given, in particular:

- the period of active use of the deposit area with a description of the peat extraction method and other features,
- whether the necessary reclamation activities were carried out after the completion of peat extraction;
- the period of use of the territory of the peat deposit after peat extraction;
- modern use of the territory of the peatland with a list of all interested parties, which may be: the local population within a radius of 15-20 km, scientific organizations, environmental organizations, hunting and fishing organizations, local authorities, authorities of the constituent entities of the Russian Federation, Federal authorities, in including those exercising control and supervision over a fire hazard situation, over the conservation and use of minerals, etc.

Thus, a description of the use of a drained peatland should contain a description of the entire period of its economic development, on the basis of which reasonable options for the subsequent use of the project area should be formulated.

In addition, it is necessary to identify retrospective maximum possible data on the number and area of fire spread within the project boundaries, on the basis of which to describe the fire hazard models at the baseline for the duration of the project.

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[4] Baseline for greenhouse gases; GHG baseline (greenhouse gas baseline: GHG baseline) - a quantified reference point (points) of GHG emissions and/or removals of GHGs that would occur in the absence of a GHG project expressing the baseline scenario against which comparisons are made of project GHG emissions and removals (GOST R ISO 14064-2-2021 - National Standard of the Russian Federation - Greenhouse gases - Part 2)

[5] The calculation of the baseline is considered conservative if the final estimate of emission reductions resulting from the implementation of project activities is not overestimated. When in doubt, it is better for the project designer to use values that underestimate the baseline forecast.

[6] Baseline approaches are provided in the Decision Adopted by the Conference of the Parties under the Meeting of the Parties to the Paris Agreement, third session (FCCC/PA/CMA/2021/10/Add.1, Article 6.4 of the Paris Agreement, p. 34, paragraph 36). URL: https://unfccc.int/sites/default/files/resource/cma2021_10a01E.pdf

When describing the baseline, a detailed description of the current state of the peatland is given. The information obtained during the initial assessment (p.2.3) is taken as the basis, which should be supplemented with data from detailed field work to improve accuracy and reliability. This description must include at least the following information:

- field survey routes covering the entire project area;
- photographic material indicating a typical condition along the entire survey route. Both terrestrial photographs and materials of remote sensing of the earth can be attached, in particular aerial photographs, photographs from unmanned aerial vehicles (UAVs), satellite images with spatial resolution sufficient for the purposes of this Methodology, laser scanning materials using LiDAR technology , etc .;
- an orthophoto map of a land plot and a map of uniform surface types based on it (several characteristic classes of vegetation, open water surfaces, roads, etc.). In this case, all areas of homogeneous types must be counted;
- for each homogeneous surface type (GEST approach), the main emission factors – residual peat level, average PWL, vegetation description, etc. – should be determined.

The results of the field survey of the territory where the Climate Project is implemented are drawn up in accordance with the unified form “Field Survey Protocol” (Appendix 2), which is a mandatory section in the project documentation.

When developing the Baseline Scenario, it is necessary to take into account the types and purpose of using the territory where the Climate Project is being implemented, both today and in the future. This information can be obtained from territorial planning documents, which determine the purpose of territories based on a combination of social, economic, environmental and other factors in order to ensure sustainable development of territories, develop engineering, transport and social infrastructures, ensure that the interests of citizens and their associations, Russian Federation, constituent entities of the Russian Federation, municipalities (Chapter 3, City of the Construction Code of the Russian Federation).

All scenarios when determining the baseline must be justified and highly probable, and also not contradict the current legislation of all levels of government (local, regional, federal).

To control and confirm the reliability of the selected type of use of the Climate Project territory, a control plot with similar characteristics, with a recommended area of 0.25 ha, is selected, located in close proximity to the Climate Project territory, or at a reasonable distance from it. In case of loss of the control site for reasons beyond the control of the implementer, it can be replaced in agreement with the validation/verification body.

If necessary, it is possible to compile a list of land use types that are allowed and not allowed under the Baseline Scenario.

At the same time, barriers that prevent the implementation of possible scenarios are described. When determining the Baseline Scenario, it is possible to use the provisions of Guideline No. 001 "Justification of the additionality of project activities" [18].

