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Federal Department of the Environment, Transport, Energy and Communications

**Federal Office for the Environment FOEN**
**Swiss Federal Office of Energie SFOE**

# Process description for authorization and specific requirements for Monitoring, Reporting and Verification of mitigation activities under Art. 6 of the Paris Agreement

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## 1. Introduction

The Federal office for the environment (FOEN) is the Swiss regulator for emission reduction projects in the Swiss compliance market. It is running the compensation office (CO) together with the federal office of energy (SFOE). Mitigation Activities (MA) under Art. 6.2 of the Paris Agreement (PA) have to be authorized by FOEN and the host country of the emission reduction activity.

This document describes the processes of the compensation office CO from authorization application to issuance of international attestations, as they are called in the domestic regulation, or International Transferred Mitigation Outcomes (ITMOs), in PA terminology.

It also outlines additional, project-specific requirements that complement those of the $CO_2$-Ordinance, particularly regarding the definition of parameters and monitoring concepts. Based on initial experience with authorized projects, existing methodologies, and external evaluations, FOEN is establishing specific criteria to ensure compliance with the Swiss $CO_2$-Ordinance and to promote high-integrity emission reductions.

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## 2. Process description for authorization

**General remarks**

Mitigation Activity Design Documents (MADD), including the methodologies, volume of ITMOs and other restrictions are defined by the partner country. FOEN will not issue any international attestation without the consent of the partner country.

On the other hand, the CO does always specifically evaluate the MA to assure the compliance with PA, with the corresponding bilateral Agreements and with the Swiss legislation (see $CO_2$-ordinance under Section 6). The CO might formulate additional restrictions, require adapted methodologies or even refuse the authorization of MA or issuance of international attestations. This has various implications that differ from processes during the CDM: 1) Methodologies are not accepted/registered per se but should be used as a starting point for project-specific adaptations. 2) The version of the MADD that has been sent to validation can differ from the MADD that is finally authorized. A feedback process to the VVBs is implemented to continuously adapt to the requirements.

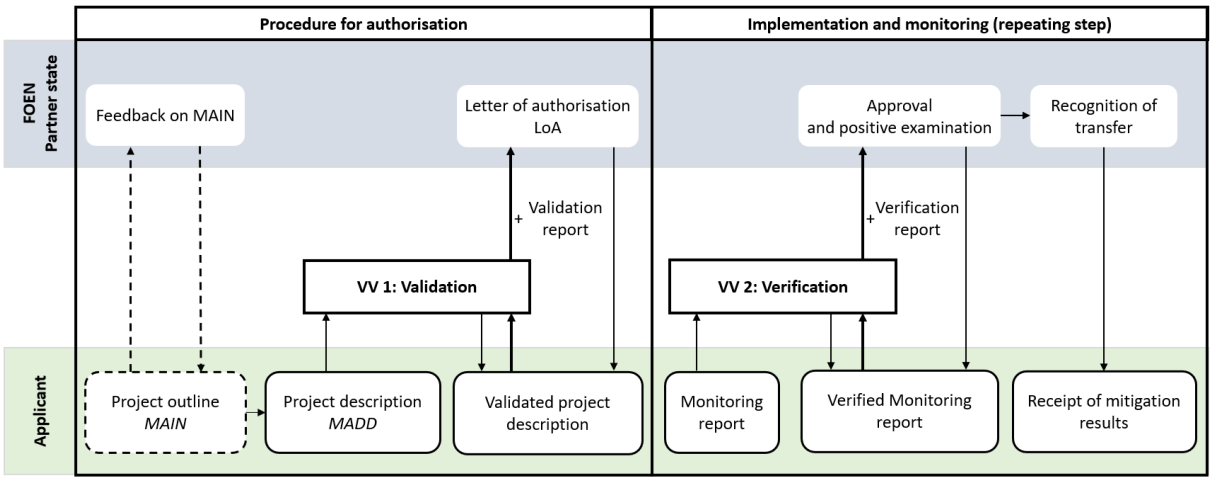


Figure 1 Diagram of the procedure for authorization applications and issuance of attestations abroad. While they do not appear in Swiss legislation, the following terms are used for activities abroad: LoI (Letter of Intent), MAIN (mitigation Activity Idea Note) = Project description, MADD (mitigation activity Description Document)= Project description, LoA (Letter of authorization).

**Mitigation Activity Idea Note, MAIN (see 3.2 in Communication of FOEN)**

An optional step before authorization application can be to ask the CO for an assessment of a Mitigation Activity Idea Note (MAIN) or draft MADD. As a reaction a Feedback on the MAIN (formerly called “Letter of Intent (LoI)”) can be issued. This includes a preliminary assessment. The better the MAIN (or draft MADD) is, the better the responses of the CO can be. CO will already contact other concerned offices from the Swiss administration to incorporate their feedback in the response.

Confirmatory feedback will only be issued for projects implemented in partner countries with existing bilateral agreement or where negotiations about a bilateral agreement are in an advanced phase.

The feedback (formerly LoI) does not influence the subsequent evaluation of the MA. **Authorization (see 3.4 in Communication of FOEN)**

The MADD has to be validated by an approved validation body (approved in the partner country and in Switzerland). It has to contain the Mitigation Activity Summary MAS (template can be downloaded on the website of FOEN, link see in Section 3). Both MADD and validation report have to be sent to

the CO by mail. The MADD also has to be signed and sent by post to the CO. The post stamp marks the date of submission. This date is important, since the implementation of the MA cannot start more than 3 months before this date. Note: for Switzerland the time when the applicant makes a significant financial commitment to a third party or itself takes organizational measures relevant to the project or programme is already deemed the start of implementation.

The CO will start examination, once the validated MADD and the corresponding validation report is received. After a formal examination, a comprehensive examination starts on the technical level. During this examination clarification requests (CR) and/or corrective action requests (CAR) can be formulated, and the project proponent might have to adapt the MADD to assure the compliance with the Swiss legislation. The final authorized MADD might therefore vary from the validated version. This process took between 4 and 6 months for the first authorized projects. An acceleration of the process in the long-term is expected. After the CO has finished its examination, it will consult with the other concerned offices of the Swiss administration at the operational level for their agreement and inputs (so called HF6 consultation), which on average takes one week. Once all offices agreed, the strategic level (so called POL) of the offices is asked for the final decision, which on average takes another week. After this decision, Switzerland is ready to issue the authorization statement, including an updated initial report. But Switzerland will only issue the authorization once the authorization statement of the partner country has been received by the CO. Informal exchanges between Switzerland and the partner country should take place before the formal authorizations such that findings and possible issues can be clarified in advance and the issuance of the authorizations coordinated.

