Climate project methodology № 0005

Energy efficiency and fuel switching measures for buildings (small-scale)

Developer: Yu. A. Izrael Institute of Global Climate and Ecology

Version 1.1

3 April 2023

Contents

1. Terms and Definitions

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

(a) **Building -** a three-dimensional building system that has above-ground and (or) underground parts, including premises, engineering and technical support networks and systems and is intended for living and (or) activities of people, locating production, storage of products or keeping animals[1]**;**

(b) **Construction -** a three-dimensional, planar or linear building system, which has ground, above-ground and (or) underground parts, consisting of load-bearing, and in some cases, enclosing building constructions and designed to perform production processes of various types, store products, temporary stay of people, movement of people and goods**;**

(c) **Premises -** part of a building or a construction, which has a specific purpose and is limited by building constructions and allocated to a specific user, which can be either a tenant or an owner. If a building (construction) has more than one tenant/owner[2], then the premises is defined as the part of the building leased to one tenant or used by the owner[3]. If the building is used by one tenant/owner, then for the purposes of this Methodology, the premises are equal to the entire building[4]**;**

(d) **Single -** family house (residential building) – a separate building, which consists of rooms, as well as auxiliary premises, designed to meet peoples' domestic and other needs related to living in such a building, see Appendix 1**;**

(e) **Multi-apartment residential building -** a building consisting of two or more apartments, which includes common property, consisting of two or more apartments, including the property specified in paragraphs 1-3 of part 1 of article 36 of the Housing Code, see Appendix 1[5]**;**

(f) **Residential premises -** isolated premises, which is a real property and is suitable for permanent residence of people (meets the established sanitary and technical rules and regulations, other legal requirements) , see Appendix 1[6]**;**

(g) **Buildings, constructions and premises for public purposes -** buildings and constructions for facilities serving the country population, buildings for public facilities, as well as multifunctional buildings (premises), see Appendix 1[7]**;**

---

[1] Federal Law of December 30.12.2009 № 384-FZ "Technical Regulations on the Safety of Buildings and constructions " article 2, paragraph 2, subparagraph 6 and 24

[2] A tenant/owner can be either an individual, or a group of individuals sharing the same building unit.

[3] Residential building unit is an example. The term residential building unit refers to a single housing unit. Namely, a single family home is one residential building unit while a building with ten apartments has ten residential building units.

[4] Schools are a typical example. As a school is normally occupied by an owner (e.g. municipality), the entire school building, not each classroom, is considered as a building unit in this methodology.

[5] Housing Code of the Russian Federation dated December 29, 2004 No. 188-FZ. (with amendments and additions), Article 15

[6] See: SP 55.13330.2011 Code of rules Residential single-apartment houses. Updated version of SNiP 31-02-2001 and SP 54.13330.2016 Code of rules Residential multi-apartment buildings. Updated version of SNiP 31-01-2003 (Multicompartment residential buildings)

[7] See: Code of Rules SP 118.13330.2022 Public buildings and constructions SNiP 31-06-2009

(h) **Gross building floor area (GFA) -** the area occupied by internal walls and partitions of the premises and calculated in accordance with the construction codes[8];

(i) **Heating and hot water supply system -** the heating and hot water system includes all the components necessary to supply thermal energy for heating and hot water. It consists of heat sources, heating devices, water treatment, water heaters, pipelines for transporting thermal energy, hot water and devices for regulating and controlling the temperature of water and heating system[9] ;

(j) **Water Cooled Building Air Conditioning System (chilled water system) -** includes all components needed to provide chilled water cooling services for buildings. It includes one or more chillers plus auxiliary equipment such as pumps to circulate chilled and condensing water, fans to circulate cooling air in the condenser, associated piping and fans used for cooling in the cooling tower;

(k) **Heating Degree days (HDD) –** heating degree days are a measure of how much (in degrees), and for how long (in days), the outside air temperature was below a certain level. They are commonly used in calculations relating to the energy consumption required to heat buildings;

(l) **Cooling Degree Days (CDD) –** cooling degree days are a measure of how much (in degrees), and for how long (in days), the outside air temperature was above a certain level. They are commonly used in calculations relating to the energy consumption required to cool buildings;

(m) **B-settings –** physical base properties of a building, such as building envelope (e.g. dimensions and building geometry, location of building surfaces such as windows, doors and skylights, orientation of external surfaces, building shades and shading from nearby objects, relative position of the building thermal zones) and thermal properties (layer-by-layer description of the building materials with their conductivity, specific heat and density);

(n) **T-settings –** tenancy-related characteristics of a building, such as internal loads (occupancy or average number of people per time period,[10] lighting and equipment power density[11], internal load schedules and plug loads, including their counts,

[8] SP 55.13330.2011 Code of rules Residential single-apartment houses. Updated edition of SNiP 31-02-2001; SP 54.13330.2016 Code of rules Residential multi-apartment buildings. Updated edition of SNiP 31-01-2003; Code of rules SP 118.13330.2022 Public buildings and constructions SNiP 31-06-2009

[9] SP 60.13330.2020 Code of Practice for Heating, Ventilation and Air Conditioning

[10] Such as population counts in weekdays, weekends and holidays, assignments to thermal zones.

[11] Data collected may include fixture counts, fixture types, nameplate data from lamps and ballasts, 24-hour weekday, weekend and holiday schedule of lighting use, characteristics of fixtures for estimating radiative and connective heat flows, thermal zone assignments and diversity of operations.

nameplate data, usage schedules and diversity of operations, and building operations reflecting occupant behavior;[12]

(o) **PDD** – Project Design Document that describes project activity;

(p) **Chilled water system** – comprises all components needed to provide the cooling services by chilled water. It comprises one or several chillers plus ancillary equipment such as pumps for circulating chilled water and the condensing water and the fans to be used for circulating the cooling air in the condenser, associated piping, and the fans used to facilitate cooling at the cooling tower;

(q) **Chilled water –** water or water mixture that circulates through an evaporator unit, where it is cooled by a refrigerant as the latter evaporates. The chilled water in turn circulates to the applications that need to be cooled (e.g. space in buildings), where it exchanges heat, and is re-circulated back to the evaporation unit;

(r) **Hot water system** – a hot water system comprises all components needed to provide hot water. It consists of heat sources, water treatment apparatus, water heaters, pipelines to transport the hot water, and devices to regulate and control the water's temperature;

(s) **BEMS** – Building Energy Management Systems; BEMS is a method to monitor and control the building's energy needs; the system can control and monitor a large variety of other aspects of the building regardless of whether it is residential or commercial;

(t) **Occupancy** – Average yearly occupancy of the residential baseline building unit;

(u) **Data coverage period** – the period for which activity data on the operation of the buildings (i.e. electricity consumed, fuel consumed and hot/chilled water consumed) is collected for the establishment or update of a standardized baseline. By default, activity data of three years are required.

(v) **Data currentness** – the time gap between the end of the data coverage period and the complete submission of the standardized baseline. The most recent data available shall be used, and the data currentness shall be no more than two years.

[12] Such as control temperatures, window opening, other related schedules, actual weather data, energy consumption (by fuel type) in the first 12 months of building operation.

(w) **Cohort of existing buildings** – buildings that have finalized the construction more than five years before the end of the data coverage period;

(x) **Cohort of new buildings** – buildings that have finalized the construction within the five years before the end the data coverage period;

(y) **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.

2. Scope and applicability

2. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical project(s)	Installation of, or replacement or retrofit of, existing equipment with energy efficiency (e.g. efficient appliances, better insulation) and optional fuel switching (e.g. switch from oil to gas) measures in residential, commercial or institutional buildings
Type of GHG emissions mitigation action	Energy efficiency: Electricity and/or fuel savings through energy efficiency improvement. Optionally, use of less-carbon-intensive fuel

Given methodology is unaffected by applying to GHG programs. If a GHG program is applied, then the requirements of this program supplement the requirements of the methodology. This methodology is prepared based on the existing methodology developed under the Clean Development Mechanism of the Kyoto Protocol (AMS.II.E.) and includes its adaptation to the current Russian regulations and standards.

2.1. Scope

3. The scope of this methodology includes project activities that implement energy efficiency measures (including savings of electricity and fuel) and/or fuel switching in new or existing residential, commercial or institutional building units or group of building units – a non-binding detailed list of building categories is presented in Appendix 1.

4. This methodology covers project activities aimed primarily at energy efficiency. Examples include technical energy efficiency measures (such as efficient appliances, better insulation and optimal arrangement of equipment, BEMS – Building Energy Management Systems) and fuel switching measures (such as switching from oil to gas).

5. The technologies may replace existing equipment or be installed in new facilities and shall not transferred from another project activity.

