Mitigation Action Facility
Mitigation Guideline for the Project Outline and Proposal Phases

Guidelines on the GHG mitigation Annex
How to present mitigation figures

September 2023

Acronyms and Abbreviations

ASP	Applicant Support Partner
BAU	Business-as-usual
BE	Baseline emissions
CDM	Clean Development Mechanism
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
ER	Emissions reduction
EUR	Euro
FC	Financial Cooperation
GEF	Global Environment Facility
GEF	Grid Emission Factor
GHG	Greenhouse gas
GHGP	Greenhouse Gas Protocol
GS	Gold standard
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
kg	Kilogram
kWh	Kilowatt hour
LE	Leakage emissions
M&E	Monitoring and Evaluation
MAI	Mean Annual Increment
MRV	Measurement, Reporting, and Verification
N	Nitrogen
N_2O	Nitrous oxide
NDC	Nationally Determined Contribution
NF_3	Nitrogen trifluoride
ODA	Official Development Assistance
PE	Project emissions
PFCs	Perfluorocarbons
SF_6	Sulphur hexafluoride
SI	International System of Units
TC	Technical Cooperation
tCO_2e	Metric tonnes of carbon dioxide equivalent
tCO_2e/a	Metric tonnes of carbon dioxide equivalent per annum
UBA	German Environmental Agency (German: *Umweltbundesamt*)
VCS	Verified Carbon Standard

Contents

List of figures

List of tables

1 Quick guide

Introduction and purpose

In order to get ready to start, please read the instruction first to understand the approach of this Guideline. This will help you fill out the Mitigation Annex, especially related to differences between the Outline and Proposal Phase. p. 6

General principles, definitions, and requirements

Please read this section to become familiar with the requirements for filling out the Mitigation Annex as well as principles and definitions applied in the Mitigation Annex and this Guideline. p. 9

How to fill out the Mitigation Annex

Detailed guidance and instructions on how the Mitigation Annex shall be filled out is provided in this section. The Mitigation Annex consists mainly of the following sheets:

0: Checklist	p. 24
1: Results	p. 25
2: Parameters and assumptions	p. 26
3: Direct mitigation	p. 26
4: Indirect mitigation	p. 28
5: Cross-border mitigation	p. 31

Relation to the Project Outline and other documents

While filling out the Mitigation Annex is the key step to describe the mitigation potential, information will need to be further 'cross-referenced' with other documents p. 31

Sector-specific guideline(s)

The Mitigation Annex shall be used for any project type that is proposed as project to the Mitigation Action Facility. Sector specific Appendices are provided for further information about specifics of a sector or type of mitigation measure that go beyond this general Guideline.

Available to date: p. 32

- Industry sector: Appendix A1
- Transport sector: Appendix A2 p. 35

Checklist

To ensure that the Mitigation Annex and related documents are properly filled out, the use of the checklist is highly recommended p. 33

Glossary

Please consult the Glossary for key terms and definitions as applied in the Mitigation Annex and this Guideline (see Appendix B in the Guideline) p. 47

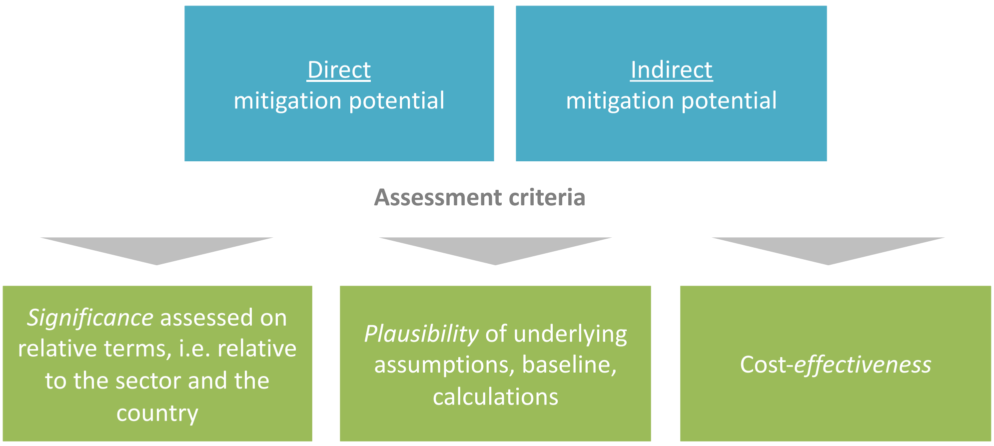
2 Introduction and purpose

Projects are assessed against two criteria: 1) Ambition and 2) Feasibility. Ambitious projects are defined by their potential for achieving transformational change, their greenhouse gas (GHG) mitigation potential as well as their potential for the leveraging of public and private finance. The Mitigation Action Facility cycle includes three main steps for project selection: the Concept Phase, the Outline Phase and the Proposal Phase.

The Project Concept Phase preceding the development of Project Outlines has been introduced with the Mitigation Action Facility Call for Projects 2023 to simplify the initial application process and open the competition to a wider range of potential applicants and partners. A specific Mitigation Guideline for the Project Concept Phase was published in June 2023 as a support for undertaking a conservative estimate of direct mitigation potential for the proposed project.[1]

At the following Project Outline or Proposal phases, Applicants / Application Support Partners (ASPs) or Implementation Organisations respectively (hereafter referred to as 'user(s)' of the Mitigation Annex should set out how mitigation actions in a certain sector are planned to be implemented. Users are expected to take a conservative approach to the mitigation potential, as the Applicant's / project's success will be measured against this initial proposition throughout the assessment and implementation process.

The mitigation potential shows the direct and indirect contribution of a project to the decarbonisation targets as defined by the country's Nationally Determined Contribution (NDC). The mitigation potential of the project is assessed both in absolute and relative terms in relation to the sector and the country target. In assessing the mitigation potential provided in the different Project Phases, the following key criteria are used.



Source: Adapted from the Mitigation Guideline for Project Concept Phase (2023)

Figure 1: Assessment criteria for project mitigation potential

For presenting the estimation of the mitigation potential, users are required to utilize the provided template at different stages of the Mitigation Action Facility cycle, namely:

- for Outline Phase as so-called Excel '**Annex 6 GHG mitigation potential'**
- for Proposal Phase as so-called Excel '**Annex 7 GHG mitigation potential'**

The Mitigation Annex template is part of the application documents that are provided by the Mitigation Action Facility at the respective stage (Annex 6 for Call for Outlines; Annex 7 during the

[1] Mitigation-Action-Facility_Mitigation-Guideline-for-Project-Concept-Phase.pdf

Detailed Preparation Phase and at Proposal Phase). In this guideline both Annexes are referred to as 'the Mitigation Annex'.

Why are there two different Annexes to calculate the mitigation potential of a project?

In line with the **two-step approach of the Mitigation Action Facility application process**, there are slight differences in the information required with regards to the mitigation potential of a project:

- In the **Outline Phase**, which aims at selecting the most promising and feasible projects, the mitigation potential in terms of direct and indirect contribution of a project to the decarbonisation targets as defined by the country's NDC, needs to be plausibly demonstrated. It is assessed on relative terms, i.e., relative to the sector and the country. In some cases, certain information and data may not be available in the same level of detail as in the Proposal Phase.
- In the **Proposal Phase**, the second stage of the application process, support is provided by the Mitigation Action Facility Technical Support Unit for a more detailed preparation of the project. In terms of the mitigation potential calculation, this means that a more detailed and elaborated estimation needs to be provided based on the first calculation made in the Outline Phase. Thus, the calculation builds upon the approach and data used in the Outline Phase. It needs to be re-fined and substantiated by e.g., providing a higher level of detail of certain parameters and data.

For both phases, the **Mitigation Annex** is structured in the same way and has the same overall scope. However, as the level of available information for projects may be different at Outline and Proposal Phase, the **level of required details of information/data is slightly reduced for the Outline Phase (for Annex 6).** Typically, the general calculation approach can be assumed to be defined already in the Outline Phase, while the level of detail regarding collection and verification of data as input for the calculation can be expected to be lower at Outline Phase compared to Proposal Phase.

Differences between Outline Phase (Annex 6) and Proposal Phase (Annex 7) in the requirements for the mitigation potential calculation will be highlighted throughout the **Mitigation Action Facility Mitigation Guideline**.

The Mitigation Annex supports the estimation of direct and indirect mitigation impacts from the project. This guidance explains the requirements and different sheets included in the Mitigation Annex and provides general instructions on how and why to fill out the Mitigation Annex.

The key objective of the Mitigation Annex and this ***Mitigation Action Facility Mitigation Guideline*** (hereinafter referred to as 'Guideline') is to support the users to transparently elaborate and present the envisaged project mitigation potential. Users are encouraged to utilize and follow the Guideline as it can facilitate filling the Mitigation Annex appropriately and can help to avoid common pitfalls when estimating and presenting the mitigation potential of projects.

As a first step, chapter 3 of this Guideline introduces ***general principles, definitions and requirements*** applied by the Mitigation Action Facility for best practice presentation of mitigation estimation for Project Outlines. The following chapter 4 presents ***how to fill out the Mitigation Annex*** with a detailed overview of the different worksheets and how to use them. Chapter 5 discusses the ***relation of the Mitigation Annex to the Project Outline and other Outline Annexes and relevant Mitigation Action Facility guidelines*** (e.g., the Monitoring and Evaluation Framework). ***Sector specific considerations*** that may be required only for certain sectors or project types are considered in chapter 6, while chapter 7 provides a detailed ***checklist*** that can be used to ensure the proper and complete filling of the Mitigation Annex. The checklist helps users to fill out the Mitigation Annex and to double check if all relevant aspects to derive the mitigation figures are considered and all required sections are completed.

Throughout the Guideline, the mandatory requirements for the Project Proposal Template (Annex 7), recommendations or examples and pitfalls will be presented in the following colours for quick recognition.

Mandatory requirements Project Proposal Template (Annex 7)
Recommendations or examples
Pitfalls to be avoided

Differences in the requirements for Outline Phase (Annex 6) and Proposal Phase (Annex 7) related to certain aspects and elements of the Mitigation Annex will be indicated in the respective sections. The following table provides an overview of the main differences regarding key aspects and requirements.

Table 1: Overview of main differences between the requirements in the Project Outline and Proposal Phase

Aspect	Outline Phase (Annex 6)	Proposal Phase (Annex 7)
1. Results		
Project Information	✓	✓
Project ID		✓
Project duration	✓	✓
Project funding	✓	✓
Project cost-efficiency	✓	✓
2. Parameters and Assumptions		
List of parameters (transparently filled, incl. justification)	✓	✓
Accuracy		✓
3. Direct mitigation		
Description of - business as usual (BAU) scenario - baseline scenario - project boundary	✓	✓
Description of approach/methodology followed for Emission Reduction (ER) calculation	✓	✓
Identification and consideration of leakage emissions, incl. justification	✓	✓
Identification and consideration of rebound effects, incl. justification		✓
Calculation of annual Emission Reductions (ER) and cumulative values over project duration, for additional 10 years after project finalization	✓	✓
Calculation of 'over the technology lifetime'	✓	✓
4. Indirect mitigation		
Description of specifications of indirect mitigation effects	✓	✓

Aspect	Outline Phase (Annex 6)	Proposal Phase (Annex 7)
The following requirements only apply if the approach for determining indirect emission reductions is different from the methodology applied for direct emissions methodology		
Description of source of emission reductions and difference to the baseline	✓	✓
Calculation of baseline emissions	✓	✓
Calculation of project emissions	✓	✓
Calculation of leakage emissions	✓	✓

3 General principles, definitions, and requirements

The Mitigation Annex provides 4 main sheets in which the estimation for GHG mitigation can be presented (incl. the direct and indirect mitigation potentials) and the optional sheet “Cross-border mitigation” that needs to be filled only if certain pre-conditions apply. In addition, the following two sheets provide useful guidance when filling the Annex:

- Sheet ‘Standards & Methodologies’ with further guidance on useful methodologies to be applied for calculating the GHG mitigation potential (see section 4.1 of this Guideline for an overview of worksheets included in the Mitigation Annex).
- Sheet ‘0 Checklist’ which functions as a cross-check that all mandatory cells are being filled.

The Checklist is linked to the different sheets on which data entries are foreseen and required and checks if all mandatory cells contain data or information. However, this provides no guarantee that the data is sufficient and of in good quality. The differences in the requirements for Outline and Proposal phase (as described in the subsequent chapters) are reflected and indicated in the Checklist. For further information and details on the Checklist, refer to sections 4.4 and 7.

When filling out the Mitigation Annex, please take the following general principles, definitions, and requirements into consideration.

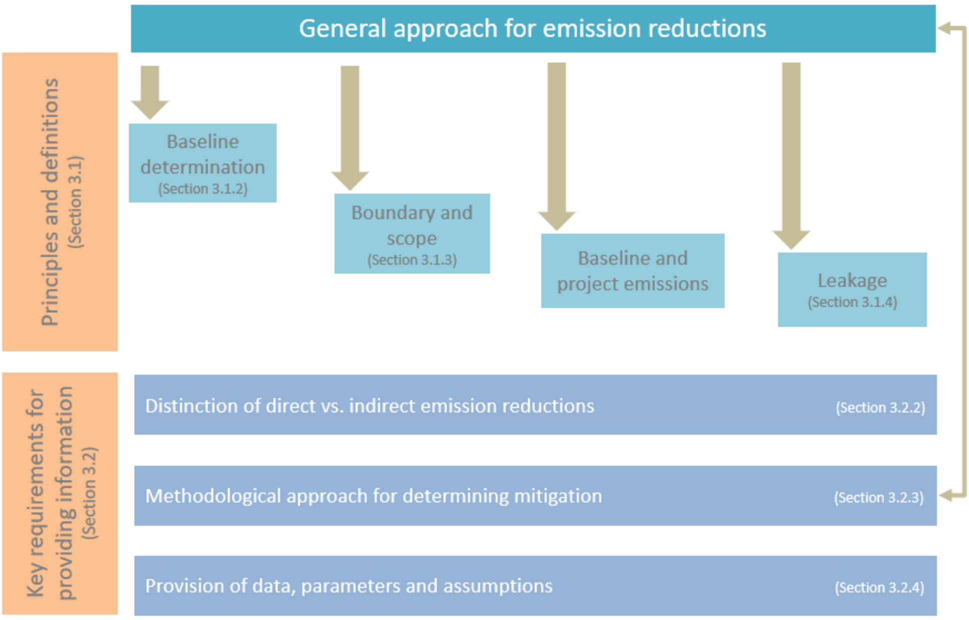


Figure 2: Overview of key elements and principles for providing information on mitigation

3.1 General principles and definitions for determining the mitigation potential

Projects are expected to achieve real emission reductions. The net change in GHG emissions, measured in metric tonnes of carbon dioxide equivalent (tCO_2e), will be estimated relative to the assumed baseline emissions trajectory and will reflect any abatement results attributable to project mitigation over the lifetime of the intervention(s). Here the project shall distinguish between direct and indirect emission reductions impacts and reflect the general principles and definitions described below.