Note:
- CO can confirm the decision of the POL to help the partner country take their decision about the authorization statement.
- The examination of the MADD is more than a formal step of authorization. It might even result in a rejection of the MA. The use of established methodologies (CDM, GoldStandard, etc.) are no guarantee for an authorization. The CO might ask for additional requirements, if these are necessary to comply with Swiss regulation.

Submission of authorization application has to be provided with the following documents:

| Document | Electronically | By post |
|---|---|---|
| Project or programme description, duly validated and signed (including annexes) | X | X |
| Redacted project or programme description, if redaction is desired | X | – |
| Signed validation report (including annexes) | X | – |
| Redacted validation report, if redaction is desired | X | – |
| *Abroad:* Project or programme authorisation granted by the partner country, duly signed[18] | X | – |

**Monitoring, reporting and verification (see 3.7 in Communication of FOEN)**

The Monitoring Report (MR) has to be verified by a verification body (approved in the partner country and in Switzerland). Both MR and verification report have to be sent to the CO by mail. The MR also has to be signed and sent by post to the CO. The post stamp marks the date of submission. This date is important, as it determines whether the deadline for MR is respected. MRs can contain max. 3 years (monitoring period) and have to be sent to the CO within one year after the end of the monitoring period. The verification body needs to be different from the initial validation body.

After the submission of the verification and monitoring reports by the verifier, a non-objection period of 90 calendar days applies for both Switzerland and the partner country until the approval of the reports takes automatic effect. The approval may take earlier effect if Switzerland and the partner country confirm the reports ahead of the non-objection period of 90 calendar days through a written non-objection. Within the same 90 calendar day period, the partner country shall also examine the mitigation outcomes covered by the submitted MR against the requirements in Article 7.5 of the bilateral agreement (no double claiming, no discrepancy with authorization statement, no violation of human rights or national legislation) and shall publicly issue a statement of positive examination. The issuance of a statement of positive examination by the partner country automatically entails the approval of the underlying monitoring report.

The CO will start examination of the verified MR upon receipt by the verifier. After a formal examination, a comprehensive examination starts on the technical level. During this examination clarification requests (CR) and/or corrective action requests (CAR) can be formulated and the project proponent might have to adapt the MR to assure the compliance with the Swiss legislation. The final accepted MR might therefore vary from the verified version. This process might take 3 months or longer, depending on the MA. After the CO has finished its examination, it will consult with the other concerned offices of the Swiss administration at the operational level for their agreement and inputs, which takes typically one week. Once all offices agreed and the publicly available examination statement of the partner country is available, the strategic level of the offices is asked for the final decision, which takes typically another week.

The CO can send a confirmation of the examination status (notification of positive examination) of the MR before the final decision of the strategic level is taken, in case the final decision of the partner country needs such a confirmation. If the examination statement of the partner country has already been received, the CO has to confirm the fulfilment of the requirements for transfer within 30 calendar days, and make it publicly available.

Once positive examination statements have been issued by both Switzerland and the partner country, the mitigation outcomes may be issued within the registry of the partner country.

The Entity authorized to Transfer may request the transfer of mitigation outcomes. The transfer can occur upon issuance of recognition of transfer by the partner country, which includes the identification of the mitigation outcomes, proof of cancellation of transferred units inside the partner country registry and the commitment to undertake corresponding adjustments in line with the method chosen by the partner country pursuant to Article 10 of the bilateral agreement. Upon receipt of the recognition of transfer of the partner country, Switzerland will publish its own recognition of transfer and subsequently issue the attestations in the Swiss registry within 4 weeks.

Switzerland and the partner country shall undertake relevant reporting in accordance with the guidance adopted under Article 6 paragraph 2 of the Paris Agreement, including relevant corresponding adjustment.

Submission of MR has to be provided with the following documents:

| Document | Electronically | By post |
|---|---|---|
| Monitoring report, duly verified and signed (including annexes) | X | X |
| Redacted monitoring report, if redaction is desired | X | – |
| Signed verification report (including annexes) | X | – |
| Redacted verification report, if redaction is desired | X | – |
| *Abroad:*<br>Project or programme authorisation granted by partner state and duly signed[24] | X | – |

Plus (should be part of the MR document):

- Identification of the project proponent
- Amount of ITMOs and vintage year
- Reference to the underlying authorization

The CO then accepts the MR as a request for transfer, if it contains all the beforementioned information.

## 3. Fraction of non-renewable biomass fNRB

MA reducing the use of non-renewable biomass (i.e., cookstoves or biogas) need to establish robust methodologies for determining the Fraction of Non-Renewable Biomass (fNRB). fNRB describes the part of biomass that will not regrow within reasonable time scales. Therefore, emissions coming from burning non-renewable biomass are considered to stay in the atmosphere for a long time, while carbon emissions from renewable biomass are removed from the atmosphere by the regrowing biomass. The parameter fNRB plays a crucial role in quantifying the effects of such activities and ensuring the integrity of emission reduction claims.

To achieve this goal, Switzerland proposes a conservative approach that draws on international studies and tries to incorporate the lessons learned from projects registered under other standards. By utilizing existing research and methodologies we want to enhance transparency, accuracy, and comparability across projects and regions.

Switzerland will authorize MA using an fNRB value of max. 30% as a default. MA can either use this value as a fixed parameter for the crediting period, or define it as a dynamic parameter. Switzerland and the partner country may however define country-specific alternative fNRB values with a regional resolution. In such case, the MA may use the new values. The new values at a regional level shall however be reflected in the MA methodology.

New values have to be based on a study that Switzerland and the partner country agree on.