As part of the calculation of GHG emissions under the Baseline Scenario, their amount is calculated taking into account the current system of land use and based on published scientific papers in peer-reviewed sources. Natural successional processes and the rate of self-healing of disturbed peatlands described in the scientific literature should also be taken into account. Recognizing the great variability of climatic, geographical and other features that can significantly affect natural processes, these assumptions and observations can be changed in the event of a longer and more thorough study of these processes on drained peatlands in the Russian Federation and its individual regions.

Baseline recalculation should be performed in the following cases:

- when extending the credit period;
- when adjusted based on monitoring data at the control plot;
- in the event of circumstances of an external force that are not subject to the control of the project implementer.

When calculating GHG emissions and assessing their dynamics in the Baseline Scenario, it is necessary to take into account the fact that the state of individual components of the disturbed peat landscape will not be constant, since the disturbed landscape will tend to self-restoration. Therefore, it is necessary, with the maximum possible degree of probability, to assume the rate and direction of changes for individual homogeneous types of surface, which as a result will also affect the change in GHG fluxes. To increase the likelihood of assumptions, it is necessary to use the current scientific literature, as well as to carry out monitoring work on the territory of the Climate Project and the control site in accordance with the recommendations set out in Section 6.

4. Project crediting period

The start date of the project activity is not regulated.

The crediting period for the project is at least 10 years, renewable for a maximum of two times 10 years or a maximum of 15 years without the possibility of renewal.

The credit period begins no earlier than 5 years before the submission of documents for validation for projects that passed validation before December 31, 2025, and no earlier than 2 years before the submission of documents for validation for projects that passed validation after January 1, 2026.

Additionality and baseline should be assessed at the beginning of the crediting period and confirmed or revised at the beginning of the next 10-year phase if the project is carried out 3 times 10 years.

During the entire period of implementation of the Climate Project, which is implemented through the rewetting of drained peatlands, the project implementer is responsible for the condition of the project areas and the calculation of the amount of GHG emitted from them.

5. Additionality

Confirmation of additionality is carried out using Guideline No. 001 "Justification of additionality of project activities" [18].

One of the criteria established by the Order of the Ministry of Economic Development of Russia dated May 11, 2022 No. 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" criteria that must be met The climate project is a requirement that project activities should be carried out in addition to activities aimed at fulfilling the mandatory requirements provided for by the legislation of the Russian Federation that are in force as of the beginning of the project.

This means that projects (programs) implemented for purposes other than the goals of reducing GHG emissions cannot be classified as Climate Projects, even if one of the side effects of these projects (programs) may be to reduce GHG emissions.

Thus, the current legislation of the Russian Federation (as well as the previous legislation of the USSR) obliges a person engaged in the extraction of natural resources (development of subsoil) and other actions, as a result of which the soil layer is disturbed, to carry out reclamation work aimed at preventing land degradation and (or) restoring them, fertility by bringing land into a condition suitable for their use in accordance with the intended purpose and permitted use, including by eliminating the consequences of soil pollution, restoring the fertile soil layer and creating protective forest plantations.

Such an obligation is also established for persons engaged in the extraction of peat. When reclamation depleted peatlands, the following requirements must be met:

- carrying out the reclamation of depleted peatlands immediately after the end of the exploitation of deposits;
- planning and cleaning of areas from stumps and wood;
- cutting edge at the channels in the areas worked out by the milling method;
- ensuring the safety in good condition of the drainage and drainage network, hydraulic structures used during the period of peat extraction;
- development of peatlands worked out by a milling method, mainly for agricultural land;

- creation of forest plantations, reservoirs for various purposes and hunting farms on worked-out peatlands unsuitable for agricultural use;

- Carrying out fire prevention activities.

Development of a land reclamation project and land reclamation, development of a land conservation project and land conservation are provided by persons whose activities have led to land degradation, including land owners, persons using land plots on the terms of easement, public easement, as well as persons using land or land plots that are in state or municipal ownership, without the provision of land plots and the establishment of servitudes.

At the same time, most of the peat deposits were abandoned without carrying out these works during the collapse of the USSR and in subsequent years. Now, for various reasons, there are no legal entities that could be entrusted with this responsibility, and it is these lands that should be involved in the implementation of Climate projects.