3.1.1 General approach for emission reductions determination

The calculation of emission reductions achieved by the project may vary according to the project type and underlying mitigation measures to be implemented. In general, the quantification of the potential mitigation impact of the project is based on a comparison between the baseline situation and the situation after the project implementation representing the mitigation scenario. Hence, the related emissions for both situations need to be determined. The difference between both, taking into account any leakage effects[2], is the potential emission reductions resulting from the project.

$$ER_y = BE_y - PE_y - LE_y \qquad \textbf{Equation (1)}$$

Where:

ER_y	=	Emission reductions in year y (tCO_2)
BE_y	=	Baseline emissions in year y (tCO_2)
PE_y	=	Project emissions in year y (tCO_2)
LE_y	=	Leakage emissions in year y (tCO_2)

Mandatory requirements: Calculate the baseline, project, and leakage emissions for your project based on the GHG emissions in the baseline situation and the project scenario. Follow the detailed procedures provided by this Guideline and relevant standards and methodology related to the technology/measure applied.

For projects including carbon sequestration, the same equation can be applied. However, any relevant and accountable GHG removals shall be presented as negative emissions in the equations (e.g., -10.000 tCO_2e).

3.1.2 Defining the baseline scenario

The baseline scenario is the ***reference case for the project***. It is a hypothetical description of what would have most likely occurred in the absence of the project to provide (nearly) the same product or service. The baseline scenario is used to estimate baseline emissions.

Generally, the baseline approach as provided and defined by the applied methodology (see also section 3.2.4 of this Guideline) should be followed taking into consideration the following guidance. There are three generic possibilities for the baseline scenario and related emissions that would occur in the absence of the proposed project (as per Clean Development Mechanism (CDM) and GHG Protocol):

- A benchmark approach, considering for example current activities, technologies or practices that provide the same type, quality and quantity of product or service as the project. Only activities, technologies and practices should be considered that have been undertaken in the

[2] Leakage effects are explained in section 3.1.4 of this Guideline.

previous five years, in similar social, economic, environmental and technological circumstances and whose performance with regard to low emissions is among the top 20 percent of their category with regard to outputs delivered;

- the emissions from an activity, a technology or practice that represents an economically attractive course of action, taking into account barriers to investment, i.e., implementation of alternative activities, technologies or practices (compared to the project) within a specified geographic area and temporal range that could provide the same product or service as the project; or
- the continuation of current activities, technologies or practices that, provide the same type, quality and quantity of product or service as the project (Business-as-Usual, BAU), resulting in existing actual or historical emissions, as applicable.

When defining the baseline, identify the scenario that most reasonably represents the situation around project actions, i.e., a sub-sector such as the building sector, and estimate the anthropogenic GHG emissions by sources that would occur in the absence of the project. In other words, the baseline is defined as the hypothetical situation without the project; hence the baseline emissions (BE) are the emissions that are expected without the project during the given period.

In many cases the 'business-as-usual' (BAU) emissions (i.e., emissions that would occur without any new and additional efforts to reduce them) represents the baseline scenario. The BAU scenario can be estimated *ex-ante* by extrapolating historical GHG emissions or projecting the development of key emissions drivers over the lifetime of the project. In the same way, it is also possible to project into the future the GHG emissions under the implementation of the project, i.e., the development under changing circumstances. The difference between these two scenarios provides the ex-ante mitigation estimate.

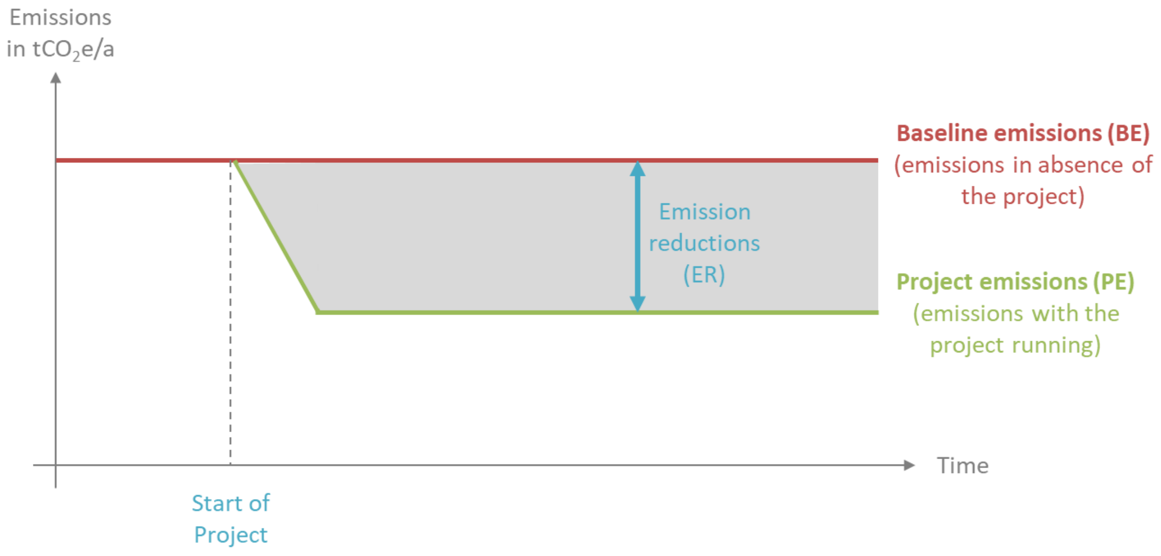


Figure 3: Baseline reference scenario

Recommendation: Choose realistic and conservative assumptions about future development of key parameters (e.g., share of coal-fired power plants in electricity generation), since ex-ante approaches tend to overestimate the effects from mitigation projects. The conservativeness principle should guide any effort to estimate the emissions magnitude. For instance, it is advisable to use upper-bound estimates, e.g., from default values, for project GHG emissions and lower-bound or zero estimates for baseline emissions.

Baseline trajectories are typically dynamic (not static), as emissions in a specific sector, sub-sector, geographical area, etc. are expected to shift over time in the absence of the intervention (see text box below). For the determination of baselines, a suitable and conservative method should be used, and country / sector-specific, climate-relevant data should be considered.

Recommendation: The baseline emissions always depend on the baseline scenario and which development is considered herein as most appropriate for the underlying interventions (e.g., BAU development, dynamic use and penetration of technologies, fuel type and consumption, efficiency standards etc.). Often the BAU scenario is the baseline scenario, since without the project intervention, required actions towards mitigation in the sector or sub-sector would not be triggered.

Baselines can be projected to be stable over time, or to increase or decrease, subject to the underlying development (dynamic baseline). For example, in case a project shall replace or avoid the future use of inefficient appliances, in the baseline scenario without the project intervention, the use of conventional (inefficient) appliances will continue to prevail and may even increase due to affordability and economic development. Hence, consequently from today's point of view (ex-ante estimation), the baseline emissions under this scenario would increase. In other cases, where, for instance, an existing power plant is operating and likely continues to provide electricity to the grid, the baseline scenario could be rather a BAU development and hence the emissions baseline would be stable, if no other intervention will take place influencing the plant's operation.

Source: Adapted from Wehner, 2019, p. 19

Some activities, especially in low-income countries such as Least Developed Countries (LDCs), may be implemented in a 'suppressed demand' context. This relates to a situation where a minimum level of basic goods and services is not available due to poverty or non-existence of modern infrastructure (e.g., access to electricity). "Suppressed Demand" refers to a situation where current levels of access to services are inadequate for basic human needs – termed "Minimum Service Levels". The emission reduction calculation approach follows the underlying assumption that emissions would occur under the baseline scenario according to the minimum service level required for ensuring basic human needs, and that does not exist at present in the project context. In the framework of existing carbon markets this is a crucial concept to give countries with low historical emission levels due to suppressed demand, access to carbon market participation while enabling leapfrogging to zero- or low-emission technologies. Under the Clean Development Mechanism (CDM), the concept was established as a baseline approach with normative elements, such as minimum service levels to meet basic human needs. Various methodologies are available under e.g., the CDM and Gold Standard that integrate the concept of suppressed demand. Gold Standard projects that apply a suppressed demand baseline are limited to micro- or small-scale thresholds.

It is important to note that projects opting for a suppressed demand context should comprehensively justify the consideration of suppressed demand and clearly indicate it in the GHG emission reduction estimations in the Mitigation Annex, for instance in the description of the baseline scenario (see sections 4.6 and 3.1.2). Ultimately, a suppressed demand baseline has an impact on monitoring, as emissions are assumed that do not actually occur. Hence, this needs to be considered for the development of the M&E plan.

3.1.3 Defining the project boundary and scope

The mitigation assessment and project boundary for the project shall encompass the potential emission reductions (ER) related to the project measures, technologies, and intervention. The project boundary encompasses all emissions of GHG under the control of the project proponent that are significant and reasonably attributable to the project activities. The specific project boundary depends on the project interventions and technologies and can refer to the operational control or geographical delineation. If the project boundary is difficult to define, the user should consult approved methodologies (e.g., of the CDM or GHG Protocol) for the detailed delineation of the project boundary.

According to the GHG Protocol[3], emissions are divided into three scopes. The estimation of emission reductions achieved by the project is analogously oriented towards the emission sources that are ‘owned’ or controlled by the project (according to the ‘control approach’):

- ***Scope 1***: Emissions reduced directly by project activities (attributable to outputs or under the control of the project).
- ***Scope 2***: Emission reductions caused by project activities through reduced energy consumption (electricity, grid-bound heat, etc.), e.g., in financed and constructed buildings.
- ***Scope 3*** (optional): upstream and downstream emissions (e.g., extraction, production and transport of purchased goods, services, energy sources, etc., unless included in other categories).

For the determination of emission reductions through the project, emissions from Scope 1 and Scope 2 are to be considered. Emissions or their reduction that cannot be clearly assigned to specific project activities and occur upstream or downstream in the value chain (Scope 3) do not have to be included except for a situation where Scope 3 emissions are significant or the applied methodology is requiring the determination of Scope 3 emissions (see also guidance provided in section 3.1.4 of this Guideline regarding leakage). In case Scope 2 or Scope 3 emission reductions are realized outside the project country boundary, the guidance on cross-border mitigation effects needs to be applied (see section below).

Potential pitfall: Avoid mixing up direct and indirect emission reductions as per Mitigation Action Facility definition (see section 3.2.2 of this Guideline) and consider the different Scopes of the project boundary as defined above.

It is recommended to follow the definitions of suitable methodologies, e.g. as available under the CDM, to define the specific project boundary. For instance, for projects aiming to implement energy efficiency measures (including savings of electricity and fuel) and/or fuel switching in new or existing buildings, the project boundary is the physical, geographical site of the building(s) and emissions of scope 1 and 2 (electricity consumed) should be considered.

When defining the project boundary, the definition of direct and indirect emission reductions by the Mitigation Action Facility shall be taken into consideration (see Figure 4 in section 3.2.2 of this Guideline). Also, define the assumed lifetime of the technology or investment. The lifetime should be derived from manufacturer information on the implemented technology (preferred) or be derived from typical experiences or expert evaluation in the country or region. Alternatively, default values can also be used, e.g., as provided in the CDM Tool to determine the remaining lifetime of equipment, if no specific information on the project’s technology is available. The user should document their choice and data used.

The project boundary includes the significant anthropogenic GHG emissions by sources influenced by the project interventions. The estimated reduced GHG emissions (direct and indirect emissions) shall cover the cumulative amount of all the ‘Kyoto basket’/Paris Agreement GHGs, which includes all emissions of the following gases:

- **Carbon dioxide (CO_2)** - **Methane (CH_4)** - **Nitrous oxide (N_2O)**	- **Hydrofluorocarbons (HFCs)** - **Perfluorocarbons (PFCs)** - **Sulphur hexafluoride (SF_6)** - **Nitrogen trifluoride (NF_3)**

[3] The Greenhouse Gas Protocol (WRI & WBCSD 2015)

Some project interventions may realize significant shares of the overall mitigation impact across-borders. Hence, related reductions of emissions from Scope 2 or 3, stemming for instance from power generation or fertilizer production might take place outside of the project country boundary. It is generally eligible to account for those cross-border mitigation impacts, but it must be distinguished whether the corresponding expected cross-border effect takes place in a country that is a potential target country of the Mitigation Action Facility and hence accountable or not.

3.1.4 Rebound effects and leakage

When estimating the achieved emission reductions, the user shall reflect and report on any rebound effects or carbon leakage (incl. action to reduce both).

Leakage is defined as the increase in emissions outside of the (project) boundary of the project mitigation action that results as a consequence of the implementation of that mitigation action. There are generally two categories (as per GHG Protocol):

- One-time effects - Changes in GHG emissions associated with the construction, installation, and establishment or the decommissioning and termination of the project activity.
- Upstream and downstream effects - Recurring changes in GHG emissions associated with inputs to the project activity (upstream) or products from the project activity (downstream), relative to baseline emissions.

For instance, leakage may result from replaced equipment through the project that is continued to be used outside of the project boundary leading to increased emissions. Typical examples are replaced old internal combustion engine vehicles, inefficient electric appliances or cook-stoves that are then used elsewhere. Also, cross-border mitigation impacts might create leakage. For example, a substitution of imported fossil-fuel based fertilizer with renewable based fertilizer might reduce the fossil-fuel based production only partly since the product is sold in alternative country markets. If leakage is a relevant and significant emissions source, corresponding emissions should be addressed in the same level of detail as project emissions.

Rebound effects occur for instance when some of the energy savings achieved by energy efficiency gains are lost due to resulting changes in behaviour, such as increased consumption of goods or services. For example, increased efficiency allows products to be manufactured and services to be performed using fewer resources, and often at a lower cost. This in turn influences purchasing behaviour and product use. A rebound effect occurs when the demand for a service, such as energy services, increases because of the decreased cost of the service per unit. For example, the (financial) benefits from energy demand savings due to technical efficiency improvement and hence reductions in GHG emissions may result in an increased energy demand in the same or other areas (e.g., extended operating hours in lighting). This can oftentimes even cancel out the original savings. According to the German Environmental Agency (UBA 2019), the direct rebound effect for space-heating use can be estimated at 10 to 30%. Hence, the actual energy savings may be lower than the projected technically feasible savings. However, the impact of any rebound effect depends on specific conditions and can be reduced using suitable instruments.