6. The aggregate energy savings of a single project may not exceed the equivalent of 60 GWh per year.

2.2. Applicability

7. This methodology is applicable to project activities where it is possible to directly measure and record the energy use within the project boundary (e.g. electricity and/or fossil fuel consumption).

8. This methodology is applicable to project activities where the impact of the measures implemented (improvements in energy efficiency) by the project activity can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity (signal to noise ratio).

9. Project activities that involve fuel switching and/or the installation of renewable energy technologies to generate electricity for self-consumption (e.g. rooftop solar PV panels) are eligible under this methodology, if the following requirements are met:

    (a) For fuel switching measures:

        (i) Fuel switching is implemented as part of a package of energy efficiency measures at a single building;

        (ii) To address potential cross-effects between the energy efficiency and fuel switching measures, the baseline for the fuel switching component is set after considering the effects of the implementation of the energy efficiency measures (i.e. the fuels consumed by building in the project activity shall be adjusted taking into account the energy efficient building scenario);

(b) For renewable energy technologies:

(i) Emission reductions from installation of renewable energy technologies shall be determined as per an applicable methodology (e.g. Renewable electricity generation for captive use and mini-grid");

(ii) The electricity consumed from renewable energy technologies and the electricity consumed from the grid or from captive power plant are measured through appropriate and reliable measurement procedures;

(iii) To address potential cross-effects between the energy efficiency and fuel switching measures, the baseline for the renewable energy technology component is set after considering the effects of the implementation of the energy efficiency measures.

2.3. Project boundary

10. The project boundary is the physical, geographical site of the building(s).

3. Baseline methodology

11. Baselines shell be set in a conservative way and below 'business as usual' emission projections (including by taking into account all existing policies).

12. Each project shall apply of one of the approaches below to setting the baseline with justification for the appropriateness of the choices:

(a) Best available technologies that represent an economically feasible and environmentally sound course of action;

(a) 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;

(b) An approach based on existing actual or historical emissions, adjusted downwards.

13. Standardized baselines shall be established at the highest possible level of aggregation in the relevant sector.

14. The level of buildings' energy consumption should not exceed the legislative requirements for the energy efficiency of buildings[13].

15. For buildings of different categories (both new buildings and/or for existing buildings), different specific consumption requirements are established, which are mandatory for all types of buildings, except for individual building. The standards[14] are set and updated by the Ministry of Construction (Minstroy) of the Russian Federation.

16. 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) "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". In other cases, while determining the baseline and evaluating emissions, it is recommended to follow the CDM methodologies or other approved programs for the implementation of climate projects at the international level.

17. Greenhouse gas emissions from building units may be determined according to the approaches in 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), as well as CDM methodologies or CDM programs for the implementation of climate projects at the international level.

[13] For the buildings built after 2013 refer to “СП 50.13330. 2012.Thermal performance of the buildings. СНиП 23-02-2003” (enacted 2013-07-01). It establishes the basic values of indicators of specific annual consumption of thermal energy for heating and ventilation of residential and public buildings and the minimum values of thermal protection of external enclosing structures. These rules and regulations apply to the thermal protection of residential, public, industrial, agricultural and storage buildings and structures (hereinafter referred to as buildings) in which it is necessary to maintain a certain temperature and humidity of the air. According to Table. 9 of SNiP 23-02-2003, for multi-apartment buildings the basic (normalized for that period) specific heat energy consumption for heating and ventilation during the heating period (referred to the degree-days of the heating period) varies from 85 (for 5 floors buildings houses) up to 70 (12 floors and more) kJ/(m2 °C day) or 23.6–19.4 Wh/(m2 °C day).

[14] For example, Order of the Ministry of Construction and Housing and Communal Services of the Russian Federation dated 17.11.2017 № 1550/pr "On approval of energy efficiency requirements of buildings, structures, structures", Federal Law No. 384-FZ of 30.12.2009 (as amended on 02.07.2013) "Technical Regulations on the Safety of Buildings and Structures", Federal Law No. 261-FZ of 23.11.2009 (as amended on 14.07.2022) "On Energy Conservation and on Improving Energy Efficiency and on Amendments to Certain Legislative Acts of the Russian Federation" etc.

18. Quantitative evaluation of indirect energy emissions and indirect energy emissions factors is based on 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" in case the climate project is implemented within the territory of the Russian Federation. In other cases, it is recommended to follow the CDM methodologies or other approved methodological documents for evaluating indirect energy emissions.

19. The approaches proposed in this methodology are consistent with the standardized approach applied at the international level (CDM methodologies).

20. Further steps and algorithms to calculate baseline emissions are defined in Section 7 (Project scenario) and Appendix 2.

4. Project crediting period

21. For emission reduction projects a crediting period is a maximum of 5 years renewable a maximum of twice, or a maximum of 10 years with no option of renewal, that is appropriate to the activity.

22. For validation, projects can be submitted to the validation and verification body, the implementation of which was started no earlier than 2 years before submission for validation.

23. The crediting period shall not start before the registration of the project in the Register of Carbon Units.

5. Additionality

24. For the additionality demonstration it is recommended to conduct the analysis and follow all the procedures indicated in Tool №1.

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

In other cases, it is recommended to follow the CDM methodologies or other approved programs for the implementation of climate projects at the international level.

26. If the project activity is comprised of one or more technologies below, it is automatically additional.

27. Criteria for automatic additionality of small-scale projects:

(b) The following grid-connected renewable electricity generation technologies are included:

(i) Solar thermal electricity generation including concentrating solar power;

(ii) Off-shore wind technologies;

(iii) Marine wave technologies;

(iv) Marine tidal technologies;

(v) Building-integrated wind turbines or household rooftop wind turbines of a size up to 100 kW;

(vi) Biomass internal gasification combined cycle.

(b) The following off-grid electricity generation technologies are included, where the individual units do not exceed the thresholds indicated in parentheses with the aggregate project installed capacity not exceeding the 15 MW threshold:

(i) Micro/pico-hydro (with power plant size up to 100 kW);

(ii) Micro/pico-wind turbine (up to 100 kW);

(iii) PV-wind hybrid (up to 100 kW);

(iv) Geothermal (up to 200 kW);

(i) Biomass gasification/biogas (up to 100 kW).

6. Monitoring plan requirements

28. 100% of the data should be monitored if not indicated otherwise in the table(s) in Appendix 4. 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. Detailed

information about the monitoring parameters for baseline and project scenario is in Appendix 4.

29. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

30. 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.

31. The calculation of the parameters and emission factors should be documented electronically that should be attached to the PDD. This 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.

32. Quality assurance/Quality control describe how to achieve good quality data, for example describe the procedures for conducting the data collection and/or field measurements including training of field personnel, provisions for maximizing response rates, documenting out-of-population cases, refusals and other sources of non-response, and related issues. An overall quality control and assurance strategy shall be documented in the plan. This shall include a procedure for defining outliers and under what circumstances outlier data/measurements may be excluded and/or replaced

33. Data and parameters monitored during the project activity are listed in Appendix 4.

7. Project scenario

7.1. Emission Reductions

34. The methodology provides three options to determine emission reductions: based on ex-post monitoring of fuel and electricity consumed (Option 1), based on a standardized tCO_2 emission factor per m^2 (Option 2) and based on a standardized value of tCO_2 emissions per occupant of building (Option 3).

35. The calculation of the CO2 emission factor from the combustion of fossil fuels (for the project as well as for the leakage emissions) should be based on one of the following two Options, depending on the availability of data on the fossil fuel type:

    (a) Based on the chemical composition of the fossil fuel type (using the weighted average mass fraction of carbon of the fuel and the weighted average density of the fuel);

(c) Based on net calorific value and CO2 emission factor of the fuel type (using the weighted average net calorific value of the fuel and the weighted average CO2 emission factor of the fuel).

36. Option (a) should be the preferred approach, if the necessary data is available.

37. Project participants are also allowed to use methodologies and CO2 emissions factors legislatively approved within the territory of the Russian Federation (including but not limited to 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").

38. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation may be calculated differently according to the source of electricity consumption (from the grid, from an off-grid captive power plant, from the grid and (a) fossil fuel fired captive power plant(s)). For examples and further guidelines, it is recommended to refer to CDM tool 05 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”.

39. Project participants are also allowed to use methodologies legislatively approved within the territory of the Russian Federation (including but not limited to 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").