The situation is aggravated by the fact that drained peatlands are located mainly on the lands of the forest fund or on the lands of the reserve. These lands are state-owned, and the current legislation does not provide for the obligation for this public legal entity to carry out reclamation and other additional work on drained peatlands.

In this regard, the Climate Project must contain information confirming that it is not a consequence or continuation of the activities of economic entities that previously used the project area for economic purposes and are obliged by law to bear the burden of its reclamation.

6. Monitoring plan requirement

Monitoring of the implementation of the activities of the Climate Project should be scientifically substantiated, comprehensive and systemic.

The main goal of monitoring the Climate Project is to reliably quantify carbon stocks and GHG emissions in the Project scenario.

Monitoring should be based on advanced technologies available based on current scientific and technological developments.

Within the framework of monitoring, at least key indicators indicating positive changes in the implementation of the Climate Project should be identified, and as a maximum, all possible indicators for which it is possible to conduct systematic and comprehensive observations within the framework of the Climate Project.

Monitoring activities are divided into two groups according to the nature of their implementation:

1. General observations of the entire project area using earth remote sensing data (satellite images, UAV data);

2. Selection of the key most representative sites 10*10 m in size in all GESTs, as well as in the buffer zone, for detailed observations of vegetation composition, PWL, residual peat thickness, GHG amount.

First of all, the following indicators should be monitored:

- vegetation and its changes within the project boundaries and adjacent areas. For this purpose, up-to-date remote sensing data (satellite images of sufficient resolution, images from UAVs), as well as data obtained during mandatory ground verification, should be used. The result of these works is a map-scheme with selected homogeneous classes of the earth's surface, having the same factors and volumes of GHG emissions within their boundaries;
- dynamics of changes in PWL;
- change in the area of territories with high level of PWL;
- residual thickness of peat deposits;
- bioindicators - changes in quantitative and qualitative indicators of key species of flora and fauna;
- climatic parameters of the territory where the Climate Project is implemented;
- direct measurements of GHG emissions at key sites. Taking into account the fact that continuous measurements can be extremely expensive and do not contribute to economic interests as a result of the project, it is advisable to identify several key most characteristic areas and measure GHG flows exactly at them. This information needs to be checked periodically for peatlands in other regions and then a model for recalculating the level of emissions for all other areas should be developed.
- to assess the degree of shrinkage and mineralization of peat, it is necessary to conduct regular observations of the surface marks of the project area (at least at key points). This assessment can be carried out by compiling a detailed digital terrain model (using the LiDAR method), or by other available and reliable methods.

The monitoring plan should contain at least the following sections:

- description of each monitoring task to be performed and technical requirements;
- parameters to be measured;
- T he data to be collected and how that data is collected;
- monitoring frequency.

The frequency of monitoring should be justified for each indicator. The following monitoring intervals are recommended:

- for PWL - a year before the project implementation and further during the entire project implementation period;
- for the residual capacity of peat - before the implementation of the project and then once every three years;

- to estimate the amount of GHG - before the project implementation and then annually;
- to assess vegetation change - before the project implementation and then once every two years;
- the number and area of spread of fires - regularly as they occur;
- for bioindicators - before project implementation and further as necessary and justified;
- for climatic indicators - regularly as data on the climatic characteristics of the project area become available.

All data must be supported by documents. All field work must have a field book attached to the monitoring report. All instruments used in the monitoring must have the necessary documentation confirming their accuracy and reliability.

The data obtained from the control plot surveys are used to adjust the previously approved baseline at each design verification. The baseline is adjusted if the monitoring data differ by more than 10% towards an increase in the baseline conservatism (i.e. downward for the baseline for net GHG emissions and upward for the baseline for net absorption). The adjustment uses the baseline data obtained before it is discounted and then applies a 5% discount as specified in section 3 of this methodology. In case of discrepancy between the received monitoring data and the approved baseline in the direction of reducing its conservativeness, adjustments are not applied.

The monitoring of the implemented activities is carried out in accordance with the unified form "Monitoring of the Climate Project" (Appendix 3).

Remote, including hyperspectral, estimates of carbon stocks and/or GHG emissions can be used in the validation of the baseline and verification of the achieved results of the project to independently confirm the measured data, but should not be used as the sole and/or main method for monitoring and evaluating the quantitative indicators of the project .

6.1. Data and parameters to be monitored

This section provides examples of substantiation of indicators for which monitoring work is carried out.