Recommendation: Managing leakage and potential rebound effects is complex as it requires knowledge about the (future) activities of (diverse) actors within and outside of the project boundaries. Users should conduct a comprehensive assessment and address the following questions:

- What leakage risks / rebound effects have been identified for the proposed project?
- Is leakage or the rebound effect expected as a one-time or as a recurring effect?
- How will leakage or the rebound effect be monitored during project implementation?

- How will leakage or rebound effects be mitigated (e.g., through the choice of the project area or by offering alternative livelihood options)?
- How will leakage or rebound effects be accounted for (e.g., will it be deducted from overall GHG emission reductions/removals)?

If leakage or rebound effects are unlikely to happen, this should be justified by the users.

Mandatory requirements: Report on and estimate any leakage and rebound effects (include corrective actions to prevent both). Also, document and justify if no leakage and/or rebound effects are expected.

For the Outline Phase, it is not mandatory to consider rebound effects. This is also reflected in the Checklist on Sheet 0. However, it is recommended to consider such effects already at an early stage to be able to plan for corrective measures, if necessary.

3.2 Key requirements for providing information on the mitigation approach

3.2.1 Time period for mitigation estimation

The users should assess the annual mitigation potential of the project and the cumulative value over the project duration. In addition, cumulative values for the period beyond the project duration should be estimated. Hence, the following potential emission reductions estimates need to be presented in the Mitigation Annex:

- Annual emission reductions in GHG emissions (in tCO_2e)
- Cumulative value over the duration of the project, i.e., accumulated target values until finalisation of the project;
- Cumulative value over a period of 10 years after the end of project implementation, and for an additional 10 years after project finalisation;
- Estimation over the lifetime of the technology.

3.2.2 Distinction of direct and indirect GHG mitigation potential

The Mitigation Action Facility differentiates between direct and indirect GHG mitigation potential.

Direct GHG emission reductions are achieved by project investments and discrete investments financed or leveraged during the project's implementation period (throughout the entire lifetime of the project). Hence, direct emission reductions are defined ***as mitigation achieved by units or measures (partially) financed or leveraged by the financial cooperation (FC) component of the project*** funding during the project period. The requirements are as follows:

- Units must be installed / measures must be implemented during project period,
- Timing of mitigation effect: Occurs during the project period, 10 years after project end and over technology lifetime (but only for those units installed during project period).

Indirect GHG emission reductions achieved by the project capture emission reductions beyond those related to direct investments, e.g., resulting from technical assistance. Hence, potential emission reductions that fall in the following categories are considered indirect emissions:

- Results of technical cooperation (TC) component during and after the project period

- Results of financial cooperation (FC) component (but only for units installed / measures implemented after project end, as a result of the continuation of the financial mechanism)
- Timing includes:
    - Technical cooperation: during project period and during period of 10 years after project end, (during lifetime: optional)
    - Financial cooperation: for units installed after project end for period 10 years after project end, (during lifetime: optional)

The following illustration summarizes the distinction between the direct and indirect mitigation potential of the project and the different reporting timeframes.

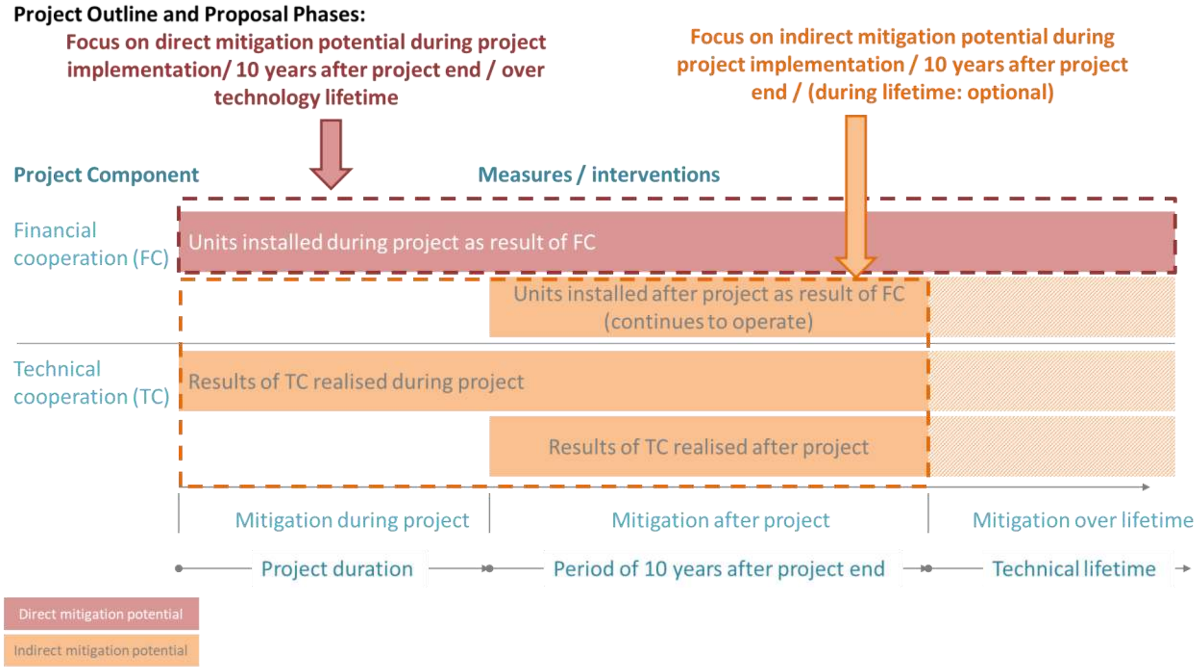


Figure 4: Definition of the direct and indirect GHG mitigation potential

As shown in the figure above, technology units installed during the project as result of the financial component of the project can continue mitigating over a period of 10 years and beyond depending on the lifetime of the underlying technology. For instance, direct emission reductions related to buildings retrofitted during the project implementation phase of 4 years can be counted for an additional 10 years. If the technology lifetime exceeds this period, e.g., 20-year lifetime, the emission reductions should be accumulated accordingly. See example below.

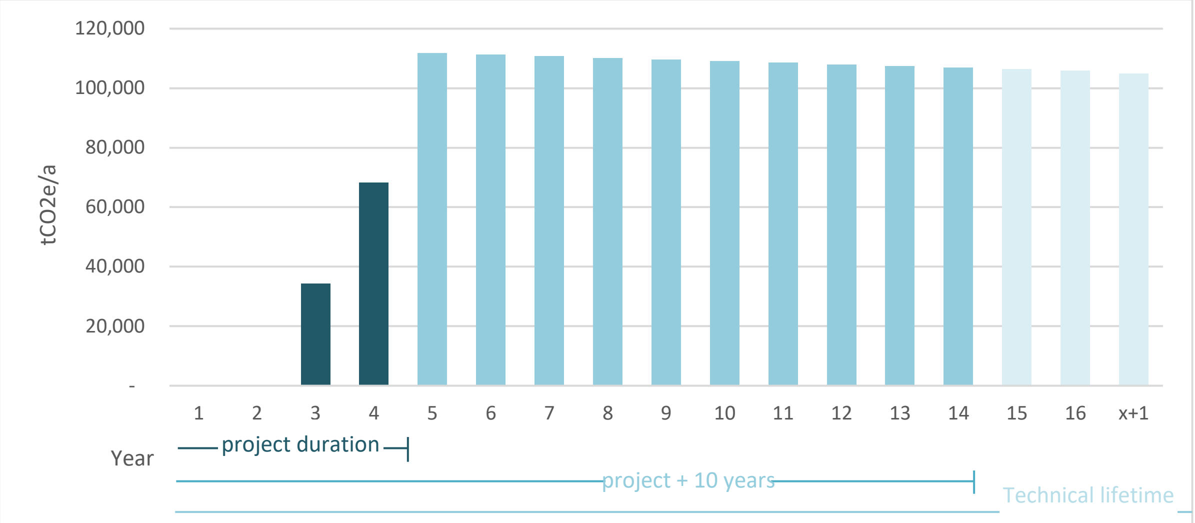


Figure 5: Example of direct emission reductions from project

Mandatory requirement(s): Clearly differentiate in the emission reductions calculation between direct and indirect mitigation potential.

3.2.3 Consideration of cross-border mitigation impacts

In case cross-border mitigation impacts are considered (see also section 3.1.3), it must be clarified whether the corresponding expected cross-border effect takes place in a country that is a potential target country of the Mitigation Action Facility. Hereby, the following guidance must be followed:

Cross-border effect takes place in Mitigation Action Facility target country (ODA eligible and developing country)[4]:

- A description of the approach to determine cross-border effects and the associated quantification needs to be included in Sheet 5 of the Mitigation Annex, highlighting the mitigation effects taking place in another country than the partner/applicant country. If applicable, additional information needs to be provided in Sheet 2, describing associated parameters and assumptions.
- The results of the calculation shall be outlined in the mitigation section of the Outline / Proposal, including a description of the cross-border mitigation effect and a justification why to account for it. Thus, the share of the mitigation results taking place outside of the partner / applicant country should be clearly described.
- In case robust data and information are not available to present a transparent quantification of the cross-border mitigation results, only a qualitative description of potential cross-border effects should be added to the Outline / Proposal.

Cross-border effect takes place in non-Mitigation Action Facility target country (non-ODA eligible and/or developed country):

- In case the mitigation results are expected to take place in a non-ODA and/or developed (e.g. industrialized) country the project shall not include and claim such cross-border emission reduction in their mitigation estimation in the Mitigation Annex, but can provide a narrative and explanation in the Outline / Proposal.

[4] According to reference given in the General Information Document of the Mitigation Action Facility (Official development assistance (ODA) - OECD).

- In cases where the cross-border mitigation is partly taking place in a non-ODA and/or developed country, and partly in an ODA-eligible and developing country, the total cross-border mitigation potential cannot be accounted for if a determination of the non-ODA and developed country cross-border mitigation potential separated by country is not possible. If separated determination is possible, the accountable share of cross-border mitigation for ODA-eligible and developing country can be accounted for.

3.2.4 Methodological approach: How to select an appropriate methodology

Methodologies are methodological tools which address specific aspects of projects and interventions, e.g., to calculate greenhouse gas (GHG) emissions from specific sources. These systematic approaches can be used to determine the amount of emission reductions achieved. They help to define the baseline and will facilitate the monitoring of such mitigation. At Project Outline Phase it is acceptable if no complete methodology is followed. However, users should be aware that the application of approved methodology(/ies) is ideal and generally desired, as it can support in the process of defining and calculating the mitigation potential most accurately.

To find a suitable methodology, users should categorise 1) the underlying mitigation activity type and 2) the applied technology type and measure.

By identifying the mitigation activity type, methodologies are selected according to the relevant sectoral scopes and type of mitigation activities, such as renewable energy, low carbon electricity generation, energy efficiency measures, fuel and feedstock switch, GHG destruction, GHG emissions avoidance, displacement of a more-GHG-intensive output and GHG removal by sinks.

Alternatively, to find a suitable methodology, users can focus on the technology applied under the project. The categorization by technology type usually helps to identify a set of comparable methodologies applicable to the technology that is going to be implemented.

For many sectors and mitigation types (e.g., technologies implemented), during the past years, multiple methodologies for estimating emission reductions have been developed, for instance, under the Clean Development Mechanism (CDM), the Global Environment Facility (GEF), the Gold Standard Foundation (GS) or the Greenhouse Gas Protocol (GHGP), VERRA / Verified Carbon Standard (VCS). These methodologies provide robust practices for estimating ex-ante mitigation potentials. For this reason, these well-established methodologies can be applied as a basis, whenever possible and applicable, for the project mitigation estimation. In addition, the Intergovernmental Panel on Climate Change (IPCC), in particular the Guidelines for National Greenhouse Gas Inventories (2006) or any update or refinement thereof can provide approaches and default values for the calculation of GHG emission reductions.

If no suitable methodology can be identified, the users can propose their own methodological approach or deviation from existing methodologies. It is recommended to provide justification accordingly.

Mandatory requirements: The users should transparently present and follow the applied methodology for estimating the mitigation potential of the project as applicable. For selecting an appropriate methodology, identify the scope and the project boundary of the methodology and assess the suitability and applicability to the project intervention and underlying technologies. As an initial starting point to check the availability of a methodology for a certain technology, the CDM Methodologies Booklet is recommended.

It is important to note that the selection of the methodological approach has direct impacts on and affects the monitoring process of the project, which is to be developed for tracking the actual mitigation impacts during project implementation (for further guidance see Mitigation Action Facility Monitoring and Evaluation Framework). Therefore, it is recommendable to consider the monitoring process and the M&E framework when selecting the methodological approach for calculating the GHG emission reductions.

3.2.5 Key requirements on providing data, parameters, and assumptions

For the emission reductions calculation, project-specific data should be used, if available, and conservativeness principles (see Recommendation below) are to be applied (i.e., input values and assumptions being based on conservative estimations) to avoid overestimation. The users should use conservative assumptions, values, and procedures when uncertainty is high. Conservative values and assumptions are those that are more likely to underestimate than overestimate GHG reductions. Additional external data sources (e.g., publicly available data from government sources) can be used depending on the specific methodologies employed for the project interventions. Please also consult recommended "Hierarchy of data sources" as presented in the Monitoring and Evaluation Framework for core indicator M1. However, in the Outline Phase, in some cases project-specific data may not yet be available. In this case, please use appropriate data and assumptions for substantiating your calculation. Please justify the choice of data and assumptions taken to the extent possible.

Recommendation: An important aspect of data use, e.g., for establishing the BAU scenario, is using *conservative* estimates. That means that the emission reductions estimate should be on the lower rather than the higher end. The choice of approach, assumptions, methodology, parameters, data sources and key factors for calculating the emission reductions should result in a *conservative* estimate taking account of uncertainties. Each possible uncertainty embedded in the estimation needs to be evaluated. The use of the default emissions factors (see for example section 3.2.4 of this Guideline) enables a conservative estimate.

Please explain and provide all specification of the underlying assumptions and reference data sources (e.g., emissions factors, methodology/calculation approach applied, units, and lifetime of technology) applied.

- Present the assumptions clearly and plausible in a conservative manner;
- Use key parameters and assumptions that are reasonable and robustly sourced;
- Provide assumptions with justification and references;
- Indicate the accuracy of data and parameters (not mandatory in Outline Phase);
- If available, make use of project-specific data.