There are three main aspects, deeming Switzerland to be key for establishing such a study:

*fNRB-values shall have a regional resolution.*
It is known that fNRB can vary greatly within a country. Adopting a regional resolution approach enables us to account for variations in biomass composition, availability and demand across different geographical areas. By tailoring the fNRB to specific regions, we can capture local nuances and ensure that the methodology reflect regional realities as good as possible.

*Participation of a multilateral party or bilateral parties.*
Clear criteria for the sources and quality of data and methodologies used in determining fNRB shall be established. To maintain credibility and avoid potential conflicts of interest, studies conducted by project developers will not be considered. Instead, Switzerland prioritizes independent, peer-reviewed research and studies. International review may be conducted by UNFCCC, or by involving both the partner country and Switzerland in the development of the study.

*MoFuSS[1] model has to be taken into account in the study*.

[1] MoFuSS is an open-source freeware. It is primarily modelling degradation rather than deforestation. Degradation occurs under the forest canopy or in open non-forest areas with low tree density. Monitoring these changes is more difficult than monitoring deforestation, which can be assessed by looking at changes in the canopy cover.

Expert knowledge and extending experience, including historical data to determine fNRB values are only within partner countries. Therefore, Switzerland will consider fNRB values established by a partner country, as long as they are compared with values from MoFuSS. As there is no way to objectively measure fNRB, and even though no model is perfect, modelling remains the best way to go ahead. Switzerland makes a strong connection to UNFCCC-funded studies, based on MoFuSS, as this model has been published after scientific peer-review and is being further developed under UNFCCC . Further, Switzerland considers the approach within MoFuSS related to i) its logistic growth function, ii) the aggregation of many years instead of a snapshot and ii) future projections to represent the state-of-the-art. If a study bases fNRB values on a different model than MoFuSS, deviations from MoFuSS shall be explained, input data has to be traceable and the study has to be reviewed by a third, independent party.

The following table gives an overview of the different ways to determine fNRB values and the consequences for authorization by Switzerland.

Table 1: ways to determine fNRB and requirements for authorization.

| fNRB value derivation | Authorization by Switzerland possible? | Regional resolution necessary? | comment |
|---|---|---|---|
| **30% or lower** | yes | no | Default value in-line with previous decision of the Compensation Office and CDM Tool 33. If a national fNRB values is lower than 30%, but no regional values are defined, 30% may be applied but only as a dynamic parameter. |
| **Higher value derived from MoFuSS-model including international review.** | yes | yes | International review may be conducted by UNFCCC, or by incorporating Switzerland and the partner country in the development of the study.<br><br>Project proponents may be allowed to challenge the model's input parameters and host countries may request updates to the input data of the MoFuSS model. If updated reliable and demonstrable conservative data are available, this can be considered in an updated calculation with MoFuSS and will be assessed on a case-by-case basis. |
| **Higher value derived from different models, but differences to MoFuSS can be explained and input data is traceable and third, independent party reviewed.** | yes | yes | A cross check of data has to be part of the study. |
| **Higher value derived from MoFuSS based on input data from the project developer only, i.e. without third, independent party review.** | no | n.a. | |
| **Higher value derived from other models, only.** | no | n.a. | |
| **Higher value derived from CDM Tool 30, only.** | no | n.a. | |

In the model, each year's wood harvest is simulated by considering the fuelwood and/or charcoal consumption from every populated pixel on a map and the accessibility of woody biomass to those pixels. Accessibility for both rural fuelwood (transported on foot) and urban fuelwood and charcoal (transported in vehicles) is determined by distance and terrain including factors like elevation, land cover, and road networks, while also accounting for borders and protected areas. Urban fNRB appears to be low because the model assesses fNRB based on the harvest location. Demand in urban areas is met by other regions.

In particular, the logistic growth function (which in our view is more representative than the assumption of constant growth in CDM Tool 30) also makes MoFuSS dependent on the assumptions about the current biomass stock in relation to the maximum stock.

## 4. Plausibility check for cookstove-related activities

This section sets out the CO's minimum requirements for monitoring plans for cookstove-related activities. The main goal is to accurately quantify emission reductions and to avoid the risk of over-crediting, pursuant to Art. 5 al. 1 let. c No. 4 of the Swiss $CO_2$-ordinance. The quantification of emission reductions achieved by mitigation activities that reduce fuel consumption is directly linked to household fuel consumption, usage rate, and the number of stoves installed. It is therefore essential that the monitoring plan, sample design and sample size are set out in a way that reliably and accurately reflects these factors. It is important to note that the following conditions apply in addition to the general requirements for offset projects and programs of the $CO_2$ Ordinance[2].

### Monitoring design overview

Description of the target population: In order to account for project-specific circumstances in the monitoring plan, a description of the target household and their livelihoods must be provided. This should include insights into their activities and practices, as well as social and environmental factors that influence them. The objective is to evaluate the diverse behaviours of the target households in relation to fuel consumption, cooking practices and the primary influencing factors. These may include geographical location, seasonality, income, as well as the different occupations and household structures of the households in question. The results of this evaluation should be incorporated into the sampling design, for example through the use of stratification. Key stratification examples are: i) the differentiation between urban and rural households; ii) the differentiation between different stove technologies. Some influencing factors may not be relevant due to their inclusion in the definition of the target population.

Each cookstove/household is considered an individual project within a program. Therefore, inclusion criteria must be clearly defined, and each cookstove/household must fulfill these criteria to be eligible for inclusion.

The inclusion criteria must be explicitly defined and designed to ensure that every project included in the program meets the requirements of Art. 5a al.1 let. c of the $CO_2$ Ordinance. The inclusion criteria are exhaustive and must ensure the assessment of each project for inclusion in a programme. If a project fails to meet the inclusion criteria, it cannot be part of the program.

The inclusion criteria should be presented in a structured format (e.g. table), clearly specifying:

1. Eligibility Criterion
2. Applicability of the Criterion
3. Means of Verification

[2] The requirements can be updated whenever relevant changes occur in international stove monitoring requirements (e.g. Clean Cooking Alliance, CCA guidance).