Data / Parameter:	$Depth_{peat,i}^{BL}$
Unit of measurement:	m
Description:	Peat depth above the average annual PWL in the Baseline

	Scenario in stratum *i* at the start of the project
Data source:	Own measurements
Applicable value:	No
Justification for data selection or description of measurement methods and procedures used:	The depth of peat at the start of the project can be obtained based on own measurements using water level sensors located directly on the project site, as well as direct sounding of the peat deposit. The number of sensors and their location must be scientifically justified.
Purpose of data	Calculation of GHG emissions in the Baseline Scenario Calculation of the maximum GHG emission reductions that can be claimed by the project
Comments:	$Depth^{BL}_{peat,i,T0} = Depth^{PS}_{peat,i,T0}$ This parameter should be reviewed at the same time as the revision of the Baseline Scenario.

Data / Parameter:	$Depth^{PS}_{peat,i,T0}$
Unit of measurement:	m
Description:	Peat depth above average annual PWL in the Project scenario in stratum *i* at the start of the project
Data source:	Own measurements
Applicable value:	No
Justification for data selection or description of measurement methods and procedures used:	The depth of peat at the time of verification during the project implementation period can be obtained based on own measurements using water level sensors located directly on the project site, as well as direct sounding of the peat deposit at control points.
Purpose of data	Calculation of the maximum GHG emission reductions that can be claimed by the project

Comments:	$Depth_{peat,i,T0}^{BL}$=$Depth_{peat,i,T0}^{PS}$ This parameter should be reviewed at the same time as the revision of the Baseline Scenario.

Data / Parameter:	$Rate_{peatloss,i,t}^{BL}$
Unit of measurement:	m/year
Description:	peat loss rate due to precipitation, fires, mineralization in the Baseline Scenario in stratum i at time t
Data source:	Own measurements, expert opinions, databases and/or retrospective literature data on the rate of peat loss
Applicable value:	No
Justification for data selection or description of measurement methods and procedures used:	The rate of peat loss due to settlement is calculated based on verifiable data from the following sources: 1. Expert judgment, datasets and/or historical literary data on settlement for the project area or similar areas, which are based on measurements of the surface height from a fixed reference point in meters above sea level (for example, marks on posts fixed in the underlying mineral soil, as well as using an optical rangefinder LiDAR , or similar methods). The data used must be verifiable. Or 2. emissions derived from prevailing GESTs combined with data on volumetric carbon content in peat. Divide the annual $CO_{2\ emission}$ (t CO_2 ha $^{-1}$) by 44/12 to get the altitude loss in meters , and then divide the result by the volumetric carbon content (g C cm $^{-3}$). The average burn depth is determined from expert judgment, available data and/or literature on past burn depth in the project area or similar areas, from surface height measurements (eg using field measurements or LiDAR). When using LiDAR data , a science-based approach should be used, with references to the relevant scientific literature, ensuring horizontal accuracy in meters and vertical accuracy in centimeters. Burnout areas can be calculated from statistical data and/or maps in official reports and/or from field measurements or remote sensing

	data. An average annual burning depth should be calculated and applied to the entire project area. Since fires in the Baseline Scenario are likely to occur only in part of the area, this approach is conservative.
Purpose of data	Calculation of baseline emissions Calculation of the maximum GHG emission reductions that can be claimed by the project
Comments:	When determining the need for stratification of a peat deposit, the use of a relatively low constant peat loss rate should not be confused with a relatively high one. This parameter should be reviewed at the same time as the revision of the Baseline Scenario.

Data / Parameter:	VC_{peat}
Unit of measurement:	kg / m ^{3}
Description:	volumetric carbon content in peat
Data source:	The volumetric content of carbon in peat can be taken from own measurements at the project site or from generally accepted literature in the peat industry.
Applicable value:	No
Justification for data selection or description of measurement methods and procedures used:	The methods used should be in accordance with international application standards and/or local standards as set out in relevant scientific literature or reference books.
Purpose of data	Calculation of the maximum GHG emission reductions that can be claimed by the project
Comments:	No