If possible, please make an indication about related uncertainties and risks related to the assumptions and data used.

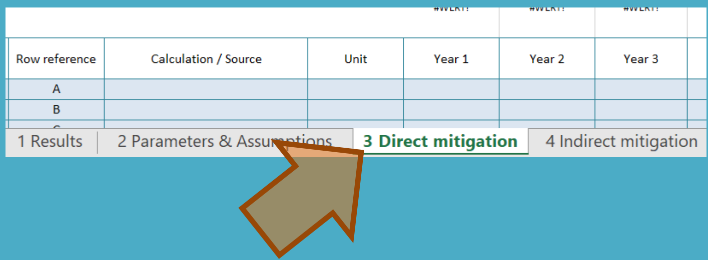
Mandatory requirements: All assumptions and calculations shall be **transparent, verifiable** and **clearly presented** in the Mitigation Annex. Applying **conservative and transparent assumptions, methodologies and transparency on data sources** is strongly recommended and honoured in the project selection cycle (this includes presenting accuracy, weaknesses, uncertainties and lack of data sources).

The following section illustrates how the general principles, definitions and requirements are applied in filling out the Mitigation Annex.

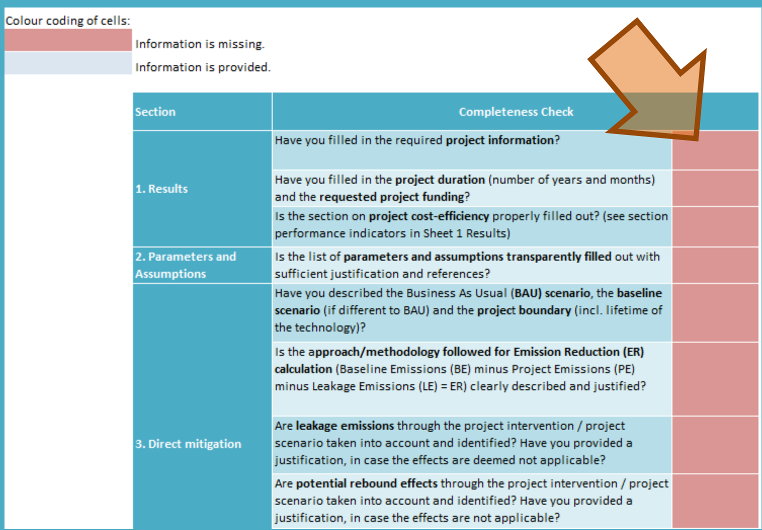
4 How to fill out the Mitigation Annex: GHG mitigation potential

This section will describe in more detail appropriate use and filling out of the Mitigation Annex. It is highly recommended to read chapter 0 of this Guideline first to get familiar with the general principles and definitions. In addition, consultation of the Glossary of this Guideline will help to ensure a good quality of the Mitigation Annex. Please consider the following general instructions.

1 Some of the worksheets have numbers on the respective tab. Only the sheets with numbers 1-5 contain cells that have to be filled in. The other sheets provide guidance and explanations on how to fill in the Mitigation Annex.



2

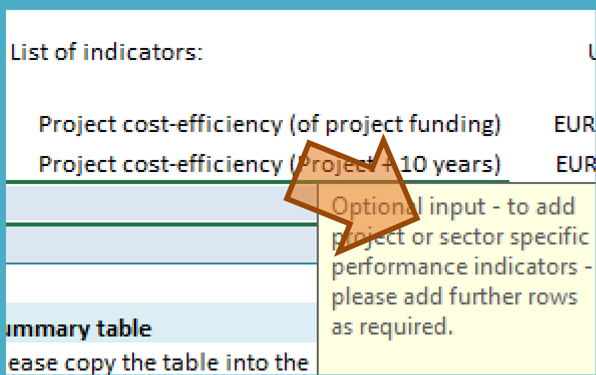


Sheet 0 includes a Checklist which runs an automatic completeness check that all mandatory cells ('must have' information) are filled out in each sheet. The Checklist is linked to the individual sheets.

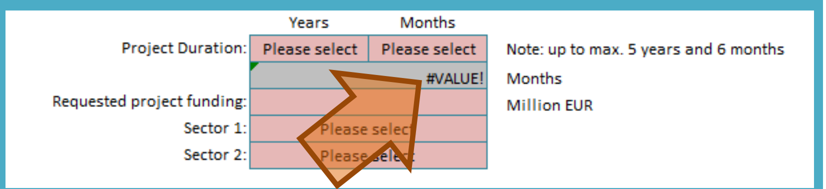
For some aspects, the check list differs between Outline Phase (Annex 6) and Proposal Phase (Annex 7).

'Must have' information is listed at the top of each section on the relevant sheets.

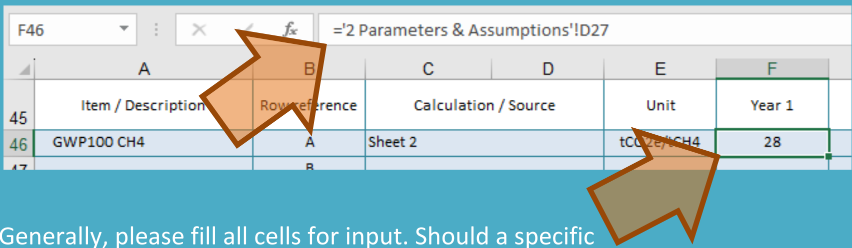
3 Most cells offer additional guidance: If you click into a cell, an input message will show up, if available.



4 If you start with the blank template, some of the pre-filled formulas may show errors. As soon as you have filled the related required information (e.g., project duration), the formulas will show corresponding values.



5



Always use formulas with cell references for enabling traceability (e.g., =D27+A20).

6 Generally, please fill all cells for input. Should a specific section (e.g., rebound effect) not be applicable to the specific project, please state so accordingly and provide a justification why it is not applicable.

Cells that require mandatory information and must be filled in (minimum required cells to be filled) are red. The background colour of the cells changes to standard blue once the cells are being filled.

Cells with pre-filled formulas should not be changed except the specific circumstances of the project requires to do so. Such changes should be identified and explained in the Mitigation Annex accordingly.

Colour coding of cells:

Cells for input

Cells for input

Calculated based on input

7

Provide appropriate reference to external documents and data used. This includes at least: Author(s), Title of document, Year of publication, Web-Link (if available).

4.1 General structure of the Mitigation Annex

The general structure of the Mitigation Annex is presented below. Some of the sheets can be copied multiple times. This can be useful for example, if the project covers different technologies or sectors (e.g., a project implementing measures in energy supply and energy efficiency).

Introduction	Explains how to use and fill the Mitigation Annex. It contains a short explanation of all relevant and recurring terminology.
0 Checklist	Includes a Checklist which automatically verifies if the mandatory cells ('must have' information) are filled. It is linked to the individual sheets which in turn contain specific checklists at the top of the sheets.
1 Results	Presents the results based on the inputs on the various sheets of the Mitigation Annex and basic information about the project (country, duration, etc.)
2 Parameter and Assumptions	Collects all parameters and assumptions used to derive the mitigation potential. Sheet can be copied multiple times if needed in order to present for example different types of mitigation measures.
3 Direct mitigation	Calculates the **direct** mitigation potential of the NSP. Sheet can be copied multiple times if needed in order to present for example different types of mitigation measures.
4 Indirect mitigation	Calculates the **indirect** mitigation potential of the NSP. Sheet can be copied multiple times if needed in order to present for example different types of mitigation measures.
5 Cross-border mitigation	To be filled only if cross-border mitigation is eligible to be considered. Information to be provided on the cross-border mitigation component.
Standards & Methodologies	Provides various potential sources for GHG accounting methodologies.

Figure 6: General structure of the Mitigation Annex

It is also possible to add further sheets in the Mitigation Annex, as required, to provide additional, more complex calculations (e.g., auxiliary calculations) or additional data and information. Additional sheets should be named appropriately and be well-structured to allow the Mitigation Action Facility to easily access and understand the additional information. Data and information from such additional sheets that is used on Sheets 1 to 4 of the Mitigation Annex should be integrated by formulas using cell references as explained in the text box above. Sheet 5 ´Cross-border mitigation` would only need to be filled in if cross-border mitigation is considered relevant for the project.

4.2 Sheet: Introduction

Sheet: Introduction explains the structure of the Mitigation Annex and provides guidance on how to fill it out. A cell colour code to indicate cells for user inputs is introduced, as shown in the text box above. Please read it once before you start filling out the Mitigation Annex. References to key sources and relevant sections of the Guideline are provided in the introduction sheet.

4.3 Sheet 0: Checklist

Sheet 0 integrates a Checklist which functions as completeness check to verify that all mandatory cells are filled. It links to each sheet (sheets 1-5) and the required information respective elements. The individual sheets contain sheet specific checklists that can be found at the top of each sheet.

The Checklist follows a simple and straightforward colour coding:

- Red = information is missing
- Blue = information is provided

	Information is missing.
	Information is provided.

In some cases, several cells need to be filled so that the checklist for a particular piece of data turns green (e.g., on *Sheet 3: Direct mitigation*: description of BAU scenario, baseline scenario and project boundary).

The Checklist(s) does not validate the quality nor the accuracy of the data and information provided and therefore does not provide a guarantee that the data entered is sufficient.

Differences between mandatory requirements for Outline Phase (Annex 6) and Proposal Phase (Annex 7) are reflected and clearly indicated in the Checklist.

For indirect mitigation, it must be indicated on *Sheet 4: Indirect mitigation* whether the approach for determining emission reduction is the same as for direct mitigation (see *Sheet 3: Direct mitigation*). This information cannot be selected on *Sheet 0: Checklist*.

4. Indirect mitigation	Are the **specifications of indirect mitigation effects** that are triggered or influenced by the project described (quantify if possible)?		
	Is the **approach** for determining indirect emission reductions different from the methodology applied for direct emissions methodology?	Yes	
	Are **sources of indirect Emission Reductions (ER)** and **difference to the baseline** clearly described?		*If No is selected above, then this checklist item is not valid.*
	Have you determined the **baseline emissions** accordingly?		
	Have you determined the **project emissions** accordingly?		
	Have you determined the **leakage emissions** accordingly?		

4.4 Sheet 1: Results

Sheet 1: Results will present the final mitigation potential once all relevant sections of the Mitigation Annex are filled out. To start with the Mitigation Annex, please fill in the cells on project information and the section on project duration. You may then continue first with Sheets 2 to 4. Once all sections are elaborated, please revisit *Sheet 1: Results* and fill the following sections considering the following guidance:

Table 2: Specific guidance for Sheet 1: Results

Section / cells	**Description / guidance**
Complete-ness check	Have you determined the **baseline emissions** accordingly? Have you determined the **project emissions** accordingly? Have you determined the **leakage emissions** accordingly?
Project information	Fill in project-specific information such as country, project title, applicant, date, and version. For Proposal Phase, the Project ID needs to be provided (not required for Outline Phase).
Direct GHG mitigation potential	Formulas are pre-filled to calculate the mitigation potential during project duration, 10 years after project end and for technology lifetime. In most cases these formulas are sufficient to display the mitigation potential of the project. However, in case the specific circumstances of a project would require adjusting, this is possible. If required, please use formulas with cell references and do not just copy values into the cells. *Example:*

	Unit	Project implementation	10 years after project end	Technology lifetime
Annual average mitigation potential	tCO_2e/a	35.217	109.131	109.694
Total mitigation potential over period	tCO_2e	158.474	1.091.311	2.193.871

Indirect GHG mitigation potential

See above (i.e., same steps as for direct GHG mitigation potential)

Performance indicators

The cost efficiency indicators (project, 10 years after project end and project + 10 years) are mandatory for filling the Mitigation Annex. Projects are encouraged to propose further key performance indicators as applicable to their interventions (e.g., in the transport sector emissions per passenger kilometre for a certain mode of transport (gCO_2/km)). As before, formulas should not be changed except if the specific project requires to do so. Any changes or adjustments made should be reported and justified (e.g., in a comment).

Example:

List of indicators:	Unit	Project implementation	10 years after project end	Technology lifetime
Project cost-efficiency (of project funding)	EUR/tCO_2e	154	77	65
Project cost-efficiency (Project + 10 years)	EUR/tCO_2e	51		

Summary table for Project Outline/ Proposal

The summary table presented should be copied into the Project Outline or Project Proposal document. As before, formulas should not be changed except the specific project requires to do so. Any changes or adjustments made should be reported and justified (e.g., in a comment).

Example (extract):

	Direct mitigation potential		Indirect mitigation potential	
	Project Implementation period	10 years after project end	Project Implementation	10 years after project end
	tCO_2e/a	tCO_2e/a	tCO_2e/a	tCO_2e/a
Year 1	0		0	
Year 2	0		0	
Year 3	34.291		0	
Year 4	68.239		0	
Year 5	55.944		0	
Year 6	55.944	55.944	0	9.324

4.5 Sheet 2: Parameters & Assumptions

Sheet 2: Parameters & Assumptions is used to collect all parameters and assumptions used for the determination of the mitigation potential. As such, calculations on Sheets 3 and 4 should use formulas with cell references to this sheet. This will also help the users if changes in the input parameters are required later, as they can then be easily found on this sheet. The assumed lifetime for the technologies implemented under the project is mandatory to be defined on this sheet. When filling out Sheet 2, please take into consideration the following guidance.

Mandatory requirements: All assumptions and calculations shall be **transparent, verifiable,** and **clearly presented** in the Mitigation Annex. Applying **conservative and transparent assumptions, methodologies and transparency on data sources** is strongly recommended and honoured in the project selection cycle (this includes presenting accuracy, weaknesses, uncertainties, and lack of data sources).