Example for inclusion criteria:

| No. | Eligibility Criteria | Applicability of Eligibility | Means of Verification |
|---|---|---|---|
| **1** | Geographic Area | Describe where stoves will be installed. Urban and rural settings shall be differentiated. | • Total Sales Record/ Programme Database including name, address, phone number of the beneficiary, date etc.<br>• Cross-check the urban or rural characterization of the household with local statistical Data |
| **2** | Baseline fuel profile | Explain which baseline fuels are eligible and which are excluded if any. Differentiation between urban and rural shall be taken into account. | • Total Sales Record/ Programme database including name, address, phone number of the beneficiary, etc.<br>• Pictures of the kitchen areas and baseline stoves before installation with GPS coordinates and date.<br>• Cross-check with local statistical Data on % of fuels consumption (Urban/Rural is differentiated) |
| **3** | Avoidance of double counting: Emissions reductions achieved by the cookstoves in the activity cannot be claimed elsewhere | Each cookstove sold under the activity requires the acknowledgement and acceptance of a carbon waiver by the beneficiary. | • Sales records<br>• Carbon waiver |
| **4** | The distribution of the cookstove under the programme are additional | The beneficiary payback period will be monitored during the ex-post surveys and compared with the ex-ante values. | • Details can be verified by the monitored parameters- Fuel price ($P_{fuel}$) and device payback period ($P_{payback}$). |
| **5** | The parameters necessary to calculate emissions reductions achieved by the programme can be measured and checked for plausibility | All parameters described in the MADD for calculation of the emissions reductions are determined ex-ante or monitored during the activity's implementation. | • (specific references to the MADD) |
| **…** | | | • |

Please note that these are just examples and may not fully apply to your specific project context. For other examples, please also see already registered Projects abroad.

## Real time data collection from the field

Emission reductions are only recognized if they “are verifiable and quantifiable". Realtime data from the field are the basis for a recognizable quantification of the emission reduction (According to Art. 5 al, 1 let. c No. 1). Data **shall** be collected using:

1. **KPT:** The Kitchen Performance Test (KPT) is the principal field–based procedure to measure household fuel consumption in the baseline as well as in the project scenario (Specific fuel savings - SFS). The application of KPT can be based on latest methodologies, such as the Gold Standard Reduced Emissions from Cooking and Heating: Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC)[3], or the Comprehensive Lowered Emission Assessment and Reporting 2 (CLEAR) Methodology for Cooking Energy Transitions[4]. FOEN may have additional requirements beyond those of established methodologies. In addition to the metered data on electric stoves, KPTs are used to evaluate actual usage and reductions in solid fuel in the baseline and project scenarios. Therefore, metered data on electricity consumption does not replace KPTs; it is additional.

2. **Stove use monitors (SUMs)** (usage rate): The usage rate must be checked for plausibility using continuous sensor-based measurements of stove usage (temperature, electricity usage).

3. **Surveys** (qualitative): represents a qualitative data acquisition to gauge how people feel about the cook stoves, to identify problems quickly, to check plausibility of the inclusion criteria of the projects in the program, usage rate (SUM) and fuel consumption (KPT) and finally to check the Sustainable development goals defined in the program are met.

4. **Appropriate sample design**

Requirements to minimize the risk of over-crediting are set out below for each of the data collection approaches 1-4.

### 4.1. The Kitchen Performance Test (KPT)

#### 4.1.1 General requirements

- The selection of households to participate in KPT’s has to be randomly selected. The MADD shall describe in detail how this will be assured

- KPTs shall be performed in at least two groups of households, one using the old stove (reference households = baseline) and one using the new stove (project households). The reference household should be representative of the participants targeted by the project activity. The MADD shall explain how this is assured.

- Baseline and project KPTs have to be performed simultaneously throughout the year, e.g. quarterly, to capture possible seasonality effects. If stratification is defined in the MADD, e.g. i) urban and rural households, ii) different project cookstove types, etc., the KPT shall further differentiate this stratification and the sample size shall be calculated accordingly for each stratum (see section 4.4. Sampling design).

- The MADD shall be described how people will be motivated to participate, especially for the reference households which are not receiving an improved stove.

[3] https://globalgoals.goldstandard.org/407-ee-ics-technologies-and-practices-to-displace-decentrilized-thermal-energy-tpddtec-consumption/

[4] https://unfccc.int/sites/default/files/resource/A6.4_PNM004_appendices_methdology_clear.pdf

#### 4.1.2 Duration of measurement

Appropriate KPT test periods shall be chosen. It shall be explained how the period captures the representative cooking pattern. Please explain how the amount of KPT test days (min 3 days) is determined and why the test period is appropriate.

#### 4.1.3 Frequency of data collection

To account for variation in climate (in space and time) and other external factors (e.g. traditions or other occupations which could influence cooking habits) influencing the consumption of fuel during the year a frequent monitoring is required. It must be clearly explained how the chosen frequency and duration of the measurement cover the possible seasonal variations in consumption. Any external factor that could influence consumption fluctuations must be discussed. An ongoing coverage during the monitoring period is considered best practice and any deviation from this has to be explained.

#### 4.1.4 Sample size

If not all the program participants can be measured a representative sampling approach can be applied. The number of KPTs conducted shall be determined in the sampling design (See Sampling design section 4.4).

### 4.2. SUM (Stove use monitors = Sensors), usage rate

The usage rate must be checked for plausibility using continuous sensor-based measurements of stove usage (temperature, electricity usage). For instance, sensor data can be used to verify stove usage established through KPT.

#### 4.2.1 General requirements

Ideally, sensor installation shall be done on the cookstoves of all the active projects otherwise deviation of this target shall be justified.

#### 4.2.2 Duration of measurement

Duration of Measurements should be as far as possible ongoing (continuous) and last at least a year. Deviations from these requirements shall be justified.

#### 4.2.3 Frequency of data collection

If digital data reception is not possible, data should be collected frequently to ensure no data loss.

#### 4.2.4 Sample size

A sampling approach may be used if it is not possible to obtain digital data following the requirements in section 4.4.

### 4.3. Surveys

Surveys should be conducted at different stages of the project and are project specific. The complete survey/questionnaire is part of the MADD. Suitability of questions in the surveys shall be assessed during the monitoring/verification and if needed adapted.

It shall be explained how data is collected and where it is stored as well as who will be responsible for data collection. Finally sample design as well as sample size shall be explained.

