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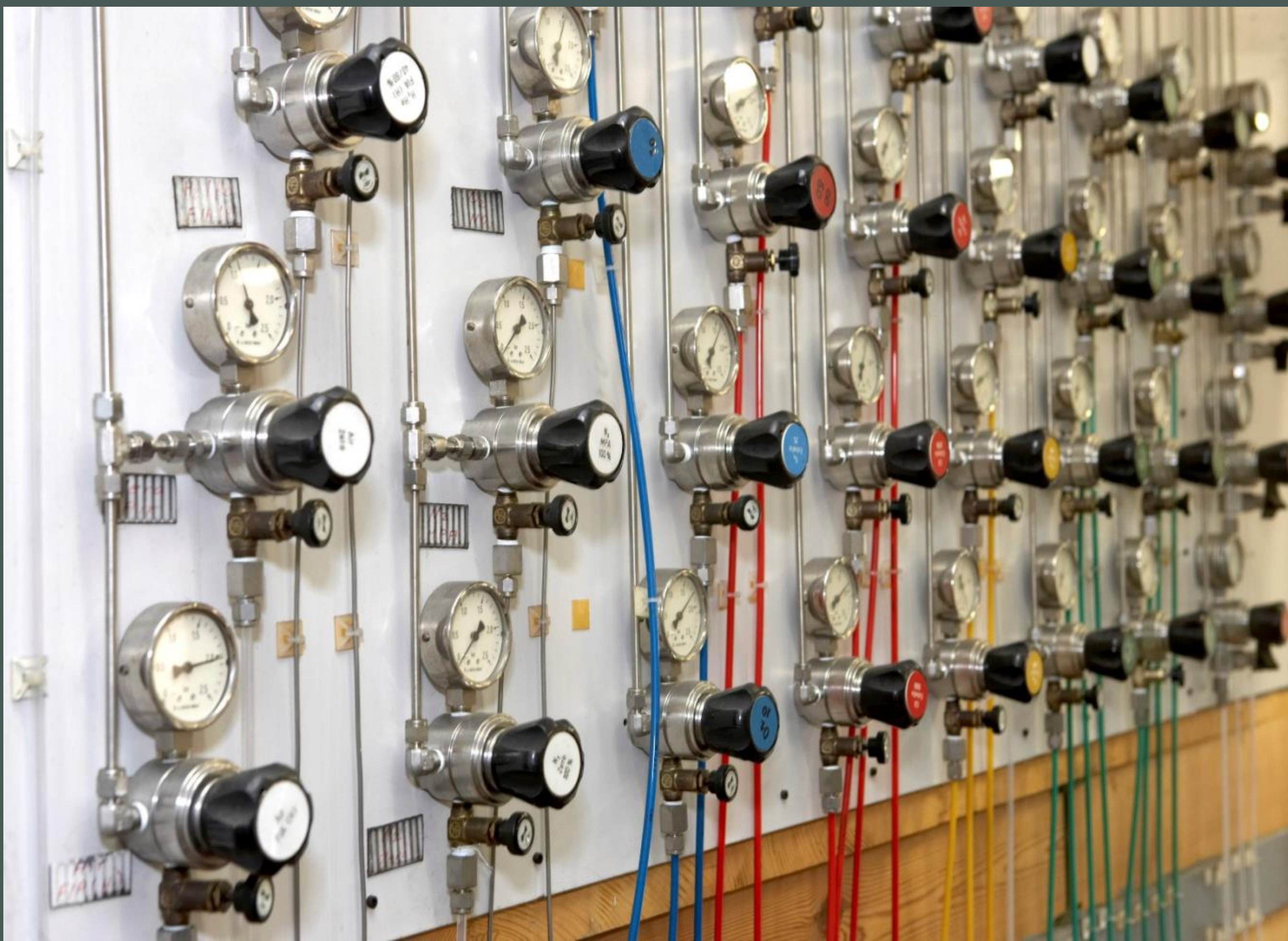
Climate

Offsetting CO_2 emissions: validation and verification

A communication of the FOEN in its capacity as enforcement authority of the CO_2 Ordinance. Status as of 2024



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Offsetting CO_2 emissions: validation and verification

A communication of the FOEN in its capacity as enforcement authority of the CO_2 Ordinance. Status as of 2024

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Legal status
This publication is a communication of the FOEN in its capacity as an enforcement authority. Intended for validators and verifiers of emission reduction and carbon storage projects and programmes, it explains the FOEN's actual practices as an enforcement authority, both formal (required validation and/or verification) and material (validation and verification requirements and requirements for approved validators and verifiers).

Validators and verifiers that comply with the information contained in this publication can assume that they are acting in accordance with federal law.

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Abstracts

The CO_2 Act (SR 641.71) requires producers and importers of fossil fuels to offset a part of the CO_2 emissions generated by their use. Approved validators and verifiers (VVs) assess whether a project or programme satisfies the requirements laid down in the CO_2 Ordinance (SR 641.711). They then conduct a full appraisal and in validating the suitability of the project or programme, make a recommendation to the Compensation Office. In the course of periodical verifications, the VVs check that the emission reductions continue to meet the specifications set out in the project or programme description. The FOEN issues attestations on the basis of these verifications.

Keywords:
CO_2 Act, Offsetting obligation, Fossil fuels, Validator, Validation, Validation report, Verifier, Verification, Verification report

Hersteller und Importeure fossiler Treibstoffe sind gemäss CO_2-Gesetz (SR 641.71) dazu verpflichtet, einen Teil der verursachten CO_2-Emissionen zu kompensieren. Die zugelassenen Validierungs- und Verifizierungsstellen (VVS) überprüfen, ob ein Projekt oder Programm die Anforderungen der CO_2-Verordnung (SR 641.711) erfüllt. Bei der Validierung untersuchen die VVS die Projekte oder Programme auf ihre Eignung hin und geben zuhanden der Geschäftsstelle Kompensation eine Empfehlung ab. Im Rahmen der periodischen Verifizierungen wird geprüft, ob die Emissionsverminderungen den Anforderungen der Projekt- oder Programmbeschreibung entsprechen. Dies dient dem BAFU als Grundlage für die Ausstellung von Bescheinigungen.

Stichwörter:
CO_2-Gesetz, Kompensationspflicht, fossile Treibstoffe, Validierungsstelle, Validierung, Validierungsbericht, Verifizierungsstelle, Verifizierung, Verifizierungsbericht

La loi sur le CO_2 (RS 641.71) oblige les producteurs et importateurs de carburants fossiles à compenser une partie de leurs émissions de CO_2. Les organismes de validation et de vérification (OVV) agréés examinent si les projets ou programmes remplissent les exigences de l’ordonnance sur le CO_2 (SR 641.711). Lors de la validation, les OVV analysent la pertinence des projets ou programmes et formulent une recommandation pour le secrétariat Compensation. Lors des vérifications périodiques, les OVV contrôlent que les réductions d’émissions répondent aux exigences définies dans la description du projet ou programme. L’OFEV décide sur cette base de la délivrance d’attestations.

Mots-clés :
loi sur le CO_2, obligation de compenser, carburants fossiles, organisme de validation, validation, rapport de validation, organisme de vérification, vérification, rapport de vérification

La legge sul CO_2 (RS 641.71) obbliga i produttori e gli importatori di carburanti fossili a compensare una parte delle loro emissioni di CO_2. Gli organismi di convalida e di controllo (OCC) accreditati verificano se i progetti o programmi soddisfano i requisiti dell’ordinanza sul CO_2 (SR 641.711). Nel corso della convalida, gli OCC verificano l’adeguatezza dei progetti o programmi e formulano una raccomandazione all’attenzione della Segreteria Compensazione. Nel quadro dei controlli periodici, gli OCC controllano se le riduzioni delle emissioni soddisfano i requisiti definiti nella relativa descrizione. Ciò serve all’UFAM come base decisionale per il rilascio di attestati.

Parole chiave:
legge sul CO_2, obbligo di compensazione, carburanti fossili, organismo di convalida, convalida, rapporto di convalida, organismo di controllo, controllo, rapporto di controllo

Foreword

Switzerland has an active policy to reduce greenhouse gas emissions. By ratifying the Paris Agreement, the country has pledged to cut its greenhouse gas emissions to half of 1990 levels by 2030. Under the revised CO_2 Act adopted by Parliament on 17 December 2021, which came into force on 1 January 2022, at least three quarters of the necessary reductions must be made in Switzerland. To achieve this target, Switzerland plans to continue focusing its action on the sectors of transport, buildings, industry, agriculture and waste. Based on new scientific findings published by the Intergovernmental Panel on Climate Change (IPCC), the Federal Council decided on 28 August 2019 that Switzerland should aim for net zero greenhouse gas emissions by 2050. With this commitment, Switzerland will help to meet the internationally agreed goal of limiting global warming to a maximum of 1.5 °C above pre-industrial levels.

To meet their offsetting obligations, producers and importers of fossil fuels can implement emission reduction projects and programmes. In this context, the Compensation Office, run jointly by the Federal Office for the Environment (FOEN) and the Swiss Federal Office of Energy (SFOE), is responsible for enforcing the provisions relating to attestations issued for emission reductions under these projects and programmes.

This communication supplements the communication 'Offsetting CO_2 Emissions: projects and programmes' (UV-1315)[1]. It explains the enforcement practices of the Compensation Office in relation to validations and verifications, and serves as a best practice guide for validators and verifiers.

This version applies from 1 January 2024.

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1 Available on the FOEN website at: *www.bafu.admin.ch/uv-1315-f*

1 Introduction

This document is a communication of the FOEN in its capacity as enforcement authority of the CO_2 Ordinance[2] and supplements the recommendations set out in the communication 'Offsetting CO_2 Emissions: projects and programmes' (subsequently referred to as the 'Communication').[3] It explains the enforcement practices of the Compensation Office (hereinafter referred to as 'the Office') and serves as a best practice guide for validators and verifiers (VVs).

Issues covered include:
- the requirements to be met by VVs (sec. 2);
- the approval process for VVs (sec. 3);
- the procedure for examining offsetting projects (sec. 4 and 5).

Items already dealt with in the EC are not repeated here and are assumed to be known (reference is made to the relevant sections).

The recommendations that follow are based on Articles 5 to 14 of the CO_2 Ordinance (SR 641.711; status as at 1 January 2024).[4] These legal bases are also assumed to be known. For the sake of readability, the following umbrella terms are used:

Tab. 1: General terms used in the document

Projects	The terms 'projects', 'project cluster' and 'programme' are encompassed within the term 'project(s)' unless further differentiation is required by the context. All statements apply to all forms of implementation (projects, project clusters, programmes) except where a statement is explicitly limited to one or more of these forms.
VVs	The terms 'validators' and 'verifiers' are combined within the term 'VVs' unless a statement refers specifically to either validators or verifiers.

