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Options for Improving the Emission Unit Eligibility Criteria under the Carbon Offsetting and Reduction Scheme for International Aviation

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Options for Improving the Emission Unit Eligibility Criteria under the Carbon Offsetting and Reduction Scheme for International Aviation

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Kurzbeschreibung

Dieses Diskussionspapier analysiert Optionen zur Verbesserung der derzeitigen „Emissions Unit Eligibility Criteria“, die unter dem Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) der Internationalen Zivilluftfahrtorganisation verwendet werden. Die Optionen werden identifiziert, um die Umweltintegrität des Systems zu gewährleisten. Eine klare Formulierung der EUC ist wichtig, um Minimalanforderungen für die Qualität von Klimaschutzzertifikaten für CORSIA sicherzustellen. Die Analyse fokussiert sich auf fünf Kriterien, die essentiell für die Qualität von Klimaschutzzertifikaten sind: Beweis der Zusätzlichkeit, Festlegung von Referenzszenarien, Dauerhaftigkeit der Minderungen, Vermeidung von Doppelzählung, und die Vermeidung von Nettoschäden. Für die Bewertung der derzeitigen EUC wird die Praxis der größten Crediting Programme ausgewertet und Bereiche identifiziert, in denen die EUC überarbeitet, verfeinert oder weiter ausgearbeitet werden können, um die Praxis der Crediting-Programme zu berücksichtigen. Es werden außerdem spezifische Empfehlungen für die Überarbeitung, Ergänzung und Verfeinerung von jedem Kriterium erstellt, einschließlich von Formulierungsvorschlägen. Insgesamt sind die derzeitigen EUCs ausreichend, um die wesentlichen konzeptionellen Elemente jedes Kriteriums abzudecken. Allerdings könnten alle fünf Kriterien weiter ausgearbeitet werden, um essentielle Anforderungen und Verfahren zu spezifizieren, damit die Kriterien tatsächlich erfüllt werden. In den meisten Fällen können die Formulierungen und die Terminologie der EUCs auch verbessert werden.

Abstract

This discussion paper assesses options for improving the current Emissions Unit Eligibility Criteria (EUCs) used for the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) adopted by the International Civil Aviation Organization (ICAO), with the goal of ensuring the scheme's environmental integrity. Clearly articulated EUCs are needed to define minimum standards for the "quality" of carbon offset credits that may be used under CORSIA. For this analysis, we focus on five EUCs that are essential for offset credit quality: additionality; baselines; permanence; avoidance of double counting; and causing no net harm. To evaluate the current EUCs, we review current practice among major carbon offset programs, and identify areas where the EUCs could be revised or elaborated to better align with best practices. We then provide specific recommendations for revision, refinement, or elaboration to improve each EUC, including suggested text edits and additions. We find that the current EUCs are mostly sufficient in covering basic conceptual elements for each of the criteria. However, all of the EUCs reviewed here could benefit from more elaboration on essential program requirements and procedures needed to ensure that the criteria are realized. In most cases, the formal wording and terminology used in the EUCs could also be improved.

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Abbreviations

AFOLU	Agriculture, Forestry, and Land-Use
A/R	Afforestation / Reforestation
CAR	Climate Action Reserve
CCB	Climate, Community, and Biodiversity Standard
CDM	Clean Development Mechanism
CER	Certified emission reductions
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DOE	Designated Operational Entity (designated verification body under CDM)
DNA	Designated National Authority
EIA	Environmental Impact Assessment
EUC	Emissions Unit Eligibility Criteria
GHG	Greenhouse gas
GS	The Gold Standard
ICAO	International Civil Aviation Organization
IFC	International Finance Corporation
MRV	Monitoring, Reporting, and Verification
NDC	Nationally determined contribution
PDD	Project design document
REDD+	Reduced Emissions from Deforestation and Degradation
SPA	Safeguarding Principles Assessment (Gold Standard)
tCO₂e	Tonnes of carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard (offset program administered by Verra)
VCU	Verified Carbon Unit (unit under the VCS)