- **First survey before start of project:** This survey shall occur before stoves are sold or distributed. The survey may also include households that do not adopt the stove. The goal is to estimate how people feel about the stove, to identify differences among the households such basic social, economic and cooking information of the community families, to identify eligibility of household participation and to check plausibility of inclusion criteria. First survey will also influence sample design.

- **A follow-up survey (first check after installation):** This could be conducted after the stove has been in use to identify both strengths and weaknesses in the stove's performance and to quickly correct problems.

- **Monitoring survey:** The goal is to acquire qualitative data about performance and use of the stove. The data collected should be in line with the parameters used for the calculation of the ER— Plausibilisation of inclusion criteria and KPT/SUM data. Finally, parameters to monitor and verify SDG alignment shall be collected.

## 4.4. Sampling design

If the entire target population cannot be measured a sampling approach can be applied. The sampling must be unbiased and ensure reliable estimates of the parameters used in the calculations of greenhouse gas emission reductions. In the following minimum requirements for the sampling design are set.

Sampling design must be explained and justified for suitability and representativeness of the target population. A random sampling is compulsory and is in principle conducted by FOEN, possibly in coordination with the partner country, based on the information provided and at the request of the project owner. Representativeness of target population (e.g. different technologies, difference between urban and rural areas, household compositions, climate etc.) shall be considered in the sampling design. Consequences if a random selected household cannot be properly accessed shall be described in the monitoring plan.

The following must be considered:

- The latest version of the sample size calculator from CDM (sampling and surveys for CDM projects activities shall be used)[5]

- In case of a stratified sampling approach: Sample size shall be defined for each stratum independently.

- Dropout should be considered in the determination of the sample size with a realistic dropout rate so that the minimal calculated sample size can actually be reached.

- Sample design is adapted regularly according to real data (mean and standard deviation). The sample size shall be recalculated after each monitoring period using to the CDM tool. As a result, the sample size may increase or decrease based on the actual variation seen in the monitoring data.

- Expected mean / SD must be comprehensible and credibly justified (data)

- A high level of confidence/precision shall be applied 95/5. The imprecision of 5% must be discounted from the calculated emission reductions to avoid over crediting (Art. 5 para. 1 let. c

[5] Sample size calculator version in 2025 in Annex 6 of : https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20151023152925068/Meth_GC48_%28ver04.0%29.pdf

No 4 $CO_2$ Ordinance). If the imprecision goes beyond 5% with the actual measurements during monitoring, this higher imprecision shall be discounted from the calculated emission reductions.

Example:

**$ER_y = BE_y – PE_y - LE_y$ –imprecision adjustment factor**

Where:

$ER_y$ Emission reductions in year y ($tCO_2e/yr$)

$BE_y$ Baseline emissions in year y ($tCO_2e/yr$)

$PE_y$ Project emissions in year y ($tCO_2e/yr$)

$LE_y$ Leakage emissions in year y ($tCO_2e/yr$)

- It must be stated what % of the ER is covered by the sample (transparency measure)
- The performance of the random sampling shall be explained in the MADD. Random selection of projects shall be performed by the FOEN and possibly in coordination with the partner country. The applicant submits the full list of active projects including planned new projects to the $CO_2$ Compensation office for random sampling before the start of monitoring.

# 5. Requirements for Methane Emission Reduction Projects in Rice Cultivation

## Summary

Mitigation activities that reduce methane emissions through adjusted water management in rice cultivation (e.g., Alternate Wetting and Drying, AWD) require robust methodological guardrails.
These guidelines outline the requirements for methane emission reduction projects in rice cultivation and are intended to facilitate the assessment of such projects by regulators and validators. The list of criteria is not exhaustive and should be applied alongside the general guidelines for all $CO_2$-compensation activities. It does not constitute an automatic methodological approval, as the criteria may be adjusted depending on project-specific circumstances and evolving requirements.

The basic emission reduction mechanism of AWD-type projects is the reduced release of methane from soil during rice cultivation through a change in water management. Historically, continuous flooding of fields is applied. Given the prolonged period of anaerobic conditions on the rice fields, substantial amounts of methane (approx. 3-6 $tCO_{2eq}$ / ha / season) are released. Adjusted water management (e.g. via AWD) reduces methane emissions by periodically draining rice fields. Thereby, oxygen is introduced into the soil and methane release is reduced (approx. 1-3 t $CO_{2eq}$ / ha / season). The process of greenhouse gas emissions is complex. Soil is a complex biological system. Even within one field the soil and its interaction with the atmosphere can vary. Furthermore, it depends on temperatures, the way it is treated, fertilizers, etc. Due to these multi-factorial influences it is especially important to have robust monitoring based on measurements.

**Common practice analysis (Additionality (Art. 5.1.b.1, $CO_2$-O))**

- A thorough common practice analysis shall be carried out using independent data (e.g. from agricultural census data, peer-reviewed scientific literature or similar). It shall be assessed whether activities of the same project type are registered under other carbon market standards (Verra, Gold Standard et al.).
- Inclusion criteria shall include the assessment of common practice as well as define a historical lookback period, ideally including satellite imagery evidence of water practice during previous growing seasons.
- Common practice shall be assessed depending on a suitable geographical stratification. *For example: Country XY has a rate of AWD application of 2 % of total rice fields, but in the region xy, where the activity shall happen, the rate is 25 %. This would mean that the activity in the given region is actually common practice.*

**Financial analysis and benefit sharing mechanism (Additionality (Art. 5.1.b.1, $CO_2$-O))**

- An investment and barrier analysis shall be provided and can be based on the explanations in Chapter 6 of the communication by FOEN.
- Importantly, the financial analysis shall be carried out on the individual farm(er) level.
- Depending on the stratification approach taken, the size of the included farms shall be discussed. The size of the farm may impact the financial additionality analysis (economies of scale effects, especially if water pumping is involved).
- If relevant, savings related to lowered use of diesel water pumps used for irrigation or any other savings due to the lower water use shall be included in the additionality analysis on the farm level.
- The carbon revenue impact for farm(er)s shall be clearly stated and the benefit sharing mechanism shall be defined in the MADD. The monitoring concept has to include verifiable proof of the described sharing mechanism.
- The effect of the AWD intervention on rice yields shall be considered for the additionality analysis.