7.1.1. Option 1: emission reductions determined based on ex-post monitoring of fuel and electricity consumption

40. Under this option emission reductions are determined as the sum of the emission reductions associated with the savings of electricity, savings of fuel and fuel switching by the project building *j* during the crediting period.

$$ER_y = \sum_j ER_{Elec\ Savings,j,y} + ER_{Fuel\ Savings,j,y} + ER_{Fuel\ Switching,j,y} \quad \text{Equation (1)}$$

Where:

ER_y	=	Emission reductions in year *y* (tCO_2)
$ER_{Elec\ Savings,j,y}$	=	Emission reductions due to electricity savings from the building unit *j* in year *y* (tCO_2)
$ER_{Fuel\ Savings,j,y}$	=	Emission reductions due to fuel savings from the building unit *j* in year *y* (tCO_2)
$ER_{Fuel\ Switching,j,y}$	=	Emission reductions due to fuel switching from the building unit *j* in year *y* (tCO_2)
j	=	Each building unit included in the project activity

41. Emission reductions from electricity savings are calculated as the difference between the electricity that would have been consumed by the baseline building unit ($EC_{BL,j}$) and the electricity consumed by the building unit *j* during the crediting period, multiplied by the CO_2 emission factor of the source supplying electricity to the building unit *j*.

$$ER_{Elec\ Savings,j,y} = \frac{EC_{BL,j} - EC_{j,y}}{1 - TDL_{AVG-k,y}} \times EF_{EL,k,y} \quad \text{Equation (2)}$$

Where:

$EC_{BL,j}$	=	Electricity that would have been consumed by the baseline building unit *j* (MWh), determined as the average electricity consumed over the 3 years prior to the start date of the project activity
$EC_{j,y}$	=	Electricity consumed by the project building unit *j* in year *y* (MWh)
$EF_{EL,k,y}$	=	Weighted average CO_2 emission factor of the sources *k* that supply electricity to the building unit *j* in year *y* (tCO_2/MWh), excluding renewable energy technologies. If there is no separate monitoring of electricity consumed from different sources or there are no plausible method of distinguishing between the sources, use the source with the lowest CO_2 emission factor

$TDL_{AVG-k,y}$ = Average technical transmission and distribution losses for consuming electricity from source *k* in year *y*

42. The electricity sources *k* can be either an electric grid, a captive power plant or a combination of both. For $EF_{EL,k,y}$, quantitative evaluation of indirect energy emissions and indirect energy emissions factors is based on 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" in case the climate project is implemented within the territory of the Russian Federation. In other cases, it is recommended to follow the CDM methodologies or other approved methodological documents for evaluating indirect energy emissions.

43. If the project involves the installation of solar PV panels to supply electricity to the building unit, emission reductions from this source shall be claimed under an applicable methodology (e.g. Renewable electricity generation for captive use and mini-grid"), taking into account any potential cross-effects. If the electricity consumed from the solar PV panels and from the source *k* cannot be measured separately or be distinguished, project participants may determine the electricity consumed from the solar PV panels:

(a) By multiplying the capacity of the solar panel by a conservative default value of twelve per cent (12%) for the annual average value for availability;

44. Emission reductions from fuel savings are calculated as the difference between the energy content of the fuel that would have been consumed by the baseline building unit ($EFC_{BL,j}$) and the energy content of the fuel(s) consumed by the building unit *j* during the crediting period, multiplied by the CO_2 emission factor of the fuel consumed by the building unit *j*.

$$ER_{Fuel\ Savings,j,y} = \left(ECF_{BL,j} - \sum_{f} ECF_{f,j,y} \right) \times EF_{CO2,AVG-f,y} \qquad \text{Equation (3)}$$

Where:

$ECF_{BL,j}$ = Energy content of the fuel(s) that would have been consumed by the baseline building unit *j* (GJ), representing the average of the product between the mass or volume of fuel consumed by the NCV of the fuel in GJ per mass or volume units over the 3 years prior to the start date of the project activity.

$ECF_{f,j,y}$ = Energy content of the fuel type *f* consumed by the project building unit *j* in year *y* (GJ).

$EF_{CO2,AVG-f,y}$	=	Average CO_2 emission factor of the different fuel types *f* that are consumed by the building unit *j* in year *y* (tCO_2/GJ). If the project does not monitor the consumption of different fuels separately, use the source with the lowest CO_2 emission factor for $EF_{CO2,AVG-f,y}$.

45. The energy content of the fuel type *f* consumed by the building unit j in year *y* is calculated as the product between the mass or volume of fuel consumed and the net calorific value of the fuel.

$$ECF_{f,j,y} = FC_{f,j,y} \times NCV_f \qquad \text{Equation (4)}$$

Where:

$FC_{f,j,y}$	=	Quantity of fossil fuel type *f* consumed by the building unit *j* in year *y* (mass or volume units)
$NCV_{f,y}$	=	Net calorific value of the fuel type f in year y

46. Emission reductions from fuel switching are determined based on the amount of fuel type *f* consumed by the building unit *j* in during the crediting period, multiplied by the NCV of the fuel type *f* and by the difference between the CO_2 emission factors of the baseline fuel *f,BL* and the project fuel *f*.

$$ER_{Fuel\ Switching,j,y} = EFC_{f,j,y} \times \left(EF_{CO2,f,BL} - EF_{CO2,AVG-f,y}\right) \qquad \text{Equation (5)}$$

Where:

$EFC_{f,j,y}$	=	Energy content of the fuel type *f* consumed by the project building unit *j* in year *y* (GJ)., determined based on the equation (4) above.
$EF_{CO2,f,BL}$	=	CO_2 emission factor of the fuel type *f* consumed by the building unit *j* in the baseline (tCO_2/GJ), determined according to 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".
$EF_{CO2,AVG-f,y}$	=	Weighted average CO_2 emission factor of the different fuel types *f* that are consumed by the building unit *j* in year *y* (tCO_2/GJ).

47. The quantity of electricity and fossil fuels that would have been consumed by the baseline building unit associated with the building unit *j* ($EC_{BL,j}$ and $EFC_{BL,j}$, respectivelly) are determined separately for projects involving the construction of new buildings and for the retrofit of existing building units.

48. $EC_{BL,j}$ and $EFC_{BL,j}$ shall remain fixed throughout the project lifetime if the requirements listed below are met.

(a) For residential building units, the building unit's *j* average number of occupants per year ($Occupancy_{j,y}$) during the crediting period is between ±20% of the average baseline building unit's *j* occupancy ($Occupancy_{j,BL}$) over the last 3 years prior to the start date of the project activity;

(b) For commercial and institutional building units, the average yearly operating hours ($h_{OP,y}$) of the unit *j* is at least 30 hours/week;

(c) The Cooling Degrees Days (CDDs) of the region where the building unit *j* is located observed during each year of the crediting period (*CDDy*) are within ± 20% of the average CDD over the last 3 years prior to the start date of the project activity[15] (CDD_{BL});

(d) The Heating Degrees Days (HDDs) of the region where the building unit *j* is located observed during each year of the crediting period are within ± 20% of the average HDD over the last 3 years prior to the start date of the project activity (HDD_{BL});

7.1.1.1. Retrofit of existing building units

49. For project activities involving the retrofit of an existing building unit *j*, the baseline electricity consumed and the baseline fuel consumed are, respectively, the average electricity and the average energy content of the fuel consumed by the existing building unit over the last 3 years prior to the start date of the project activity.

50. The type of fuel consumed by existing buildings *f,BL* shall be documented in the PDD. If the baseline building consumes more than one type of fuel, the parameter $EF_{CO2,f,BL}$ shall represent the weighted average CO_2 emission factor of the different fuels – if the separate monitoring of the different fuels is not possible, $EF_{CO2,f,BL}$ shall refer to the source with the lowest CO_2 emission factor.

51. Sampling described in Appendix 2 can be used to determine $EC_{BL,j}$ and $EFC_{BL,j}$ only if similar building units are included in the sample, where similar buildings are defined in section 7.1.1.2.1 below.

[15] The base temperatures used to determine HDDs and CDDs shall be the same in the baseline and project scenarios.

7.1.1.2. New buildings

52. The baseline electricity and fuel consumed by new buildings shall be determined through a sample-based measurement in similar buildings chosen in accordance with section 7.1.1.2.1. below.

53. To determine the electricity (EC_{BL}), the quantity of fuel (EFC_{BL}) and type of fuel (f,BL) consumed by a baseline building, the following requirements apply:

(a) Based on documented energy performance and/or equipment performance standard(s), the construction features and type of fuel that would have been consumed by the baseline building.

(b) If there is no equipment performance standard(s) on energy performance, the construction features and type of fuel that would have been consumed by the baseline building to feed the computer simulation tool shall be based on:

(i) An opinion provided by a construction company or expert (e.g. a third-party architect or Chartered Engineer);

(ii) An existing building unit that:

a. Has been constructed less than 3 years prior to the start date of the project activity;

b. Is used for the same purpose of the project building unit;

c. Meets the occupancy, CDD and HDD requirements specified in paragraph 48 of the project building unit;

d. Has a Gross Floor Area (GFA) of $\pm$20% of the project building unit.