Table 3: Specific guidance for Sheet 2: Parameters & Assumptions

Section / cells	**Description / guidance**
Complete-ness check	Is the list of parameters and assumptions transparently filled out with sufficient justification and references?
Name (of the parameter)	Please name each parameter with a unique name and use this name throughout the Mitigation Annex (i.e., also in further descriptions as filled in the different sections of the Mitigation Annex as applicable). As soon as the first cell is being filled, the entire row turns red. Once the required data is provided, the cells turn blue again. *Example:* Specific thermal energy demand (baseline)
Unit	Please specify the unit of each parameter used. SI units should be used as a preference. *Example:* **Unit** kWh/m^2
Value	The value of each parameter should be defined on this sheet. From here, the value can be further used in the Mitigation Annex by formulas using cell reference. *Example:* **Value** 280
Description	Please explain the parameter in more detail. Abbreviations should only be used after first introducing the full name, e.g., 'Mean Annual Increment (MAI)' *Example:* **Description / Comment** Baseline thermal energy demand per square meter
Source	Please specify the source of the parameter and its value. Consider further instruction regarding identification of sources used as presented in the text box above. Peer-reviewed publicly available data should be used if available. Government data may also be used. Generally, most recent available data should be taken into consideration (e.g., from past 3 years). There is no clear cut-off date in terms of outdated data as this is also dependent on the dynamics related to a specific parameter. As such, for data from more than 3 years ago, users should justify why the data is still valid. *Example:* Energy Efficiency Study, 2019, See Appendix 1, p. 5

Section / cells	Description / guidance
Accuracy	While the Mitigation Action Facility will not require a fully elaborated error propagation, it is still important to have a rough understanding of the accuracy of the parameters used. Therefore, please estimate the approximate accuracy. This is not mandatory for Outline Phase. *Example:* medium: +/-15% This would indicate for example that an expected energy generation value of 1.000 kWh would result in the range 850 to 1.150 kWh.
Justification/ uncertainties	Please add a justification or explanation on the data used for the emission reductions calculation, e.g., why certain data is selected and/or considered appropriate. Example: **Justification/ uncertainties** Project-specific data obtained through energy audit and metering of thermal energy consumption

The sheet may be copied multiple times to structure the Annex 6 into different components (i.e., different mitigation measures). If this is done, please identify the related component in Row 22 of the sheet.

Example:

Component (if applicable):	Thermal and electric energy

In a similar way, *Sheet 3: Direct mitigation* and *Sheet 4: Indirect mitigation* would be copied accordingly.

4.6 Sheet 3: Direct mitigation

Sheet 3: Direct mitigation is the main sheet on which the mitigation potential is presented. It includes sections for explanation and calculation.

Mandatory requirements:

Describe the **BAU and baseline scenario**, **project boundary** and the **methodology/ approach** used to calculate the emission reductions.

Calculate the **annual emission reductions**, the **cumulative values over project duration** and for **additional 10 years after project finalisation** as well as the emission reductions **over the technology lifetime**.

Report on and estimate any **leakage and rebound effects** (include corrective action to prevent both). Also, document and justify if no leakage and/or rebound effects are expected. Insert assumptions and justification for **risks and accuracy**. Regarding the latter, a sensitivity analysis is recommended for high uncertainties and low accuracy.

Table 4: Specific guidance for Sheet 3: Direct mitigation

Section / cells	Description / guidance
Complete-ness check	**3. Direct mitigation** Have you described the Business As Usual **(BAU) scenario**, the **baseline scenario** (if different to BAU) and the **project boundary** (incl. lifetime of the technology)? Is the **approach/methodology followed for Emission Reduction (ER) calculation** (Baseline Emissions (BE) minus Project Emissions (PE) minus Leakage Emissions (LE) = ER) clearly described and justified? Are **leakage emissions** through the project intervention / project scenario taken into account and identified? Have you provided a justification, in case the effects are deemed not applicable? Are **potential rebound effects** through the project intervention / project scenario taken into account and identified? Have you provided a justification, in case the effects are not applicable? Are the **annual Emission Reductions** (ER) and **cumulative values** over project duration, for additional 10 years after project finalisation provided? Is '**over the technology lifetime**' calculated?
Description of the mitigation potential	Please describe the general mitigation potential and the approach for its determination, e.g., incl. related mitigation technology/intervention in its technical parameters, e.g., size, volume, lifetime, and its operational output (e.g., number of kWh produced per year, development of efficiency and replacements throughout the lifetime). Please give reference to any methodology (e.g., Clean Development Mechanism) applied (see also information related to Sheet 5 below) and present the key steps and calculations of the methodology (See also section 3.2.4 of this Guideline).
Description of the project boundary	Please fill in the description of the project boundary (see chapter 0 and the Glossary of this Guideline for further explanation).
Baseline emissions	In this section, the BAU scenario must be described. If the applied baseline scenario (i.e., the scenario used in the calculation of baseline emissions (see chapter 0 and the Glossary of this Guideline for further explanation) is different from the BAU scenario, this should be identified and explained in the corresponding section.
Calculation table for baseline emissions	To incorporate the parameters as filled in Sheet 2, please use formulas with cell references. The table provides sections for calculation of emissions during project implementation, 10 years after project end and thereafter including in Columns W and X a section covering technology lifetime. It is important to identify in each row of the calculation table the description of what is calculated in the row, the calculation approach or source used, and the unit of the values presented. With the row reference, users can refer to other rows while explaining the calculation (e.g., Row A x B). Users must use formulas with cell references as applicable to allow the Mitigation Action Facility to understand the calculations. *Example (see example Annex 6 for Energy Efficiency projects[5]):*

[5] Please see chapter 6 of this Guideline to access the example.

<table>
<tr><th>Section / cells</th><th>Description / guidance</th></tr>
<tr><td></td><td>
<table>
<tr><th></th><th></th><th></th><th></th><th>Project implementation</th><th>Project implementation</th><th>Project implementation</th><th>Project implementation</th><th>Project implementation</th><th>Over technology lifetime</th><th></th></tr>
<tr><th>Item / Description</th><th>Row reference</th><th>Calculation / Source</th><th>Unit</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Annual</th><th>Total</th></tr>
<tr><td>Accumulated number of buildings (4 storeys) to be retrofitted</td><td>A</td><td>Project implementation plan</td><td>No.</td><td></td><td></td><td>75</td><td>150</td><td>300</td><td></td><td></td></tr>
<tr><td>Thermal energy consumption before EE measures</td><td>B</td><td>See 2 Parameters & Assumptions</td><td>MWh_t/a</td><td></td><td></td><td>470</td><td>Please link input parameters to sheet "2_Parameters & Assumptions" if possible/applicable as done here</td><td>[illegible]</td><td></td><td></td></tr>
<tr><td>Electricity consumption before EE measures</td><td>C</td><td>See 2 Parameters & Assumptions</td><td>MWh_e/a</td><td></td><td></td><td>36</td><td>[illegible]</td><td>[illegible]</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Accumulated number of buildings (10 storeys) to be retrofitted</td><td>D</td><td>Project implementation plan</td><td>No.</td><td></td><td></td><td>50</td><td>[illegible]</td><td>[illegible]</td><td></td><td></td></tr>
<tr><td>Thermal energy consumption before EE measures</td><td>E</td><td>See 2 Parameters & Assumptions</td><td>MWh_t/a</td><td></td><td></td><td>1680</td><td>1680</td><td>1680</td><td></td><td></td></tr>
<tr><td>Electricity consumption before EE measures</td><td>F</td><td>See 2 Parameters & Assumptions</td><td>MWh_e/a</td><td></td><td></td><td>128</td><td>128</td><td>128</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Central heating emission factor (current system)</td><td>G</td><td>See 2 Parameters & Assumptions</td><td>tCO_2/MWh_t</td><td>0,40</td><td>0,40</td><td>0,40</td><td>0,39</td><td>0,39</td><td></td><td></td></tr>
<tr><td>GEF_{grid}</td><td>H</td><td>See 2 Parameters & Assumptions</td><td>$tCO_2/Mwhe$</td><td>0,65</td><td>0,65</td><td>0,64</td><td>0,64</td><td>0,64</td><td></td><td></td></tr>
<tr><td>Baseline emissions (BE)</td><td>A*(B*G+C*H)+D*(E*G+F*H)</td><td></td><td>tCO_2e</td><td></td><td></td><td>53,17</td><td>105,808</td><td>173,493</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Project emissions (PE)</td><td>Project emissions (see chapter 0 and the Glossary of this Guideline for further explanation) must be explained (which sources of project emissions exist) and calculated. The same guidance as provided for the calculation table of baseline emissions applies.</td></tr>
<tr><td>Leakage emissions (LE)</td><td>Leakage emissions (see section 0 and the Glossary of this Guideline for further explanation) must be explained (which sources of project emissions exist) and calculated. The same guidance as provided for the calculation table of baseline emissions applies. Users can select pre-defined answers from a dropdown menu and provide a more detailed explanation in the box below. If no leakage emissions are considered, a justification would be required for not considering leakage emissions.</td></tr>
<tr><td>Emission reductions (ER)</td><td>The emission reductions are calculated as per a standard approach applied in most standards or methodologies (see chapter 0 and the Glossary of this Guideline for further explanation). As such, the pre-defined formulas would be sufficient for most projects. Should the specific circumstances of a project require editing of the formulas, this can be done and would need to be justified. As mentioned before, formulas with cell reference are to be used (not only providing or copying in values).</td></tr>
<tr><td>Overall accuracy</td><td>As explained above in section 4.5 above, the Mitigation Action Facility will not require a fully elaborated error propagation. Still, it is important to have a rough understanding of the accuracy of the mitigation potential determined on Sheet 3. Therefore, please give an approximate estimation (see cell with dropdown list) and add an explanation accordingly.</td></tr>
<tr><td>Risks</td><td>Any project is expected to be affected by risks so that the estimated mitigation potential will not materialise as expected. Please evaluate the pre-defined risks with corresponding cells with dropdown lists and specify any project-specific risks, again with level from dropdown list. Please add further explanation on such risks in the related cells. It might be helpful to cross-check the identified risks with the indications and assumptions made in the project Log-frame (Annex 2).</td></tr>
<tr><td>Rebound effect</td><td>Rebound effects (see chapter 0 and the Glossary of this Guideline for further explanation) must be described and estimated in their level (see cell with dropdown list). Projects that do not expect rebound effects still have to state this and justify the same.</td></tr>
</table>

4.7 Sheet 4: Indirect mitigation

Sheet 4: Indirect mitigation is structured in the same way as *Sheet 3: Direct mitigation*. As the approach for determination of the indirect mitigation might differ from the direct mitigation, the sheet offers generally the same sections as Sheet 3 to describe the approach. Likewise, the guidance presented in section 4.6 above applies. Should the approach for direct and indirect mitigation be the same, the description for the indirect mitigation does not need to be repeated. Users can select from a dropdown list, if the approach is different from the methodology applied for direct emissions or if it is the same. Correspondingly, it needs to be stated in related cells "Same as described under direct mitigation potential" or, if it differs, the specific approach needs to be described. The selection has implications on the completeness check and Checklist. If the user applies a different approach and selects the corresponding answer in the dropdown list, sections on

- approach,
- BAU scenario,
- baseline scenario and
- project and leakage emissions

need to be filled (only if approach differs; otherwise leave blank)

However, independently from the question if the same approach is used as for direct mitigation, calculations still must be defined and selected in related calculation tables. For the indirect potential, determination of accuracy, risks and rebound effects is not mandatory.

4.8 Sheet 5: Cross-border mitigation

Sheet 5: Cross-border shall be filled by applicants/ projects that expect cross-border mitigation impacts from the implementation of the planned activities and technologies (for details see also section 3.2.3). While it is generally possible to account for such emission reductions across borders, it must be verified that the country in which the cross-border effect takes place is a country eligible for funding from the Mitigation Action Facility. If in doubt, applicants can contact the Mitigation Action Facility to clarify eligibility. In the Outline Phase, the information to be provided by the applicant on cross-border impacts can be qualitative and descriptive, while in the Proposal Phase, the mitigation impacts generated in another country (cross-border impacts) need to be quantified. Further guidance on how exactly to distinguish between cross-border effects in Mitigation Action Facility-funded countries and non-Mitigation Action Facility-funded countries and how these can be accounted for can be found in section 3.2.3. First of all, the applicant should answer the question whether "cross-border mitigation" is expected as a result of the project. If this question is answered with "yes", the following information should be provided:

Table 5: Specific guidance for sheet 6: Cross-border

Section / cells	Description / guidance
Complete-ness check	Is "cross-border mitigation" expected as a result of the project? — Yes Is information provided in sections 1 and 2? Is information provided in sections 3 and 4?
Description of expected cross-border mitigation and what causes is.	Please describe the expected or potential cross-border mitigation effect. This should include information on the scope and relation of cross-border mitigation (i.e. processes, technologies) and how this relates to the Mitigation Action Facility funded project.
Geographical location where cross-border	Please specify the country/location where cross-border mitigation is expected to take place (country, region). Note that cross-border mitigation is only

<table>
<tr><th>Section / cells</th><th>Description / guidance</th></tr>
<tr><td>mitigation is expected</td><td>accountable if occurring in countries that are eligible for funding from the Mitigation Action Facility.[6]</td></tr>
<tr><td>Approach to estimate the mitigation</td><td>If already known, briefly describe the general approach to estimate and calculate the cross-border mitigation to the extent possible (e.g. by stating the general approach for calculating the cross-border mitigation effect, the baseline and monitoring methodology used, assumptions made etc.).</td></tr>
<tr><td>Volume of cross-border mitigation</td><td>At Outline Phase, initial estimate of expected volume of cross-border mitigation to be provided only if available and to the extent possible. At Proposal Phase, more detailed calculations of expected volume of cross-border mitigation (in tCO_2e) expected per year and in total.
<table>
<tr><th></th><th>Unit</th><th>Project implementation</th><th>10 years after project end</th><th>Technology lifetime</th></tr>
<tr><td>Annual average mitigation potential</td><td>tCO_2e/a</td><td></td><td></td><td></td></tr>
<tr><td>Total mitigation potential over period</td><td>tCO_2e</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>

4.9 Sheet: Standards & Methodologies

Sheet: Standards & Methodologies references useful guidance and methodologies that can be used for the calculation of GHG emission reductions (see also chapter 0 and specifically section 3.2.4 of this Guideline for further information on the selection of methodologies). No information needs to be filled by the users in this sheet. The list is only providing recommendations and orientation regarding available methodologies and standards[7]. There is no claim to completeness. Other appropriate methodologies and standards can be used as well. Generally, the Mitigation Action Facility is not asking to apply a specific methodology or standard or would prefer one standard over another. However, applied methodologies should ensure the key principles of determination of mitigation as presented in Table 6 below are recognised. The same principles are required to be followed if no existing methodology can be applied and the users suggest their own approach, or an approach based on an adjusted existing methodology. It should be noted that it is recommended to apply existing methodologies as far as available and applicable.

Table 6: Key principles for the determination of the mitigation potential

Principle	Description
Accuracy	The data and parameters used to determine the mitigation potential should be most precise as possible and with the least uncertainty.
Completeness	The determination of the mitigation potential should include all relevant GHG sources and sinks.
Conservativeness	All the estimates should be made following a conservative approach, especially in situations when estimations made have high levels of uncertainty.
Consistency	At least within the project but also beyond, the use of data and information should be consistent among different measures, especially in the context of NDC-related reporting.