Data / Parameter:	$S_{i,Tp}^{BL}$

Unit of measurement:	ha
Description:	Area of base stratum *i* in year t
Data source:	Own measurements
Applicable value:	No
Justification for data selection or description of measurement methods and procedures used:	Layering should preferably be done using a geographic information system (GIS) that allows integration of data from various sources (including GPS coordinates and remote sensing data). The methods used should be in accordance with international application standards and/or local standards as set out in relevant scientific literature or reference books.
Purpose of data	Calculation of baseline emissions
Comments:	No

Data / Parameter:	$S^{PS}{}_{,i,t}$
Unit of measurement:	ha
Description:	Area of project stratum *i* in year t
Data source:	Own measurements
Applicable value:	No
Description of applied measurement methods and procedures:	It is desirable to measure the area of the layers using a geographic information system (GIS) that allows the integration of data from various sources (including GPS coordinates and remote sensing data). The methods used should be in accordance with international application standards and/or local standards as set out in relevant scientific literature or reference books.
Frequency of monitoring / measurements:	Determined for each monitoring period. At least one year before the project implementation, for the 2nd year after

	watering, and then once every two years
Purpose of data	Calculation of project emissions
Comments:	No

Data / Parameter:	Average annual of PWL
Unit of measurement:	cm
Description:	Subsoil or above ground water surface, relative to the soil surface
Data source:	Own measurements
Applicable value:	No
Description of applied measurement methods and procedures:	It is recommended to measure the level of swamp waters using automatic control sensors that operate throughout the year and record the dynamics of the PWL at least every day. These sensors should be installed at least in representative areas of all GESTs in the project area.
Frequency of monitoring / measurements:	See section 10
Purpose of data	Calculation of project emissions
Comments:	No

7. Project scenario

When describing the Project Scenario, data on the use of the territory of the Climate Project for the entire period of economic activity, given when determining the Base Scenario, are indicated.

The Project Scenario also needs to provide for measures to disclose information related to the implementation of the Climate Project (conducting sociological surveys and other studies), taking into account the opinion of the population in the relevant territory, as well as involving the local population in the implementation of the Climate Project and subsequent monitoring.

Thus, the description of the use of the drained peatland should contain a description of the entire period of its economic use and the intended use within the framework of the Project scenario.

When developing the Project Scenario, it is necessary to take into account the types and purpose of using the territory where the Climate Project is being implemented, both today and in the future. This information can be obtained from territorial planning documents, which determine the purpose of territories based on a combination of social, economic, environmental and other factors in order to ensure sustainable development of territories, develop engineering, transport and social infrastructures, ensure that the interests of citizens and their associations, Russian Federation, constituent entities of the Russian Federation, municipalities (Chapter 3, Town Planning Code of the Russian Federation).

The Project Scenario should define the area management plan for the entire project period. The project documentation includes the following information:

- goals and objectives of the Climate Project;
- activities and ways to achieve the set goals (description of the main design solutions);
- cartographic software, including at least:
    - cartographic material at a scale of 1:5000-1:10000 [7] to present a detailed plan of the land plot;
    - cartographic material at a scale of 1:25000 for the situational plan for the location of the territory of the Climate Project;
    - cartographic material at a scale of 1:5000-1:10000 to display the implementation of design solutions;
- image of the main structures used in the implementation of the Climate Project;
- results of hydrological modeling of the territory of implementation of the Climate Project, indicating the dynamics for the period of implementation of the Climate Project;
- environmental impact assessment (EIA) of the implementation of project activities;
- social aspects - a list of all stakeholders, a description of the risks that may arise during the implementation of the Climate Project and in subsequent years, as well as measures to reduce or prevent them;
- assessment of biodiversity and measures to improve or not worsen it (in case of presence of especially valuable representatives of flora and fauna in the project area);
- information about customers and implementers of the Climate Project;
- a description of possible risks during the entire period of the project's existence, possible ways to reduce them, as well as a possible action plan if they occur.

[7] The scale of the cartographic material can be changed depending on the area of the project area

The project must provide for corrective actions if within five years after the implementation of the project there are no changes in the project areas in the form of an increase in the level of swamp waters, or other changes specified in Section 10. In this case, changes are made to the project documentation and additional corrective actions are carried out. Actions on the ground (Section 11).

As part of the Project Scenario, GHG emissions are calculated for the entire duration of the project, i.e. 100 years.