7.1.1.2.1. Sample of Similar Buildings

54. Under this option, the electricity (EC_{BL}), the quantity of fuel (EFC_{BL}) and type of fuel (f,BL) consumed by the baseline building are determined based on records of the highest annual electricity and the fuel with the lowest CO_2 emission factor consumed by a sample of similar building units whose construction has been finalizer over the last 5 years and that have been occupied at least over the last 3 years.

55. Similar building units are defined as building units that:

(a) Belong to the same building category and that are used for the same purpose of the project building unit *j*;

(b) Are located in an area with similar socio-economic conditions to the one in which the project building units are located;

(c) Are located in the same city or metropolitan region. If there are no new similar units in the city or metropolitan region, select a similar building unit from a region with average temperature and humidity within ±10% of the average temperature and humidity of the region of the project building unit;

(d) Have a GFA of ±20% of the project building unit *j*;

(e) Meets the occupancy requirements specified in paragraph 48 of the project building unit.

7.1.2. Option 2: emission reductions determined based on a standardized CO_2 emission factor per m^2

56. For project activities that apply a standardized baseline that standardizes the specific CO_2 emissions per m^2, determined based on the Appendix 2, emission reductions are determined separately for new buildings and for existing buildings[16] based on the equation below:

$$ER_y = BE_y - PE_y \quad \text{Equation (6)}$$

Where:

ER_y = Emission reductions in year *y* (tCO_2e)
BE_y = Baseline emissions in year *y* (tCO_2e)
PE_y = Project emissions in year *y* (tCO_2e)

57. BE_y represents the energy that would have been consumed by buildings from the same category *i* and located in the same geographical scope in the absence of the project, and is determined as:

$$BE_y = \sum_i \sum_j \left(SE_{CO2,Top20\%,i} \times GFA_{j,i,y}\right) \quad \text{Equation (7)}$$

[16] The definitions of cohort of new buildings and cohort of existing buildings from the tool shall apply.

Where:

$SE_{CO2,Top20\%,i}$	=	Average specific CO_2 emissions of the top 20 per cent performing building units in building unit category *i* included in the sample over the applicable data coverage period ($tCO_2/(m^2$ year)). This parameter is determined following the Appendix 2.
$GFA_{j,i,y}$	=	Gross floor area of the project building unit *j* in building unit category *i* in year *y* (m^2)
j	=	Building units included in the project activity
i	=	Building unit categories

58. PE_y represents the emissions associated with the consumption of energy by the project buildings in the project scenario, and is determined as:

$$PE_y = \sum_i \sum_j \left(\frac{EC_{j,i,y} \times EF_{elec,y}}{1 - TDL_y} \right) + \left(FC_{k,j,i,y} \times NCV_k \times EF_{CO2,k} \right) \quad \text{Equation (8)}$$

Where:

$FC_{k,j,i,y}$	=	Fossil fuel type *k* consumed by the project building unit *j* in building unit category *i* in year *y* (mass or volume units)
NCV_k	=	Net calorific value of the fossil fuel type *k* (GJ/mass or volume units)
$EF_{CO2,k}$	=	CO_2 emission factor of the fossil fuel type *k* (tCO_2/GJ)
$EC_{j,i,y}$	=	Electricity consumed by the project building unit *j* in building unit category *i* in year *y* (MWh)
$EF_{elec,y}$	=	Emission factor of the electric grid supplying electricity to the project building unit *j* in building unit category *i* (tCO_2e/MWh)
TDL_y	=	Average technical transmission and distribution losses for providing electricity to the grid to which the project building unit *j* in building unit category *i* is connected

7.1.3. Option 3 emission reductions determined based on a standardized tCO_2 emission factor per occupant

59. For project activities involving residential building units only, baseline emissions can be determined by multiplying a standardized CO_2 emission factor per occupants ($SE_{CO2,Top20\%,occ,i}$) by the number of occupants of a residential building unit *j* during the crediting period ($Occ_{j,i,y}$), as indicated by the equation below:

$$BE_y = \sum_i \sum_j \left(SE_{CO2,Top20\%,occ,i} \times Occ_{j,i,y} \right) \quad \text{Equation (9)}$$

Where:

$SE_{CO2,Top20\%,occ,i}$	=	Average specific CO_2 emissions of the top 20 per cent performing building units in building unit category *i* included in the sample over the applicable data coverage period based on the average number of occupants (tCO_2/(person. year))
$Occ_{j,i,y}$	=	Average number of occupants of the project building unit *j* in building unit category *i* in year *y* (m^2)
j	=	Building units included in the project activity
i	=	Building unit categories

60. The average specific CO_2 emissions from the top-20% best performing buildings under the building category *i* over the applicable data coverage period for new and existing buildings is determined following the equation below:

$$SE_{CO2,Top20\%,occ,i} = \frac{\sum_j SE_{CO2,Top20\%,occ,j,i,BL}}{J_{i,BL}} \quad \text{Equation (10)}$$

Where:

$SE_{CO2,Top20\%,occ,i}$	=	Specific CO_2 emissions of building unit *j* in the top 20% performing building units in building unit category *i* included in the sample over the relevant data coverage period based on the number of occupants (tCO_2/(person. year))
$J_{i,BL}$	=	Total number of the top 20 per cent performing building units of building unit category *i* in each of the years of the applicable data coverage period, calculated as the product of the number of baseline building units in building category *i* included in the sample and 20 per cent, rounded up to the next integer if it is decimal

61. The specific emissions of baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period are determined following the equation below:

$$SE_{j,i,occ,BL} = \frac{BE_{electricity,j,i,BL} + BE_{fuel,j,i,BL} + BE_{water,j,i,BL}}{Occ_{j,i,BL}} \quad \text{Equation (11)}$$

Where:

$SE_{j,i,occ,BL}$	=	Specific CO_2 emissions of baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period based on the average number of occupants (tCO_2/(person.·year))
$BE_{electricity,j,i,BL}$	=	Baseline emissions from electricity consumption of baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period (tCO_2/year)

$BE_{fuel,j,i,BL}$	=	Baseline emissions from fossil fuel consumption of baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period (tCO_2/year)
$BE_{water,j,i,BL}$	=	Baseline emissions from chilled/hot water consumption of baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period (tCO_2/year)
$Occ_{j,i,BL}$	=	Average number of occupants living in the baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period (person)

62. $BE_{electricity,j,i,BL}$, $BE_{fuel,j,i,BL}$ and $BE_{water,j,i,BL}$ are determined based on Appendix 2,

63. Project emissions and emission reductions are determined based on section 7.1.2 above mutatis-mutandis.

8. Leakage assessment

8.1. Leakage

64. According to the Order of the Ministry of Economic Development of Russia dated May 11, 2022 N 248 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 exist in accordance with the methodology below.

65. Leakage is the phenomenon through which efforts to reduce emissions in one place simply shift emissions to another location or sector where they remain uncontrolled or uncounted. Leakage is an inherent risk in carbon projects and programs. The level of leakage risk depends on what causes the baseline emissions and on the design of the carbon projects or programs, i.e. on how well they mitigate risks. The leakage management approach should include identifying, elimination, monitoring and quantifying carbon leakage throughout the whole cycle of the project, and subtracting that leakage from the estimated number of GHG emission reductions or removals that can be issued as carbon units.

66. There are three types of leakage:

(a) Market leakage occurs when projects significantly reduce the production of a commodity causing a change in the supply and market demand equilibrium that results in a shift of production elsewhere to make up for the lost supply;

(b) Activity Shifting leakage is related to activities that directly cause carbon-emitting activities to be shifted to another location outside of the project boundaries, cancelling out some or all of the project's carbon benefits;

(c) Ecological leakage occurs when the project activity causes changes in GHG emissions or fluxes of GHG emissions from ecosystems that are hydrologically connected to the project area.

67. GHG emissions from leakage may be determined either directly from monitoring, or indirectly when leakage is difficult to monitor directly but where scientific knowledge provides credible estimates of likely impacts. Leakage occurring outside the host country (international leakage) does not need to be quantified. Projects should not consider positive leakage (i.e., where GHG emissions decrease or removals increase outside the project area due to project activities).

68. If the energy efficiency technology is equipment transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

69. The calculation of the CO2 emission factor from the combustion of fossil fuels (for the project as well as for the leakage emissions) should be based on one of the following two Options, depending on the availability of data on the fossil fuel type:

(a) Based on the chemical composition of the fossil fuel type (using the weighted average mass fraction of carbon of the fuel and the weighted average density of the fuel);

(d) Based on net calorific value and CO2 emission factor of the fuel type (using the weighted average net calorific value of the fuel and the weighted average CO2 emission factor of the fuel).

70. Option (a) should be the preferred approach, if the necessary data is available.

71. Project participants are also allowed to use methodologies and CO2 emissions factors legislatively approved within the territory of the Russian Federation (including but not limited to 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").

72. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation may be calculated differently according to the source of electricity consumption (from the grid, from an off-grid captive power plant, from the grid and (a) fossil fuel fired captive power plant(s)). For examples and further guidelines, it is recommended to refer to CDM tool 05 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”.

73. Project participants are also allowed to use methodologies legislatively approved within the territory of the Russian Federation (including but not limited to 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").

9. Non-permanence risk analysis

74. The section is not applicable to this methodology.

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

75. 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.

76. Efforts should be made to avoid double counting between project areas (project boundaries), between company reporting and reporting on the project, between the reporting of different companies, between the subjects of the Russian Federation and different countries in the case of international transfer of carbon 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.

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

77. 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.

78. 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.

79. 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.

80. 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.

81. 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.

82. 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.

83. Assessment the validity of the original/current baseline and to update the baseline at the renewal of a crediting period.

84. 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. Further details on procedure to the validity of the original/current baseline at the renewal of the crediting period are in The Appendix 3.

12. Normative references

AMS-II.E. Small-scale Methodology. Energy efficiency and fuel switching measures for buildings. Version 12.0. CDM Methodology.

Приказ Минэкономразвития России от 11.05.2022г. № 248 «Об утверждении критериев и порядка отнесения проектов, реализуемых юридическими лицами, индивидуальными предпринимателями или физическими лицами, к климатическим проектам, формы и порядка представления отчета о реализации климатического проекта» (Зарегистрировано в Минюсте России 30.05.2022г. № 68642)

ГОСТ Р ИСО 14064-1-2021. Национальный стандарт Российской Федерации. Газы парниковые. Часть 1. Требования и руководство по количественному определению и отчетности о выбросах и поглощении парниковых газов на уровне организации (утв. и введен в действие Приказом Росстандарта от 30.09.2021г. № 1029-ст);

ГОСТ Р ИСО 14064-2-2021. Национальный стандарт Российской Федерации. Газы парниковые. Часть 2. Требования и руководство по количественному определению, мониторингу и составлению отчетной документации на проекты сокращения выбросов парниковых газов или увеличения их поглощения на уровне проекта (утв. и введен в действие Приказом Росстандарта от 30.09.2021г. № 1030-ст);

ГОСТ Р ИСО 14064-3-2021. Национальный стандарт Российской Федерации. Газы парниковые. Часть 3. Требования и руководство по валидации и верификации заявлений в отношении парниковых газов (утв. и введен в действие Приказом Росстандарта от 30.09.2021г. № 1031-ст);

ГОСТ Р ИСО 14065-2014 Национальный стандарт Российской Федерации. Газы парниковые. Требования к органам по валидации и верификации парниковых газов для их применения при аккредитации или других формах признания (утв. и введен в действие Приказом Росстандарта от 26.11.2014г. № 1869-ст);

ГОСТ Р ИСО 14080-2021. Национальный стандарт Российской Федерации. Управление парниковыми газами и связанные виды деятельности. Система подходов и методическое обеспечение реализации климатических проектов (утв. и введен в действие Приказом Росстандарта от 30.09.2021г. № 1033-ст);

ГОСТ Р ИСО 14066-2013. Национальный стандарт Российской Федерации. Парниковые газы. Требования к компетентности групп по валидации и верификации парниковых газов (утв. и введен в действие Приказом Росстандарта от 17.12.2013г. № 2274-ст);

Приказ Минприроды России от 27.05.2022г. № 371 «Об утверждении методик количественного определения объемов выбросов парниковых газов и поглощений парниковых газов» (с 01.03.2023 г., за исключением отдельных положений, вступающих в силу с 1 марта 2024 г.);

МГЭИК 2006. Руководящие принципы национальных инвентаризаций парниковых газов Межправительственной группы экспертов по изменению климата, 2006 г. /Под ред. С. Игглестона, Л.Буэндиа, К.Мива, Т.Нгара и К.Танабе. // Т.1-5. – ИГЕС// Хайяма. 2006.

Распоряжение Минприроды России от 16.04.2015г. №15-р «Об утверждении методических рекомендаций по проведению добровольной инвентаризации объема выбросов парниковых газов в субъектах РФ»

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

TOOL19 Methodological tool. Demonstration of additionality of microscale project activities. Version 10.0. CDM Methodology

TOOL21 Methodological tool. Demonstration of additionality of small-scale project activities. Version 13.1. CDM Methodology

TOOL22 Methodological tool. Leakage in biomass small-scale project activities. Version 04.0. CDM Methodology

TOOL31 Methodological tool. Determination of standardized baselines for energy efficiency measures in residential, commercial and institutional buildings. Version 01.1. CDM Methodology

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

CDM-EB50-A30-STAN Standard Sampling and surveys for CDM project activities and programmes of activities. Version 09.0. CDM Methodology

Appendix 1. List of building unit categories

This list provides categories of buildings (premises) eligible under this methodology. The list categorizes building units based on two criteria: (i) type of a building (premises); and (ii) height of a whole building that the building unit belongs to.

Definitions of buildings (premises) types eligible under this methodology are provided below.

1. Buildings and premises for permanent residence of citizens:

    (a) Single - family house (Detached single-family house) - residential buildings (hereinafter referred to as houses) with no more than three floors, intended for one family (objects of individual housing construction).

    (b) Row houses - blocked residential buildings, with the number of floors not more than three, consisting of several blocks, the number of which does not exceed ten and each of which is intended for use by one family, has a common wall (common walls) without openings with the neighboring block or neighboring blocks, is located on a separate land plot and has access to a common plot area (residential buildings of blocked development).

    (c) Multi-apartment residential buildings of any number of floors, including apartment-type dormitories, as well as residential premises that are part of the premises of buildings of other functional purposes (including an apartment building, an apartment building of a gallery type, corridor type and sectional type).

2. Buildings and constructions of any number of floors for facilities serving the country population:

    (a) Buildings and premises of educational organizations: organizations of general and vocational education (preschool, general education, vocational education; educational organizations of higher education), educational organizations of additional education and organizations of specialized vocational education (aero clubs, driving schools, defense educational institutions, etc.), other organizations

providing training under general education programs (sports schools, boarding schools, educational camps for children).

(b) Buildings and premises of healthcare and social services for the population:

(i) Medical organizations: hospitals, outpatient organizations, pharmacies, medical rehabilitation organizations, including those for children, blood transfusion stations, ambulance stations, etc., resort organizations.

(ii) Social service organizations for the population: with a hospital, semi-stationary and without a hospital (including boarding houses for the disabled

and the elderly, for disabled children, rehabilitation centers, social adaptation centers, etc.).

(c) Buildings and premises for enterprises and public service organizations:

(i) Retail and small wholesale enterprises, as well as shopping and entertainment complexes.

(ii) Catering establishments.

(iii) Objects of communal services to the population.

a. Public service enterprises (repair and sewing workshops; laundries, dry cleaners, organizations providing rental services)

b. Public utilities organizations designed to directly serve the country population (housing management companies, etc.).

c. Sanitary service organizations (baths, hairdressers, public toilets).

d. Organizations of civil rights.

(iv) Communication facilities intended for direct public service (post offices).

(v) Transport organizations designed to directly serve the population:

a. Station buildings of all types of transport (air terminals, sea, river, railway stations).

b. Transport hubs.

c. Agencies and offices (tourist, real estate, ticket offices, insurance, etc.).

(d) Constructions, buildings and premises for cultural and leisure activities of the population and religious rites.

(i) Sports facilities and premises for sports and recreation, leisure purposes:

a. Open flat constructions (sports facilities, football stadiums)

b. Indoor sports facilities (arenas, swimming pools, sport clubs, aquaparks etc.)

(ii) Buildings and premises for cultural and educational purposes and religious organizations:

a. Libraries, reading rooms, media libraries, archives

b. Museums, exhibitions, aquariums, etc.

c. Religious organizations for the population

(iii) Entertainment and entertainment organizations

a. Entertainment organizations (theaters, cinemas, concert halls, circuses, etc.)

b. Club and leisure and entertainment organizations

(e) Buildings and premises for temporary residence

(i) Hotels, including motels, hostels, etc.

(ii) Recreation and tourism organizations:

a. Boarding houses, tourist bases, year-round and summer camps, including for children and youth, etc.

b. Organizations for temporary residence in non-stationary facilities

(f) Dormitories and dormitories of educational organizations and social service organizations

(g) Facilities for pets and animals without owners (treatment, maintenance and services for animals)

3. Buildings (facilities) of any number of floors of for the service of public society and the state

(a) Buildings of government bodies, public service buildings

(i) Buildings of state organizations for public service (multifunctional centers, territorial bodies of the Social Fund of Russia, social service bodies, labor exchanges)

(ii) Management bodies of firms, organizations, enterprises, as well as divisions of firms, agencies, etc.

(b) Specialized buildings: credit organizations, courts and prosecutor's office, notarial and legal organizations, law enforcement organizations (tax services, police, customs, correctional institutions, isolation wards, etc.)

