NAMA Facility Mitigation Guideline

Guidelines on Outline Annex 6: GHG mitigation potential
How to present mitigation figures

May 2021

Acronyms and Abbreviations

AFOLU	Agriculture, Forestry and Other Land Use
ASP	Applicant Support Partner
BAU	Business as Usual
BE	Baseline Emissions
C	Carbon
CDM	Clean Development Mechanism
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	Carbon dioxide equivalent
ER	Emission Reductions
EUR	Euro
FC	Financial Cooperation
FCPF	Forest Carbon Partnership Facility
GEF	Global Environment Facility
GHG	Greenhouse Gas
GHGP	Greenhouse Gas Protocol
GS	Gold Standard
ha	Hectare
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
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
NAMA	Nationally Appropriate Mitigation Actions
NDC	Nationally Determined Contribution
NF_3	Nitrogen trifluoride
NSP	NAMA Support Project
PE	Project Emissions
PFCs	Perfluorocarbons
REDD	Reducing Emissions from Deforestation and forest Degradation
SF_6	Sulphur hexafluoride
SI	International System of Units
SOC	Soil organic carbon

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

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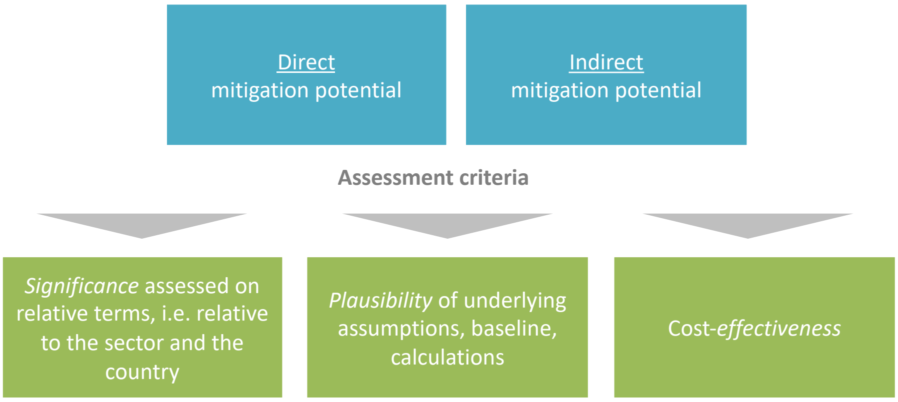
1 Quick guide

2 Introduction and purpose

NAMA Support Projects (NSPs) are assessed against two criteria: 1) Ambition and 2) Feasibility. Ambitious NSPs 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. In their corresponding Outline, Applicants / Applicant Support Partners (ASPs) should set out how mitigation actions in a certain sector are planned to be implemented. Applicants / ASPs are expected to take a conservative approach to the mitigation potential, as the Applicant's / NSP'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 an NSP to the decarbonisation targets as defined by the country's Nationally Determined Contribution (NDC). The mitigation potential of the NSP is assessed both in absolute and relative terms in relation to the sector and the country target. In assessing the mitigation potential provided in Outline Annex 6, the following key criteria are used.

Figure 1: Assessment criteria for NSP mitigation potential



Source: NAMA Facility (2020), General Information Document for the Ambition Initiative

For presenting the estimation of the mitigation potential, Applicants / ASPs are required to use the provided Excel template for Outline Annex 6: GHG mitigation calculation[1] (available on the NAMA Facility website with the template for NAMA Support Project Outlines and Annexes). Annex 6 supports the estimation of direct and indirect mitigation impacts from the NSP. This guidance explains the requirements and different sheets included in Outline Annex 6 and provides general instructions on how and why to fill out Outline Annex 6.

The key objective of Annex 6 and this ***NAMA Facility Mitigation Guideline*** (hereinafter referred to as 'Guideline') is to support the Applicants / ASPs to transparently elaborate and present the envisaged NSP mitigation potential. Applicants / ASPs are encouraged to use and follow the Guideline as it can facilitate filling the Annex 6 appropriately and can help to avoid common pitfalls when estimating and presenting the mitigation potential of NSPs.

As a first step, chapter 3 of this Guideline introduces ***general principles, definitions and requirements*** applied by the NAMA Facility for best practice presentation of mitigation estimation for NSP Outlines. The following chapter 4 presents ***how to fill out Annex 6*** with a detailed overview of the different worksheets and how to use them. Chapter 5 discusses the ***relation of Annex 6 to the NSP Outline and other Outline Annexes and relevant NAMA 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 Annex 6. The checklist helps Applicants / ASPs to fill out

[1] In the following text we use 'Annex 6' to refer to Outline Annex 6: GHG mitigation calculation.

Annex 6 and to double check if all relevant aspects to derive the mitigation figures are taken into account and all required sections are completed.

Throughout the Guideline, the mandatory requirements, recommendations or examples and pitfalls will be presented in the following colours for quick recognition.