All emissions are calculated for two main GHGs - CO_2 and CH_4 . Further conversion into tons of CO2-eq.

All calculations are updated as reliable information becomes available, but at least once every five years based on the results of annual monitoring and constantly measured indicators (GHG flows, climatic characteristics, dynamic of PWL, etc.). Priority is given to evidence and its contribution to changes in GHG fluxes.

The most accurate and reliable method for calculating GHG flows, which reflects the actual situation in the territory of the Climate Project, is presented in clause 2.8 of this Methodology. Nevertheless, various methods of international and national level can be used to carry out generalized and preliminary calculations of GHG flows, including:

- emission factors of the IPCC [35];
- calculation method based on indirect emission factors (GEST - approach) [3];
- Order of the Ministry of Natural Resources of Russia dated May 27, 2022 No. 371 “On approval of methods for quantifying greenhouse gas emissions and greenhouse gas removals” [5, Section 12.13] or not contradict them.

Other calculation methods can also be used, indicating their publication in scientific peer-reviewed sources. The application of methods should be motivated and justified in the project and should give comparable results with the above methods. This fact must be confirmed during verification.

As part of the substantiation of additional positive effects from the implementation of the Climate Project, the implementer has the right to provide an economic assessment of changes in other ecosystem services that are affected by the activities of the Climate Project. Such ecosystem services can be - changing biodiversity, improving the quality of atmospheric air, improving the quality and quantity of surface and ground waters, and others [8, 9, 29].

7.1. Calculation of Net Greenhouse Gas Emission Reductions

Net GHG emission reductions are calculated from an estimate of four main elements – change in carbon stocks in carbon pools, change in GHG fluxes, fire mitigation and fire prevention potential, and all identified leaks from project activities.

For a general assessment of the reduction in GHG emissions as a result of the Climate Project, formula *(1)* can be transformed into the following form:

$$NEP^{RDP} = \frac{44}{12} \times (\Delta C^{BL} - \Delta C^{PS}) + \Delta GHG^{PS} + FRP - GHG^{L} \qquad (14)$$

The reduction of GHG emissions as a result of watering, taking into account formula *(8),* is estimated for each stratum as follows:

$$\Delta GHG_{i,t}^{rewetted} = S_{i,t} \times ((GHG_{GEST-CO2,i,t}^{BL} + GHG_{GEST-CH4,i,t}^{BL}) - (GHG_{GEST-CO2,i,t}^{PS} + GHG_{GEST-CH4,i,t}^{PS})) \qquad (15)$$

Where:

$\Delta GHG_{i,t}^{rewetted}$ *- reduction of GHG emissions as a result of flooding in stratum i in year t , tCO2eq/year ;*

$S_{i,t}$*– total area of stratum i in the Project scenario, ha;*

$GHG_{GEST-CO2,i,t}^{BL}$- CO_2 *emissions from baseline GESTs in stratum i in year t in the Baseline scenario , tCO2-eq/year ;*

$GHG_{GEST-CH4,i,t}^{BL}$- CH_4 *emissions from baseline GEST in stratum i in year t in the Baseline Scenario , tCO2-eq/year ;*

$GHG_{GEST-CO2,i,t}^{PS}$- CO_2 *emissions from project GESTs in stratum i in year t in the Project Scenario , tCO2-eq/year ;*

$GHG_{GEST-CH4,i,t}^{PS}$- CH_4 *emissions from project GEST in stratum i in year t in the Project scenario , tCO2-eq/year ;*

i – 1, 2, 3, ...(M ps or M bl) strata of the peat deposit in the Project or Baseline scenarios of the project;

t – 1,2,3… Tr years that have passed since the beginning of the project activities;

44/12 is the coefficient of conversion of carbon into carbon dioxide, equal to the ratio of the relative molecular mass of carbon dioxide to the relative atomic mass of carbon.