4. Multifunctional public buildings (premises) of any number of floors.

Appendix 2. Determination of the specific CO2 emissions in buildings

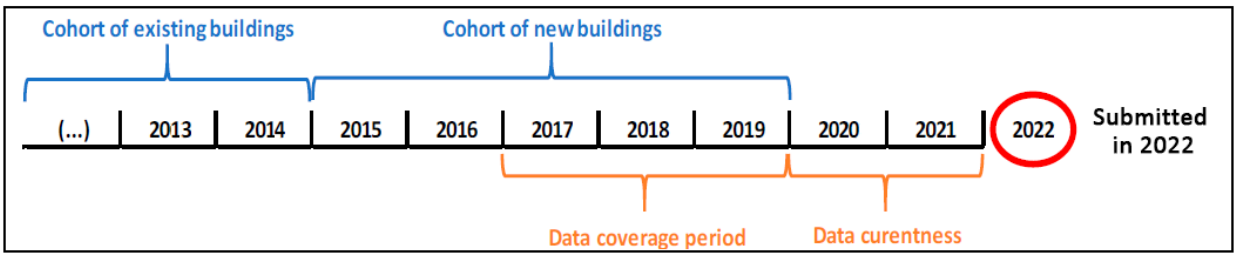
1. An organization implementing a climate project and issuing carbon units within the territory of the Russian Federation is allowed not to use the procedure from Appendix 2 and apply the approaches established in the Order of the Ministry of Natural Resources of Russia to evaluate greenhouse gas emissions (05.27.2022 №371) "On approval of methodologies for quantitative determination of greenhouse gas emissions and removals of greenhouse gases" or the IPCC Guidelines (2006). Used approaches must be accurately justified and documented in accordance with the requirements of the Order of the Ministry of Economic Development of Russia (11.05.2022 №248).

2. The proposed approaches are consistent with the standardized approach applied at the international level (CDM methodologies).

3. Data coverage period – the period for which activity data on the operation of the buildings (i.e. electricity consumed, fuel consumed and hot/chilled water consumed) is collected for the establishment or update of a standardized baseline. By default, activity data of three years are required.

4. Data currentness – the time gap between the end of the data coverage period and the complete submission of the standardized baseline.

   Figure A2.1. Example on how to determine the cohort of new and existing buildings and the allowed data currentness submitted in 2022



5. Data currentness – the time gap between the end of the data coverage period and the complete submission of the standardized baseline. The specific CO2 emissions are determined based on benchmark using the top-20% best performing buildings. Under this approach, similar building units should:

   (a) Belong to the same building category; and

   (b) Are located in the same geographical scope.

6. The information related to the electricity, fuel and chilled/hot water consumption for new and existing buildings shall be collected following the requirements of data coverage period as specified in Section 1 (Terms and Definitions) above.

7. The information related to the electricity, fuel and chilled/hot water consumption for new and existing buildings shall be collected following the requirements of data coverage period as specified in Section 1 (Terms and Definitions) above.

8. The average specific CO2 emissions from the top-20% best performing buildings under the building category *i* over the applicable data coverage period for new and existing buildings is determined following the equation below:

$$SE_{CO2,Top20\%,i} = \frac{\sum_j SE_{CO2,Top20\%,j,i,BL}}{J_{i,BL}}$$

Where:

$SE_{CO2,Top20\%,i}$	=	Average specific CO2 emissions of the top 20 per cent performing building units in building unit category *i* over the applicable data coverage period (tCO2/(m2.year))
$SE_{CO2,Top20\%,j,i,BL}$	=	Specific CO2 emissions of building unit *j* in the top 20% performing building units in building unit category *i* over the relevant data coverage period (tCO2/(m2. year))
$J_{i,BL}$	=	Total number of the top 20 per cent performing building units of building unit category *i* in each of the years of the applicable data coverage period, calculated as the product of the number of baseline building units in building category *i* and 20 per cent, rounded up to the next integer if it is decimal

9. The specific emissions of baseline building unit j in building unit category i included in the sample over the applicable data coverage period are determined following the equation below:

$$SE_{j,i,BL} = \frac{BE_{electricity,j,i,BL} + BE_{fuel,j,i,BL} + BE_{water,j,i,BL}}{GFA_{j,i,BL}}$$

Where:

$SE_{j,i,BL}$	=	Specific CO2 emissions of baseline building unit *j* in building unit category *i* over the applicable data coverage period (tCO2/(m2·year))
$BE_{electricity,j,i,BL}$	=	Baseline emissions from electricity consumption of baseline building unit *j* in building unit category *i* over the applicable data coverage period (tCO2/year)

$BE_{fuel,j,i,BL}$ = Baseline emissions from fossil fuel consumption of baseline building unit *j* in building unit category *i* over the applicable data coverage period (tCO2/year)

$BE_{water,j,i,BL}$ = Baseline emissions from chilled/hot water consumption of baseline building unit *j* in building unit category *i* over the applicable data coverage period (tCO2/year)

$GFA_{j,i,BL}$ = GFA of baseline building unit *j* in building unit category *i* over the applicable data coverage period (m2)

2. Average baseline emissions from electricity consumption

10. The emissions associated with the consumption of electricity are determined based on the specific electricity consumption from different sources by the building unit *j* under the building category *i* (new or existing) included in the sample over the applicable data coverage period, multiplied by the emission factor of the source providing electricity to the building unit *j*, as follows:

$$BE_{electricity,j,i,BL} = \left(EC_{grid,j,i,BL} \times EF_{grid,j,i}\right) + \left(EC_{captive,j,i,BL} \times EF_{captive,j,i}\right)$$

Where:

$BE_{electricity,j,i,BL}$ = Baseline emissions from electricity consumption of baseline building unit *j* in building unit category *i* over the applicable data coverage period (tCO2/year)

$EC_{grid,j,i,BL}$ = Grid electricity consumed by the baseline building unit *j* in building unit category *i* over the applicable data coverage period (MWh/year)

$EF_{grid,j,i}$ = Emission factor of the electric grid supplying electricity to the baseline building unit *j* in building unit category *i* (tCO2e/MWh)

$EC_{captive,j,i,BL}$ = Captive electricity consumption by the baseline building unit *j* in building unit category *i* over the applicable data coverage period (MWh/year)

$EF_{captive,j,i}$ = Emission factor of the captive power plant(s) supplying electricity to the baseline building unit *j* in building unit category *i* (tCO2e/MWh)

3. Average baseline emissions from fossil fuel consumption

11. The emissions associated with the consumption of different types of fuel are determined based on the sum of the amounts of fuel type k consumed by the building unit *j*, under building category *i* (new or existing) included in the sample over the applicable data coverage period, multiplied by the fuel's net calorific value and CO2 emission factor, as follows:

$$BE_{fuel,j,i,BL} = \sum_{k} FC_{k,j,i,BL} \times NCV_k \times EF_{CO2,k}$$

Where:

$BE_{fuel,j,i,BL}$	=	Baseline emissions from fossil fuel consumption of baseline building unit *j* in building unit category *i* over the applicable data coverage period (tCO2/year)
$FC_{k,j,i,BL}$	=	Amount of fossil fuel type *k* consumed by the building unit *j* in building unit category *i* over the applicable data coverage period (mass or volume units/year)
NCV_k	=	Net calorific value of the fossil fuel type *k* (GJ/mass or volume units)
$EF_{CO2,k}$	=	CO2 Emission factor of the fuel type k (tCO2/GJ)

4. Average baseline emissions from chilled/hot water consumption

12. The emissions associated with the consumption of chilled/hot water are determined based on the energy required to produce the chilled/hot water and on the distribution losses of the water distribution network, as follows:

$$BE_{water,j,i,BL} = \frac{WC_{j,i,BL} \times EF_{WP,j,i,BL}}{1 - \eta_{dist,s,BL}}$$

Where:

$BE_{water,j,i,BL}$	=	Baseline emissions from chilled/hot water consumption of baseline building unit *j* in building unit category *i* over the applicable data coverage period (tCO2/year)
$WC_{j,i,BL}$	=	Energy content of the chilled/hot water consumption in baseline building unit *j* in building unit category *i* over the applicable data coverage period (GJ/year)
$EF_{WP,j,i,BL}$	=	Emission factor for production of chilled/hot water that is supplied to baseline building unit *j* in building unit category *i* over the applicable data coverage period (tCO2/GJ)
$\eta_{dist,s,BL}$	=	Average technical distribution losses of the chilled/hot water system *s* network serving baseline building unit *j* in building unit category *i* over the applicable data coverage period (GJ of technical thermal energy losses in the chilled/hot water distribution network divided by GJ of thermal energy supplied to the building units)