1 Introduction

In 2016, the International Civil Aviation Organization (ICAO) adopted the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) to help achieve its aspirational goal of carbon-neutral growth starting in 2021. The scheme requires airline operators to offset increases in carbon dioxide (CO₂) emissions from international flights above 2020 levels. To fulfil their offsetting requirements under CORSIA, airline operators can only purchase offset units from carbon offset programs (“programs”) that were approved by the Council of ICAO. In 2019, the ICAO Council adopted Emissions Unit Eligibility Criteria (EUCs) which specify the requirements that must be fulfilled in order for programs and their offset credits to be eligible under CORSIA. These include “program design elements” and “Carbon Offset Credit Integrity Assessment Criteria.”

This discussion paper assesses options for improving the current EUCs. Clearly articulated EUCs are needed to define minimum standards for the “quality” of carbon offset credits that may be used under CORSIA. High quality offset credits will ensure the environmental integrity of CORSIA, meaning that global GHG emissions will be no higher under CORSIA than if airlines were to meet their emissions limitation goals without using offset credits. The paper can inform future revisions of the EUCs that are envisaged with the view to improve and refine them over time.

ICAO’s current EUCs include a set of “carbon offset credit integrity assessment criteria,”¹ which state that offset credits must represent “emission reductions, avoidance, or sequestration” that:

1. Are additional.
2. Are based on a realistic and credible baseline.
3. Are quantified, monitored, reported, and verified.
4. Have a clear and transparent chain of custody.
5. Represent permanent emissions reductions.
6. Assess and mitigate against potential increase in emissions elsewhere.
7. Are only counted once towards a mitigation obligation.
8. Do no net harm.

For this analysis, we focus on five EUCs that are essential for offset credit quality: additionality; baselines; permanence; avoidance of double counting; and causing no net harm (i.e., criteria 1, 2, 5, 7, and 8 in the list above). To evaluate the current EUCs, we review current practice among major carbon offset programs, and identify areas where the EUCs could be revised or elaborated to better align with best practices. We then provide specific recommendations for revision, refinement, or elaboration to improve each EUC, including suggested text edits and additions.

Throughout this document, we use several terms as a “shorthand” or in ways that may require clarification:

- ▶ **“Program”** refers to a third-party carbon offset program that certifies and issues carbon offset credits. Programs may serve voluntary offset markets or issue credits for use in regulatory emissions trading systems. Likewise, they be administered by independent, non-governmental organizations (e.g., the VCS, GS, and CAR), or by international, national, or local governmental bodies (e.g., the CDM). ICAO plans to approve one or several programs for the purpose of qualifying carbon offset credits as meeting the EUCs. Programs will be approved if they meet ICAO’s “program design elements” and have provisions in place to

¹ Ibid.

ensure that “carbon offset credit integrity assessment criteria” are met for any carbon offset credits qualified for use under CORSIA.

- ▶ **“Project”** refers to an activity that reduces emissions or enhances removals of greenhouse gases and to which a program issues offset credits. Relevant activities can include single projects, programmatic approaches or sectoral approaches (which are all referred to in this document as “projects”).
- ▶ **“Carbon offset credit”** (or “credit”) refers to an emissions unit that is issued by a program and represents an emission reduction or removal of one metric tonne of CO₂ (or its equivalent). The current EUCs use the terms “offset credit” and “offset unit” (or just “unit”) interchangeably. In suggesting edits to the EUCs, we have mostly preserved this mix of terminology. However, it should be noted that “unit” could be interpreted as a broader term, including both offset credits and allowances issued under emissions trading systems. In our assessment of the EUCs, we focused only on the essential quality elements of carbon offsets credits, and did not examine considerations that might pertain to the use of allowances as offsets for airline emissions. All of the programs reviewed here – the CDM, VCS, GS, and CAR – are strictly carbon offset programs.