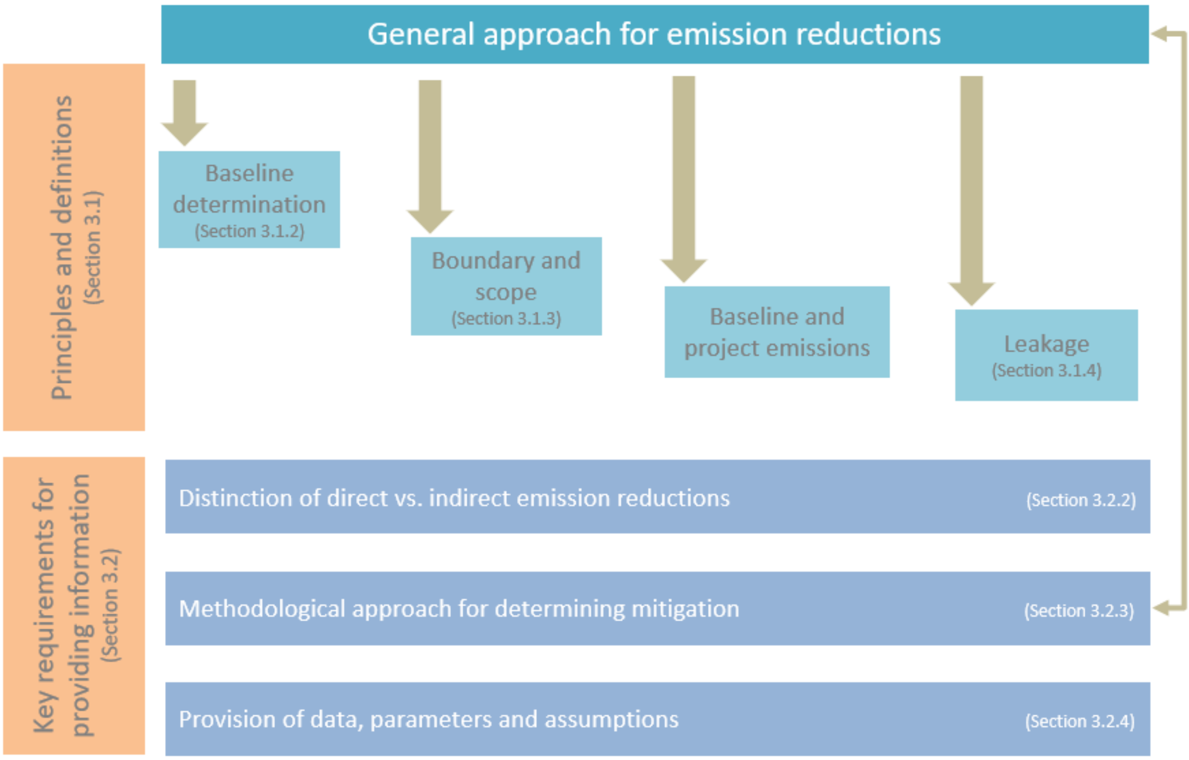
Mandatory requirements
Recommendations or examples
Pitfalls to be avoided

3 General principles, definitions and requirements

Annex 6 provides 4 sheets in which the estimation for GHG mitigation can be presented (incl. the direct and indirect mitigation potentials). In addition, Annex 6 also includes one sheet called 'Guidance' 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 Annex 6).

When filling out Annex 6, please take the following general principles, definitions and requirements into consideration.

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



Source: authors

3.1 General principles and definitions for determining the mitigation potential

NSPs 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 NSP mitigation over the lifetime of the intervention(s). Here the NSP 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 NSP 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 NSP is based on a comparison between the baseline situation and the situation after the NSP 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 NSP.

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

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 NSP 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(-ies) 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). See Appendix A1: Agriculture, Forestry and Other Land Use of this Guideline for further details.

3.1.2 Defining the baseline scenario

The baseline scenario is the ***reference case for the NSP***. It is a hypothetical description of what would have most likely occurred in the absence of the NSP in order 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 3.2.3 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 NSP (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 NSP. Only

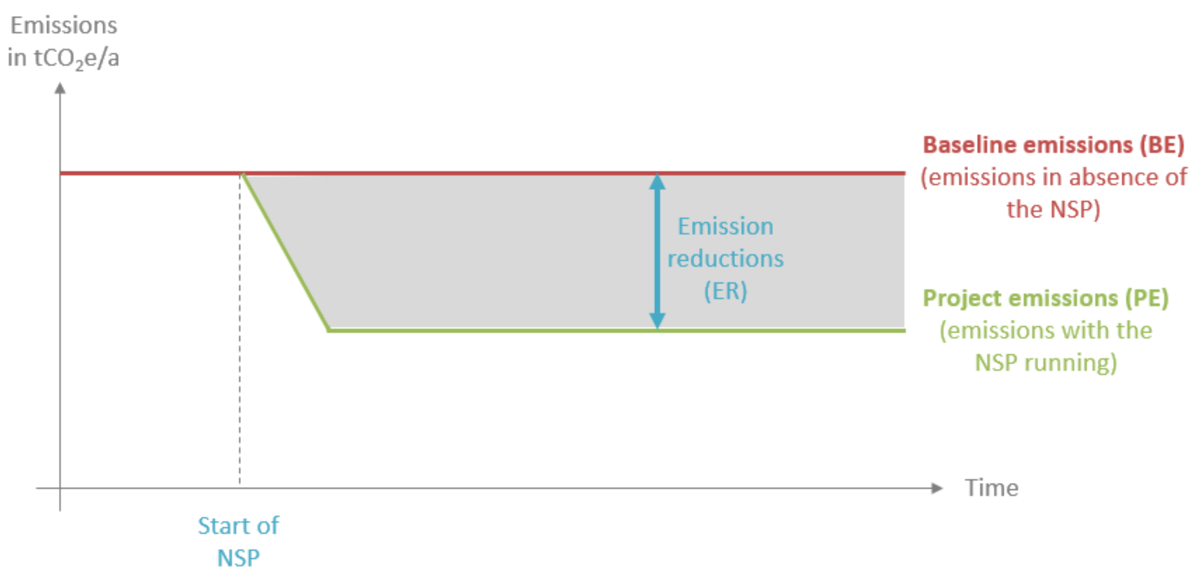
[2] Leakage effects are explained in section 3.1.4 of this Guideline.

activities, technologies and practices should be considered that have been undertaken in the 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 NSP) within a specified geographic area and temporal range that could provide the same product or service as the NSP; or
- the continuation of current activities, technologies or practices that, provide the same type, quality and quantity of product or service as the NSP (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 in the area of NSP 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 NSP. In other words, the baseline is defined as the hypothetical situation without the NSP; hence the baseline emissions (BE) are the emissions that are expected without the NSP 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 NSP. In the same way, it is also possible to project into the future the GHG emissions under the implementation of the NSP, i.e., the development under changing circumstances. The difference between these two scenarios provides the ex-ante mitigation estimate.

Figure 3: Baseline reference scenario



Source: authors

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 NSP 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 Textbox 1). For the determination of baselines, a suitable and conservative method should be used and country / sector-specific, climate-relevant data should be considered.