Based on formula *(15),* the overall effect on changes in GHG flows is summarized for all years and for all strata according to the following formula:

$$\Delta GHG^{rewetted} = \sum_{t=1}^{Tp} \sum_{i=1}^{M_{ps}} \Delta GHG_{i,t}^{rewetted} \quad (16)$$

Where:

$\Delta GHG^{rewetted}$- *reduction of GHG emissions as a result of flooding up to a year Tp , tCO2-eq. ;*

$\Delta GHG_{i,t}^{rewetted}$ - *reduction* of GHG *emissions as a result of flooding in stratum i in year t , tCO2eq/year ;*

FRP is the reduction of GHG emissions while preventing the occurrence of fires in the project area up to a year Tp , tCO2-eq. ;

GHG^{L}*– leakages as a result of the implementation of the Project scenario, tCO2-eq.;*

i – 1, 2, 3, ...(M ps or M bl) strata of the peat deposit in the Project or Baseline scenarios of the project;

t – 1,2,3… Tr years that have passed since the beginning of the project activity.

7.2. Adaptation procedures

In the case when the monitoring work of the first five years after the implementation of the project activities did not record significant changes in the key indicators adopted in Section 10, adaptation (corrective) procedures for the implementation of the Climate Project should be provided.

As part of the implementation of these procedures, the main causes and factors of inefficiency of the implemented measures should be identified, or justification should be given that this happened for reasons beyond the implementer's control (for example, dry years, etc.). Based on the information received, additional corrective actions should be identified and implemented.

Adaptation procedures should be carried out in accordance with the general concept of design solutions and comply with the design documentation submitted for validation. This fact is confirmed during verification.

8. Leakage assessment

According to the Order of the Ministry of Economic Development of Russia dated May 11, 2022 No. 248, project activities should not lead to a cumulative increase in the mass of GHG emissions or a decrease in the level of their absorption outside the area of influence of such activities.

When developing and implementing the Climate Project, it is necessary to provide for measures aimed at reducing or eliminating the negative impact on the existing land use system on adjacent lands in terms of a possible increase in GHG emissions.

Such territories may have different legal regimes and purposes, for example, linear structures (roads and railways, power lines, pipelines), settlements, agricultural land, forests of various statuses and purposes.

In this regard, in the Project scenario it is necessary to determine all possible and expected options for impact on neighboring territories. These options should be based on the need to achieve the following goals:

- minimizing or eliminating the impact of the Climate Project on the existing land use system in neighboring territories;
- minimization or elimination of impact on adjacent territories, which may increase GHG emissions from them.

If factors of possible negative impact are identified, it is necessary to take into account the data on the increase in GHG emissions in the adjacent territories when calculating the Baseline and Project scenarios. In this case, it is necessary to calculate the leakage rate (GHG^L) in formulas *(1)* or *(14)* according to the appropriate methodologies. To do this, it is necessary to take into account the maximum number of all types of leaks, including:

- market leaks;
- change of activities;
- environmental leaks (impact on GHG emissions in the adjacent project areas).

9. Non-permanence risk analysis

As part of the development of project documentation for the Climate Project, the implementer foresees possible risks of force majeure catastrophic events, the occurrence and development of which can completely or partially destroy the positive result accumulated at the time of its occurrence.

As a rule, such phenomena include extraordinary force majeure circumstances, first of all, these are various natural phenomena - hurricanes, earthquakes, fires, destruction of a forest stand by pests and diseases of the forest (in the case of the presence and preservation of a forest stand), etc. Such circumstances can include accidents and catastrophes of a man-caused nature in the event that hazardous production facilities are located in the immediate vicinity of the territory where the Climate Project is being implemented, and other events that affect the prospects for the implementation of the Climate Project and its results.

To minimize the negative consequences of force majeure catastrophic events, the implementer has the right to develop additional measures to prevent or reduce the likelihood of such events. An example of this would be specialized additional measures to reduce fire hazards in the Climate Project area. The development and implementation of such measures will significantly reduce the risks of destroying the accumulated positive effect of the Climate Project.

In the event of catastrophic events occurring during the implementation of the Climate Project, the implementer must take all possible actions on its part to reduce their negative impact.

The fact of occurrence of emergency circumstances, as well as measures taken by the implementer to reduce the negative impact, must be recorded, documented and presented to the verifier to prove that these catastrophic events could not have been prevented.

The implementer is not responsible for the state of the project areas and the increase in the amount of GHG emissions emitted from them, in case it proves that the force majeure catastrophic events that have arisen were beyond its control, they could not reasonably be expected or avoided or overcome.

At the same time, the amount of GHG emissions is recalculated for both the Baseline and Project scenarios, starting from the date of completion of the catastrophic event.