Other terms are defined in the EC glossary.

2 All communication modules are available on the FOEN website at: *www.bafu.admin.ch/communications-co2-ordinance*

3 Available on the FOEN website at*: www.bafu.admin.ch/uv-1315-f*

4 The current version of the CO_2 Ordinance (SR 641.711) is available at: *www.fedlex.admin.ch > Classified CompilationInternal law > 6 Finance64 Taxation > 641.711 Ordinance of 30 November 2012 for the Reduction of CO_2 Emissions (CO_2 Ordinance)*

2 Requirements to be met by VVs

Only VVs approved by the FOEN may validate or verify projects in accordance with Article 6 paragraph 1 or Article 9 paragraph 2 of the CO_2 Ordinance. Companies wanting to apply for approval as a VV must comply with Article 11*a* of the CO_2 Ordinance and meet the requirements set out below.

2.1 Personnel requirements

Every VV must have the following specialist staff:

- An **overall manager,** who must be an employee of the VV (i.e. not a contractor). The FOEN must be able to contact this person regarding the quality of the VV's validation and verification reports. The overall manager is also responsible for implementing the quality assurance measures agreed as part of the feedback process (see sec. 3).
- At least one **quality manager,** who is responsible for compliance with the quality assurance processes within the VV and is an employee of the VV (i.e. not a contractor). The quality manager must be independent of the technical experts in the context of the validation/verification concerned.
- **For each project type for which the VV is applying for approval, at least one (internal or external) technical expert** meeting the requirements of section 2.2. Where technical experts are not employees of the VV, the FOEN must be informed of the nature of their contractual relationship with the VV.

For the validation/verification, the VV must use only the experts specified in the application, except for the provision of minor assistance. A person can work for the VV in all three roles (technical expert, quality manager and overall manager). However, for the appraisal of a given project, the same person may act as either technical expert or quality manager but not both. Conversely, it is possible for the same person to take on the roles of technical expert and overall manager, or of quality manager and overall manager.

Example: Minimum size of a VV
A VV may only apply to the Office for approval if it registers at least two individuals, at least one of whom must be a permanent employee of the VV. This person must act as the overall manager and quality manager. A second person, who acts as a technical expert, may be employed by the VV as a contractor.

2.2 Technical skills

The technical experts must have the expertise required for validating and verifying a particular type of project (as per Annex L of the EC). For each technical expert, proof of expertise consists of:

- a **CV** listing all relevant experience and training documenting the development of specialist knowledge of the project type or a related field;
- details of at least **two relevant reference projects. Relevant** means having a strong connection to the project type or from a closely related field. The references must specify the role of the technical experts in the project and the amount of work performed in person-days;
- proof of **practical experience** with the validation or verification of climate change mitigation and compensation projects, e.g. through details of relevant work in reference projects.

If a technical expert is not sufficiently qualified for the validation or verification activity or for a particular project type, the FOEN may grant a conditional approval. This may entail conditions and/or recommendations on how to deal with the insufficient qualification. For example, it may be advisable for the technical expert to work initially on two or three validations or verifications for projects of the relevant type alongside the validation or verification team before assuming personal responsibility and signing the reports as a technical expert.

In addition to specialist knowledge of the project types and appraisal activities, the VV must have suitable quality assurance processes in place.

The FOEN must be notified immediately if a technical expert, quality manager or overall manager named in the approval application is no longer deployed for validation and verification. If the approval criteria in this section are no longer met as a result, an alternative person must be proposed for the role in question and approved as a technical expert by the FOEN. Failing this, the VV will no longer be able to undertake appraisals for this type of project.

3 VV approval and feedback process

3.1 VV approval

VVs must apply to the FOEN for approval. The Office provides an application form for VVs to use.[5] In the application, the VV must provide the names of the professionals involved (overall manager, quality manager and technical experts for each project type) as well as the proof of expertise stipulated in section 2.

More information about the application and approval process for VVs can be found at:
www.bafu.admin.ch/validators-verifiers

3.2 Feedback process and quality improvement measures

The Office has a feedback process aimed at improving the quality of appraisal reports.[6] As part of this process, the Office gives the VV feedback on each report it draws up, including an overall rating in one of the following categories: 'very good', 'good', 'unsatisfactory' or 'no comment'. The Office has published a document informing VVs which findings in the reports automatically lead to an 'unsatisfactory' rating.[7] This is to help VVs set priorities for their appraisals. The Office checks the content of reports based on a combination of risk and sampling.

All reports are evaluated according to the following system:
- Reports classified as 'very good', 'good' or 'no comment' receive 1 point ('bonus').
- Reports classified as 'unsatisfactory' receive -10 points (deduction, 'malus').

The Office totals the score at the end of each assessment year. The assessment year runs from 2 September of one year to 1 September of the following year. A report is evaluated in the assessment year in which it was received by the FOEN. This is determined by the date of receipt (postmark of the application). The final score is calculated as soon as all reports within an assessment year have been evaluated, but no later than 30 November. Reports that have not yet been assessed by this date will be considered in the following assessment year. At the beginning of each assessment year, the score is set to 10 (starting credit).

5 The application form for VVs is available online (in German, French and Italian) at: *www.bafu.admin.ch/validators-verifiers*

6 *www.bafu.admin.ch/validators-verifiers*

7 This document (Bewertung von Berichten der Validierungs- und Verifizierungsstellen durch die Geschäftsstelle Kompensation) is available online (in German, French and Italian) at: *www.bafu.admin.ch/validators-verifiers*

The Office holds a meeting with each VV once a year. This takes place regardless of the quality of the VV's reports, and is scheduled some time between November and March. If both the Office and the VV consider a meeting unnecessary, it may be dispensed with. The main aims of the meeting are to:

- discuss the quality of the appraisal reports in the past assessment year and any scope for improvement;
- convey any concerns/requests from the VV to the Office; and
- agree quality improvement measures in case of a negative score (see below for details).

Assessment year with a non-negative score

If the score based on the evaluations of reports in an assessment year is positive or zero, no quality improvement measures are agreed. Any existing measures will not be renewed. The score is set to 10 for the new assessment year.

First assessment year with a negative score (ending in year y)

If the score at the end of the assessment year is negative, the VV will be informed of this prior to the yearly meeting. It will receive an invitation to this meeting no later than 1 December (i.e. after the end of the assessment year). During the meeting, the VV and the Office *jointly* define measures to improve the quality of the reports. The start date for implementing these measures is also agreed. The measures must be implemented as quickly as possible, beginning no later than 1 February of the following year.

The score is set to 10 for the new assessment year (2 September y to 1 September y+1) and the feedback process continues.

Second assessment year with a negative score (ending in year y+1)

If the score in the following assessment year (year y+1) is negative again, the VV will again be notified of this ahead of the yearly meeting. It will receive an invitation to this meeting no later than 1 December y+1. Once again, measures to improve the quality of the reports are defined *jointly* with the Office. These replace the previous measures. Again, the implementation start date is defined, bearing in mind that the measures must be implemented as quickly as possible, beginning no later than 1 February of the following year (y+2). However, for these measures a 'probationary period' is applied, starting at the same time as the implementation of the measures.

The score for the new assessment year (2 September y+1 to 1 September y+2) is set to 10 and the feedback process continues.

Third assessment year with probationary period (ending in year y+2)
Scenario 1: Probationary period successfully completed

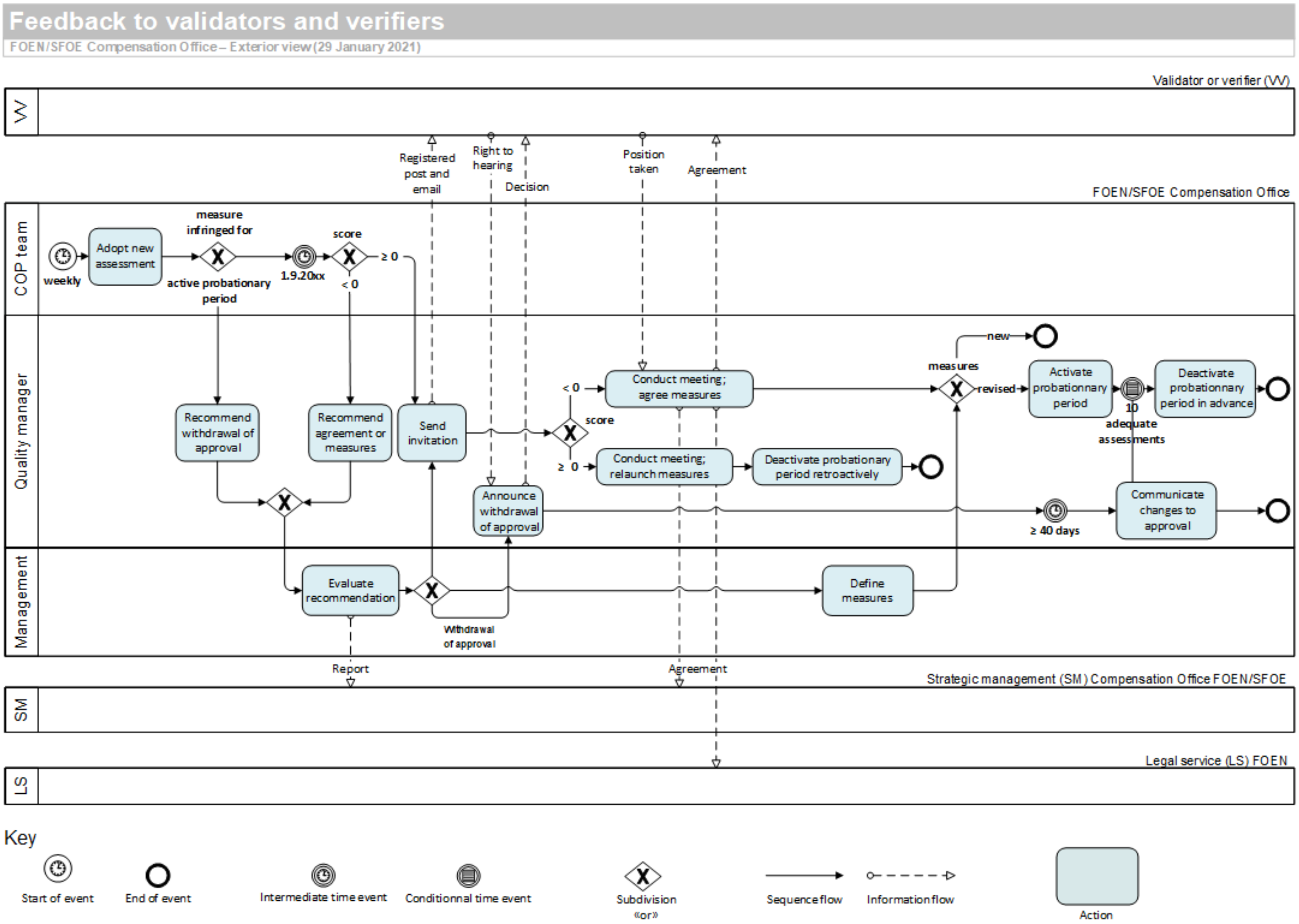
The probationary period is completed successfully if no report dating from that period (based on the postmark of the application) violates the agreed measures and is classified as 'unsatisfactory'. The probationary period is ended early if ten reports submitted during that period (based on the postmark) are rated 'very good' or 'good'.