[6] According to reference given in the General Information Document of the Mitigation Action Facility (Official development assistance (ODA) - OECD).

[7] We refer in this guideline to 'methodology' as the document defining the approach for the calculation of the mitigation potential, while 'standard' would refer to the scheme or programme such as CDM, Gold Standard, Verified Carbon Standard, IPCC, etc. However, the terms 'methodology' and 'standard' might be used differently under different schemes or programmes.

Principle	Description
Comparability	Similar to the consistency principle, the information and data used should allow comparison across different measures and across different periods of time, especially in the context of NDC-related reporting.
Transparency	Transparency of the data and methodologies used for the calculations of GHG emission reductions should not only allow the Mitigation Action Facility to understand the approach applied, but also the public.

5 Relation to other documents

5.1 Alignment with Project Outline or Proposal, and Annexes

Together with the Project Outline, users need to provide additional Annexes besides the Mitigation Annex. The Outline or Proposal and the Annexes should be aligned and consistent with regards to the intended scope, results, and assumption/parameters of the project. In particular, the Annexes on the project's Log-frame and Business model and financial model/mechanism need to be aligned with the Mitigation Annex. For instance, the same assumptions, e.g., on implementation schedule and number of units should be featured across all documents. This applies for the following elements, among others:

- *Technical features (e.g., capacities, size) incl. referring to availability of the technology/practice on the national market*
- *BAU technology / practice description*
- *Mitigation technology / practice description*
  - *The lifetime of a technology / practice can be prolonged (e.g., through a replacement of specific parts)*
  - *Key technical features per unit of a technology / practice*
- *The number of investment projects that are expected to be installed directly under the project financial support mechanism(s)*
  - *Investment projects within the project lifetime*
  - *Investment projects beyond the project lifetime*

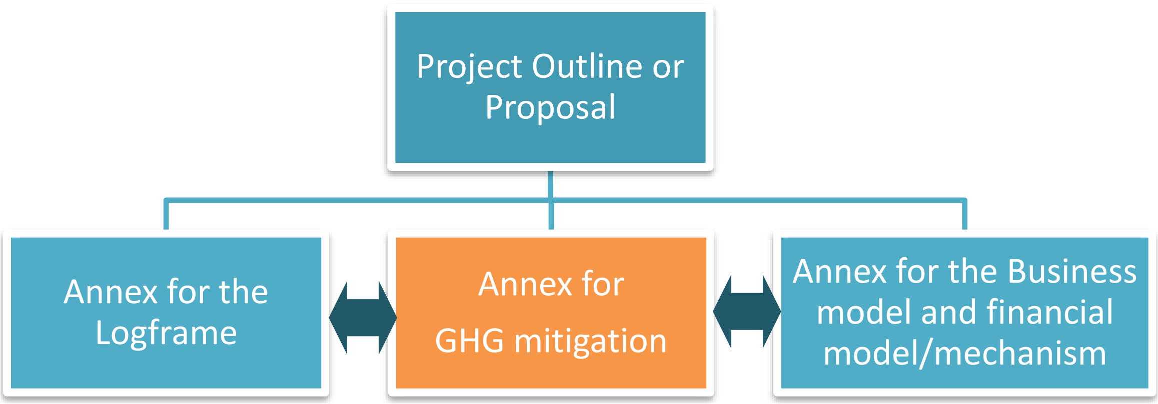


Figure 7: Relation of the Mitigation Annex, the Project Outline, and other Annexes

In the Project Outline or Proposal, the results from the Mitigation Annex should be presented in a summary table (copy the completed table in *Sheet 1: Results* to the Outline).

Potential pitfall: Assumptions, units and parameters should be constantly used across all application documents, in particular between the Annex for the Business Model and financial model/mechanism and the Mitigation Annex. Ensure cross referencing between the annexes is accurate and traceable. Typical inconsistencies may happen easily, e.g., the Outline speaks about a lifetime of solar PV plants of 20 years, but the emission reductions are calculated for 25 years without further explanation. At the same time, equipment (units, appliances, etc.) cannot be considered to generate emission reductions after the end of its lifetime and would therefore need to be removed from the calculation after the end of its lifetime or replaced by new equipment. Hence, double check that key parameters are applied in a consistent manner, such as the technology lifetime across all Annexes and the main Outline or Proposal document.

5.2 Mitigation Action Facility Monitoring and Evaluation Framework

The projects aim to contribute to the overall objectives of the Mitigation Action Facility; hence, a harmonised monitoring and evaluation (M&E) system is desirable. An important aspect of project implementation is the need to demonstrate progress on the mandatory core indicators e.g., on GHG emission reductions - core indicator M1 - in a systematic and verifiable manner. To do this, project's data collection and monitoring and reporting systems need to be harmonised with each other and must be sound and systematic. Hence, it is recommended that the Project Outline and Proposal already consider the requirements as defined in the Mitigation Action Facility Monitoring and Evaluation Framework.

The users should already in the Outline Phase bear in mind that the measurability of the data will be important and essential during the project implementation. The Mitigation Annex will be used as basis for annual reporting in the context of the M&E Framework. Therefore, the selection of the underlying approach and parameters to calculate emission reductions should always consider the applicability and relevance for the project's M&E Plan. Please refer to the Mitigation Action Facility Monitoring and Evaluation Framework for further information and requirements for reporting of GHG emission reductions under core indicator M1.

6 Sector specific considerations

The Mitigation Annex was developed to be used for various mitigation measures applied by projects. As mitigation measures can be very different, with different approaches and methodologies applied to determine the mitigation potential, the template may not satisfy all specific needs of an individual project. This may be also observed on a more generic level for some selected specific sectors. The Mitigation Action Facility would therefore like to provide sector specific guidance on how the Mitigation Annex can be filled out taking sector specific circumstances into account. This sector specific guidance is presented as an Appendix to this Guideline. To date, the following sector specific guidance is available:

Appendix	Sector
Appendix A1	Industry sector
Appendix A2	Transport sector

The Mitigation Action Facility will continue to work on development of further sector specific guidance and Mitigation Annex examples. Please check the Mitigation Action Facility website on a regular basis.

7 Checklist

Section	Completeness Check		
1. Results	Have you filled in the required **project information**?		
	Have you filled in the **project duration** (number of years and months) and the **requested project funding**?		
	Is the section on **project cost-efficiency** properly filled out? (see section performance indicators in Sheet 1 Results)		
2. Parameters and Assumptions	Is the list of **parameters and assumptions transparently filled** out with sufficient justification and references?		
3. Direct mitigation	Have you described the Business As Usual (**BAU) scenario**, the **baseline scenario** (if different to BAU) and the **project boundary** (incl. lifetime of the technology)?		
	Is the **approach/methodology followed for Emission Reduction (ER) calculation** (Baseline Emissions (BE) minus Project Emissions (PE) minus Leakage Emissions (LE) = ER) clearly described and justified?		
	Are **leakage emissions** through the project intervention / project scenario taken into account and identified? Have you provided a justification, in case the effects are deemed not applicable?		
	Are **potential rebound effects** through the project intervention / project scenario taken into account and identified? Have you provided a justification, in case the effects are not applicable?	Not required in Outline stage	
	Are the **annual Emission Reductions** (ER) and **cumulative values** over project duration, for additional 10 years after project finalisation provided?		
	Is '**over the technology lifetime**' calculated?		
4. Indirect mitigation	Are the **specifications of indirect mitigation effects** that are triggered or influenced by the project described (quantify if possible)?		
	Is the **approach** for determining indirect emission reductions different from the methodology applied for direct emissions	No	
	Are **sources of indirect Emission Reductions (ER) and difference to the baseline** clearly described?		*If No selected above, this checklist item is not valid.*
	Have you determined the **baseline emissions** accordingly?		
	Have you determined the **project emissions** accordingly?		
	Have you determined the **leakage emissions** accordingly?		
5. Cross-border Mitigation	Is "cross-border mitigation" expected as a result of the project?	No	
	Is information provided in sections 1 and 2?		*If No selected above, these checklist items are not required.*
	Is information provided in sections 3 and 4?		

8 List of reference documents

The Greenhouse Gas Protocol (2005), The GHG Protocol for Project Accounting, World Resources Institute / World Business Council For Sustainable Development. Retrieved from here.

The Greenhouse Gas Protocol (2015): A Corporate Accounting and Reporting Standard, World Resources Institute / World Business Council For Sustainable Development. Retrieved from here.

Intergovernmental Panel on Climate Change (IPCC) (2006), 2006 IPCC Guidelines for National Greenhouse Gas Inventories (referred to as the 2006 IPCC Guidelines).

Mitigation Action Facility (2020), Monitoring and Evaluation Framework.

Umweltbundesamt (German Environment Agency) (2019): Rebound effects. Retrieved from here.

UNFCCC CDM methodologies and methodical tools. Retrieved from here.

Wehner, Stefan (2019), District Energy Projects: MRV Framework Guidance, UN Environment District Energy in Cities Initiative. September 2019. Retrieved from here.

Appendix A1: Industry sector

1. Introduction and objectives

This chapter outlines key aspects that must be considered when estimating and presenting the mitigation potential of projects in the industry sector. The main objective is to facilitate filling out the Mitigation Annex appropriately, considering sector specific issues (e.g., data availability and baseline definition) that need to be considered in addition to the aspects explained and provided before in the general Guideline. To this end, the chapter explains crucial elements in mitigation calculations for the industry sector and provides guidance on how common pitfalls can be addressed. One example of emission reductions calculation for the industry sector is presented below and focuses on the use of green hydrogen (H_2) for cement production.

Please note that the Mitigation Guideline for the Project Concept Phase presents typical approaches for estimating the emission reduction potential from project activities for the Industry sector (e.g. emission sources, baseline and project scenarios, calculation of emission reductions and key parameters) (p.18).

As described in the Mitigation Guideline for Project Concept Phase, the industrial sector covers interventions aiming at GHG emission reductions in the heavy (e.g., construction, cement, chemicals, metals) and light industry (e.g., consumer goods, fashion, retail), such as optimisation of resource use, innovation on industrial processes and product use (IPPU), introduction of near-zero-emission technologies, etc. Those interventions can target any type of enterprise – small- and medium sized enterprises (SMEs), large companies or even industrial clusters.

Projects targeting energy efficiency and / or energy generation in the industrial sector will be considered as cross-sectoral linked to two priority sectors (energy and industry) of the Mitigation Action Facility.

2. Common pitfalls of industrial sector mitigation calculations

Data availability and baseline definition

According to the IPCC (2014), the diversity of practices in the industry sector leads to uncertainty, incompleteness, lack of comparability and quality of data available in the public domain on energy use and costs for technologies of this sector. Due the competitive nature of industrial operations (e.g. competition within the sector, country, internationally) lack of transparency and confidential information may often lead to lack of access to information. Lack of data and data uncertainty is a challenge, particularly for key parameters which can influence emission reductions estimation strongly, e.g. energy performance level of facilities, types and quantity of fuels used in the processes, etc.

Rebound effects

Energy efficiency improvements represent an important share of the mitigation interventions conducted in the industry sector. As described in section 3.1.4. of this guideline, energy efficiency interventions decrease cost associated to energy services and could result in an increased demand for this service. Therefore, rebound effects are particularly likely for energy efficiency interventions in the industry sector.

Leakage

Leakage emissions can be relevant for certain activities of the sector, e.g. if certain equipment replaced are transferred to another activity.

Technology performance

The case study described below, considers the use of green hydrogen (H_2) as a fuel alternative for the industry sector. Green H_2 burner is an innovative technology and is therefore characterized by a high level of uncertainty with regards to its performance. Innovative technologies have higher risks of failure, which may lead to project delays. Therefore, technology performance and implementation timeline are two key factors to consider for the calculation of the mitigation potential.

3. <u>How to address sector specific issues when filling the Mitigation Annex</u>

Calculation

To ensure the transparency and traceability of calculations conducted for the (direct and indirect) mitigation potential estimate, the users should provide a detailed explanation of the following aspects:

- Overall calculation procedure and approach,
- Formulae applied for calculating baseline and project emissions,
- Assumptions, parameters, criteria, equations, and other justifications for estimating activity data, emissions factors, and performance indicators,
- (Raw) data and information used (by providing sources of information) to construct the reference level, the project scenario, the geographical project boundary, and related estimations (including potential mitigation),
- Application of conservativeness principle (i.e., input values and assumptions being based on conservative estimations) to avoid overestimation of GHG mitigation.

Generally, the users should provide as much detail as possible and describe all steps undertaken to estimate GHG reductions – that is, the decreases in GHG emissions or the increases in GHG removals – rather than just presenting summaries or totals. The origin of (raw) data should be clearly indicated to allow for cross checks and plausibility assessments of variables and values. Examples include both activity data and other parameters:

- Activity data in the industry sector include e.g. quantity of fuel consumed, number of efficient appliances installed, power consumption.
- Emissions factor(s): the GHG emissions rate(s) of a given source per unit of activity or input. For instance, the IPCC indicates the following default emission factor for stationary combustion of petroleum coke in manufacturing industries and construction: 97.500,00 kg CO_2 eq/TJ. If available, emissions factor used in the national context (e.g. in the national inventory or in other implemented projects) should be used.

Data units (e.g., tons of petroleum coke consumed) should be provided for all numbers and used consistently.

A detailed explanation should be provided on whether and how the estimation approach considers risk discounts for uncertainties, leakage, as well as other rebound effects (see sections below). If a specific tool has been used to conduct calculations, this tool should be made available.

Additional calculation sheets should be presented as additional sheets within the Mitigation Annex rather than just providing a summary. Furthermore, users should calculate cost efficiency of the proposed investment in relation to direct GHG emission reductions (tCO_2e / EUR of funding). The cost efficiency is unfavourable, for instance, if the technology requires large investment volumes but is expected to generate a relatively limited amount of direct GHG emission reductions.

Uncertainty analysis

Evidence shows that the sector specific complexities and challenges often lead to substantial measurement errors and/or uncertainties (usually as a combination of random errors, caused by a lack of precision, and systematic errors, caused by biased or incorrect assumptions, models and variables). Therefore, users should present and explain a detailed analysis that quantifies the uncertainty of baseline scenario estimates as well as expected performance (i.e., GHG emission reductions), considering and explaining all relevant error sources. It should be clear what information forms the basis of uncertainty (e.g., quantification or expert judgement) and what factors are considered in the analysis (e.g. confidence intervals and standard deviation). If conservativeness safeguards (e.g., uncertainty discounts) are applied, they should be explained in detail as well. Finally, a sensitivity analysis should be performed on the most critical and most uncertain assumptions in the calculations.