13. The parameter *WCj,i,BL* can be calculated using heat meters or using mass flow-meters and temperature sensors as indicated in the equations below:

$$WC_{j,i,BL} = m_{j,i,BL} \times \Delta t_{j,i,BL} \times C_m$$

Where:

$m_{j,i,BL}$	=	Mass of chilled/hot water consumption of baseline building unit *j* in building unit category *i* over the applicable data coverage period (kg/year)
$\Delta t_{j,i,BL}$	=	Average temperature difference between the outlet water and inlet water of the cooling/heating system used for the cooling/heating of building unit *j* in building unit category *i* over the applicable data coverage period (K)
C_m	=	Specific heat capacity of the chilled/hot water (GJ/(kg·. K))

14. The emission factor for chilled/hot water production (*EFWP,j,i,BL*) shall be calculated for each centralised chilled/hot water system *s* that supplies the chilled/hot water to the respective building unit *j* in building unit category *i* included in the sample over the applicable data coverage period, according to the equation below:

$$EF_{WP,j,i,BL} = \frac{(EC_{WP,s,BL} \times EF_{CO2,s,electricity}) + (\sum_f FC_{WP,k,s,BL} \times NCV_k \times EF_{CO2,k})}{m_{s,BL} \times \Delta t_{s,BL} \times C_m}$$

Where:

$EC_{WP,s,BL}$	=	Electricity consumed to produce the chilled/hot water system *s* over the applicable data coverage period (MWh/year)
$EF_{CO2,s,electricity}$	=	CO2 emission factor of power source to which the chilled/hot water system *s* is connected to (tCO2e/MWh). If the source is grid electricity, the monitoring provisions of the parameter *EFgrid,j,i* shall apply; if the source is a captive power plant, the monitoring provisions of the parameter *EFcaptive,j,I* shall apply.
$FC_{WP,k,s,BL}$	=	Amount of fossil fuel type *k* consumed to produce the chilled/hot water system *s* over the applicable data coverage period (mass or volume unit/year)
NCV_k	=	Net calorific value of the fossil fuel k (GJ/mass or volume unit)
$EF_{CO2,k}$	=	CO2 emission factor of the fossil fuel type k (tCO2/GJ)
$m_{s,BL}$	=	Mass of chilled/hot water production by chilled/hot water system *s* over the applicable data coverage period (kg/year)
$\Delta t_{s,BL}$	=	Average temperature difference between the outlet and inlet of the heat exchanger used for the chilled/hot water production in chilled/hot water system *s* over the applicable data coverage period (K)
C_m	=	Specific heat capacity of the chilled/hot water (GJ/(kg. K))

Appendix 3. 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.

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

(a) 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.

(b) 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.

(c) 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.

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

4. If the application of p.a, b, c and d 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 5.

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

6. This step is only applicable if any of the above p. a, b, c and/or d showed that the current baseline needs to be updated.

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

(b) Update the data and parameters. If the application of p.d 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 participants should update all applicable data and parameters.

Appendix 4. Data and parameters monitored.

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
1.	$EC_{j,y}$ / $EC_{BL,j}$	MWh	ECj,y: Electricity consumed by the project building unit j in year y ECBL,j: Electricity that would have been consumed by the baseline building unit j	Baseline emissions from electricity consumption and monitoring of electricity generation may be calculated differently according to the sources of electricity consumption (from the grid, from an off-grid captive power plant, from the grid and (a) fossil fuel fired captive power plant(s)). For examples and further guidelines, it is recommended to refer to CDM TOOL05 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”.	Direct measurement or calculated based on measurements from more than one electricity meters.Use electricity meters installed at the electricity consumption sources.	Continuous measurement and at least monthly recording.		Preferably, the consumption of electricity from different sources shall be monitored separately. The parameter ECBL,j does not need to be monitored ex-post, however it shall be determined and fixed ex-ante by following the measurement procedures.

2.	$EF_{EL,k,y}$	tCO2/MWh	Average CO2 emission factor of the sources k that supply electricity to the building unit j in year y	(a) Values provided by the fuel supplier in invoices
				This is the preferred source.
				(b) Measurements by the project participants
				(c) Regional or national default values
				These sources can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances).
				(d) IPCC default values at the upper or lower limit – whatever is more conservative – of the uncertainty at a 95% confidence interval.
					For (a) and (b): Measurements should be undertaken in line with national or international fuel standards.
					For a): If the fuel supplier does provide the NCV value and the CO2 emission factor on the invoice and these two values are based on measurements for this specific fuel, this CO2 factor should be used. If another source for the CO2 emission factor is used or no CO2 emission factor is provided, options (b), (c) or (d) should be used.
						For a) and b): The CO2 emission factor should be obtained for each fuel delivery, from which weighted average values for the period t should be calculated.
						For (c): Review appropriateness of the values annually.
						For (d): Any future revision of the IPCC Guidelines should be taken into account.
								If there is no separate monitoring of electricity consumed from different sources k, the source with the lowest CO2 emission factor shall be used.

3.	$TDL_{AVG-k,y}$	%	Average technical transmission and distribution losses for consuming	1. Use annual average value based on the most recent data available within the country; 2. Use as default values of 20% for:	It should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project	Annually. In the absence of data from the relevant year, most recent figures		

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
			electricity from source k in year y	(a) project or leakage electricity consumption sources; (b) baseline electricity consumption sources; 3. Use as default values of 3% for: (a) baseline electricity consumption sources; (b) project and leakage electricity consumption sources.	activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project participants or be based on references from utilities, network operators or other official documentation.	should be used, but not older than 5 years.		

4.	$EF_{CO2,f,BL}$ / $EF_{CO2,AVG-f,y}$	tCO2/GJ	$EF_{CO2,f,BL}$: Average CO_2 emission factor of the different fuel types *f* that are consumed by the baseline building unit *j*.
			$EF_{CO2,f,y}$: Average CO_2 emission factor of the different fuel types *f* that are consumed by the building unit *j* in year *y*
				(a) Values provided by the fuel supplier in invoices
				This is the preferred source.
				(b) Measurements by the project participants
				(c) Regional or national default values
				These sources can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances).
				(d) IPCC default values at the upper or lower limit – whatever is more conservative – of the uncertainty at a 95% confidence interval.
					For (a) and (b): Measurements should be undertaken in line with national or international fuel standards.	For (a) and (b): The CO2 emission factor should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
						For (c): Review appropriateness of the values annually.
						For (d): Any future revision of the IPCC Guidelines should be taken into account.		

5.	$FC_{f,j,y}$	Mass or volume units	Quantity of fossil fuel type f consumed by the building unit j in year y	Onsite measurements.	- Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); - Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance;	Continuously The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.		

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
					- In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.			

6.	$NCV_{f,y}$	GJ/mass or volume unit	Net calorific value of the fuel type f in year y	(a) Values provided by the fuel supplier in invoices
				This is the preferred source.
				(b) Measurements by the project participants
				(c) Regional or national default values
				These sources can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances).
				(d) IPCC default values at the upper or lower limit – whatever is more conservative – of the uncertainty at a 95% confidence interval.
					For (a) and (b): Measurements should be undertaken in line with national or international fuel standards.	For (a) and (b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
						For (c): Review appropriateness of the values annually.
						For (d): Any future revision of the IPCC Guidelines should be taken into account.		

7.	$Occupancy_{j,BL}$	Persons	Average yearly occupancy of the residential baseline building unit	Building unit owner.	(i) Directly answer (ii) Determined based on baseline surveys	N/A. This parameter will be determined once and will remain fixed through the project lifetime.		The following requirements apply when baseline surveys are used to determine this parameter: - Default number of occupants can be determined for buildings with different ranges of GFA; - The survey shall be conducted following the sampling standard
8.	$Occupancy_{j,y}$	Persons	Average yearly occupancy of the residential baseline building unit	Building unit owner.	(i) Directly answer (ii) Determined based on baseline surveys	At least once every two years (biennially).		The following requirements apply when baseline surveys are used to determine this parameter: - Default number of occupants can be determined for buildings with different ranges of GFA; - The survey shall be conducted following the sampling standard

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
9.	$h_{OP,y}$	Hours	Average yearly operating hours of the institutional building unit j	Building unit owner/building unit user.	Directly answer	Yearly.		
10.	CDD_y, CDD_{BL}	Degree-days	CDD_y: Cooling Degrees Days of the region where the building unit *j* is located during year *y*. CDD_{BL}: Cooling Degrees Days of the region where the baseline building unit is located during year *y*.	Building unit owner.		CDD_y: Yearly. CDD_{BL}: Not monitored, the parameter will remain fixed through the project lifetime.		The base temperature used to determine CDD_y and CDD_{BL} shall be the same and shall be documented in the PDD.
11.	HDD_y, HDD_{BL}	Degree-days	HDD_y: Heating Degrees Days of the region where the building unit *j* is located during year *y*. HDD_{BL}: Heating Degrees Days of the region where the baseline building unit is located during year *y*			HDD_y: Yearly. HDD_{BL}: Not monitored, the parameter will remain fixed through the project lifetime.		The base temperature used to determine HDD_y and HDD_{BL} shall be the same and shall be documented in the PDD.
12.	$GFA_{j,i,y}$	m2	Gross floor area of the project building unit j in building unit category i in year y	1. Building plan (Preferred source) 2. On-site measurement (If the building plan is not available)		The parameter shall be determined before the start of the building's construction.	When determined through the building plan, confirm on-site that building geometry represented in the plan is accurate.	When determined using sampling, the requirements of the latest version of the Sampling standard shall be followed. This parameter shall be monitored only when emission reductions are determined through the application of a standardized baseline that standardizes the specific CO2 emissions of buildings.