If the score at the end of assessment year y+2 is positive or zero, all measures are cancelled and the feedback process continues as normal (as for an assessment year with a non-negative score).

If the score at the end of assessment year y+2 is negative, the procedure is the same as for a second assessment year with a negative score.

Scenario 2: Failure to complete the probationary period and withdrawal of approval
If at least one report is rated 'unsatisfactory' during the probationary period and the report in question violates the agreed measures, the FOEN *may* have the VV's approval withdrawn. The approval is withdrawn by means of an FOEN ruling.

The process is illustrated in the following diagram:



Once the withdrawal of approval comes into force, the VV is prohibited from taking on new validation or verification contracts. The Office removes the VV from the list of approved VVs published online.[8] The VV may complete appraisal reports for any contracts that it accepted before the withdrawal of approval came into force and on which it has already started work (evidence of this must be provided). A maximum of one report per contract and per project may be completed after the withdrawal of approval has come into force.

8 The list of approved validation and verification bodies is published on the FOEN's website at: *www.bafu.admin.ch/validators-verifiers*

3.3 Re-approval and additional requirements

After the withdrawal of approval has come into force, a new application for approval as a VV may be submitted to the FOEN, subject to the following conditions:

- If the application for re-approval does not involve a technical expert whose reports contributed to the withdrawal of approval, the VV only needs to submit the documents normally required for a first approval.
- If the application includes technical experts whose reports contributed to the withdrawal of approval (i.e. who during the probationary period produced unsatisfactory reports that violated the agreed measures), those experts must undergo training provided by the FOEN prior to the re-approval of the VV. The FOEN will suggest two or three possible dates for this training, usually within two months following the submission of the approval application. The training ensures that the requirements for the approval of the VV, in particular as regards technical knowledge, are met.

The training reviews the key framework conditions as well as specific issues arising from the appraisal reports that were deemed unsatisfactory. It is followed by an exam consisting of two parts, a multiple-choice test and an open-response test. The first part, i.e. the multiple-choice test, comprises around 20 questions on implementation issues and is (mostly) not specific to a particular type of project. The open-response test covers key areas typically included in validations and verifications. It is tailored to the specific project type(s) for which the VV was approved before the approval was withdrawn and for which it wishes to re-apply. The questions deal with issues typically associated with the project type(s) concerned. For district heating network projects, the questions cover, for example, the application of Annex 3*a* of the CO_2 Ordinance, or for gas networks, the choice of reference.

Technical experts who fail the exam will not be included in the VV's approval.

3.4 Transfer of an approved expert to another VV

An expert cannot be approved by several VVs.[9] If an expert changes VV, the new VV must provide written confirmation that their personal details are still up to date and valid. They can do so by completing the registration form for experts (see sec. 3.1) or by sending an email to the Office. If an expert is no longer registered, they must reregister before their transfer to another VV and resubmit all the documents.

9 This only applies to approved VVs and does not mean the experts cannot work for different VVs.

4 General requirements concerning the VV's work

The following section details the general requirements concerning the work of a VV.

4.1 Independence

The VV, the registered technical experts, the quality manager and the relevant overall manager must be demonstrably independent, impartial and free from conflicts of interest during the appraisal process. The VV guarantees its independence in accordance with the requirements set out in the relevant sections of the verification and validation report templates and the application form for VVs published on the FOEN website.

4.2 Cooperation and roles

The VV performs the validation and verification independently and decides at its own discretion whether the documents provided by the applicant are sufficient for carrying out the appraisal.

In the following cases, the VV may contact the Office directly:

- Key aspects of the project give rise to discussions. The disagreements between the applicant and the VV regarding their assessment of the situation cannot be resolved. In this case, the Office makes a professional assessment or gives the VV feedback on how to proceed.
- A conclusive assessment of the situation is not possible because the Office's enforcement principles or the lack of legal bases leave too much scope for interpretation.
- The VV has identified irregularities with the project.

The VV assumes full responsibility for the quality of the reports submitted in its name. This applies equally to reports written by internal (VV employees) and external (VV contractors) technical experts. All validation and verification reports must be signed by the technical expert who was in charge of preparing the report, the quality manager and the overall manager (electronic signature is sufficient).

4.3 Verifiability and plausibility check

The application documents and in particular the appraisal reports must be verifiable and coherent. Since the application documents are published on the FOEN website, they must also be understandable for third parties without having to consult additional documents.

The appraisal activities must be documented, and all individuals who worked on the appraisal must be named, with an indication of their roles and responsibilities. VVs must explicitly demonstrate how the appraisal items included in the report templates[10] were examined and on the basis of which considerations the VVs reached their conclusions. Justification must be provided. Simply stating that the items were examined is not sufficient.

Examples of formulations for documentation:
- "10 % of the invoices were checked and based on this sample it can be stated that the values reported by the applicant are correct."
- "The applicant explained on the phone that ... From this, the validator was able to conclude that... => CR[11] closed."

The same applies to the handling of CRs, CARs and FARs,[12] the processing and clarification of which must also be documented in the appraisal report. As a general principle, FARs should not be used to put off addressing unresolved assessment issues.

Example: If an applicant refuses to provide an appropriate response to a CR or CAR, it cannot be converted into an FAR. Instead, the CR or CAR must be left open and the application recommended for refusal. If necessary, the Office may be involved in the clarification.

Judgements on the part of the VV must always be identified as such and justified. Every relevant exchange with applicants must be documented in the form of CRs and CARs, including if the exchange took place by telephone, in person or by email. A brief summary will suffice in each case.

It is always the applicant's responsibility to substantiate all statements and assumptions about the project with calculations and documents that the VV considers appropriate and, where required, to carry out a plausibility check. All sources referred to in the application documents must therefore be attached to the application in electronic form by the applicant or, where appropriate, kept ready (e.g. invoices for heat consumers) so that they can be sent on request. Information is considered plausible if it can be verified on the basis of other independent information.

Example: The oil consumption of a peak load boiler is measured. This information can be checked for plausibility by inferring the amount of oil consumed based on the measurement of the heat production of the peak load boiler with an assumed efficiency.

4.4 Equal treatment

10 The templates can be downloaded (in German, French or Italian) from the following web page: *www.bafu.admin.ch/compensation*

11 As part of its current appraisal activity (validation or verification), the VV identifies unclear or unresolved issues and asks the applicant to clarify them (c*larification request* [CR])) in a way that is also comprehensible for third parties. In addition, the VV proposes corrective measures and asks the applicant to implement them (corrective action request [CAR]). The VV identifies those aspects of the project description or the monitoring and reporting that cannot yet be conclusively checked as part of the current appraisal activity and asks the applicant to clarify these in the initial or subsequent verification (forward action request [FAR]). See section 4.5.

12 Ibid.

VVs must apply all appraisal criteria in the same way to all projects, insofar as they are applicable. This applies in particular when evaluating expert assessments by third parties that are used to demonstrate achieved emission reductions.

4.5 Documentation of appraisal results

VVs document the results of their appraisal in the form of a complete list of all identified CARs, CRs and FARs included in the validation or verification report. The outstanding issues (CARs and CRs) raised by the VV must all be satisfactorily addressed or implemented before the report can be closed.

Tab. 2: Different types of requests made by the VV to the applicant

CR	**Clarification request** Unclear or outstanding issues identified by the VV to be clarified by the applicant
CAR	**Corrective action request** Corrective measures identified by the VV to be implemented by the applicant
FAR	**Forward action request** Issues that cannot yet be definitively checked during validation or verification, usually to be clarified in the next verification

4.6 Avoiding substantial misestimations

The demonstration methods submitted by the applicant must not lead to any substantial misestimations of the eligible emission reductions.

The aim of the appraisal is to avoid such substantial misestimations. A substantial misestimation is deemed to occur if the assessment of the methods for demonstrating project impact leads to an overestimation of the eligible emission reductions to the following extent:[13]

Tab. 3: Share of overestimation of emission reductions

Project size in tonnes of CO_2eq per year	Percentage overestimation relative to project size
Under 1000	15 %
Over 1000	10 %

13 The values are derived from the CDM's requirements for small-scale projects, see *http://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/cmp7_cdm_.pdf* . The larger projects and programmes typically implemented in Switzerland generally fall into category (e) of the CDM materiality standard. Since significantly smaller projects than in the CDM are also common in Switzerland, the FOEN accepts a higher value for very small projects.

The VV has various options for verifying the information provided and so avoiding substantial misestimations:

- own calculations;
- statistical analysis;
- technical queries to manufacturers and suppliers;
- consideration of comparative values.

The VV must ensure that the rules are not being deliberately stretched in order to systematically maximise the quantity of eligible emission reductions. The requirement for a best possible and/or conservative estimate applies.

Example: The correct way to handle misestimations
The change of refrigerants in air conditioning systems as part of a programme means that the electricity consumption of the systems and hence the programme emissions also change. This must be taken into account when calculating the programme's emission reductions. The applicant explains that the change in emissions due to the change in electricity consumption is very small (< 1 %). The applicant goes on to explain that factoring this into the calculation of emission reductions would be very costly and time-consuming as it would significantly complicate the overall methodology and would also entail considerable additional financial expenditure on monitoring since the power consumption would have to be measured individually for the reference and project case in each project. Therefore, the method ignores the emissions from electricity consumption, which could in principle give rise to a misestimation. The validator now examines whether ignoring the emissions from electricity consumption could lead to a substantial misestimation of the eligible emission reductions.

Conclusion of the validation:
In the validator's view, it is reasonable to ignore the emissions resulting from the change in electricity consumption. This is acceptable as it does not result in any substantial misestimation. The validator can affirm this because it has checked whether all other parameters influencing the emission reduction are recorded with a high degree of certainty and the overall methodology allows reliable recording of the actual emission reduction (e.g. with an uncertainty of less than 5 %).