Textbox 1: Dynamic and static business-as-usual (BAU) and baseline scenario

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 NSP 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 an NSP shall replace or avoid the future use of inefficient appliances, in the baseline scenario without the NSP intervention, the use of conventional (inefficient) appliances will continue to prevail and may even increase due to affordability and economic development. Hence, as a consequence 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

3.1.3 Defining the project boundary and scope

The mitigation assessment and project boundary for the NSP shall encompass the potential emission reductions (ER) related to the NSP 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 NSP activities. The specific project boundary depends on the NSP interventions and technologies and can refer to the operational control or geographical delineation. If the project boundary is difficult to define, the Applicants / ASPs 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 NSP 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 NSP 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 NSP, emissions from Scope 1 and Scope 2 are to be considered. Emissions or their reduction that cannot be clearly assigned to specific project

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

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).

Potential pitfall: Avoid mixing up direct and indirect emission reductions as per NAMA 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 NSPs 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 taken into account.

When defining the project boundary, the definition of direct and indirect emission reductions by the NAMA 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 NSP's technology is available. The Applicants / ASPs should document their choice and data used.

The project boundary includes the significant anthropogenic GHG emissions by sources influenced by the NSP 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 (N2O)**
- **Hydrofluorocarbons (HFCs)**
- **Perfluorocarbons (PFCs)**
- **Sulphur hexafluoride (SF_6)**
- **Nitrogen trifluoride (NF_3)**

3.1.4 Rebound effects and leakage

When estimating the achieved emission reductions, the Applicants / ASPs 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 NSP mitigation action that results as a consequence of the implementation of that mitigation action. For instance, leakage may result from replaced equipment through the NSP 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 cookstoves that are then used elsewhere. 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 as a result 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 through the use of 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. Applicants / ASPs 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 Applicants / ASPs.

3.2 Key requirements for providing information on the mitigation approach

3.2.1 Time period for mitigation estimation

The Applicants / ASPs should assess the annual mitigation potential of the NSP and the cumulative value over the NSP duration. In addition, cumulative values for the period beyond the NSP duration should be estimated. Hence, the following potential emission reductions estimates need to be presented in Annex 6:

- Annual emission reductions in GHG emissions (in tCO_2e)
- Cumulative value over the duration of the NSP, i.e., accumulated target values until finalisation of the project
- Cumulative value over a period of 10 years after the end of NSP 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 NAMA 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 NSP'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 NSP*** funding during the NSP period. The requirements are as follows:

- Units must be installed / measures must be implemented during NSP period

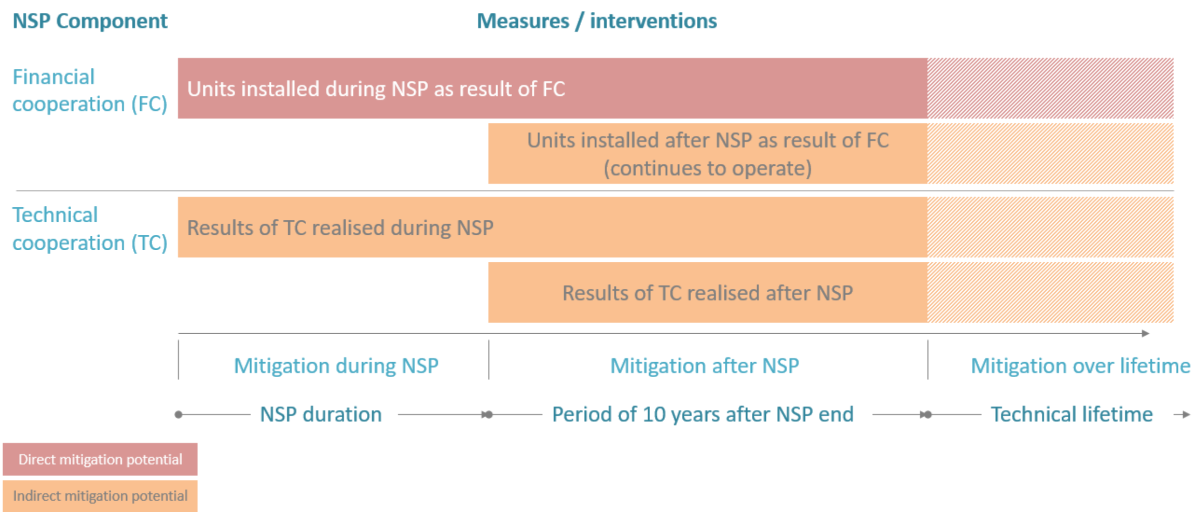
- Timing of mitigation effect: occurs during the NSP period, 10 years after NSP end and over technology lifetime (but only for those units installed during NSP period)

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

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

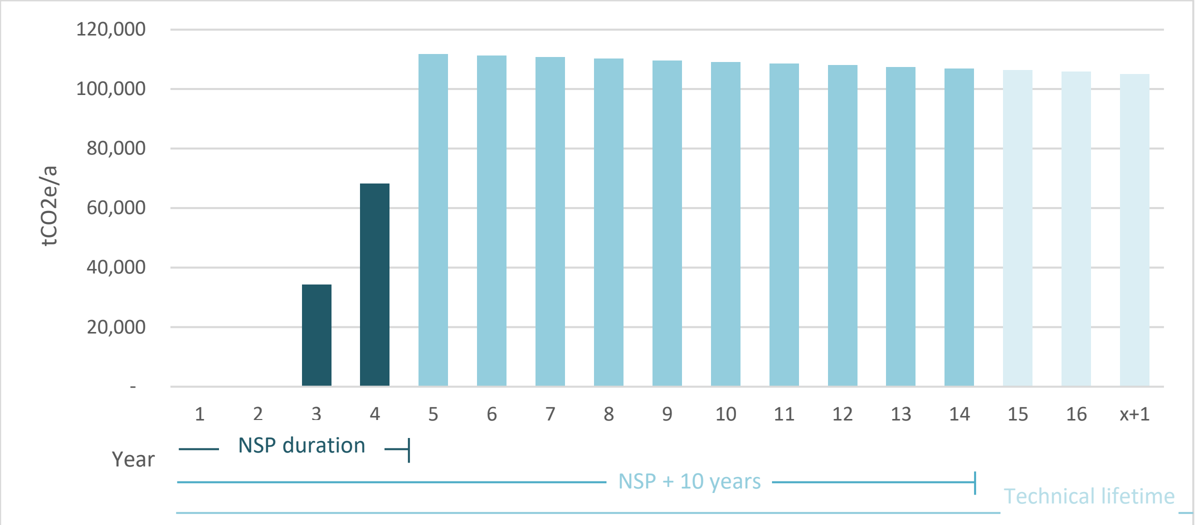
Figure 4: Definition of the direct and indirect GHG mitigation potential



Source: authors

As shown in the figure above, technology units installed during the NSP as result of the financial component of the NSP 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 NSP 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 NSP



Source: authors

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

3.2.3 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 in order to determine the amount of emission reductions achieved. They help to define the baseline and will facilitate the monitoring of such mitigation. At NSP Outline stage it is acceptable if no complete methodology is followed. However, Applicants / ASPs 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.