2 Approach and methodology

Programs have a critical role to play under CORSIA, in that they must apply their own criteria, procedures, and safeguards to ensure that offset credits satisfy all EUCs. In some cases, programs already have strong criteria and procedures in place, and their current practices may suggest ways to improve ICAO's EUCs. In other cases, program criteria and procedures could be improved – even where they are nominally consistent with the current EUCs. To evaluate the EUCs, therefore, this analysis applies the following steps:

1. **Summarize how four major offset programs address each of the five EUCs identified above.** The four programs are:
 - The Clean Development Mechanism (CDM)
 - The Verified Carbon Standard (VCS)
 - The Gold Standard (GS)
 - The Climate Action Reserve (CAR)
2. **Assess how well each program's criteria and procedures align with the EUCs, and with necessary conditions for high quality offset credits more generally.** This includes identifying important approaches for ensuring offset credit quality followed by programs, but that are not reflected in the EUCs, as well as identifying gaps in the programs' current practice.
3. **Suggest ways for improving the EUCs based on the current practices of existing programs.** For each EUC reviewed here, we identify potential gaps in how the EUC is formulated, and suggest possible revisions or refinements to the EUCs to ensure that high quality of carbon offsets is achieved in practice.

For each EUC, we classify possible revisions and refinements as either “high priority” or “lower priority.” The high priority recommendations are the most important for improving the specificity and substance of the EUCs in order to set a high bar for offset credit quality. The lower priority recommendations are aimed at improving clarity, using more precise terminology, and in some cases suggesting possible elaboration on key criteria or concepts. Finally, for each EUC we provide suggested edits to align the EUC text with our recommendations. Deletions to the original EUC text are indicated through strike-through red text (~~e.g. this text should be deleted~~), additions to the original EUC text are indicated through bold red text (**e.g. this text should be added**).

3 Assessment of EUCs

In this section, we provide an explanation and overview of the five EUCs reviewed for this analysis; describe the rules and procedures adopted by major existing programs to address these criteria; and identify possible improvements to each EUC as written, including suggested text for each EUC.

3.1 Additionality

“Additionality” is perhaps the most frequently cited and essential criterion for the quality of offset credits (Cames et al. 2016; Gillenwater 2011). For CORSIA to have environmental integrity, offset credits must represent emission reductions or removals that are “additional” to any that would have occurred in the absence of the incentives from carbon market revenues. In practice, additionality has been defined in different ways under different programs, and the tests used to demonstrate additionality also vary among programs.

A key distinction is between “project-specific” and “standardized” approaches to additionality determination. Project-specific approaches rely on an analysis of a project’s specific characteristics and circumstances to determine whether the project is additional. Commonly, this involves a financial analysis – e.g. demonstrating that the project is not profitable without carbon offset revenues – and/or a “barriers” analysis identifying non-financial implementation barriers that carbon revenues could help overcome. Project-specific approaches can be rigorous when applied appropriately, but can also be time consuming and often require subjective judgments, e.g. in evaluating financial parameters or identifying barriers, and strongly hinge on assumptions about uncertain future developments (e.g. international fuel prices). Information asymmetry between the project developers conducting the analysis, and regulatory bodies and verifiers assessing the appropriateness of the analysis, is considered a further important drawback of project-specific approaches.

Standardized approaches determine additionality by evaluating projects against objectively defined eligibility criteria, e.g. performance benchmarks or other criteria that are deemed to distinguish additional projects from non-additional projects. Standardized approaches require upfront analysis to establish eligibility criteria that are effective in screening out non-additional activities, and may not be feasible for all project types. Where applied, they can reduce the administrative burdens of making additionality determinations and eliminate elements of subjectivity in the assessment of individual projects (Hayashi et al. 2010; Broekhoff 2007). On the other hand, they provide a “simplified” picture and for many project types may be imprecise in distinguishing additional from non-additional projects. Standardized additionality tests are sometimes formulated as “positive lists,” i.e. lists of defined technologies or practices that are considered “automatically” additional without further evaluation. However, standardized approaches can also involve a combination of technology/practice definitions along with qualifying eligibility criteria (e.g. landfill gas collection and destruction, but only at sanitary landfills below a certain size threshold).