**Inclusion criteria (Programs, Art. 5a.1.c $CO_2$-O)**

- For programmatic approaches, concrete inclusion criteria shall be defined along with the exact data acquisition mechanism and plausibility checks.
- Specifically, the mechanism for the acquisition of the exact coordinates of participating rice field areas shall be described.
- Utility and workability of digital media for continuous monitoring shall be discussed. If digital platforms are used, data transmission shall be discussed (how is the internet connection? What kind of information is recorded and how? What happens if no cellular connection is possible?).
- If relevant, exclusion criteria shall be defined in the case of non-compliance with inclusion criteria or if withdrawal is requested by the participant. The inclusion criteria are generally assessed once at the start of the program for any given participant. This can include the willingness and availability to provide data in the digital MRV platform. A mechanism shall be described explaining how non-compliance will be handled. Lastly, plausibility checks of the inclusion criteria (e.g. via satellite imagery) shall be defined wherever possible.

**Emission reductions calculation (Art. 5.1.b.3 and Art. 5.1.c.1, $CO_2$-O)**

- The impact of $N_2O$ emissions as well as $CO_2$ (via soil organic carbon) on the total GHG emissions balance shall be discussed. Fertilizer application may lead to substantial $N_2O$ emissions in both baseline and project scenarios and shall be discussed; specifically, its integration in the MRV approach and the impact on the ER calculation. Similarly, soil organic carbon may be significantly changed via the application of AWD and shall be discussed.
- Uncertainties related to the quantification of the relevant greenhouse gases ($CH_4$, $N_2O$, $CO_2$) shall be discussed and their effect on the ER calculation shall be included as well.
- Potential leakage from limited water availability shall be discussed under the project specific circumstances.
- Seasonality and its effect on the ER calculation shall be discussed.

**Baseline setting (Article 6.2.d, $CO_2$-O)**

If relevant, a stratification approach shall be described and detailed in the MADD and shall include, inter alia:

- Water regime
- Soil type
- Organic matter management
- Fertilizer application
- Climate zones

**Monitoring (Article 5.1.c.1, $CO_2$-O)**

Measurements of both project field as well as baseline control sites must be clearly and comprehensively described in the MADD. These may include, but are not limited to:

- water level sensors
- satellite imagery and remote sensing, especially to monitor water levels for each field participating in the program
- closed chamber GHG measurements ($CH_4$, $N_2O$), including an explanation of frequency, duration and location of measurements to be rolled out to deliver statistically viable proof
- SOC content
- Modeling of soil methanogenesis and nitrous oxide fluxes
- PVC tubing (including a pre-defined density of the number of PVC tubes per ha or per farm)

# 6. Guidelines for Photovoltaic Projects

## 1. Types of Photovoltaic (PV) projects

PV offset projects can take several forms:

1.1 PV plants for self-consumption: these systems are typically installed on rooftops or other structures such as parking areas or garages. Their main purpose is to replace electricity from the grid or generated by fossil-fuel generators (genset) or both (reference). If permitted by local regulations, electricity surplus not consumed on-site can be injected into the grid (see also below). Such projects are often grouped into a programme.

1.2 PV plants for grid injection: these are ground-mounted solar farms that inject renewable electricity into the grid. Their purpose is to replace electricity produced with fossil energy in the reference scenario, thereby reducing the national grid emission factor.

1.3 PV plants with Battery Energy Storage System (BESS): In some cases, PV plants are combined with BESS. These systems store surplus electricity produced that cannot be consumed on site and/or injected into the grid. For example, during company shutdowns or maintenance periods (no or low consumption) or when the grid cannot absorb the electricity produced. Electricity can be stored to be sold at later date at a better price. BESS is not covered in detail in this document.

1.4 PV-plants for e-mobility charging: these systems are coupled with e-mobility projects/programmes and are not covered by these guidelines document.

This document provides guidance specific to photovoltaic technology. General requirements (e.g art. 5 - 6 of the $CO_2$ ordinance) must still be included in the MADD and discussed in the validation report.

## 2. Grid Emissions factor

Grid emission factors must be taken from official government publications. If official data are not available, the applicant shall use the values provided on request by the compensation office.
The emission factor must be updated regularly and must not be older than two years prior to the monitoring period.

## 3. Reference and project scenario

### 3.1 PV for self-consumption

The reference scenario is the amount of electricity from the grid or from fossil generators that will be replaced by solar electricity generated through the project. Emission reductions are calculated by multiplying the electricity consumption (kWh) in the reference scenario by the grid emission factor of the host country (see also above). The following key aspects must be considered:

#### 3.1.1 Project duration:

the standard project duration is 25 years and must be reflected in the financial analysis. Any deviation of this value must be justified (e.g. region and technology specific studies).

#### 3.1.2 Reference consumption

- The reference is typically grid or fossil generator electricity consumption. A combination of both is also possible. For simplification, a conservative approach, that only considers the lower-emission power source (usually grid), is acceptable.
- The annual adoption rate or legal targets of photovoltaics in the absence of the offsetting project shall be included with a conservative **reference factor** where applicable.
- If the area is regularly affected by **power cuts /outage** and that PV can reduce these interruptions:
    - In the case when (hybrid) inverters or BESS[6] allow PV production/consumption under outage, a correction factor that reflects the PV-electricity production during outage, must be integrated in the reference scenario, as no electricity would have been consumed during these periods without the project.
    - If inverter does not allow a PV production without electricity from the grid and that no BESS are installed, no correction must be applied. The applicant must justify why no hybrid inverter is installed.

[6] When a conventional inverter detects a grid failure or other anomalies, it disconnects from the grid and the PV system stops producing solar power. Hybrid inverters allow continuous operation even without a grid connection. In some cases, PV production remains possible without a battery/BESS (but at a limited power output). The combination of a hybrid inverter and a battery allows full use of the solar installation in the event of a grid failure. See also: Électricité solaire en cas de panne de réseau.

Installing a battery with a conventional inverter compensates for a power outage but does not allow the PV system to continue producing energy.

- Where a generator already existed before the project, no correction is required, as the generator would have overcome the outage.