In order to find a suitable methodology, Applicants / ASPs 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, Applicants / ASPs can focus on the technology applied under the NSP. 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), the Greenhouse Gas Protocol (GHGP), VERRA / Verified Carbon Standard (VCS) or the Forest Carbon Partnership Facility (FCPF). 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 NSP 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 Applicants / ASPs can propose their own methodological approach or deviation from existing methodologies. It is recommended to provide justification accordingly.

Mandatory requirements: The Applicants / ASPs should transparently present and follow the applied methodology for estimating the mitigation potential of the NSP 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 NSP 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

3.2.4 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 Applicants / ASPs 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 NSP interventions. Please also consult recommended "Hierarchy of data sources" as presented in the Monitoring and Evaluation Framework for core indicator M1. However, at the Outline stage, 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 3.2.3 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

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 Annex 6. Applying conservative and transparent assumptions, methodologies and transparency on data sources is strongly recommended and honoured in the project selection cycle (this includes presenting weaknesses, uncertainties and lack of data sources).

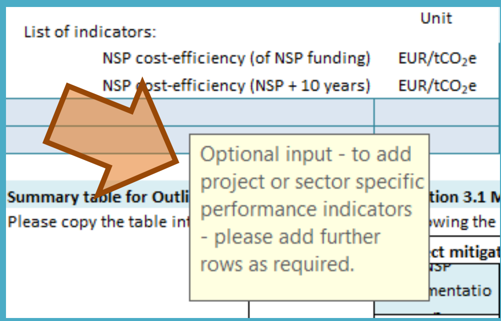
The following section illustrates how the general principles, definitions and requirements are applied in filling out Annex 6.

4 How to fill out Outline Annex 6: GHG mitigation potential

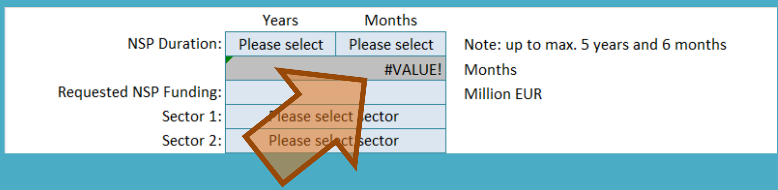
This section will describe in more detail appropriate use and filling out of Annex 6. It is highly recommended to read chapter 3 of this Guideline first in order to be familiar with the general principles and definitions. In addition, consultation of the Glossary of this Guideline will help to ensure a good quality of Annex 6. Please consider the following general instructions.

Textbox 2: General instruction to fill out Annex 6

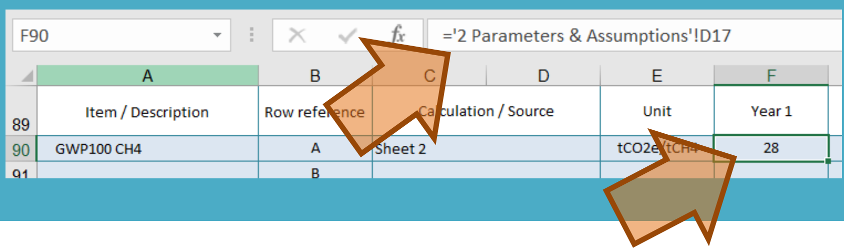
1 Most of the cells offer additional guidance: If you click into a cell, an input message will show up, if available.



2 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., NSP duration), the formulas will show corresponding values.



3 Always use formulas with cell references for enabling traceability (e.g. =D17+A20).



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

Cells for input
Calculated based on input

Cells with pre-filled formulas should not be changed except the specific circumstances of the NSP requires to do so. Such changes should be identified and explained in Annex 6 accordingly.

5

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 Annex 6

The general structure of Annex 6 is presented below. Some of the sheets can be copied multiple times. This can be useful for example, if the NSP covers different technologies or sectors (e.g., an NSP implementing measures in agriculture and energy).

Figure 6: General structure of Annex 6

Introduction	Explains how to use and fill Annex 6
1 Results	Presents the results based on the inputs on the various sheets of Annex 6 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 Guidance	Provides various potential sources for GHG accounting methodologies.

Source: authors

It is also possible to add further sheets in the Annex 6, 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 NAMA 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 Annex 6 should be integrated by formulas using cell references as explained in Textbox 2 above.

4.2 Sheet: Introduction

Sheet: Introduction explains the structure of Annex 6 and provides guidance on how to fill it out. A cell colour code to indicate cells for user inputs is introduced, as shown in Textbox 2 above. Please read it once before you start filling out Annex 6.

4.3 Sheet 1: Results

Sheet 1: Results will present the final mitigation potential once all relevant sections of Outline Annex 6 are filled out. To start with the Annex 6, please fill in the cells on NSP information and the section on NSP 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 1: Specific guidance for Sheet 1: Results

<table>
<tr><th>Section / cells</th><th>Description / guidance</th></tr>
<tr><td>Direct GHG mitigation potential</td><td>Formulas are pre-filled to calculate the mitigation potential during NSP duration, 10 years after NSP end and for technology lifetime. In most cases these formulas are sufficient to display the mitigation potential of the NSP. However, in case the specific circumstances of an NSP would require adjusting, this is possible. If required, please use formulas with cell references and do not just copy values into the cells.
Example:
<table>
<tr><th></th><th>Unit</th><th>NSP implementation</th><th>10 years after NSP end</th><th>Technology lifetime</th></tr>
<tr><td>Annual average mitigation potential</td><td>tCO_2e/a</td><td>35,217</td><td>109,131</td><td>109,694</td></tr>
<tr><td>Total mitigation potential over period</td><td>tCO_2e</td><td>158,474</td><td>1,091,311</td><td>2,193,871</td></tr>
</table>
</td></tr>
<tr><td>Indirect GHG mitigation potential</td><td>See above (i.e., same steps as for direct GHG mitigation potential)</td></tr>
<tr><td>Performance indicators</td><td>The cost efficiency indicators (NSP, 10 years after NSP end and NSP + 10 years) are mandatory for filling Outline Annex 6. NSP are encouraged to propose further key performance indicators as applicable to their interventions (e.g. emission reductions (removals) per hectare forest area). As before, formulas should not be changed except if the specific NSP requires to do so. Any changes or adjustments made should be reported and justified (e.g. in a comment).