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
13.	$EC_{j,i,y}$	MWh/yr	Electricity consumed by the project building unit j in building unit category i in year y (MWh)	Direct measurement or calculated based on measurements from more than one electricity meters.	Use electricity meters installed at the electricity consumption sources.	Continuous measurement and at least monthly recording.		When determined using sampling, the requirements of the latest version of the Sampling standard shall be followed. Values shall be cross-checked against electricity purchase receipts/invoices.
14.	$EF_{elec,y}$	tCO2e/MWh	Emission factor of the electric grid supplying electricity to the project building unit j in building unit category i	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"				
15.	TDL_y	%	Average technical transmission and distribution losses for providing electricity to the grid to which the project building unit j in building unit category i is connected	1. Use annual average value based on the most recent data available within the country; 2. Use as default values of 20% for: (a) project or leakage electricity consumption sources; (b) baseline electricity consumption sources; 3. Use as default values of 3% for: (a) baseline electricity consumption sources; (b) project and leakage electricity consumption sources.		Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.		
16.	$FC_{k,j,i,y}$	Mass or volume units	Fossil fuel type k consumed by the project building unit j in building unit category i in year y (mass or volume units)	Onsite measurements.	- Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); - Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly	Continuously The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.	Values shall be cross-checked against fuel purchase receipts/invoices.	This parameter shall be monitored only when emission reductions are determined through the application of a standardized baseline that standardizes the specific CO2 emissions of buildings.

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
					calibrated with the ruler gauge and receiving a reasonable maintenance; - In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.			

17.	NCV_k	GJ/mass or volume units	Net calorific value of the fossil fuel type k	(a) Values provided by the fuel supplier in invoices
				This is the preferred source.
				(b) Measurements by the project participants
				(c) Regional or national default values
				These sources can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances).
				(d) IPCC default values at the upper or lower limit – whatever is more conservative – of the uncertainty at a 95% confidence interval.
					For (a) and (b): Measurements should be undertaken in line with national or international fuel standards.	For (a) and (b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
						For (c): Review appropriateness of the values annually.
						For (d): Any future revision of the IPCC Guidelines should be taken into account.		

18.	$EF_{CO2,k}$	tCO2/GJ	$EF_{CO2,k}$: CO_2 emission factor of the fossil fuel type k	(a) Values provided by the fuel supplier in invoices
				This is the preferred source.
				(b) Measurements by the project participants
				(c) Regional or national default values
				These sources can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances).
				(d) IPCC default values at the upper or lower limit – whatever is more conservative – of the uncertainty at a 95% confidence interval.
					For (a) and (b): Measurements should be undertaken in line with national or international fuel standards.	For (a) and (b): The CO2 emission factor should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
						For (c): Review appropriateness of the values annually.
						For (d): Any future revision of the IPCC Guidelines should be taken into account.		

19.	$Occ_{j,i,y}$	Person	Average number of occupants of the project building unit j in	Survey with project buildings.		Yearly, based on survey.		When determined using sampling, the requirements of the latest version of the Sampling standard shall be

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
			building unit category i in year y					followed. This parameter shall be monitored only when emission reductions are determined through the application of a standardized baseline that standardizes the specific CO2 emissions of buildings.
20.	$EC_{grid,j,i,BL}$ / $EC_{captive,j,i,BL}$ / $EC_{WP,s,BL}$	MWh/year	$EC_{grid,j,i,BL}$: Grid electricity consumption by the baseline building unit *j* in building unit category *i* included in the sample. $EC_{captive,j,i,BL}$: Captive electricity consumption by the baseline building unit *j* in building unit category *i* included in the sample. $EC_{WP,s,BL}$: Electricity consumed to produce the chilled/hot water system for the baseline building unit *j* in building unit category *i* in the sample. Take average of the data from the coverage period	Direct measurement or calculated based on measurements from more than one electricity meters	Use electricity meters installed at the grid interface for electricity export to grid and for supply to captive consumers use electricity meters installed at the entrance of the electricity consuming facility. In case of grid and net electricity generation: This parameter should be either monitored using bi-directional energy meter or calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity the project plant/unit from the grid. If it is calculated, then the following parameters shall be measured: (a) The quantity of electricity supplied by the project plant/unit to the grid; and (b) The quantity of electricity delivered to the project plant/unit from the grid	Continuous measurement and at least monthly recording	The electricity meter will be subject to regular maintenance and testing in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements. The calibration of meters, including the frequency of calibration, accuracy class should be done in accordance with national standards or requirements set by the meter supplier or requirements set by the grid operators. If these standards are not available, calibrate the meters every 3 years and use the meters with at least 0.5 accuracy class. The electricity generation shall be cross-checked with records of electricity sale.	If the electricity consumed is measured for the whole building and not individually for each building unit, this parameter shall be determined by multiplying the electricity consumed by the whole building by the ratio between the GFA of the building unit *i* and the GFA of the total building, as follows: $EC_{grid,j,i,BL} = EC_{Bldg,BL} \times GFA_{j,i} GFA_{Bldg}$, where If the electricity is supplied by a captive power plant, $EC_{grid,j,i,BL}$ is replaced by $EC_{captive,j,i,BL}$; $EC_{Bldg,BL}$ = electricity consumed by the whole building, which baseline building unit *j* in building unit category *i* belongs to over the applicable data coverage period (MWh/year); GFA_{Bldg} = gross floor area of the whole building which baseline building unit *j* in building unit category *i* belongs to (m^2)

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
21.	$m_{j,i,BL}$ / $m_{s,BL}$	kg/year	$m_{j,i,BL}$: mass of chilled/hot water consumption of baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period (kg/year). $m_{s,BL}$: mass of chilled/hot water production by chilled/hot water system *s* over the applicable data coverage period (kg/year). Take average of the data from the coverage period	(a) Utility billing records or (b) On-site measurements.	(a) As per the utility metering; (b) Use mass meters.	(a) As per the utility metering; (b) Continuously, aggregated at least annually.	Check consistency of the monitored records with the records from previous monitoring intervals.	
22.	$\Delta t_{j,i,BL}$ / $\Delta t_{s,BL}$	K or Celsius	$\Delta t_{j,i,BL}$: Average temperature difference between the outlet and inlet of the heat exchanger used for the cooling/heating of building unit *j* in building unit category *i* included in the sample over the applicable data coverage period. $\Delta t_{s,BL}$: Average temperature difference between the outlet and inlet of the heat exchanger used for the	(a) Readings taken from temperature meters installed at pipeline of inlet and outlet of the heat exchanger used for the chilled/hot water supply. This is the preferred source. (b) Specification of the manufacturer of the chilled/hot water system.				The temperature meter readings should be installed at the immediate inlet and outlet point of the heat exchanger of the chilled/hot water system.

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
			chilled/hot water production in chilled/hot water system *s* over the applicable data coverage period					
23.	vj,i,BL	m^3/year	Annual average chilled/hot water consumption (in volume) of baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period (m^3/year). Take average of the data from the coverage period	On-site measurements.	Use volume flow-meters			Applicable only if a volume flow meter is installed for monitoring of chilled/hot water production.
24.	$\eta_{dist,s,BL}$	decimal	Average technical distribution losses of the chilled/hot water system network serving baseline building unit *j* in building unit category *i* included in the sample over the applicable data coverage period i.e. GJ of technical thermal energy losses in the chilled/hot water distribution network divided by GJ of thermal energy supplied to the building units.	Monitoring records of thermal energy supply and demand or thermal energy loss measurement. A default value of 0 per cent may be used if no recent data are available or the data cannot be regarded accurate and reliable.	(a) Based on monitoring of thermal energy supply and demand; or (b) Measurement and estimation of surface thermal energy losses. Follow authentic engineering handbooks/ publications or national or international standards for calculation of the surface thermal energy losses.			

№	Data / Parameter	Data unit	Description	Source of data	Measurement procedures	Monitoring frequency	QA/QC procedures	Any comment
			Take average of the data from the coverage period					