5 Validation requirements

The full procedure for issuing attestations is described in section 3 of the EC. The aspects of the procedure relevant to VVs are explained below. The purpose of validation is to ensure that the project description meets the specifications of the CO_2 Ordinance and the chosen approach complies with the mandatory requirements of the CO_2 Ordinance and the recommendations of the Office (in particular the EC and standard methods). If a project falls within the scope of a mandatory standard method (Annexes 3*a* and 3*b* of the CO_2 Ordinance), this method must be applied as stipulated (without adjustments). The validation includes a formal examination of the project description, including annexes, and an examination of the project's content. As an interim result of its appraisal, the validator formulates CRs and CARs (if necessary). In all cases, the validator must comment on whether and how the requirements of the CO_2 Ordinance are met. The applicant must implement the corrective measures (CARs) identified by the validator. Similarly, if the validator deems that the information provided by the applicant is insufficient or too vague to determine whether the requirements of the CO_2 Ordinance are met, the applicant must clarify these aspects (CRs).

This may be the case in particular when:
- the economic unfeasibility of the project or programme is not clearly and verifiably apparent from the project description (or information or assumptions that cannot be verified or plausibility-checked were made as part of the economic feasibility analysis);
- the choice of reference scenario was not made correctly or the reason for the choice is not verifiable or plausible;
- the project/programme description is incorrect with regard to assumptions made, data or calculation of emission reductions;
- the monitoring plan does not include the relevant parameters or specifies unsuitable procedures for measurements and interface monitoring;
- the criteria for inclusion in a programme do not guarantee that each project meets the requirements of Art. 5 of the CO_2 Ordinance.

Further information on validation can be found in the validation report template.[14]

Section 5.1 explains the formal requirements for application documents. The content requirements are described in section 5.2. Explanations of the individual appraisal items are provided in boxes under the relevant title.

14 Available (in German, French and Italian) at: *www.bafu.admin.ch/compensation*

5.1 Procedure for formal examination of applications

The results of the formal examination will be documented in the validation report.

Complete and consistent project description
The project description is complete if:
- all the information required under Article 6 paragraph 2 of the CO_2 Ordinance is complete (see detailed list in sec. 3.2 of this Communication) and verifiable (see also sec. 4.3);
- in the preparation of the information required under Article 6 paragraph 2 of the CO_2 Ordinance, the feedback from the Office on the project outline (if any) has been taken into account (see Art. 6 para. 4 CO_2 Ordinance);
- all relevant annexes to the project description referred to in the project description are either available to the VV in electronic form or were viewed during an on-site visit.

5.2 Procedure for examination of application content

The results of the content examination are documented in section 3 of the validation report. Explanations of individual appraisal items are given below.

5.2.1 Framework conditions

The validator examines the following items:
- Technical description of the project, including the procedure for demonstrating the permanence of carbon sequestration (Art. 5 para. 2 CO_2 Ordinance) and the plan for scientific support under Article 5*b* of the CO_2 Ordinance
- Financial assistance, double counting, apportionment of effect
- Delimitation from other instruments and measures
- Start of implementation
- Project duration and duration of effect

Individual items are explained below:

The current state of the art (see definition in sec. 2.2 EC)
Essentially, the state of the art designates a certain level of technology. The term refers to an advanced state of development of technological processes that are feasible or have been proven to work in practice. As a general rule, the state of the art corresponds to the requirements and calculation methods set out in the currently applicable standards, information sheets, enforcement aids and recommendations, as issued by the relevant specialist bodies. It may change over time, for example as a result of technological advances, economic factors or new scientific discoveries.

The state of the art applied in one company/plant cannot be transferred indiscriminately to another company/plant. Among other factors, the type and quantity of production are key to determining the state of the art used.

The following are indicative of the current state of the art:
- Comparable processes, facilities or operating methods have been used successfully abroad under comparable geographical conditions and on a comparable scale.
- The technologies are being discussed in specialist circles but are demonstrably no longer at the research and development stage.

The following indicate that the technology used is no longer state of the art:
- There are newer or more efficient technologies on the market for the same application.
- Specialist circles (forums, journals) are no longer discussing the technology, or only to make comparisons with new developments.
- The technology's market share is on a clear downward trend.

Start of implementation (see sec. 2.6.1 EC)
The start of implementation (Art. 5 para. 3 CO_2 Ordinance) is the point in time at which a project can no longer be cancelled without significant financial losses. The financial commitment and/or the funded measures must be directly related to project implementation. Work that is entirely preparatory (e.g. carrying out a feasibility study) is not relevant, even if it entails a high financial outlay.

Example 1: Start of implementation for an investment project
If a boiler is secured with a purchase agreement during the construction of a heating network, this is normally considered the start of project implementation. If it transpires that the project is not recognised as an offsetting project, the applicant still has to pay the bulk of the investment costs for the boiler under the terms of the agreement.
Such investments cannot be cancelled without major financial losses.

Example 2: Start of implementation for the import of biofuels
If the applicant secures a quantity of biofuels under a purchase agreement, this is not yet the start of project implementation. If it transpires that the imported quantity is not recognised, the buyer could also sell this quantity abroad. While this may well result in a loss, such a loss would be acceptable in the context of business risk. The start of implementation here is, at the latest, the time at which the biofuel is imported into Switzerland (based on the customs declaration).

Useful life (see sec. Ann. A2 EC)
Useful life (also known as service life) is a key parameter of the economic feasibility analysis. It often differs from the technical lifetime, which is the length of time that a system or installation is expected to be fully functional. The useful life, on the other hand, only covers the period in which the system or installation is actually used. The system or installation is often replaced before the end of its technical lifetime, for example because rising maintenance costs make the old systems unprofitable or there is an increased operational risk due to ageing. For these reasons, the useful life is usually shorter than the expected technical lifetime.

A default value is generally used for the useful life (see below). Only in the absence of default values can a project-specific standardised useful life be determined.

Sources for standardised useful life values are (in order of priority):
- the table of standardised useful lives given in EC Annex A2 (Table 8);
- federal government guidelines on standardised useful lives of components and systems;
- credible and scientifically-based empirical analyses performed in the specific project context (e.g. analysis of databases);
- industry-specific standards and guidelines (e.g. SIA 480/1 on economic feasibility calculations for investments in building construction);
- the greenhouse gas inventory/National Inventory Report (NIR);
- manufacturer information;
- empirical values from the literature and estimates by experts.

Specific information for programmes:
In the case of programmes, only the standardised useful life of the projects included in the programmes is relevant. The above principles for determining useful life for projects apply *mutatis mutandis* to the projects in a programme. The duration of the project's effect is derived from its useful life. The duration of effect should be stated in the programme description.

Examples:
- The Federal Office for Buildings and Logistics (FOBL) publication *Standardisierte Nutzungszeiten von Gebäuden und Bauteilen* (Standardised Useful Lives of Buildings and Components) specifies a standardised useful life of 30 years for hot-water and steam systems.
- The greenhouse gas inventory uses lifetimes mainly in cohort models (vehicles, refrigeration systems, etc.) and could potentially be used as a data source in a programme related to automotive air conditioning systems.

5.2.2 Calculation of expected emission reduction

The validator examines the following items:

- System boundaries and emission sources
- Influencing factors
- Expected project emissions
- Determination of the reference scenario
- Determination of the reference development
- Expected emission reduction

Individual items are explained below:

Direct and indirect emission sources (see sec. 5.1 EC)
The validator checks whether all relevant emission sources have been identified. Distinguishing emission sources by type helps with this process. In some cases, there may be scope for interpretation when assigning an emission source to a type. However, this is not a problem as long as all relevant sources are recorded.

- *Examples of direct emission sources:* combustion equipment, engines, processes, methane slip
- *Examples of indirect emission sources:* transportation, processing or drying of biofuels in Switzerland

Specific information for programmes:
In the case of programmes, the system boundary must be defined for each project or project type (if there are multiple project types in one programme).

Leakage (see sec. 5.1 EC)
The validator checks whether leakage has been correctly estimated.

What is leakage?
The term 'leakage' as used here describes the change in emissions outside the system boundaries of the project. This should not be confused with leakage in the sense of the unintentional escape of greenhouse gases such as methane through leaks in pipe connections. Such leaks have nothing to do with leakage and must be considered as part of direct emissions.

Quantification of leakage
In order to quantify leakage, the key cause-and-effect relationships must be analysed and the relevance of the individual sources estimated. Uncertainties in the quantity and hence in the relevance of the individual sources are often considerable. If a source is not deemed to be relevant, an objective and quantitative explanation must be given as to why ignoring it will not result in a substantial misestimation (see sec. 4.6).

In any case, in the interests of simplification and based on the principle of conservativeness, changes in emissions that would lead to higher emission reductions can be omitted.

Example: Installing a smart heating control system simultaneously reduces the consumption of fossil fuels (main effect) and of electricity (secondary effect). For reasons of conservativeness, the quantification of emission reductions due to the reduction in electricity consumption can be dispensed with.

Territorial principle
Estimating leakage and indirect emissions is made simpler by the fact that, in line with the territorial principle (national greenhouse gas inventory), only emission sources within Switzerland generally need to be considered.

Embodied emissions
As a rule, embodied (or 'grey') emissions must be taken into account when estimating leakage and indirect emissions. In accordance with international carbon offsetting standards (Clean Development Mechanism, CDM), emissions from embodied energy associated with the construction of project facilities (e.g. in the production of steel, concrete) or the early replacement of such facilities are ignored. Emissions from the production of fossil fuels in Swiss refineries are also not taken into account, as these fall within the emissions trading system (ETS).

Example: In the construction of biogas plants, the embodied emissions account for well below 2 % of the total project emissions and were therefore omitted.

Influencing factors (see sec. 5.2 EC)
Influencing factors are any factors that could substantially influence the project emissions and the reference development. The validator examines the influencing factors listed in the project description and assesses whether the underlying assumptions are realistic. Based on its specialist knowledge/expertise, it also checks whether other factors having a substantial influence on the eligible emission reductions need to be taken into account. For example, planned changes to the law in force at federal, cantonal and communal level must be taken into account. The influencing factors must be chosen so as to avoid significant estimation errors (see sec. 4.6).

Specific information for programmes:
Influencing factors may be relevant to an entire programme or just to individual projects. If the projects have the same purpose, it is not usually necessary to check how these factors affect each individual project.

Examples of influencing factors:
- Changes in activity rates, e.g. annual distance travelled in km, kWh of building heat
- Development of energy or other relevant prices (oil/gas, liberalisation of the electricity market, transport costs)
- Direct and indirect rebound effects (e.g. energy efficiency or capacity expansions may trigger increased demand and consumption)

Legal Provisions
If all the necessary legal approvals have been obtained for a project, the validator can assume that the project complies with the applicable legislation. A further examination of the project for compliance with legal provisions is not necessary. However, when determining the reference development, all relevant legal provisions in force at federal, cantonal and communal level must be taken into account.