Example:
<table>
<tr><th>List of indicators:</th><th>Unit</th><th>NSP implementation</th><th>10 years after NSP end</th><th>Technology lifetime</th></tr>
<tr><td>NSP cost-efficiency (of NSP funding)</td><td>EUR/tCO_2e</td><td>76</td><td>11</td><td>5</td></tr>
<tr><td>NSP cost-efficiency (NSP + 10 years)</td><td>EUR/tCO_2e</td><td colspan="2">10</td><td></td></tr>
</table>
</td></tr>
<tr><td>Summary table for Outline</td><td>The summary table presented should be copied into the NSP outline. As before, formulas should not be changed except the specific NSP requires to do so. Any changes or adjustments made should be reported and justified (e.g. in a comment).</td></tr>
</table>

	Example (extract):

	Direct mitigation potential		Indirect mitigation potential	
	NSP Implementation	10 years after NSP end	NSP Implementation	10 years after NSP end
	tCO_2e/a	tCO_2e/a	tCO_2e/a	tCO_2e/a
Year 1	0			
Year 2	0			
Year 3	34,291			
Year 4	68,239			
Year 5	55,944	55,944		9,324

Source: authors

4.4 Sheet 2: Parameters and Assumptions

Sheet 2: Parameters and 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 Applicants / ASPs if later on changes in the input parameters are required, as they can then be easily found on this sheet. The assumed lifetime for the technologies implemented under the NSP is mandatory to be defined on this sheet. When filling out Sheet 2, please take into consideration the following guidance.

Table 2: Specific guidance for Sheet 2: Parameters and Assumptions

Section / cells	Description / guidance
Name (of the parameter)	Please name each parameter with a unique name and use this name throughout Annex 6 (i.e. also in further descriptions as filled in the different sections of Outline Annex 6 as applicable). *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 Outline Annex 6 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

Section / cells	Description / guidance
Source	Please specify the source of the parameter and its value. Consider further instruction regarding identification of sources used as presented in Textbox 2 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, the Applicants / ASPs should justify why the data is still valid. *Example:* Energy Efficiency Study, 2019, See Appendix 1, p. 5
Accuracy	While the NAMA 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. *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.

Source: authors

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 12 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.

4.5 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.

Table 3: Specific guidance for Sheet 3: Direct mitigation

Section / cells	Description / guidance
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 3.2.3 of this Guideline).

<table>
<tr><th>Section / cells</th><th>Description / guidance</th></tr>
<tr><td>Description of the project boundary</td><td>Please fill in the description of the project boundary (see chapter 3 and the Glossary of this Guideline for further explanation).</td></tr>
<tr><td>Baseline emissions</td><td>In this section, the BAU scenario has to be described. If the applied baseline scenario (i.e., the scenario used in the calculation of baseline emissions (see chapter 3 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.</td></tr>
<tr><td>Calculation table for baseline emissions</td><td>In order to incorporate the parameters as filled in Sheet 2, please use formulas with cell references. The table provides sections for calculation of emissions during NSP implementation, 10 years after NSP 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, Applicants / ASPs can refer to other rows while explaining the calculation (e.g. Row A x B). Applicants / ASPs must use formulas with cell references as applicable to allow the NAMA Facility to understand the calculations.

Example (see example Annex 6 for Energy Efficiency projects[4]):
<table>
<tr><th></th><th></th><th></th><th></th><th>NSP implementation</th><th>NSP implementation</th><th>NSP implementation</th><th>NSP implementation</th><th>NSP implementation / period after NSP end</th><th>W</th><th>X</th></tr>
<tr><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></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>NSP 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_{th}/a</td><td></td><td></td><td>470</td><td>470</td><td>470</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_{el}/a</td><td></td><td></td><td>36</td><td>36</td><td>36</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>NSP implementation plan</td><td>No.</td><td></td><td></td><td>50</td><td>100</td><td>150</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_{th}/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_{el}/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/MWh_{el}</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></td><td>A*(B*G+C*H)+D*(E*G+F*H)</td><td>tCO_2e</td><td>-</td><td>-</td><td>53,170</td><td>105,808</td><td>173,493</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>tCO_2e/a</td><td>tCO_2e</td></tr>
</table>
TSU:
Please link input parameters to sheet "2 Parameters & Assumptions" if possible/applicable as done here.</td></tr>
<tr><td>Project emissions (PE)</td><td>Project emissions (see chapter 3 and the Glossary of this Guideline for further explanation) have to 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 3 and the Glossary of this Guideline for further explanation) have to be explained (which sources of project emissions exist) and calculated. The same guidance as provided for the calculation table of baseline emissions applies. 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 3 and the Glossary of this Guideline for further explanation). As such, the pre-defined formulas would be sufficient for most</td></tr>
</table>

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

Section / cells	Description / guidance
	NSPs. Should the specific circumstances of an NSP require editing of the formulas, this would be possible. As mentioned before, formulas with cell reference are to be used (not only providing or copying in values).
Overall accuracy	As explained above in section 4.4 above, the NAMA 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.
Risks	Any NSP 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 NSP-specific risks, again with level from dropdown list. Please add further explanation on such risks in the related cells.
Rebound effect	Rebound effects (see chapter 3 and the Glossary of this Guideline for further explanation) have to be described and estimated in their level (see cell with dropdown list). NSPs that do not expect rebound effects still have to state this and justify the same.

Source: authors

4.6 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 4.5 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. Applicants / ASPs can state in related cells "Same as described under direct mitigation potential". However, calculations still have to be defined and selected in related calculation tables. For the indirect potential, determination of accuracy, risks and rebound effects is not mandatory.