The ICAO adopted the following “eligibility criterion” with respect to additionality (International Civil Aviation Organization 2019):

Carbon offset programs must generate units that represent emissions reductions, avoidance, or removals that are additional. Additionality means that that the carbon offset credits represent greenhouse gas emissions reductions or carbon sequestration or removals that exceed any greenhouse gas reduction or removals required by law, regulation, or legally binding mandate, and that exceed

any greenhouse gas reductions or removals that would otherwise occur in a conservative, business-as-usual scenario. Eligible offset credit programs should clearly demonstrate that the program has procedures in place to assess/test for additionality and that those procedures provide a reasonable assurance that the emissions reductions would not have occurred in the absence of the offset program. If programs pre-define certain activities as automatically additional (e.g., through a “positive list” of eligible project types), then they have to provide clear evidence on how the activity was determined to be additional. The criteria for such positive lists should be publicly disclosed and conservative. If programs do not use positive lists, then project’s additionality and baseline setting should be assessed by an accredited and independent third-party verification entity and reviewed by the program.

3.1.1 How offset programs address this criterion

The four major offset programs we reviewed for this analysis all have established methods for determining additionality, though their specific approaches differ somewhat. Both the CDM and VCS use both project-specific and standardized additionality determinations, depending on the methodology and project type. Under the CDM (and the VCS, which allows projects to be certified using CDM methodologies), some methodological standards apply simplified or standardized methods, including some project types that are effectively eligible on a “positive list” basis, while some methodological standards use project-specific tests or allow a choice between the two approaches.

Formal procedures for developing and applying additionality tests

All programs reviewed here have established formal procedures for developing and applying additionality tests. The CDM, for example, has adopted a standard “tool for the demonstration and assessment of additionality” – and a parallel tool, the “combined tool to identify the baseline scenario and demonstrate additionality” – which prescribe specific steps for conducting project-specific additionality determinations. The VCS incorporates these tools by reference for many of its methodologies, and has adopted similar prescriptive tools related to specific kinds of projects (e.g. agriculture, forestry, and land-use project activities). In brief, the CDM tool specifies that additionality tests must involve:

- ▶ A demonstration that the project activity is not legally required (or that non-enforcement of legal requirements is wide-spread); and
- ▶ An “investment analysis” to determine whether the project is financially attractive in the absence of CDM revenues; and/or
- ▶ A “barriers analysis” to demonstrate that at least one alternative to the project would not be prevented by identified barriers; and
- ▶ A “common practice analysis” to demonstrate that the project is not common practice, or is distinct from similar types of activities that are common practice.

Individual methodologies under the VCS and other programs mostly follow this same template, with (in some cases) elaborations or additions specific to certain kinds of project activities. The large majority of methodologies under both the CDM and VCS prescribe project-specific additionality determinations – in many cases by requiring use of one of the CDM “tools.”

In addition, the CDM and VCS have separately developed sets of rules and guidance for developing *standardized* additionality tests. The VCS allows the specification of standardized eligibility criteria on the basis of activity penetration rates, conditions for financial viability, or the (non-)existence of alternative revenue streams apart from offset credits. Under the CDM, positive lists are established in various ways, including through a top-down assessment of the costs and barriers of technologies or through the proposals by host countries (e.g. through the submission of “standardized baselines”).

CAR is distinct in that it has designed its program around standardized approaches, and all of its protocols employ standardized additionality tests in some form. CAR additionality tests formally have two components: a “legal requirements” test to determine that projects are not legally required, and a “performance standard” which determines project eligibility based on performance characteristics. The precise nature and scope of “performance standard” tests depends on the type of project. In addition, all protocols set eligibility conditions based on start date and location, which can also help screen for additionality. For some project types, additionality tests involve project-specific characteristics, e.g. forestry projects must in some cases demonstrate lack of financial viability without carbon offset revenues. Basic methodological requirements for developing standardized additionality tests are presented in CAR’s Program Manual (Climate Action Reserve 2011).