When filling out the Mitigation Annex, all relevant input parameters and assumptions should be listed in Sheet 2 (Parameters & Assumptions). To ensure transparency and traceability, users are asked to provide the source of each parameter and assumption. In addition, they should estimate the accuracy of all values. Accuracy is evaluated as precision (relative error margin in %) based on a 90% confidence interval. The aim should be to rely on values of high accuracy (+/- 5%) whenever possible. Sheet 2 contains a separate column for a detailed description and additional comments. This should be used to explain the choice of parameters and assumptions, as well as relevant error sources (see also section 4.5 of this Guideline for further instructions).

Accounting approach

The Mitigation Annex should contain a detailed explanation of the accounting approach, which includes the measuring, reporting and verification of GHG emissions as well as defining the benchmark against which project performance is assessed. If the project follows an existing framework, potential deviations or amendments (e.g., a different reference period) should be transparently listed, discussed and justified.

Project boundaries

It is particularly important to define precisely project boundaries in the industry sector. Users should make sure that the processes and equipment of the targeted facilities which will be impacted by project implementation are clearly described. Baseline and project emissions should only be calculated for those processes/equipment targeted by the project.

In case cross-border mitigation impacts are considered, Scope 2 and 3 emission reductions in Mitigation Action Facility eligible countries (developing countries that are ODA-eligible) need to be presented in a quantitative and qualitative manner in Sheet 6 of the Mitigation Annex. This comprises for instance for energy-intensive industrial products such as fertilizers that are substituted by the project intervention.

Baseline setting

The baseline scenario is the reference case for the project as it describes what would have occurred in the absence of the proposed project (please refer to section 3.1.2 of this Guideline for general instructions regarding baselines). Users should provide full methodological detail on the calculation of baseline GHG emissions, project GHG emissions as well as (expected) GHG emission reductions. This includes the explanation of the selected reference period, if applicable.

The users should list the sources of information and differentiate between expert knowledge, qualitative and quantitative analyses, modelling, etc.

Users need to reflect the impact of existing national policies in the baseline setting, i.e. prior to project implementation. For instance, it will be key to reflect in the baseline scenario how existing policies (e.g. energy performance standards) could impact the penetration rate of a targeted energy-efficient technology.

Project scenario

The deployment of new technologies in the industry sector (e.g. energy-efficiency technology) is often gradual, starting with a smaller number of units at the beginning. The users should make sure that assumptions for the deployment of new technology is conservative. Efficiency reduction over time of the targeted technologies should also be considered.

Emission reductions of new installed units/technologies should be accounted for from the year following the year in which the installation occurs (and not the installation year). Alternatively, a discount factor could be used for estimating the emission reductions of the installation year. This is relevant, as not all installed units/technologies will operate for the full year, so reasonable adjustments are required that reflect the reality.

Users need to make sure to describe well the assumptions related to the consideration of leakage emissions and rebound effect.

Direct and indirect emission reductions

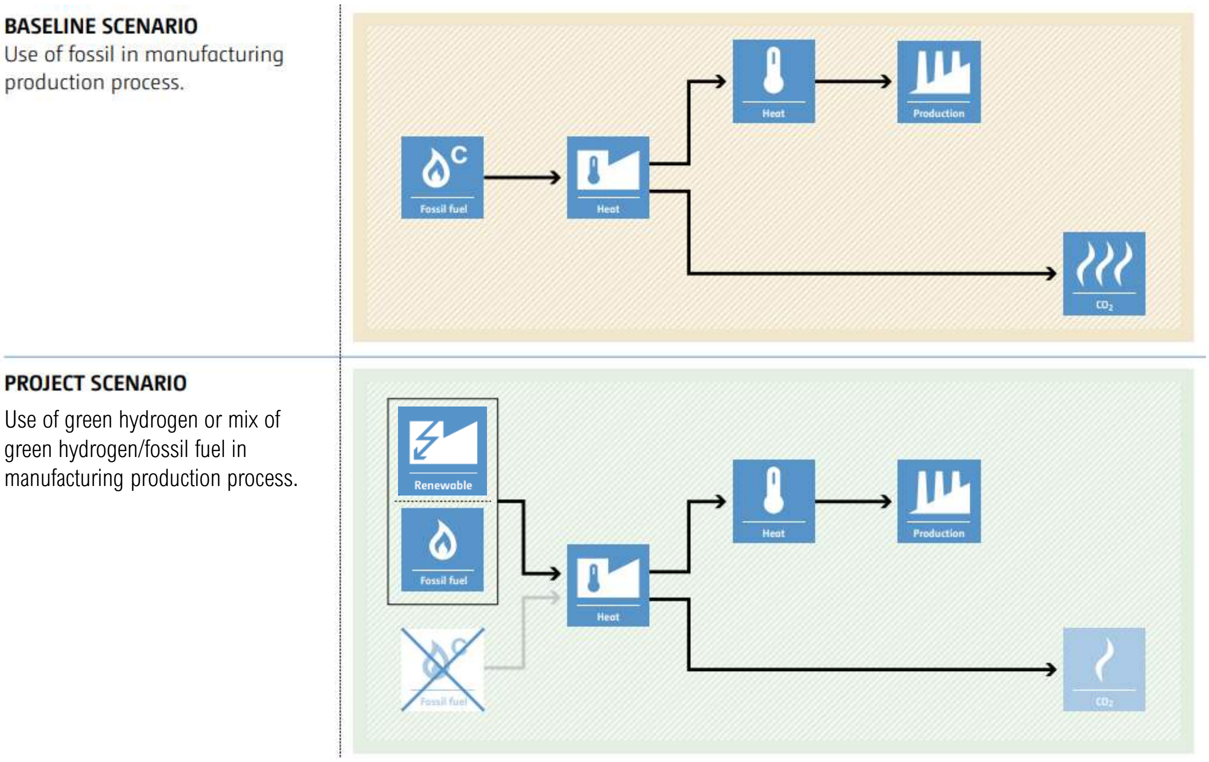
The users should differentiate between direct and indirect GHG mitigation potential, and make sure that direct and indirect GHG emissions/removals are indicated, substantiated, and correctly attributed (see section 3.2.2 of this Guideline). It must be noted though, that a reasonable direct mitigation potential is a pre-condition for the Mitigation Action Facility to choose projects.

Very often, calculations of indirect emission reductions are not clearly explained. Sufficient information should be provided on how the indirect emission reductions are estimated, e.g the number of units or equipment installed/expected to be installed through the removal of barriers (e.g. through a funding opportunity like a revolving fund).

Mitigation calculation example: use of green hydrogen (H_2) for cement production

This example focuses on the use of green H_2 (H_2 produced with renewable energies) as a fuel alternative to petroleum coke for cement production. The project boundaries cover one cement production site, which main emissions stem from the operation of a kiln used for producing clinker and drying products. The kiln functions at very high temperatures (approx. 1500°C). Petroleum coke is used to reach this high temperature. Baseline emissions come from the burning of petroleum coke to heat the kiln. Given that green H_2 is an innovative alternative energy source for industrial processes, the fuel switch from petroleum coke to H_2 will be partial, i.e. only 1% of the petroleum coke consumption will be replaced by H_2. Project emissions come from the burning of petroleum coke which has not been replaced by green H_2.

Figure 8: Baseline and project scenario for fuel switch in manufacturing production process



Source: CDM Methodology Booklet, UNFCCC 2021, AMS-III.AS. (adapted)

- Baseline GHG emissions (BE_y): 190.125 tCO_2e/a
  - $BE_y = EF_{comb} * NCV_{pc} * Qr_{pc}$ = 0,0325 TJ/tonne*97,5 tCO_2 eq/TJ* 60.000 tonnes = 190.125 tCO_2e/a
    - Emission Factor (EF_{comb}) for stationary combustion of petroleum coke in manufacturing industries and construction (IPCC, 2006): 97,5 tCO_2 eq/TJ
    - Net Calorific Value of petroleum coke (NCV_{pc}) (UNStats, 2014): 32,5 GJ/tonne = 0,0325 TJ/tonne
    - Quantity of petroleum coke consumed in baseline scenario (Qcb_{pc}): 60.000 tonnes
- Project GHG emissions (PE_y): 188.224 tCO_2e/a
    - Emission Factor (EF_{comb}) for stationary combustion of petroleum coke in manufacturing industries and construction (IPCC, 2006): 97,5 tCO_2eq/TJ
    - Net Calorific Value of petroleum coke (NCV_{pc}) (UNStats, 2014): 32,5 GJ/tonne = 0,0325 TJ/tonne
    - Quantity of petroleum coke consumed in project scenario (Qcp_{pc}): 59.400 tonnes
  - $PE_y = EF_{comb} * NCV_{pc} * Qcp_{pc}$ = 0,0325 TJ/tonne*97,5 tCO_2eq/TJ* 59.400 tonnes = 188.224 tCO_2e/a
- Leakage GHG emissions/removals (LE_y): 0 tCO_2e/a
- GHG emission reductions (ER_y) = BE_y - PE_y - LE_y = 190.125 tCO_2e/a – 188.224 tCO_2e/a - 0 tCO_2e/a = **1.901 tCO_2e/a**

Further information can be found at IPCC Industry Guideline (2014)**, and** GHG Protocol (2005)

References:

UNStats (2014): Net Calorific Values of Energy Products, https://unstats.un.org/unsd/energy/yearbook/2014/08i.pdf

IPCC (2006): 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 - Energy, Chapter 2 on Stationary combustion, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

IPCC (2014): IPCC Industry Guideline https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter10.pdf

Appendix A2: Transport sector

1. Introduction and objectives

This chapter outlines key aspects that must be considered when estimating and presenting the mitigation potential of projects in the transport sector. The main objective of this appendix is to facilitate filling out the Mitigation Annex appropriately, considering sector specific issues (e.g., data availability and baseline definition) that need to be considered in addition to the aspects explained and provided before in the general Guideline. To this end, the chapter explains crucial elements in mitigation calculations for the transport sector and provides guidance on how common pitfalls can be addressed. One example of emission reductions calculation for the transport sector is presented below and focuses on shifting from fossil fuel powered public minibuses to electric mobility.

Please note that the Mitigation Guideline for the Project Concept Phase also presents typical approaches for estimating the emission reduction potential from project activities for the Transport sector (p.21).

The transport sector covers projects aiming at GHG emission reductions in land, sea and air transport. Land (road) transport includes solutions ranging from the deployment of zero emission vehicles to the development and harmonisation of charging infrastructure as well as interventions along the electric vehicle (EV) / EV batteries supply chain. Further, expansion of rail network and infrastructure, including public transport, can offer a climate-neutral alternative to individual (road) transport. Sea and air transport also present opportunities for the coordinated deployment of zero emission charging or refuelling infrastructure, e.g., along the major international routes. The mitigation measures can also aim at achieving carbon neutrality in ports / airports.

2. Common pitfalls of transport sector mitigation calculations

Data availability

In the transport sector, access to data and monitoring of certain components may be difficult for certain vehicle types which are rather small and dispersed (e.g. motorcycles).

Additionally, some of the parameters used for mitigation calculations in this sector have strong influence on the overall emission reductions estimated, e.g. quantity of fossil fuel consumed, annual km travelled, vehicles' lifetime (e.g. high traffic load context and long operating hours reduce the lifetime). In addition, vehicles are often operated by diverse and dispersed user groups and access to data on milage, fuel type etc. is often challenging.

Baseline and project scenarios

Common pitfalls for baseline setting include the lack of evidence or justification on the development of the vehicle market. NDCs or other national policies in place prior to project implementation are not always well reflected in the baseline scenario.

The performance of vehicles and equipment is also a key aspect to pay attention to. For instance, vehicles efficiency improvement is often not considered in baseline emission calculations (considering a high efficiency improvement in the baseline scenario would be a conservative approach). For the project scenario, sufficiently specific data is needed e.g. on the performance of (electric) vehicles, which vary depending on road conditions, speed, weather, charge capacity and battery age. Replacement of batteries to ensure that vehicle performance is maintained should always be reflected in mitigation calculations.

Providing clarity on the exact categories (vehicle type, size, load capacity etc.) and quantities of vehicles which the project addresses is very important. Users should also demonstrate that the vehicles under the baseline scenario are comparable to the vehicles considered under the project scenario (e.g. with regards to vehicle category, passenger/load capacity).

Projects focusing on the development of e-mobility should sufficiently reflect the fact that the deployment of e-vehicles relies on different key enabling conditions like battery replacement and charging stations' availability. With regards to the uptake of e-vehicles, assumptions should be conservative and relevant barriers should be discussed, e.g. consumers' unwillingness to purchase new types of vehicles with significantly different attributes (such as smaller size, shorter range, longer refuelling or recharging time and higher cost) (IPCC, 2014). Estimates of the grid emission factor (GEF) influence strongly the calculation and should be updated during the project implementation period and be clearly referenced. If the grid of the targeted country relies on power imports, it could be relevant to also reflect the GEF of the electricity exporting countries in the calculations.

Leakage emissions

Leakage emissions can be associated with the implementation of mitigation interventions in the transport sector, e.g. if replaced vehicles are re-used outside project boundaries. In order to be conservative, the potential re-use of replaced vehicles should therefore be assessed (e.g. how many replaced vehicles will be scrapped or are continued to be used, how old are the replaced cars / is the fleet?). If no leakage is expected, then an explanation on how proper vehicles' scrapping will be conducted is necessary. The proper monitoring of vehicle scrapping will be key to ensure leakage emissions are avoided.

Rebound effects

For mitigation projects in the transport sector, rebound effects are often existing and should be taken into consideration. Rebound effects in the transport sector can for example include shift to bigger sized vehicles due to fuel and cost savings achieved through the mitigation project. Also changes in the modal shift (switch from one transport mode to more emission intensive ones due to the project) can cause rebound effects. Such potential or expected rebound effects should be clearly described and accounted for.

3. How to address sector specific issues when filling the Mitigation Annex

Calculation

To ensure the transparency and traceability of calculations conducted for the (direct and indirect) mitigation potential estimate, the users should provide a detailed explanation of the following aspects:

- Overall calculation procedure and approach,
- Formulae applied for calculating baseline and project emissions,
- Assumptions, parameters, criteria, equations, and other justifications for estimating activity data, emissions factors, and performance indicators
- (Raw) data and information used to construct the reference level, the project scenario, the geographical project boundary, and related estimations (including potential mitigation)
- Application of conservativeness principle (i.e., input values and assumptions being based on conservative estimations) to avoid overestimation of GHG mitigation.