4.7 Sheet 5: Guidance

Sheet 5: Guidance references useful guidance and methodologies that can be used for the calculation of GHG emission reductions (see also chapter 3 and specifically section 3.2.3 of this Guideline for further information on the selection of methodologies). No information needs to be filled by the Applicants /ASPs in this sheet. The list is only providing recommendations and orientation regarding available methodologies and standards[5]. There is no claim to completeness. Other appropriate methodologies and standards can be used as well. Generally, the NAMA 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 4 below are recognised. The same principles are required to be followed if no existing methodology can be applied and the Applicants / ASPs 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.

[5] 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.

Table 4: 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 NSP but also beyond, the use of data and information should be consistent among different measures, especially in the context of NDC-related reporting.
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 NAMA Facility to understand the approach applied, but also the public.

Source: authors

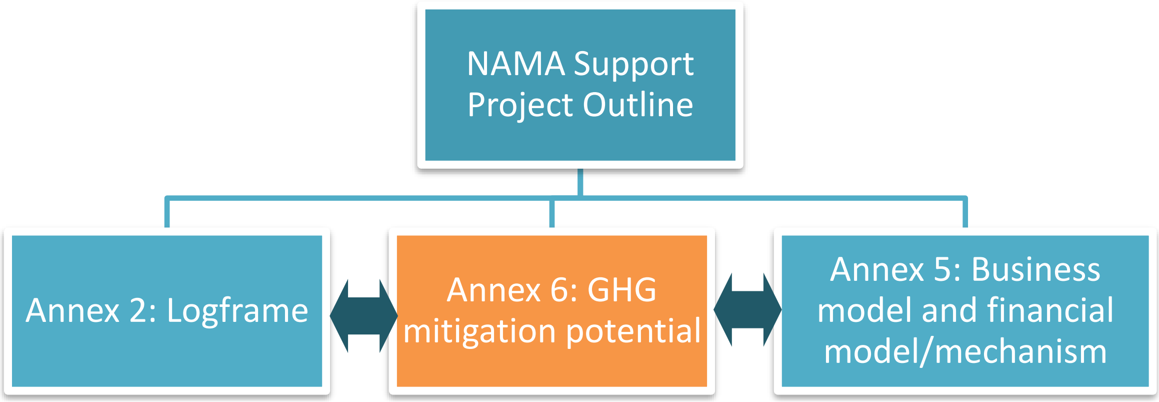
5 Relation to other documents

5.1 Alignment with NAMA Support Project Outline, Annexes 2 and 5

Together with the NSP Outline, the Applicants / ASPs needs to provide additional Annexes besides Annex 6. The Outline and the Annexes should be aligned and consistent with regards to the intended scope, results and assumption/parameters of the NSP. In particular, the Annex on the NSP's logframe (Annex 2) and the underlying Annexes on the business case/model and financial mechanism need to be aligned with Annex 6. For instance, the same assumptions, e.g., on implementation schedule and units should be featured across all documents. This in particular 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 NSP financial support mechanism(s)*
    - *Investment projects within the NSP lifetime*
    - *Investment projects beyond the NSP lifetime*

Figure 7: Relation of Annex 6, the NSP Outline and other Annexes



Source: authors

In the NSP Outline, the results from Annex 6 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 Annex 5a, Annex 5b and Annex 6. 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 25 years, but the emission reductions are calculated for 20 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 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 document.

5.2 NAMA Facility Monitoring and Evaluation Framework

The NSPs aim to contribute to the overall objectives of the NAMA Facility, hence, a harmonised monitoring and evaluation (M&E) system is desirable. An important aspect of NSP 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, NSPs' 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 NSP Outline already takes into account the requirements as defined in the NAMA Facility Monitoring and Evaluation Framework.

The NSP Applicants / ASPs should already at the Outline stage bear in mind that the measurability of the data will be important and essential during the NSP implementation.

6 Sector specific considerations

The Outline Annex 6 template was developed to be used for various mitigation measures applied by NSPs. 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 NSP. This may be also observed on a more generic level for some selected specific sectors. The NAMA Facility would therefore like to provide sector specific guidance on how the Annex 6 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 1A	Agriculture, Forestry and Other Land Use (AFOLU)

In addition, the NAMA Facility is also offering examples for Outline Annex 6. The following examples are currently available:

Example	Description
01	Energy Efficiency (EE) in residential buildings, including renewable energy measures (RE). The example can be found here. In addition, a podcast can be found here.

The NAMA Facility will continue to work on development of further sector specific guidance and Outline Annex 6 examples. Please check the NAMA Facility website on a regular basis.

7 Check list

Section	Completeness check	
Annex 6		
1. Results	Have you filled in the NSP duration (number of years and months) and the requested NSP funding?	☐
	Is the section on NSP cost-efficiency properly filled out? (see performance indicators)	☐
2. Parameters and Assumptions	Is the list of parameters and assumption transparently filled out with sufficient justification and references?	☐
3. Direct emission reductions	Have you described the BAU scenario, the baseline scenario (if different to BAU) and the project boundary (incl. lifetime of the technology)?	☐
	Is the approach/methodology followed for ER calculation (BE-PE-LE=ER) clearly described and justified?	☐
	Are the Baseline Emissions (BE) and Project Emissions (PE) traceably calculated, i.e., no hardcoded numbers but calculations with cell referencing, incl. references to the parameters and assumptions sheet?	☐
	Are leakage and 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), cumulative values over NSP duration, for additional 10 years after project finalisation and over the technology lifetime calculated?	☐
4. Indirect emission reductions	Are the specifications of indirect mitigation effects that are triggered or influenced by the project described (quantify if possible)?	☐
	Are sources of indirect ER and difference to baseline clearly and comprehensibly described?	☐
	Is the methodology and calculation (incl. traceable formulas) for indirect emission reductions presented?	☐
	If the approach for determining indirect emission reductions differs from the methodology applied for direct emissions, have you determined the baseline, project and leakage emissions accordingly?	☐
Outline		
Outline	Are all relevant sections for mitigation, in particular section 3.3 Mitigation of the Outline filled in with the results of the calculation in Annex 6?	☐
	Have the technology and business models (also in Annex 5, if applicable) that lead to the expected mitigation been clearly described? Is the business model presented fully reflected in the approach of the mitigation potential? Ensure alignment of Annex 5 and Annex 6.	☐
	Have you differentiated between direct and indirect mitigation potential and presented the emission reductions indicators (annual, cumulated over NSP lifetime, cumulative values for additional 10 years after project finalisation, over the technology lifetime)?	☐

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 (2006), The Land Use, Land-Use Change, and Forestry Guidance for GHG Project Accounting Retrieved from here (referred to as GHG Protocol LULUCF Guidance).