To implement the Climate Project, it is recommended to develop a risk assessment system that may arise at all stages of the Climate Project. To do this, the project implementer draws up the most detailed matrix indicating the following information:

1. Main stages of the implementation of the Climate Project.
2. Description of the risks that may arise at each stage of the Climate Project.
3. Description of the probability of occurrence of risks. For this, the rating options "low, medium, high" or any other understandable numerical scales can be used.
4. Description of the impact of each risk on the results of the entire Climate Project. This can also be done using "low, medium, high" or any other understandable numerical scale.
5. Description of the impact period of each risk on the entire Climate Project.
6. For each risk, measures are developed to minimize or prevent it (if such actions are possible in relation to each described risk situation).
7. The time for the implementation of each measure that reduces or prevents the occurrence of risks (if such actions are possible in relation to each described risk situation) is indicated (Table 9.1).

The implementer has the right to include in the project documentation other additional information related to the possible risks of loss or significant reduction in the useful result of the Climate Project.

The Implementer is obliged to take into account the risks of volatility in order to assess the overall feasibility of implementing the Climate Project in the selected area.

It is necessary to provide guarantees that the results of the project will be preserved for 100 years. For every 10 years that are not covered by guarantees, 3% of the issued carbon units must be discounted.

In the event of a force majeure occurring during the credit period and with due justification, the baseline may be recalculated to take this phenomenon into account.

To minimize the risk of a dangerous event of force majeure after the credit period, 15% must be discounted for each issue of carbon credits.

Table 9.1. Risk Assessment of the Climate Project

Implementation stage of the Climate Project	**Description of risks**	**Probability of occurrence**	**Impact on the project**	**Period of influence**	**Ways to minimize**	**Minimization period**
		1. Low 2. Medium 3. High	1. Low 2. Medium 3. High	1. Preparatory 2. Implementation period 3. 1-2 years after implementation 4. The entire period of the Climate Project	Detailed description of measures to reduce 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			

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

The result of the implementation of project activities is the reduction of GHG emissions from the territory of the Climate Project. This reduction is expressed in specific carbon units calculated according to the methods justified in this Climate Project or directly measured in the territory of the Climate Project.

In order to confirm the receipt of the result, a preliminary validation of the Climate project is carried out and further verification of the project implementation. The validator/verifier must be officially registered in accordance with the legislation of the Russian Federation.

The official verifier checks the fact of changes in GHG emissions. The verification plan is developed separately. The official verifier must have a specialist in his staff with proven competencies in the field of peat resources use, as well as meet other requirements of national legislation [12-14]. All deficiencies identified during the verification process must be scientifically substantiated.

Thus, in order to avoid double counting, project results registered in the national register cannot be re-registered in other registers.

In the event that the facilities within the project boundaries specified in this methodology belong to different legal entities (or are under the operational management of different legal entities), then the project documentation should include a description of the procedures for eliminating the possibility of double counting of GHG emission reductions potentially achieved in as a result of project activities, enshrined in contractual agreements. It is also recommended that the validation/verification body exclude double counting of the same project (the territory of the Climate Project), as a result of applications submitted by different legal entities , during the validation procedure of the Climate Project at the stage preceding its registration in the National Register .

These units may be accepted for the NDC report and in this case are kept in the national registry. Also, carbon units can be sold on the international market of carbon units. In this case, the corresponding carbon units are excluded from the national register and entered into the register of the country in which the company that acquired the carbon units operates.

It is allowed to sell carbon units obtained as a result of the implementation of one Climate project, partly on the international market, and partly on the domestic market.

In order to increase the social significance of the Climate Project, it is recommended to deduct 10-15% of the benefits received from the implementation of carbon units for the development of the territories of the municipality within which the Climate Project is being implemented.

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

When extending the crediting period, the project is subject to review with elements of validation and technical evaluation by the validation and verification body to determine the necessary updates to the baseline, additionality and quantification of emission reductions.

To update the baseline, the approach to its determination, the main parameters and assumptions used in the analysis are reviewed and updated. The baseline must reflect the conditions for the start of a new crediting period and be valid during this period.

Additionality upon renewal of the crediting period is checked for compliance with the criteria in Guideline No. 001 “Rationale for additionality of project activities” at the start date of the new crediting period.

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