Generally, the users should provide as much detail as possible and describe all steps undertaken to estimate GHG reductions – that is, the decreases in GHG emissions or the increases in GHG removals – rather than just presenting summaries or totals. The origin of (raw) data should be clearly indicated to allow for cross checks and plausibility assessments of variables and values. Examples include both activity data and other parameters:

- Activity data in the transport sector include e.g. type and quantity of fuels consumed, type and category of vehicles used and annual distance travelled.
- Emissions factor(s): the GHG emissions rate(s) of a given source per unit of activity or input. For instance, the emission factors of baseline vehicles are key parameters and should, if possible, be determined based on local data (e.g. density of fuel, country-specific fuel carbon contents, etc.) available from e.g. in the national inventory or from other implemented projects. If local data is not available, IPCC indicates default emission factor for mobile combustion. For instance, the emission factor for road transport with motor gasoline: 69.300,00 kg CO_2 eq/TJ.

Data units (e.g., tonnes of fossil fuels consumed) should be provided for all numbers and used consistently.

A detailed explanation should be provided on whether and how the estimation approach considers risk discounts for uncertainties, leakage, as well as other rebound effects (see sections below). If a specific tool has been used to conduct calculations, this tool should be made available.

Additional calculation sheets should be presented as additional sheets within the Mitigation Annex rather than just providing a summary. Furthermore, users should calculate cost efficiency of the proposed investment in relation to direct GHG emission reductions (tCO2e / EUR of funding). The cost efficiency is unfavourable, for instance, if the technology requires large investment volumes but is expected to generate a relatively limited amount of direct GHG emission reductions.

Uncertainty analysis

Evidence shows that complexities and challenges associated to the transport sector often leads to substantial measurement errors and/or uncertainties (usually as a combination of random errors, caused by a lack of precision, and systematic errors, caused by biased or incorrect assumptions, models and variables). Therefore, users should present and explain a detailed analysis that quantifies the uncertainty of baseline scenario estimates as well as expected performance (i.e., GHG emission reductions), considering and explaining all relevant error sources. It should be clearly provided what information forms the basis of uncertainty (e.g., quantification or expert judgement) and what factors are considered in the analysis (in particular, confidence intervals and standard deviation). If conservativeness safeguards (e.g., uncertainty discounts) are applied, they should be explained in detail as well. Finally, a sensitivity analysis should be performed on the most critical and most uncertain assumptions in the calculations.

When filling out the Mitigation Annex, all relevant input parameters and assumptions should be listed in Sheet 2 (Parameters & Assumptions). To ensure transparency and traceability, users are asked to provide the source of each parameter and assumptions. In addition, they should estimate the accuracy of all values. Accuracy is evaluated as precision (relative error margin in %) based on a 90% confidence interval. The aim should be to rely on values of high accuracy (+/- 5%) whenever possible. Sheet 2 contains a separate column for a detailed description and additional comments. This should be used to explain the choice of parameters and assumptions, as well as relevant error sources (see also section 4.5 of this Guideline for further instructions).

Accounting approach

The Mitigation Annex should contain a detailed explanation of the accounting approach, which includes the measuring, reporting and verification of GHG emissions as well as defining the benchmark against which project performance is assessed. If the project follows an existing framework, potential deviations or amendments (e.g., a different reference period) should be transparently listed, discussed and justified.

Baseline setting

The baseline scenario is the reference case for the project as it describes what would have occurred in the absence of the proposed project (please refer to section 3.1.2 of this Guideline for general instructions regarding baselines). Users should provide full methodological detail on the calculation of baseline GHG emissions, project GHG emissions as well as (expected) GHG emission reductions. This includes the explanation of the selected reference period, if applicable. The users should list the sources of information and differentiate between expert knowledge, qualitative and quantitative analyses, modelling, etc.

Project scenario

As described above, the Mitigation Annex should clearly present the assumptions and sources of information related to the development of the vehicles' market (e.g. e-vehicles, including the impact from other policies), the use of key parameters (e.g. GEF), the performance of vehicles, etc.

For e-mobility, users should assess in the project scenario whether emissions associated with charging, transmission and distribution losses are relevant.

Direct and indirect emission reductions

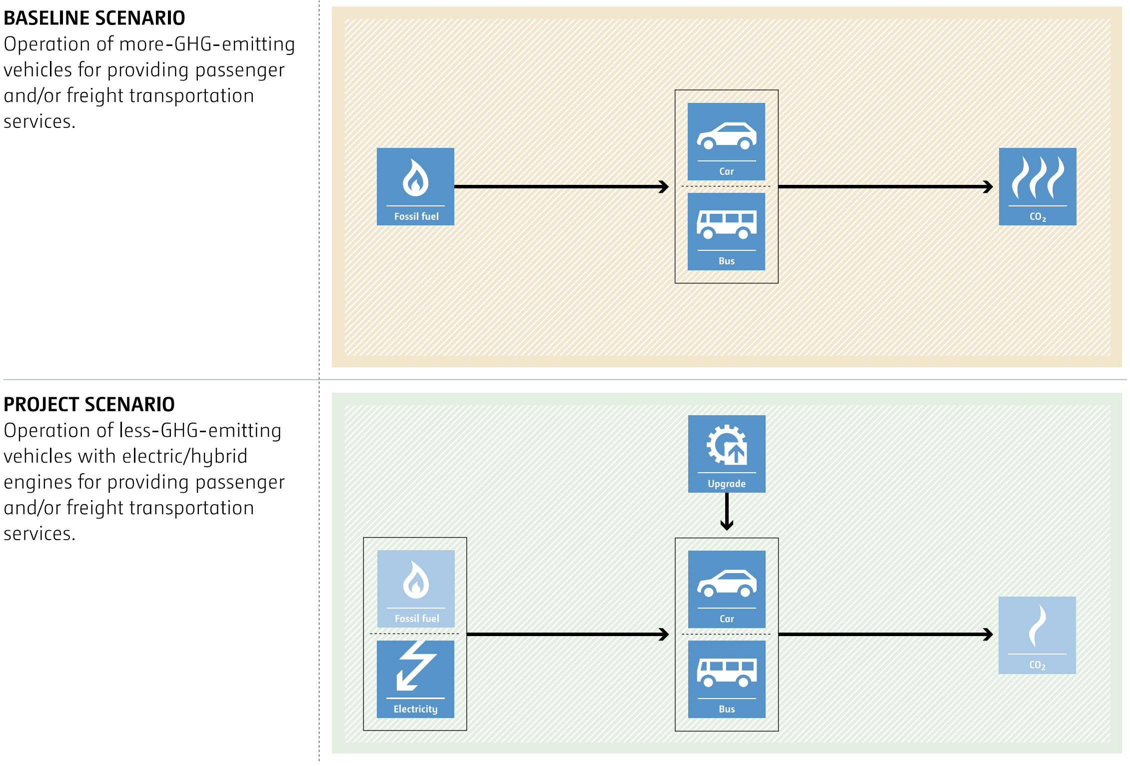
The users should differentiate between direct and indirect GHG mitigation potential, and make sure that direct and indirect GHG emissions/removals are indicated, substantiated, and correctly attributed (see section 3.2.2 of this Guideline). It must be noted though, that a reasonable direct mitigation potential is a pre-condition for the Mitigation Action Facility to choose projects.

Indirect emission reductions can be related to the use of charging infrastructure financed through the project by electric vehicles which have not been financed by the project. Users need to be specific on the vehicle categories targeted for indirect emission reductions as catalytic effects on vehicle types not included in the project are usually more uncertain.

Mitigation calculation example: deployment of electric mini-buses

This example focuses on the replacement of diesel mini-buses by electric mini-buses which will be powered by electricity from the grid. The project boundaries cover the 100-diesel powered mini-buses of the target jurisdiction which are reaching the end of their lifetime (replaced vehicle will be scrapped, so no leakage emissions are considered). Baseline emissions come from CO_2 emissions associated with the use of diesel-powered engines. Project emissions come principally from the production of the electricity used to power the new electric mini-buses.

Figure 9: Baseline and Project scenario for EVs introduction



Source: CDM Methodology Booklet, UNFCCC 2021, AMS-III.C.

- **Baseline GHG emissions (BE_y): 2.400 tCO_2e/a**
  - $BE_y = EF_{diesel} * N_{mini\text{-}buses} * D_{mini\text{-}buses}$ = 0,0006 tCO_2e/km*100 mini-buses*40.000 km = 2.400 tCO_2e/a
    - Emission Factor of mini-buses (EF_{diesel}): 0,0006 tCO_2e/km
    - Number of diesel mini-buses replaced by electric mini-buses ($N_{mini\text{-}buses}$): 100 mini-buses
    - Average annual distance travelled mini-buses ($D_{mini\text{-}buses}$): 40.000 km
- **Project GHG emissions (PE_y): 720 tCO_2e/a**
  - $PE_y = N_{mini\text{-}buses} * D_{mini\text{-}buses} * EC_{mini\text{-}buses} * GEF$ = 100 mini-buses*40.000 km*0,900 KWh/km* 0,0002 tCO_2e/KWh = 720 tCO_2e/a
    - Number of diesel mini-buses replaced by electric mini-buses ($N_{mini\text{-}buses}$): 100 mini-buses
    - Average annual distance travelled mini-buses ($D_{mini\text{-}buses}$): 40.000 km
    - Average annual electric consumption of mini-buses ($EC_{mini\text{-}buses}$): 0,900 KWh/km
    - Grid Emission Factor of the targeted country (GEF): 0,0002 tCO_2e/KWh
- Leakage GHG emissions/removals (LE_y): 0 tCO_2e/a
- **GHG emission reductions** (ER_y) = $BE_y - PE_y - LE_y$ = 2.400 tCO_2e/a - 720 tCO_2e/a - 0 tCO_2e/a = **1.680 tCO_2e/a**

Further information can be found at IPCC Transport Guideline (2014)**, and** GHG Protocol (2005)

References

IPCC (2006): 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 on Energy, Chapter 3 on Mobile Combustion, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf

IPCC (2014): Transport Guideline, https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter8.pdf

Appendix B: Glossary

Please also consult the general Mitigation Action Facility Glossary available at the Mitigation Action Facility website.

Accuracy within this template shall be evaluated as precision (relative error margin in %) based on a 90% confidence interval.

Baseline scenarios - Projections of greenhouse gas emissions and their key drivers as they might evolve in a future in which no explicit actions are taken to reduce greenhouse gas emissions.

Business-As-Usual (BAU) Scenario - A reference case that represents future events or conditions that are most likely to occur because of implemented and adopted policies and actions. It represents therefore an emission level that would occur without any new and additional efforts to reduce emissions. It is sometimes used as an alternative term for 'baseline scenario'. However, in this Guideline we understand the BAU as on option to define the baseline scenario.

Baseline emissions - The GHG emissions that would occur in the baseline scenario.

Cross-border mitigation impact – Emission reductions that are realized outside of the project country boundary.

Direct mitigation potential - achieved by project investments and discrete investments financed or leveraged during the project's supervised implementation period (throughout the entire lifetime of the project). Hence, direct emission reductions are defined as mitigation achieved by units or measures (partially) financed or leveraged by the financial cooperation (FC) component of the project funding during the project period:

- Units must be installed / measures must be implemented during project period
- Timing of mitigation effect: during project period, during period of 10 years after project end and over technology lifetime (but only for those units installed during project period)

Dynamic baseline scenario - A baseline scenario that is recalculated based on changes in emissions drivers.

Emissions factor - A carbon intensity factor that converts activity data into greenhouse gas emissions data.

Indirect mitigation potential - Indirect GHG emission reductions achieved by the project capture emission reductions beyond those related to direct investments, e.g., resulting from technical assistance. Hence, potential emission reductions that fall in the following categories:

- Results of technical cooperation (TC) component during and after project period
- Results of financial cooperation (FC) component but only for units installed / measures implemented after project end, as result of the continuation of the financial mechanism
- Timing includes:
  - Technical cooperation: during project period and during period of 10 years after project end, (during lifetime: optional)
  - Financial cooperation: for units installed after project end for period 10 years after project end, (during lifetime: optional)

Leakage - An increase in emissions outside of the boundary of a mitigation action that results as a consequence of the implementation of that mitigation action.

Mitigation - Human intervention to reduce the sources or enhance the sinks of GHG. Examples include using fossil fuels more efficiently for industrial processes or electricity generation, switching to solar energy or wind power, the improving the insulation of buildings, and 'sinks' e.g. to remove greater amounts of CO_2 from the atmosphere.

Mitigation / Project scenario - A mitigation scenario represents future GHG emissions with the assumption of the introduction of certain policies and measures reducing GHG emissions as a result of the project with respect to some baseline (or reference) scenarios.

Monitoring - Collecting and archiving all data necessary for determining the baseline, and for measuring anthropogenic emissions by sources of GHGs within the project boundary, and leakage, as applicable.

Parameter - A variable that is part of an equation used to estimate emissions. For example, 'emissions per head of cattle' and 'quantity of livestock' are both parameters in the equation '1.5 kg CO_2e/ head of cattle × 100 head = 150 kg CO_2e'.

Project boundary - Physical delineation and/or geographical area of the Project and the specification of GHGs and sources under the control of the project participants that are significant and reasonably attributable to the project, in accordance with the applied.

Rebound effect / Spill-over effects - Reverberations caused by actions taken to cut greenhouse-gas emissions. For example, emission reductions could lower demand for oil and thus international oil prices, leading to more use of oil and greater emissions in other areas, partially offsetting the original cuts.

Scope - Defines the operational boundaries in relation to indirect and direct GHG emissions.

Sink - Any process, activity or mechanism which removes a GHG, an aerosol or a precursor of a GHG from the atmosphere. Forests and other vegetation are considered sinks because they remove carbon dioxide through photosynthesis.

Suppressed demand - refers to a situation where current levels of access to services are inadequate for basic human needs – termed "Minimum Service Levels". The emission reduction calculation approach follows the underlying assumption that emissions would occur under the baseline scenario according to the minimum service level required for ensuring basic human needs, and that does not exist at present in the project context.

Technical lifetime - The total time for which the equipment is technically designed to operate from its first commissioning. The technical lifetime is expressed in years or hours of operation.

Technology/Measure - A broad class of GHG emission reductions activities possessing common features, for example, fuel and feedstock switch, switch of technology with or without change of energy source (including energy-efficiency improvement), methane destruction and methane formation avoidance.