Example: For heating projects outside the scope of the CO_2 Ordinance, when choosing the reference scenario, the minimum requirements of the Confederation and of the canton and commune where the site is located must be taken into account with regard to the share of renewable energy in existing buildings, renovations and new builds. The choice must be justified. The validator verifies the choice and the associated justification. If, for example, the Canton of Fribourg stipulates that 20 % of the energy requirements for new buildings must be met by renewable energy, the reference development for new buildings cannot be less than 20 % renewable energy.

Changes to the legal framework (see Art. 10 para. 5 CO_2 Ordinance):
If the validator determines that a project could be deemed to qualify but will be required by law anyway in the near future or its reference development would be assessed differently in the future due to upcoming changes in the law, it will inform the Office of this fact in its validation report by formulating an FAR.

Influencing factors
For the validation result, influencing factors are included in the monitoring plan and monitored accordingly (see Tab. 5.3.4 Review of influencing factors and ex-ante defined reference development in the project description template[15]). These may include factors that cannot be directly influenced by the applicant or the project, such as the legal framework or economic developments, with such factors generally being assumed to be constant over the crediting period.

15 Available on the FOEN website at: *www.bafu.admin.ch/compensation, template version* v5.2/March 2020 (available in German, French and Italian).

Expected project and reference emissions (see sec. 5.3 and 5.4 EC)
Assumptions for emission factors:
The validator checks whether correct emission factors (EFs), calorific values and densities have been applied. The applicant may rely on the following data sources, in the order listed:
- CO_2 Ordinance
- Annex A3 to the EC
- Official Confederation documents the latest report on the Swiss greenhouse gas inventory (National Inventory Report), communications on the enforcement of the CO_2 Ordinance, comments regarding EMIS *www.bafu.admin.ch > Topics > Topic Air > Data, indicators and maps > Technische Informationen zum Emissionsinformationssystem der Schweiz EMIS* etc.;
- Own measurement data on specific EFs and calorific values (e.g. laboratory analyses). the validator examines in particular generally recognised scientific sources (e.g. *Ecoinvent* and peer-reviewed scientific articles) and verifies the values that apply to the project: comparing the type of installation, intended use, uncertainties and other specific influencing factors (feedstock, local conditions, etc.).

It also checks:
- whether the measurement documentation is complete and correct;
- how long measurements were taken for and whether they were taken in the right place;
- the level of uncertainty in the devices' measurements;
- the impact of the uncertainty on total emissions; and whether
- the magnitudes of the measured values are plausible. Comparisons with default values provided by the FOEN or from the literature may prove helpful here.

Empirical values from other projects should only be used if none of the above sources are available. In particular, the validator must check whether the project type and the installations and feedstocks used (e.g. digestate in biogas plants) are comparable with those of the current project.

Assumptions and measurements for activity rates
The validator checks whether the right type of activity rate has been chosen and whether a more accurate or suitable approach exists. It also verifies whether the most accurate data source is used to determine the activity rate, with priority given to data from audit-relevant documents such as invoices received and issued (oil, gas or electricity).

Where activity rates are measured, the validator checks whether:
- suitable measuring devices are used;
- the rates are measured at the right point in the system;
- all substance flows relevant to the activity rate are measured;
- resulting uncertainties are acceptable;
- the measurements are performed consistently;
- the measured values are plausible. Comparisons with similar installations or values from the literature may be used for this purpose.

Specific information for programmes:
- In the case of programmes, the validator must check whether the chosen EFs can be used appropriately for every project or whether, for example, they need to be specifically defined for each project or project type.
- An ex-ante estimate of the expected reference and project emissions at programme level is always required. A project-level estimate alone is not sufficient. Based on the specified expected emissions at programme level, it is possible to decide subsequently whether any substantial modifications have taken place.
- For the sake of simplicity, and only when estimating the expected project and reference emissions, it may be permitted to make general assumptions rather than estimating an individual EF for each project.

5.2.3 Additionality check

The validator examines the following items:

- Economic feasibility analysis
- Barrier analysis
- Common practice analysis

Individual items are explained below:

Choice of analysis method is correct (see sec. 6.3 EC)
The validator checks whether the method for analysing economic feasibility has been correctly chosen and properly applied.

To be checked in case of simple cost analysis:
No profit or other receipts are generated. Other receipts may arise, for example, from reduced operating costs of installations in the case of a project, lower personnel expenses, or the sale of additional output (e.g. if the new installation is more productive).

To be checked in case of investment comparison analysis:
- All profit and receipts are taken into account. See note under simple cost analysis.
- The residual value of installations or parts of installations at the end of the project duration is taken into account.

To be checked in case of benchmark analysis:
- All profit and receipts are taken into account. See note under simple cost analysis.
- The chosen benchmark value is normal for the industry and takes into account the individual risk exposure of the investment in the case of a project.

Assumptions according to EC (see also Ann. A3 EC)
Useful life and consideration of residual value
Either the project duration is limited to the standardised useful life of the installation in the reference scenario, in which case the economic feasibility calculation must also take into account the residual value of the project installation at the end of the project duration. Or the project duration covers the entire standardised useful life of the project installation, in which case the economic feasibility calculation must also include the investments required to replace the installations in the reference scenario, if such a replacement is planned.

Correct calculation of economic feasibility
The validator checks the completeness and accuracy of the economic feasibility calculation. Figures should be rounded mathematically. In Excel annexes, it must check whether formulas and references are set correctly and match the assumptions in the project description.

Note on the status of third-party additionality tools:
Third-party tools may help project developers to perform the economic feasibility analysis in accordance with federal government guidelines. The use of such a tool by the applicant does not release the validator from the obligation to check the validity of the tools and whether the numerical values, assumptions and calculation formulas are correct and comply with the specifications of the CO_2 Ordinance and the recommendations of the FOEN communication.

Example: Excel tool for simplified demonstration of additionality
www.bafu.admin.ch/Excel-Tool_vereinfachter_Nachweis_Zusaetzlichkeit_Fernwaerme_2022_DE.xlsx

Economic unfeasibility of the project

Assessment of economic unfeasibility in case of simple cost analysis and investment comparison analysis

If economic feasibility is analysed by means of a simple cost analysis or investment comparison analysis, the validator examines whether the project generates relevant additional costs compared with the reference development and whether the revenue from the sale of the attestations makes a relevant contribution to overcoming the economic unfeasibility.

Relevant additional costs:

Compared with the reference scenario, additional costs amounting to at least 10 % of the total project costs are typically incurred in the case of a project. This value provides a benchmark for the relevant degree of economic unfeasibility, which may be of particular use to the VV as an assessment aid. If the additional costs are less than 10 %, the applicant must provide a valid justification for why the degree of economic unfeasibility is relevant. The validator must comment on this justification.

Relevant contribution to overcoming additional costs:

The revenue from the sale of attestations makes a relevant contribution to covering the additional costs if it amounts to at least 10 % of the total costs budgeted for the project's implementation. This value provides a benchmark which may be of particular use to the VV as an assessment aid. If the contribution is less than 10 %, there must be a valid justification as to why the contribution is nevertheless substantial and the project could not be carried out without the contribution. The validator must comment on this justification.

Assessment of economic unfeasibility in case of benchmark analyses

The project is deemed economically unfeasible if the relevant financial indicator (e.g. internal rate of return (IRR), return on capital employed) is below the benchmark.

Relevant impact of revenue on the financial indicator:

The revenue from attestations must make a relevant contribution to overcoming the economic unfeasibility and must improve the financial indicator used (e.g. IRR) by at least two percentage points in absolute terms. This value provides a benchmark for the relevant improvement of the financial indicator, which may be of particular use to the VV as an assessment aid. If the contribution is less than two percentage points, there must be a valid justification as to why the contribution is nevertheless relevant and the project could not be carried out without the contribution. The validator must comment on this justification.

Specific information for programmes:

In the case of programmes, financial additionality is demonstrated at the project level and not at the programme level. The applicant can either demonstrate the economic unfeasibility of each individual project within its programme ('*project-specific demonstration of economic unfeasibility*'), or it can provide a representative demonstration of the economic unfeasibility of all (future) projects in the programme ('*representative demonstration of economic unfeasibility*') when drawing up the programme description. In the latter case, it is not necessary to provide a separate demonstration of economic unfeasibility for each project when preparing the monitoring reports or during verification.

The validator must examine whether the representative demonstration of additionality yields a result comparable to that which would have been provided by a project-specific demonstration. The validator checks whether the determination parameters and their scope ensure that only projects that meet the requirements of Articles 5 and 5*a* of the CO_2 Ordinance are included in the programme. It makes sure that the inclusion criteria are chosen accordingly. In this connection, any uncertainties in the assumptions and possible ranges in the cost factors must be taken into account and documented. The sensitivity analysis must reflect these ranges conservatively.

Specific information for programmes abroad

Projects and programmes are deemed additional if they do not transfer any emission reduction to Switzerland for the sectors involved in achieving the partner state's unconditional Nationally Determined Contributions (NDCs). The VV checks the scope of the partner state's objectives and compensation projects and programmes. The share of receipts from the sale of international attestations attributable to the persons implementing the measures must be communicated in a transparent and verifiable way.

Sensitivity analysis (see also sec. 6.3.2 EC)
The parameters relevant for the sensitivity analysis are those that have a significant impact on the outcome of the economic feasibility analysis (main parameters). When reviewing the sensitivity analysis, the validator checks whether:

- the list of main parameters to be examined in the sensitivity analysis is complete and accurate;
- the sensitivity of the economic feasibility was checked 'independently' for each main parameter in the analysis, under both a maximum and a minimum scenario, i.e. the value of a main parameter was increased by, say, 10 %, while all other main parameters were left at the most probable value; and
- the percentage variation in the typical uncertainty for the main parameter under consideration is at least 10 %. For example, typical uncertainties for the construction costs of larger technical installations, as applied in non-binding quotations, are +/-20 %. A value of +/-25 % is prescribed for biogas plants.

As a rule, the economic analysis only provides a valid basis for demonstrating additionality if the sensitivity analysis supports the outcome that the project remains additional in all minimum and maximum scenarios (for each main parameter considered separately).

If such an outcome is not supported for at least one main parameter, additionality cannot be unconditionally demonstrated by this economic feasibility analysis. The VV assesses the robustness of the demonstration of additionality.

Barrier analysis (see also sec. 6.3.1 EC)
The validator checks whether the barriers invoked meet the following requirements (in addition to the appraisal items listed in sec. 6.3.1 EC):

- The costs of overcoming the barriers are verifiably documented and quantified using plausible and sufficiently conservative assumptions. Industry-standard values must be used. If no such values are available, average values for the economy as a whole or comparative values from other sectors may be used, for which the comparability must be justified.
- It must be demonstrated that the barriers can only be overcome with the additional revenue from the sale of the attestations. Two elements are used to verify this, namely:
  - the economic feasibility analysis expanded to include the costs of the barriers with and without revenue from attestations;
  - the validator's specialist knowledge and expertise.