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).

Intergovernmental Panel on Climate Change (IPCC) (2014), Climate Change 2014: Mitigation of Climate Change. Working Group III Contribution to the IPCC Fifth Assessment Report. Chapter 11: Agriculture, Forestry and Other Land Use (AFOLU). Retrieved from here (referred to as IPCC AFOLU Guideline).

NAMA Facility (2020), Monitoring and Evaluation Framework. Retrieved from here.

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: Agriculture, Forestry and Other Land Use (AFOLU)

1. Introduction and objectives

This chapter outlines key aspects that must be considered when estimating and presenting the mitigation potential of NSPs in the Agriculture, Forestry and Other Land Use (AFOLU) sector. The main objective is to facilitate filling out the Annex 6 appropriately, taking into account sector specific issues (e.g., non-permanence and leakage) 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 AFOLU mitigation calculations and provides guidance on how common pitfalls can be addressed.

AFOLU is an (economic) sector defined by the IPCC which includes activities related to Agriculture, Forestry, and Other Land Use. AFOLU can lead to both CO_2 emissions (e.g. from deforestation) and CO_2 sequestration (e.g. afforestation and soil carbon sequestration). Agriculture activities included in the AFOLU sector can also be a source of CH_4 and N_2O emissions; e.g. CH_4 from livestock enteric emissions and rice cultivation, N_2O from manure management, managed agricultural soils receiving N inputs as well as biomass burning (IPCC 2014).

2. Common pitfalls of AFOLU mitigation calculations

Leakage

To capture actual GHG emission reductions/removals, it is crucial to consider leakage (see section 3.1.4 of this Guideline for general explanation of leakage). Leakage occurs when GHG emission reductions within the boundaries of the project lead to higher GHG emissions elsewhere. This happens, for instance, if a shortfall in meat supply caused by the establishment of agroforestry systems and the cattle is compensated by additional cattle and/or conversion of forests in pastures in other locations. Managing leakage is complex as it requires knowledge about the (future) activities of (diverse) actors within and outside the project boundaries. Applicants / ASPs should conduct a comprehensive leakage assessment as described in section 3.1.4 of this Guideline. If leakage is unlikely to happen, this should be justified.

Non-permanence

To achieve long-term – ideally everlasting – mitigation benefits, GHGs must be permanently kept out of or removed from the atmosphere. While some AFOLU activities (e.g., avoided N_2O from fertiliser or GHG emission reductions from changed diet patterns) are effectively permanent since avoided GHG emissions cannot be re-emitted, others (e.g., agricultural soil carbon sequestration, afforestation and reforestation) have an inherent risk of future reversals. Applicants / ASPs should assess the risk of non-permanence of achieved GHG emission reductions/removals, i.e., the likelihood that sequestered GHGs are emitted back into the atmosphere, either due to natural events (e.g., wildfires, floods, diseases) or human interventions (e.g., forest mismanagement, farmer's decision to convert forests into other land use). Information should be provided on insurance mechanisms that are used to reduce this likelihood (e.g., risk buffer) and on how potential non-permanence would be accounted for and monitored.

Other rebound effects

If applicable, Applicants / ASPs should describe other potential rebound effects resulting from the NSP implementation (e.g., increased nitrous oxide (N_2O) emissions caused by measures to enhance soil carbon sequestration, or increased consumption caused by increases in yields). The Applicants / ASPs should also demonstrate how these effects are minimised.

3. <u>How to address sector specific issues when filling the Annex 6</u>

Calculation

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

- Overall calculation procedure and approach
- Formulae applied for calculating
- 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

Generally, the Applicants / ASPs 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: forest area, tree cover, deforestation rate, land area converted to other land use, managed land, etc.
    - → Potential data sources: ground surveys; local, regional, and national statistics; forest inventories; satellite data
- Carbon stock: quantity of carbon in a pool (e.g., aboveground biomass, below ground biomass, dead wood, litter, and soil organic matter); needed to estimate changes in carbon stock from carbon pools
    - → Potential data sources: default values provided by the IPCC
- Emissions factor(s): the GHG emissions rate(s) of a given source per unit of activity or input. For instance, the IPCC suggests the use of three emissions factors to estimate direct N_2O emissions from managed soils: one for the amount of N_2O emitted from synthetic and organic applications to soils, one for the amount of N_2O emitted from an area of drained/managed organic soils, and one for the amount of N_2O emitted from urine and dung. Emissions factors can differ between ecosystems, geographical and climatic zones, etc.
    - → Potential data sources: emissions factor used in national inventory or in other projects implemented in the country; default values provided by the IPCC

Data units (e.g., ha) should be provided for all numbers and used consistently. It should be clarified how certain key terms are understood and defined, especially those that lack a common definition, such as ‘forest’ and ‘deforestation’.

A detailed explanation should be provided on whether and how the estimation approach takes into account risk discounts for uncertainties, leakage and non-permanence risks, as well as other rebound effects (see sections below). If a specific tool has been used to conduct calculations (e.g., a GHG Protocol for Agriculture tool, a GHG Protocol for Forestry tool), this tool should be made available. Additional calculation sheets should be presented as additional sheets within the Annex

6 rather than just providing a summary. Applicants / ASPs should also give input on the various ecosystems and climatic zones the project would be addressing with differing calculations in case those are needed. Furthermore, Applicants / ASPs should calculate cost efficiency of the proposed investment in relation to direct GHG emission reductions/removals (tCO_2e / EUR of funding). The cost efficiency is unfavourable, for instance, if the conversion of degraded or deforested land into climate-smart agroforestry systems requires large investment volumes but is expected to generate a relatively limited amount of direct GHG emission reductions/removals.