#### 3.1.3 Grid injection

- If grid injection is permitted in the host country and/or region where the project is implemented, emissions reduction for grid injection may be claimed. This must be clarified by the applicant in the MADD.
- If technically or regulatory not permitted, the applicant must clearly describe how the electricity surplus is managed (e.g., stored or curtailed by a limitation system preventing grid-injection).

#### 3.1.4 Measurement

- The amount of fossil electricity displaced through the PV installation can be estimated via the electricity production of the PV.
- PV production is measured on inverters that are coupled with data loggers. Loss between production and consumption/grid injection are negligeable. Therefore PV-production can be used as the parameter for electricity consumption/injected into the grid.
- Unlike smart meters with remote reading, manual readings require photographic evidence.
- A plausibility check or sampling method must verify data accuracy for electricity consumption. When only part of the data is verified, the applicant develops a sampling concept to verify the plausibility of the electricity consumption assessment. The sample is determined based on representative projects and must be verified by the verification body. This could be done based on chapter 4 of the document published by FOEN “Description for authorization and monitoring, reporting and verification of mitigation activities under Art. 6 of Paris Agreement, Version 3.0, March 2025”.
- Systems should not be oversized to artificially increase ITMOs. To this end, PV installation must be dimensioned to cover electricity/capacity need, especially when storage or grid injection are not possible.
- Missing data must be conservatively estimated or set to zero if operation of the installation cannot be proven.

**3.1.5** **Project emissions** must be considered but they typically are negligible. In rare cases, PV may indirectly cause emissions (e.g. increased genset use). This may occur when electricity consumers stop relying on the grid and instead use PV combined with genset.

**3.1.6** **Leakage** can occur when the project indirectly enables new grid connections or when PV replace generators that are then resold elsewhere. In this case no emission reduction can be accounted for.

### 3.2 <u>PV-plant for grid injection</u>

The reference is the amount of grid electricity produced in the host country that will be replaced by solar electricity generated through the project. Emission reductions are calculated by multiplying the electricity injected into the grid (kWh) by the grid emission factor of the host country (see also above). The following key aspects must be considered:

**3.2.1** **Project duration:** the standard project duration is 30 years and must be reflected in the financial analysis. Any deviation of this value must be justified (e.g. region and technology specific studies).

#### 3.2.2 Reference and Measurement

- The reference is typically the national grid generation replaced by the PV-plant.
- Legal targets of photovoltaics in the absence of the offsetting project should be included with a conservative **reference factor** where applicable.

- Only electricity injected into the grid (not losses nor self-consumption) counts toward emission reductions.
- Production must be measured by calibrated meters and crossed-checked for plausibility (see also chapter 7.2 of the FOEN notice Offsetting CO2 emissions: projects and programmes).

**3.2.3** **Project emissions** induced by the project must be considered. If fossil back-up generation is used, emissions must be accounted for unless they are below 1 % of the total emission reductions of the project (see chapter 4.6 of the FOEN notice "Offsetting $CO_2$ emissions: validation and verification"). If project emissions can be disregarded, the applicant must still prove in every monitoring that they represent a negligible share (1 %) of the emission reductions.

**3.2.4** **Leakage** can occur when the project indirectly enables new grid connections. In this case no emission reduction can be accounted for.

## 4. Additionality and financial analysis

Offsetting projects must demonstrate additionality, meaning they could not occur without ITMOs financing. This is particularly true for PV projects, as this technology is well established in some countries and can be profitable under certain circumstances. The following key aspects must be considered:

- The **reference scenario must be reflected** in the financial analysis, covering the entire project duration or integrating a residual value of the main investment. The technical and regulatory possibility of injecting into the grid should also be considered.
- When projects are grouped into a programme, the financial analysis can either be done for each project or based on a representative demonstration of the economic unfeasibility of all the projects that will be included in the programme. In this case, the analysis must be carried out for the most economically feasible activity, where conservative values must be taken (see ch. 6.1, Box "Specific information for programmes" of the FOEN Notice "Offsetting $CO_2$ emissions: projects and programmes").
- PV installations usually do not replace an existing system but come as a complementary source of electricity. Financial analysis of PV projects is typically done using a benchmark analysis by comparing the project's IRR (Internal Rate of Return) to a benchmark. The applicant must calculate a project IRR but can also provide an equity IRR to reinforce his analysis. Other methodologies may be used, in accordance with ch. 6.3 of the FOEN Notice "Offsetting $CO_2$ emissions: projects and programmes".
- **All parameters** must be supported with independent sources or internal and legally recognised documentation.
- **Revenues** are determined either by electricity saved from the grid or from fossil generators (self-consumption) or sold (grid injection). To calculate this revenue, the production potential (MWh/MWp) as well as its price must be determined:
    - A conservative revenue estimate assumes that all production potential is either self-consumed or injected into the grid at the highest price listed below.
    - Production potential may be determined using real measurements or tools from reliable sources like Global Solar Atlas.
    - Correction factors may be applied if justified: e.g. the correction is not already considered in the estimated production potential, and it can be justified that this potential cannot be reached. This is for example the case when electricity surplus cannot be injected into the grid nor stored, or when local conditions (high temperatures in summer), existing building conception (shading) or maintenance periods reduce this potential.

    - For PV-plants, the electricity is sold at prices concluded under Power Purchase Agreement (PPA, long-term contract between an electricity producer and a buyer, defining the price, quantity, and duration of the electricity purchase), contracts or at spot prices (the current market price at which a commodity or electricity can be bought or sold for immediate delivery). The applicant must clearly describe which condition prevails for his project.
    - For self-consumption projects, the price of saved electricity (market-based) may differ from the price of electricity injected into the grid (set by contract with electricity taker or grid operator).
    - Any subsidies or external financial support must be disclosed and considered in financial analysis.
- **Project costs** are mainly composed of investment costs (CAPEX) and operating costs (OPEX).
    - CAPEX includes the equipment costs (PV-modules, inverter, cable, metering…) and its installation, as well as the costs for the design of the plant and the site preparation. If justified, other costs can be considered.
    - OPEX includes maintenance and exploitation costs, insurance, land lease (PV-Plant for grid injection). OPEX can be determined as a percentage of CAPEX. Values of OPEX components must be justified
- **Benchmark** may reflect the company's internal Benchmark (like Weighted Average Cost of Capital, WACC), the current national bank interest or a specific return on investment like benchmarks from the CDM Tool 24. Default values in Table 1 of the CDM Tool 24 are benchmarks to be compared with equity IRR and not with project IRR. Project IRR is generally compared with a WACC. The parameter used to calculate de WACC (share equity/debt, capital and debt cost and tax rate) must also be documented and justified. Capital costs may but must not be taken from the CDM Tool 24.
- **Sensitivity analysis** varies the main parameters (CAPEX, OPEX, prices) by 10 %. If the project becomes profitable under any scenario, the applicant must thoroughly justify why such variations are unlikely (e.g. contractually defined prices are fixed).
- **Periodical review/updates** of the financial analysis must be regularly conducted for programmes as both parameters and influencing factors are very dependent on market fluctuations.