Finally, the Gold Standard incorporates by reference CDM methodologies and CDM methods for demonstrating additionality (both project-specific and standardized). It also allows project developers to propose alternative additionality tests, developed in accordance with general guidelines in the Gold Standard’s program documentation, which the Gold Standard may then review and approve for use. The Gold Standard emphasizes the concept of “financial additionality,” i.e. that a project must be shown to not be profitable without carbon offset revenues. In addition, project developers are required to demonstrate “ongoing financial need,” indicating that ongoing carbon revenues are needed to sustain the project (Gold Standard 2018).

Requirements for third-party verification

All the programs reviewed here require third-party verification related to additionality determinations, along with reviews or audits by program staff to assess and confirm the determinations of third-party verification bodies. This is true for both project-specific and standardized additionality determinations.

Track record

Many critiques of carbon offsets have focused on a perceived lack of additionality, and the CDM has come in for particular scrutiny in this regard. In perhaps the most comprehensive assessment to date, Cames et al. (2016) determined that 85% of the CDM projects they assessed – responsible for around 73% of potential certified emission reductions (CERs) between 2013 and 2020 – have a low likelihood of generating additional emission reductions. Although other programs have not been subject to similarly rigorous assessments, they are likely to be subject to the same concerns, especially since the VCS and Gold Standard, for example, rely to a large extent on CDM methodologies and additionality testing procedures.

Fundamentally, one challenge is that additionality is inherently difficult to determine. One conclusion cited by multiple studies, however, is that the risk of non-additionality is higher for some types of projects than for others (Cames et al. 2016; Bailis et al. 2016). Thus, one way for programs to provide greater assurance of additionality would be to exclude “high risk” project types from eligibility. CAR has done this to some extent by focusing its program on a relatively small number of project types (although some of these are not necessarily low risk for non-

additionality). The VCS and Gold Standard are actively contemplating removing certain “high risk” project types from eligibility.

3.1.2 Potential gaps

Although the current EUC for additionality addresses the main concepts related to additionality determinations, its clarity and precision could be enhanced. Potential issues include:

- ▶ The current EUC specifies that programs “should clearly demonstrate that [they have] procedures in place to assess/test for additionality and that those procedures provide a reasonable assurance that the emissions reductions would not have occurred in the absence of the offset program.” However, the EUC does not specify what kinds of procedures would provide a “reasonable assurance” in this regard, nor what is deemed as “reasonable”. The EUC could be improved by explicitly mentioning core elements of additionality tests established under existing programs. In addition, given the challenges that programs have had to date in ensuring additionality, the EUC could be improved by setting a standard for “high assurance,” and by stipulating that programs should either limit eligibility to project types with a low risk of non-additionality, or (alternatively) exclude from eligibility project types with a high risk of non-additionality.
- ▶ The EUC should specifically reference the need for programs to regularly review and update additionality tests. Since the additionality of certain activities can depend on country policy context, additionality tests should at a minimum be reviewed and update in line with NDC revision cycles under the Paris Agreement (see also the discussion in the following section regarding baseline updates and crediting periods).
- ▶ The EUC refers to approaches that automatically qualify projects as additional through “positive lists.” However, positive lists are only one form of standardized additionality determination. The requirements of the EUC could be written to more broadly pertain to “standardized approaches, such as positive lists.” In addition, although it is sound practice to ensure that criteria for standardized approaches are “publicly disclosed and conservative,” this by itself may not be sufficient to guarantee environmental integrity. Instead, the EUC should refer explicitly– as already noted – to core elements of standardized additionality tests established under existing programs.
- ▶ Formally, the EUC’s definition of additionality is not as precise as it could be, and seems to combine a series of different formulations, including that emission reductions:
 - Must exceed those required by “law, regulation, or legally binding mandate”;
 - Must exceed those that “would otherwise occur in a conservative, business-as-usual scenario”; and
 - “[W]ould not have occurred in the absence of the offset program.”