Examples of barriers:

- There is a lack of qualified personnel to operate and maintain the technology. Such staff can be trained with the revenues from attestations.
- The project entails additional risks (e.g. increased probability of installation failure, uncertainties associated with expanding the grid connections of a local heating network), which can be covered with the revenues from attestations.
- There is a lack of trust among customers, which can be overcome with accompanying measures (e.g. extensive measurement campaigns) using the revenues from attestations.

Common practice analysis (see also sec. 6.4 EC)
The validator checks whether the activities planned as part of the project are generally already being implemented in the country in question or in neighbouring countries and are thus common practice. It bases its assessment on existing studies of market conditions and deployed technologies.

The validator gives a brief description of the current situation, including:
- the market trend concerning the planned activities in the country concerned in recent years;
- a description of the technologies that are deemed potential alternatives to the planned activities, and the application and distribution of these technologies.

The validator gives a reasoned opinion on whether or not the project is common practice. The final decision and the burden of proof that a project is common practice lie with the FOEN. If the FOEN provides evidence, backed up by relevant basic data, that the project or programme is regarded as current practice, and is not therefore additional, it may be rejected. Neither the applicant nor the validator need to carry out their own studies in order to demonstrate that the project is not common practice. If opinions differ on the issue of common practice, the FOEN will undertake further investigations.

The following may indicate that activities are common practice:
- Penetration of a technology or activity stands at 20 % or more of the total market. For this factor to be considered, the total market must be clearly defined.
- Equivalent, alternative technologies exist which could also be used in the project and are state of the art.
- The market shows a clear trend towards the practice envisaged or the technology used in the project. Many similar projects (in terms of technology or activities) are already being implemented. Projects are considered similar if they have a common purpose, are of similar capacity/size and are carried out in a similar economic and regulatory environment.

If a project is the first of its kind in Switzerland or neighbouring countries, it is by definition not common practice.

5.2.4 Review of the monitoring plan

The validator examines the following items:

- Method for demonstrating achieved emission reductions
- Data and parameters
- Responsibilities and processes

Individual items are explained below:

Suitability and adequacy of the demonstration method

The validator examines whether the chosen monitoring method is suitable and adequate by checking it against the following criteria:

- The list of parameters is complete, appropriate and consistent with the specifications of the Office (in particular emission factors, global warming potentials (GWPs), standardised useful lives, calorific values and published standard methods). This concerns both the parameters determined at the time the application was submitted and those regularly recorded as part of the monitoring.
- The method is only complete if it describes the entire pathway from the measured value to the eligible emission reduction in t CO_2eq.
- The permissible age of the data is appropriate and adequate. This is the case if the data cannot give rise to any substantial misestimations, for example due to being out of date.
- The data collection specifications and measurement procedures are adequate, complete, accurate, reliable and consistent. Substantial misestimations are avoided.
- The demonstration data to be collected are described and their sources clearly identified.
- The method describes how the monitoring would need to be adapted if the project were to be expanded (e.g. expansion of a local heating network during the project duration). Such a description is mandatory if an expansion of the project is foreseeable, probable or commonplace in comparable projects.
- The method is demonstrably feasible.
  Foreseeable subsequent deviations from the monitoring method are addressed and can be avoided.
- The use of a method accepted by another international standard (CDM; Gold Standard, Verra etc.) does not guarantee that the qualification of the project or programme, nor that attestations will be issued. Reference should also be made to other projects registered with the FOEN using the same technology.[16]

Calculation tool

It is recommended that a calculation tool (e.g. Excel table) already be available at the time of validation, showing how the actual emission reductions are to be calculated ex-post based on the parameters of the demonstration method. Such a tool may be dispensed with in justified cases.

The validator checks the calculation tool against the following criteria:

- The concept and functionalities of the calculation tool must be comprehensible.
- The calculation steps must be explained in a comprehensible way.
- If Excel is used, formulas and cell references are available.

Uncertainties in the ex-post calculation of achieved emission reductions

A key task of validation is to ascertain whether the proposed demonstration method is such as to avoid a substantial misestimation of the emission reduction actually achieved (see sec. 4.6). The requirements regarding uncertainty are therefore more stringent for the method used for ex-post determination of the actual emission reduction resulting from project implementation than for the ex-ante estimate of expected emission reductions.

The validator must ascertain whether the demonstration method is such as to provide the best possible estimate of the emission reduction. The demonstration method must adequately account for uncertainties and adhere to the principle of conservativeness (see sec. 7.1.1).

16 The list of registered offsetting projects abroad can be found on the FOEN's website at: *www.bafu.admin.ch > Topics > Topic Climate > Information for specialists > Measures CO_2 Act > CO_2 compensation > Projects abroad > Registered compensation projects abroad*

Data and parameters for monitoring

The validator checks the suitability of the data intended for monitoring, applying the following criteria:

- It is clear where the data will come from (it would be helpful, for example, to indicate the measuring points on a process diagram). The data can realistically expected to be available on the required scale.
- The envisaged quality controls guarantee the accuracy and completeness of the data (four-eyes principle, spot checks by another person, etc.).
- It is clear which data collection and evaluation tools are envisaged. These tools are suitable for determining the emissions.

Measurement procedure and measurement interval for monitoring

The validator checks the suitability of the measurement procedure and measurement interval, applying the following criteria:

- Description: The key points of the procedure are specified. It is clear who measures where, when, what, how and how often. The procedure makes sense and is consistent. The measurement is documented.
- Minimum requirements for measurement accuracies are specified by the applicant (e.g. flowmeters with 1 % accuracy, calibrated according to the manufacturer's specifications).
- Calibration procedure (if known): It is clear for which processes and parameters the measuring devices are calibrated, how they are calibrated and how often.
- Verifications: These are required for meters that are relevant for billing, in accordance with the provisions of the Measuring Instruments Ordinance of 15 February 2006 (MIO; SR 941.210). All other meters are not subject to verification and should not be verified.
- Accuracy of the measurement method (if known): What measurement uncertainties are permissible? The minimum required measurement accuracy of the measuring devices must be specified. How often do the devices have to be verified?
- The person responsible for the measurement is designated: The monitoring method indicates who is responsible for the measurements (including deputisation arrangements).

5.2.5 Specific case of revalidation

In the event of revalidation, whether for an extension of the crediting period or in the case of a substantial modification, the validator checks whether the project or programme still complies with Article 5 or 5*a* and whether the project has been properly updated. If the project or programme does not include any modifications relating to Article 5 or 5*a*, it is therefore only a question of examining whether the legal and technical framework conditions relevant to these aspects have changed (see Ann. A1 EC). Barring any substantial modifications to the project or programme, there is no need to carry out a new economic feasibility analysis since the latter is valid for the entire project duration, regardless of the crediting period. Insofar as the emission reductions claimed by the applicant in the context of programmes are exclusively attributable to changes in the legal and technical framework conditions, they no longer give rise to any entitlement to attestations (Art. 10 para. 5).

Verification FARs

All conditions/requirements from the old crediting period should be included in the new project description in such a way that these FARs are no longer necessary.

6 Verification requirements

The purpose of verification is to ensure that the monitoring report meets the requirements of the CO_2 Ordinance and the monitoring has been implemented as specified in the validated project description. The verification includes a formal examination of the monitoring report, including annexes, and an examination of the report's content.

The verifier ensures in particular that:
- the project, programme or planned component activities are implemented and operated as stated in the project or programme description: in particular, the technology, installations, equipment and devices used for monitoring must meet the requirements set out in the monitoring plan;
- the monitoring report and the other documents on which it is based are complete and consistent and meet the requirements of the CO_2 Ordinance;
- the systems and procedures actually implemented for the monitoring match those described in the monitoring plan and the necessary monitoring data are properly recorded, registered and documented.

The verification of the first monitoring report is usually the most time-consuming, since it involves, in particular, checking whether the project has been implemented in accordance with the application for the issuance of attestations. As part of the initial verification, the verifier must in particular check whether:

- the start of implementation took place as scheduled and not (for example) earlier;
- the monitoring processes and requirements defined in the project description are complied with;
- the FARs contained in the project qualification ruling[17] have been properly taken into account during implementation so that the overall result of the validation is still valid;
- new knowledge (e.g. regarding implementation of the project described in the project description) or changes to the framework conditions (e.g. new legal provisions) call into question the results of the validation or the qualification decision;
- a site visit should take place (see sec. 7.3).

If the verifier finds inconsistencies, errors or misestimations in the already completed validation, it suspends the verification and reports its findings to the Office. The Office will decide how to proceed.

If the verifier finds manifest errors in the project description and annexes to the project description (e.g. in the formulas for calculating emission reductions), it lists these errors in the verification report, requests their correction with a CAR and has the emission reductions calculated on the basis of the corrected values.

17 The rulings (decisions) on project qualification (Art. 8 para. 1 CO2 Ordinance) and the issuance of attestations (Art. 10 para. 1^{bis} CO_2 Ordinance) are published (in German, French and Italian) at: *www.bafu.admin.ch/registered-projects*

As an interim result of its appraisal, the verifier formulates CRs and CARs if necessary. Further information on verification can be found in the verification report template.[18]

Section 6.1 sets out the formal requirements for application documents. The content requirements are described in section 6.2. Explanations of the individual appraisal items are provided in boxes under the relevant title.

6.1 Procedure for formal examination of applications

The results of the formal examination are documented in the verification report.

Complete and consistent monitoring report
The monitoring report is complete if:
- the monitoring report template has been fully completed in a way that is comprehensible to the VV. In particular, it must be ensured that:
  - the monitoring report explains comprehensively how the emission reductions in t CO_2eq were calculated from the measured values;
  - the monitoring period(s) has/have been recorded correctly;
  - achieved emission reductions are reported for each calendar year;
  - fixed and dynamic parameters have been recorded completely and accurately in accordance with section 4.3 of the monitoring report template;
- the (measured) values for each parameter used in the monitoring are evidenced by an appropriate document.

Electronic copies of all documents mentioned in the monitoring report must be attached to the report. Reports and scientific studies must be correctly referenced (with at least the author, year of publication and number of pages stated directly in the text of the monitoring report).

Specific information for programmes:
In the case of programmes, the VV also checks whether:
- all relevant information according to the monitoring plan is available for all projects (e.g. in the form of completed application forms); and
- for all projects newly included since the validation or last verification, there is proof that they meet the inclusion criteria.