Uncertainty analysis

An accurate measurement or estimation of the GHG mitigation potential of AFOLU activities is difficult compared to other sectors, with GHG fluxes from land use and land-use change activities varying significantly across spatial and temporal scales. First of all, it is not always possible to separate anthropogenic and natural GHG fluxes (e.g., in the case of deforestation caused by fire). Second, the data used to estimate GHG fluxes is often based on (country-level) statistics as well as information retrieved from remote sensing (e.g., satellite data to estimate GHG emissions from forest fires), rather than field measurements. Third, depending on the availability of consistent, precise and up-to-date data as well as stakeholder capacities, methods for quantifying actual GHG emissions/removals range from default methodologies (e.g., an IPCC default methodology to compute stock-difference) and the use of proxies (e.g., carbon loss associated with conversion of forest to other land use as a proxy for GHG emissions from deforestation) to complex estimates (e.g., model-based spatial analyses).

Evidence shows these 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, Applicants / ASPs 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/removals), taking into account 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 (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 Annex 6, all relevant input parameters and assumptions should be listed in Sheet 2 (Parameters & Assumptions). To ensure transparency and traceability, Applicants / ASPs 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 4.4 of this Guideline for further instructions).

Accounting approach

Annex 6 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 (e.g., the FCPF monitoring and accounting 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 NSP 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). Applicants / ASPs should provide full methodological detail on the calculation of baseline GHG emissions/removals, project GHG emissions/removals as well as (expected) GHG emission reductions. This includes the explanation of the selected reference period, if applicable. The Applicants / ASPs should list the sources of information and differentiate between expert knowledge, qualitative and quantitative analyses, modelling, etc.

Direct and indirect emission reductions

The Applicants / ASPs 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 NAMA Facility to choose projects.

GHG removals

Applicants / ASPs should describe and sufficiently explain how GHG removals were calculated. GHG removals are presented as negative (project) GHG emissions.

Example 1: Project plans to reforest 2,000 ha of barren land, creating a natural carbon sink capable of removing 20,000 tCO_2e/a during growth phase. The most likely baseline scenario for the land is continuation of the status quo (i.e., it will continue to lie barren; no GHG emissions/removals expected in the absence of the project). No existing vegetation (tree/non-tree biomass) is cleared. Leakage does not apply for the project activity.

- Baseline GHG emissions/removals (BE_y): 0 tCO_2e/a
- Project GHG emissions/removals (PE_y): -20,000 tCO_2e/a
- Leakage GHG emissions/removals (LE_y): 0 tCO_2e/a
- GHG emission reductions (ER_y) = 0 tCO_2e/a - (-20,000 tCO_2e/a) - 0 tCO_2e/a = **20,000 tCO_2e/a**

Example 2: Project plans to reforest 2,000 ha of barren land, creating a natural carbon sink capable of removing 20,000 tCO_2e/a during growth phase. The most likely baseline scenario for the land is continuation of the status quo (i.e., it will continue to lie barren; no GHG emissions/removals expected in the absence of the project). Existing vegetation (tree/non-tree biomass) is cleared[6], creating 5,000 tCO_2e in the first project year. Leakage does not apply for the project activity.

Year 1

- Baseline GHG emissions/removals (BE_y): 0 tCO2e/a
- Project GHG emissions/removals (PE_y): 5,000 tCO_2e/a -20,000 tCO_2e/a
- Leakage GHG emissions/removals (LE_y): 0 tCO_2e/a
- Emission reductions (ER_y) = 0 tCO_2e/a - (-20,000 tCO_2e/a + 5,000 tCO_2e/a) - 0,000 tCO_2e/a = **15,000 tCO_2e/a**

Year 2

- Baseline GHG emissions/removals (BE_y): 0 tCO_2e/a
- Project GHG emissions/removals (PE_y): -20,000 tCO_2e/a
- Leakage GHG emissions/removals (LE_y): 0 tCO_2e/a

[6] In this example, the existing vegetation has no removal capacity. If the existing vegetation would remove a certain amount of carbon from the atmosphere per year, it would be counted as baseline GHG removals.

- Emission reductions (ER_y) = 0 tCO_2e/a - (-20,000 tCO_2e/a) - 0 tCO_2e/a = **20,000 tCO_2e/a**

Example 3: Project plans to improve the level of fertilization over 1,000 ha of cropland, by shifting from low fertilization practice (removal of residues from the field) to high fertilization practice (use of green manure and cover crops), enabling an increase of C inputs. The baseline scenario for the fertilization practice is the continuation of the status quo (i.e., low fertilization practices are maintained) which will contribute to further reduce soil carbon stocks. The project will improve carbon sequestration compared to the baseline scenario by enabling reduced loss of carbon stocks by 300 tCO_2e/a during the time period for soil carbon stock change (20 years in this case). Leakage does not apply for the project activity.

- Baseline emissions from decrease in soil organic carbon (SOC), ($BE_{SOC,y}$): 1,223 tCO2e/a
- Project emissions from decrease in SOC ($PE_{SOC,y}$): 923 tCO_2e/a
- Leakage (LE_y): 0 tCO_2e/a
- Emission reductions (ER_y) = 1,223 tCO_2e/a - 923 tCO_2e/a - 0 tCO_2e/a = **300 tCO_2e/a**

Further information can be found at IPCC AFOLU Guideline (2014), GHG Protocol (2005) **and** GHG Protocol LULUCF Guidance (2006)

Appendix B: Glossary

Please consult also the general NAMA Facility Glossary available here.

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 as a result 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.

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 NSP funding during the NSP period:

- Units must be installed / measures must be implemented during NSP period
- Timing of mitigation effect: during NSP period, during period of 10 years after NSP end and over technology lifetime (but only for those units installed during NSP 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 NSP 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 NSP period
- Results of financial cooperation (FC) component but only for units installed / measures implemented after NSP end, as result of the continuation of the financial mechanism
- Timing includes:
    - Technical cooperation: during NSP period and during period of 10 years after NSP end, (during lifetime: optional)
    - Financial cooperation: for units installed after NSP end for period 10 years after NSP 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, improving the insulation of buildings, and expanding forests and other 'sinks' to remove greater amounts of CO_2 from the atmosphere.

Mitigation / NSP 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 NSP 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 NSP and the specification of GHGs and sources under the control of the project participants that are significant and reasonably attributable to the NSP, 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.

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.