## 5. Remarks

CDM methodologies may support the determination of emission reductions and financial analysis of their project but cannot be used for calculating the grid emission factor. Calculation of emission reductions and additionality must comply with both the swiss and host-country regulations, following the principle of conservatism.

## 7. Guidelines Battery Energy Storage Systems (BESS)

**Summary**
Battery Energy Storage System (BESS) is an electrical energy storage technology that uses batteries to store electricity for later use. Large-scale BESS can be connected to the electrical grid. They are classified either as **"integrated BESS"**, meaning they are technically linked to and directly charged by an integrated renewable energy generation park, or as "**stand-alone BESS"**, meaning they charge from and discharge to the electrical grid. They generally serve two purposes, which can be implemented either independently or simultaneously: they can inject predominantly renewable energy at strategic grid nodes to limit curtailment, and they can provide capacity and ancillary services to the electrical grid, such as frequency regulation, spinning reserve, grid-forming and black start capabilities.

Emission reductions achieved through the use of batteries result primarily from decarbonizing the electrical grid by storing renewable energy that would otherwise be curtailed and discharging it into the grid replacing fossil-based generation sources. Typically, this means the BESS charges during the daytime (when renewable energy ("solar") is abundant and discharges it during the nighttime when the electrical grid tends to be more carbon intensive. In addition, the intermittent nature of renewable energy sources increases the demand for grid services, which can be effectively provided by BESS. Electricity system operators typically generate high-frequency operational and market data to ensure the efficient functioning of electricity markets. The robust data environment makes BESS well suited for carbon offsetting projects, although the availability and granularity of data may vary across countries.

These guidelines set out the requirements for BESS projects and are intended to facilitate understanding of FOEN's requirements for this specific type of mitigation activity. Please note that these methodological requirements are subject to periodic updates; therefore, applicants should ensure that they consult the most recent version before submitting the Mitigation Activity Design Document (MADD) to FOEN. The latest version must be used 3 months after publication. The points presented here are not exhaustive and should be applied in conjunction with the general guidelines for $CO_2$ compensation projects.

**General description of the mitigation activity**
In describing the mitigation activity, a key distinction to be made is whether the project or programme involves a stand-alone BESS or an integrated BESS. If the programme includes both stand-alone and integrated BESS, and the carbon accounting methodologies differ between these two configurations, the programme must be split accordingly, and two separate MADDs must be submitted—one for each methodology.

Describe the electricity market in the country where the mitigation activity takes place. Specify the degree of market regulation, distinguishing between vertically integrated, regulated markets and liberalized or deregulated markets. For regulated markets, describe the dispatch protocols—where available—especially with respect to renewable energy generation, grid injection, and curtailment practices. For liberalized markets, explain the applicable merit-order mechanism, including whether the price of the marginal unit is determined through bidding or based on generation costs.

**Methodology**
FOEN does not prescribe a specific methodology for BESS projects. The applicability of a given methodology depends on the characteristics of the country's electricity market and on whether the BESS is deployed as a stand-alone or an integrated system. Accordingly, the selected methodology must be appropriately tailored and must convincingly account for both factors.

To ensure the conservativeness of the calculated emission reductions, it is essential to measure or estimate a marginal grid emission factor for both the charging and discharging phases of the BESS. For stand-alone BESS mitigation activities, the grid emission factor during charging must not be assumed to be zero but instead be derived during monitoring. To assess the risk of leakage resulting from energy displaced by the battery being exported beyond the system boundaries, specify whether the electricity

grid in the country of the mitigation activity operates as a closed system or is interconnected with other electricity markets.

**Monitoring**

As electricity grid data is usually very comprehensive, please include a clear "how-to" guide for completing and using the monitoring file. In addition, discuss data accuracy and assess whether the use of a statistical software package is more appropriate than an Excel-based system, particularly when working with large datasets. If a statistical package is used, ensure that the Validation and Verification Bodies, as well as FOEN, can perform plausibility checks and spot checks.

**Additionality**

To conduct the common practice analysis, the following indicator must be calculated for target market penetration and must remain below the common practice threshold percentage jointly defined by the host country and FOEN:

$$PTM(m) = \frac{Inj_{12\text{m, BESS}}(m)}{Inj_{12\text{m, Thermo}}(m)} \times 100\ \%$$

Whereby Inj 12m BESS (m): Injection of BESS energy in MWh over the last 12 months
Whereby Inj 12m Thermo (m): injection thermoelectric energy from fossil sources in MWh over the last 12 months

Because large-scale BESS require substantial capital investments, ITMO revenues represent a relatively smaller portion of the total project costs. Accordingly, the common practice analysis serves to complement the investment analysis in assessing financial additionality. For programmes, the financial additionality through an investment analysis must be demonstrated at the time of inclusion, as battery prices are expected to decline substantially over time.

## 8. Links

- Communication of FOEN for projects and programmes: Climate: Enforcement aids
- Communication of FOEN for validation and verification bodies: Climate: Enforcement aids
- Mitigation Activity Summary template: Applicants
- Bilateral climate agreements
- CO2-Ordinance (requirements for offset projects Art. 5 – 12)
- Emissions Trading Registry of Switzerland

## 9. Changes

In comparison to version 4.2 December 2025 the following changes have been made to the document:

- Section 7: New: Guidelines for Battery Energy Storage Systems (BESS)