All projects must meet all of the inclusion criteria set out in the programme description. This can only be guaranteed if all projects are reviewed by the applicant. The verifier may rely on sampling when verifying the inclusion criteria if a comprehensive check would entail a disproportionate amount of effort and if such an approach is methodologically justifiable. An examination of selected representative projects is possible, particularly where the individual projects and their implementation are very similar and there are many small-scale projects involved (i.e. small-scale in terms of their emission reduction performance).

18 Available (in German, French and Italian) at: *www.bafu.admin.ch/compensation*

6.2 Procedure for examination of application content

6.2.1 Examination procedure

The content examination includes at least the following steps:

1. Assessment of project implementation and operation in terms of consistency with the information contained in the project description:
   The aspects of the implemented project set out in Table 4 must be checked, particularly in the initial verification, for consistency with the information contained in the project or programme description. A detailed list of any differences is drawn up during this verification and their relevance is assessed.

Tab. 4: Comparison of project in place with description given

Aspect of the project, programme or	Possible comparison parameters
Technology used in the installation	Input capacities, output power, process, etc.
Operation of the installation	Installation utilisation rate, load factor, digestate composition, process parameters, etc.
Financial parameters	Economic feasibility calculation, investment costs, running costs, receipts, interest expenses

2. Examination of the procedures for generating, aggregating and entering monitoring parameters:
   The procedures listed in Table 6 must comply with the specifications in the project or programme description. Discrepancies must be identified and described in detail.

Tab. 5: Examination of the procedures for measuring and entering data

Aspects of monitoring	Possible comparison parameters
Monitoring plan Data entry Archiving of monitoring data Quality assurance	Actual procedures Responsibilities for data entry and monitoring Parameters measured

3. Examination of measuring instruments, measurement practice and calibration requirements for compliance with the specifications in the project/programme description and monitoring plan (see Tab. 6):
   Measurements must be made with the greatest possible accuracy. The greater the influence of a parameter on the calculated emission reduction, the more precise the checks on compliance with the requirements for measuring instruments, measurement practice and calibration need to be.

Tab. 6: Comparison of the monitoring as implemented with the specifications in the project/programme description and in this communication

Aspects of monitoring	Possible comparison parameters
Measuring instruments Measurement practice Calibration requirements	Measuring devices used Measurement methods used Measurement intervals Accuracy, calibration

4. If indicated, visit to the installation(s) and discussions with the body responsible for the project, programme or planned component activity.

In addition, in the case of planned component activities included in a programme, a check to determine whether these activities meet the inclusion criteria set out in the programme description, which ensures that they fulfil the requirements of Article 5 or 5*a* of the CO_2 Ordinance.

The results of the content examination are documented in the verification report. Explanations of individual appraisal items are given below.

6.2.2 Description of monitoring (checklist sec. 2)

In connection with the monitoring description, the verifier examines the following items:

- Monitoring method and demonstration of achieved emission reductions
- Process and management structures, responsibilities and quality assurance
- FARs from the ruling on project qualification (verification of the monitoring report for the first monitoring period) or the ruling on the most recent monitoring report (verifications of monitoring reports for all subsequent monitoring periods).[19]

19 The rulings (decisions) on project qualification (Art. 8 para. 1 CO_2 Ordinance) and the issuance of attestations (Art. 10 para. 1^{bis} CO_2 Ordinance) are published at: *www.bafu.admin.ch/registered-projects*

Individual items are explained below:

The method used matches the method described in the monitoring plan
A project assessed as qualifying must, in principle, be implemented in accordance with the project description on which the project qualification ruling is based. A project may change during its implementation. Unless they are substantial modifications, changes are only documented in the monitoring report.

All deviations must be documented by the applicant and justified in a way that the VV considers comprehensible and coherent. As well as the deviation itself, the documentation must present its effects on the demonstration of additionality, the reference development and the expected emission reduction, if applicable. The applicant and the VV may deal summarily with modifications to the project that do not affect the decision on the project's qualification. If the deviations represent manifest errors, the VV makes a suggestion in the verification report about how to deal with the errors. The VV does not explicitly identify potential improvements.

Examples of deviations:
- Making adjustments to assumptions about parameters and variables (only permissible if the originally chosen values turn out to be manifestly incorrect, e.g. due to typing errors)
- Optimising the demonstration method by changing the data to be monitored (e.g. collecting additional data or omitting obsolete measurements)

Not examples of deviations:
- Making adjustments to fixed parameters because using updated values (e.g. current emission factors as per the EC) would positively impact the revenue from attestations
- Optimising the demonstration method by the subsequent application of exceptions and the resulting adjustment of the reference development

For all deviations, the VV checks whether they represent substantial modifications within the meaning of Article 11 of the CO_2 Ordinance (see also sec. 6.2.5). Section 3.9 EC explains when modifications to a project are considered substantial.

6.2.3 Framework conditions

In connection with the framework conditions, the verifier examines the following items:
- Technical description of the project
- Financial assistance
- Delimitation from other instruments and measures
- Start of implementation

6.2.4 Calculation of achieved emission reductions

In connection with the calculation of achieved emission reductions, the verifier examines the following items:

- System boundary and influencing factors
- Monitoring of project emissions
- Determination of the reference development
- Achieved emission reduction

Individual items are explained below:

Data plausibility checks
For parameters deemed of fundamental importance, the information must be checked for plausibility in accordance with section 7.2 EC. In this context, it should be noted that internal and external sources cannot automatically be considered trustworthy. The VV must assess the trustworthiness in each case, based on its experience and specialist knowledge/expertise. If the calculation of the emission reductions achieved by a project or programme cannot be based entirely on measured values at the project level (e.g. too labour-intensive because the number of projects in the programme is very large), a suitable plausibility check may be carried out on the impact model as part of the monitoring and verification. If there is any doubt about the feasibility of the plausibility check, another approach must be defined. In this case, the VV examines both the fitness for purpose of the impact model and the amount of the emission reductions achieved, in order to answer the following questions: whether and why the impact model stated in the project or programme description remains suitable and whether and why the emission reductions achieved are plausible.

Examples of plausibility checks:

- Horizontal plausibility checks based on other sources:
  - Installation logbook
  - Inventories and accounting documents
  - Electricity/heat meters
  - Purchase receipts (e.g. for fuel) or similar sources

Vertical plausibility check:
Analysis of time series data of individual parameters (e.g. trend analysis: Are there outliers in the collected data and, if so, why? Is the trend realistic and explainable?)

6.2.5 Substantial modifications

The verifier assesses whether deviations in project implementation compared with the version of the project set out in the project description constitute substantial modifications within the meaning of Article 11 of the CO_2 Ordinance (see also sec. 3.9 EC). If the modification is deemed non-substantial, the VV gives a justification for this classification and so concludes the verification on this point. Otherwise, the VV recommends a revalidation in accordance with section 4.3 EC (to be noted in each case under 'Overall assessment of the monitoring report, summary and FARs' and in section 3.5 of the verification report template).[20]

In connection with substantial modifications, the verifier examines the following items:

- Substantial modifications in the economic feasibility analysis
- Substantial modifications in the emission reductions
- Substantial modifications in the technology used

20 This refers to template version v2.4/February 2020, available at: *www.bafu.admin.ch/compensation*

Individual items are explained below:

Substantial modifications in the economic feasibility analysis
If the cost structure of a project changes, this may affect the economic feasibility analysis and hence the additionality of the project. The applicant must explain why the cost structure of the project has changed and why this does not represent a substantial modification to the project. The verifier should comment on these explanations and justify why it recommends, or does not recommend, a revalidation.

Examples of reasons for changes in investment and operating costs:

- The actual construction costs relative to the revenues are much lower than estimated in the project description because:
  - more households than originally planned are now being supplied by the local heating network (and the supply network is longer as a result); or
  - a facility has two burners installed, whereas only one was planned.
- The operating costs have changed because:
  - maintenance turned out to be much less expensive than indicated in the project description; or
  - deconstruction costs are lower than planned, which only became apparent after construction.
- Operating revenues have changed because:
  - the biogas plant generates significantly more electricity than stated in the project description.

Substantial modifications in the emission reductions
If the technical parameters of a project change, this may affect the project's eligible emission reductions.

Examples of changing technical parameters: utilisation of the plant, composition of materials used (e.g. digestate), process parameters, etc.

Specific information for programmes:
If the inclusion criteria for projects have been adjusted, this always represents a substantial modification and must be reported to the Office. Normally, a change in the inclusion criteria results in a revalidation.

6.2.6 Verification of programmes

When verifying programmes, the VV proceeds as detailed above. It also checks:

- there are deviations in the system boundaries of the implemented programme compared with the programme outlined in the programme description (in terms of geography, greenhouse gases covered, etc.);
- the projects newly included in the programme (i.e. since the validation or the last verification) meet the inclusion criteria specified in the programme description and have been implemented in accordance with the programme description. This may also be checked using a representative sample if a comprehensive check would entail a disproportionate amount of effort and if such an approach is methodologically justifiable. In any case, the projects selected for the sample must be taken into account in accordance with the monitoring plan (see sec. 7.4);
- for all projects, the eligible emission reductions have been documented as specified in the programme description. The documentation of eligible emission reductions may also be checked using a representative sample if a comprehensive check would entail a disproportionate amount of effort and if such an approach is methodologically justifiable (see sec. 7.4).

7 Other appraisal items

Projects and eligible emission reductions must meet the relevant requirements of the CO_2 Ordinance. The VV examines all aspects required for an appropriate assessment of the projects and eligible emission reductions, paying particular attention to the completeness and accuracy of the information, justifications and assumptions. If necessary, the VV uses other sources of information besides the documents submitted by the applicant. It makes sure to document these additional sources.

The requirements for the examination of some key aspects are explained below. Unless stated otherwise, the VV must check the following items during both validation and verification.

7.1 Verifiability and quantifiability, conservativeness

7.1.1 Requirements for monitoring data

Eligible emission reductions are considered verifiable and quantifiable if the underlying data are measured or estimated with sufficient accuracy. The values specified in the CO_2 Ordinance must be used, where available. It is possible to deviate from the EC recommendations if the proposed values are equivalent to the EC recommendations.

The effort/expense involved in collecting measurement data required for monitoring should be proportionate. All manufacturer information and measurement results used for the calculations should be cited in the application documents.

In many cases, the applicant will have a choice between (its own) more complex/costly measurement campaigns and conservative estimated values that can be derived with less effort. Estimates are made as accurately as possible and based on current scientific and technical knowledge.

The relevant sources (peer-reviewed papers, technical and other standards) are cited correctly and attached to the application documents.

In case of uncertainty, a conservative approach is adopted. Assumptions are made in such a way that there is a high degree of certainty that the eligible emission reductions will not be overestimated. If there are several equivalent options, the option that results in the lowest emission reductions must be selected.

Example: When calculating the project emissions from a biogas plant, the methane slip may be measured annually. Alternatively, a conservative estimated value that is assumed to be constant over the project duration may be used.

If measurements or data collections by the applicant are not appropriate or too complex/costly, the following *data types* from other sources should be used, in the order listed:

- Government financial and tax data
- Official statistical data
- Data from in-house measuring systems:
  - Company-related financial data (e.g. invoices or tax returns)
  - Data reported to statistical offices
  - Data from internal management and control systems (log files and the like)
- Historical data and extrapolations from such data
- Scientific data from the literature and estimated values
- Data from experimental tests and extrapolations from such data

All studies, evaluations, market information or other expert opinions should be correctly cited and the relevant sources attached to the application documents in electronic form.

7.1.2 Requirements for the demonstration method

The method for demonstrating emission reductions must meet the requirements of the CO_2 Ordinance and/or be equivalent to the Office's recommendations. During validation, the VV checks whether the demonstration method meets the following criteria:

- The pathway from measurement to emission reduction in t CO_2eq is comprehensively set out (see also monitoring plan).
- The demonstration method fully covers the defined areas of application. If this is not the case, restrictions have been created for those cases where the demonstration method and its assumptions are not valid.
- The terms and system boundaries are fully and correctly defined. Key terms have been clearly explained. (Example: In a project involving cooling systems, the type of cooling is clearly explained).
- If it is not possible to perform measurements, the demonstration method enables a realistic and – in the case of uncertainties – conservative estimate of the eligible emission reductions.
- Additionality can be appropriately and adequately assessed on the basis of the demonstration method.
- Calculations and parameters used for reference and project emissions as well as leakage can be verified.
- The proposed monitoring plan is appropriate and adequate. Where necessary, the data may be checked for plausibility using data from other sources. These sources must be stated.
- If the monitoring plan or the calculation of achieved emission reductions is not entirely based on measured values but relies on an impact model, a suitable plausibility check of the impact model must be provided for as part of the monitoring and verification (see sec. 6.2.3 → Plausibility check on information and sec. 7.4 → Sampling).
- Methodological uncertainties in the calculation of eligible emission reductions (e.g. problem of signal-to-noise ratio in case of a relatively small quantity of eligible emission reductions) are compensated for with an appropriately conservative approach.
- If methodological principles published on the FOEN website were used, these were applied correctly and consistently.

7.1.3 Double counting

The VV ensures that:

- the system boundary (see EC sec. 5.1) of a project clearly defines which emission reductions can be credited to the project;
- no emission reductions without apportionment of effect are counted more than once in different projects, parts of projects or measures further upstream or downstream in the impact chain; and
- where necessary, a correct apportionment of effect (see EC sec. 8) has been carried out. If the apportionment of effect was done using the Excel tool provided by the Office, the VV checks whether the tool was used correctly and whether the necessary signatures were obtained. If the apportionment of effect was not done using the Excel tool provided by the Office, the VV checks that the apportionment of effect has not given rise to double counting and that the necessary signatures have been obtained.

Example: Double counting occurs if both the producer and consumer of biofuels claim emission reduction attestations for the same quantity of biofuel as part of their respective offsetting projects (production of biofuels and switch from fossil fuels to biofuels respectively).

7.2 Quality assurance

Quality assurance systems provided by the applicant should show transparently and comprehensibly which process and management structures are involved in the project's implementation and how the quality of the data collected and reports prepared, in particular the monitoring report, is verified. The persons responsible must be named in the monitoring report.

7.3 Site visits

A site visit should be undertaken by the VV and possibly by the Office, if necessary, in addition to the document check, as part of the verification of the first monitoring report or in the event of a revalidation (EC 4.3 and in accordance with Art. 6 para. 5 CO_2 Ordinance) insofar as this can be done with reasonable effort and may generate significant additional benefit. If a site visit is not undertaken, the VV gives a justification for this. There is no absolute obligation to carry out a site visit.

A site visit is appropriate if:

- without an *in person* inspection and an on-site discussion with the applicant, the validity and completeness of the data and information in the monitoring report cannot be adequately verified (e.g. if accounting documents are only available in paper form), and there is insufficient transparency in the available documents and information;
- the project uses complex equipment and systems whose set-up (type and completeness), operation and maintenance are a significant factor in the emission reductions that can be achieved (such as in biomass plants, for example).

Example: Where standardised compact devices (e.g. efficient heating controls) have been installed by third party companies and the user has only limited influence over the functioning of the device, a site visit may be dispensed with, or only a representative sample of the devices need be checked on site.

A site visit should cover at least the following:
- Verifying actual project implementation compared with the validated project as detailed in the project description to which the qualification decision relates;
- Verifying the flow of information for measurement, aggregation and reporting of monitoring parameters;
- Talking to applicants and relevant departments/units to determine whether operational and data collection processes have been implemented in accordance with the validated specifications and are applied in practice;
- Checking the plausibility of the information in the monitoring report using other sources such as accounting data, inventory data, delivery notes, internal statistics, etc.;
- Checking measuring devices, data collection systems, data storage systems and quality assurance processes for compliance with the specifications set out in the project description to which the qualification decision relates.

If the VV deems a site visit appropriate but no such visit takes place, this is recorded in the verification or revalidation report, together with a recommendation for further action in the form of an FAR. A site visit deemed appropriate by the VV but which does not take place represents an exception, whereby the appraisal can be completed and an FAR recommended despite an unresolved appraisal item (CR, CAR).

7.4 Demonstration of emission reductions and verification by sampling

Statistical methods using a sampling approach may be helpful or necessary to estimate the value of a particular parameter or parameters. A sampling approach is used where a parameter cannot be surveyed for the entire population. The parameter can then be estimated using data collected from a sample. Sampling may be used both for demonstrating achieved emission reductions and for verifying the associated reporting. VVs ensure that the relevant scientific principles and requirements are observed when sampling is used (see sec. 7.1 and 7.3 EC). This also applies when the VVs themselves use sampling. In the verification report, they explain how the sample was chosen and justify their procedure. They also describe what proportion of the emission reductions achieved are covered by the chosen sample.

Good practice guidance and detailed examples:
For further information:
- Guidelines for sampling and surveys for CDM project activities and programme of activities, Version 07.0 (CDM-EB50-A30-STAN) *https://cdm.unfccc.int/Reference/new_reg.html* (version dated 4 May 2017)
- Appendix 6. Sample size calculator, Version 03.1 (CDM-EB 67 – A06-GUID) https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150813144045237/Meth_guid48Calculator.xlsx (version dated 13 August 2015)
- Sachs, Lothar: Angewandte Statistik. Springer-Verlag, Berlin 2004

7.4.1 Terminology

The following terms are relevant in the context of sampling:

- **Population:** Set of all items or events that are similar with regard to the studied characteristic.
- **Parameter:** Constant for characterising an empirical distribution in a population (e.g. number of trips or mean operating times). In this section, a parameter is defined as a characteristic of a population that is relevant in terms of emission reduction (e.g. the average reduction in energy consumption achieved by installing a control unit in buildings, the mean operating time or the average proportion of decommissioned installations).
- **Sample:** Subset of units studied within a population, selected based on specific aspects (e.g. 54 central heating systems out of a population of 500 central heating systems in single-family homes).
- **Unbiasedness:** Approximation of the expected value of the estimator to the true parameter value (e.g. estimation of the average amount of energy supplied by a local heating project compared with the amount actually supplied).
- The **study plan:**
  - describes exactly what is being studied (operationalisation);
  - sets out what sample is studied by what means (study method); and
  - is to be understood as a guide for conducting the sampling and should be followed without deviation in procedure. If sampling is to be used in the monitoring or verification of a programme, the procedure for determining the representative projects should be explained and validated in advance in the programme description (see EC, sec. 7.1 and 7.3).

7.4.2 Choice of sampling design

The correct choice of sampling design is key to ensuring the representativeness of parameter estimation. The VV examines the following items in this regard:

- The samples are chosen from the population in a random and independent way (i.e. demonstrably independent of the applicant's interests). The independence of the estimate depends to a large extent on who selects the sample. The validation must check whether the method uses a suitable random sampling process and/or organisational measures to ensure that the selection is indeed random and independent. For an independent estimate, it may be necessary or helpful for the sample to be selected by an external, independent and neutral body.
- If the sampling is based on fixed criteria (e.g. every nth individual project), the validation must examine what potential there is to influence the result of the emission reduction (e.g. by not including selected projects in the programme in order to deliberately optimise a relevant parameter) and what measures have been taken in this regard.
- The composition of the population is taken into account. If strata or clusters of parameters are to be expected (e.g. because there are cantonal differences in the parameters or because the parameters differ according to subcategories such as single-family homes and multi-family homes), this must be taken into account in the sample selection procedure by using stratified samples ('stratification'). This means that the total population is divided into suitably homogeneous subpopulations (strata), according to the aspects that are important for the study of the parameters investigated.

7.4.3 Review of the approach by the VV

If the demonstration method or monitoring involves the use of sampling, the VV examines in particular whether:

- the choice of sampling design reliably excludes the possibility of a substantial misestimation of the resulting total value;
- the minimum number of samples required is determined based on the confidence/precision requirements and using reliable statistical methods that are appropriate for the issue at hand;
- the chosen sample size can be accounted for objectively and has not been determined based solely on estimates. If a sufficiently large sample size cannot be achieved (e.g. for cost reasons), the increased uncertainty is taken into account by means of conservative assumptions, for example in the form of discount factors on the eligible emission reduction;
- the project description includes a study plan that meets the following requirements:
  - Overall, the study plan follows the scientific rules of statistics.
  - The study plan presents the methodological concept (including its justification), the sample selection procedure, the number of samples required and the assumptions made in a comprehensible and complete manner.
  - The study plan is suitable for determining unbiased and reliably estimated mean values of parameters on the basis of the samples.
  - In implementing the study plan, a high level of confidence with a statistical certainty of at least 90 % is achieved for each relevant parameter.
  - The confidence interval is interpreted correctly.

Example: If the parameter is a mean value of 4 GWh, the confidence interval ranges from 3,6 GWh to 4,4 GWh. If the parameter is a ratio or percentage, say 60 % of the installations in operation, the confidence interval extends from 54 % to 66 %.

List of changes

Status as of January 2024

- Updating of publication details, foreword and introduction
- Clarification of the procedures for the transfer of an expert to another VV (sec. 3.4)
- Clarification of validation requirements (sec. 5)
- Deletion of an outdated example (sec. 5.2.3)
- Addition of information on the additionality of projects and programmes abroad (sec. 5.2.3)
- Addition of information on the qualification of projects and programmes (sec. 0)
- Clarification of plausibility check procedures (sec. 6.2.5)
- Addition of the possibility of on-site visits by the FOEN (sec. 7.3)
- Extension of the descriptions throughout the document to cover projects and programmes implemented abroad