Several issues could be raised here. First, the requirement that emission reductions are not legally required is essential (and reflected in all additionality tests prescribed under existing programs, although the CDM makes an exception, for example, where legal requirements are

not enforced); however, it is also redundant with the notion of a “conservative, business-as-usual scenario.” Second, the concept of a “conservative, business-as-usual scenario” itself is fairly subjective. Although this terminology is used in an existing regulatory context (under California’s emissions trading system), for conceptual purposes the definition could be expressed more precisely as a scenario “without incentives provided by offset credit revenues” or something similar. The formulation that emissions reductions “would not have occurred in the absence of the offset program” is closest to a sound definition.

- ▶ The EUC mention the need to have project-specific additionality (and baseline) determinations “assessed by an accredited and independent third-party verification entity and reviewed by the program.” However, in practice such assessments should be conducted for all additionality determinations, including those using “positive lists” or other standardized approaches, because it is still necessary to assess whether a proposed project matches the positive list or meets other standardized eligibility criteria.

3.1.3 Recommendations for revising the EUC

Based on the potential gaps identified above, we make the following recommendations for improving the EUC related to additionality determinations:

High priority

- ▶ The EUC should require that programs should exclude from eligibility project types that have a high risk of being non-additional because they are legally required and/or frequently profitable without carbon offset revenues.
- ▶ The EUC should specify that programs’ additionality testing procedures must provide “high assurance” that the emissions reductions would not have occurred in the absence of an offset program.
- ▶ The EUC should require that all additionality determinations be reviewed by third-party entities and reviewed by program staff, regardless of whether project-specific or standardized approaches are used.
- ▶ The EUC could stipulate that programs should have procedures in place to regularly review additionality tests and standards in line with NDC revision cycles, including an assessment of which project types should continue to be eligible.
- ▶ The EUC could be improved by explicitly mentioning core elements of additionality tests established under existing programs, including:
 - For project-specific approaches, a requirement to assess projects using procedures equivalent to those prescribed by the CDM’s “tool for the demonstration and assessment of additionality.” This would mean, at a minimum, that additionality tests must involve a determination that emission reductions are not legally required; that project proponents must show that a project is not financially viable without carbon revenues and/or that the project faces implementation barriers not faced by viable alternatives; and that the project can be distinguished from common practice activities.

- For standardized approaches, a requirement to assess projects using eligibility criteria developed in accordance with general methodological requirements established under existing programs (e.g., CDM, VCS, or CAR). This should include a requirement that standardized approaches be developed through a top-down assessment of the costs and barriers of technologies or practices, and taking into account market penetration rates and common practice.

Lower priority

- ▶ The language of the EUC should be modified to refer generally to “standardized approaches” (included within which may be “positive lists”).
- ▶ The EUC should use a single, consistent definition of additionality.

Suggested text

Carbon offset programs must generate units that represent emissions reductions, avoidance, or removals that are additional. Additionality means that the carbon offset credits represent greenhouse gas emissions reductions ~~or carbon sequestration~~ or removals that exceed any greenhouse gas **emission** reductions or removals **that would have occurred in the absence of an offset program. required by law, regulation, or legally binding mandate, and that exceed any greenhouse gas reductions or removals that would otherwise occur in a conservative, business-as-usual scenario.** Eligible offset credit programs should clearly demonstrate that the program has procedures in place to assess/test for additionality and that those procedures provide a **reasonable high** assurance that the emissions reductions would not have occurred in the absence of the offset program. **The program's procedures shall exclude from eligibility project types that have a high risk of being non-additional (e.g. because they are frequently profitable without carbon offset revenues).** The procedures shall also ensure that a project required by law, regulation or legally binding mandate is not eligible. **If “project-specific” additionality tests are used, such tests must, at a minimum, involve a determination that emission reductions are not legally required; require that project proponents show that a project is not financially viable without carbon revenues and/or that the project faces implementation barriers not faced by viable alternatives; and require that the project can be distinguished from common practice activities.**

If standardized approaches to test for additionality are used (including “positive lists” of eligible project types), such tests must be developed through a top-down assessment of the costs and barriers of technologies or practices, and take into account legal requirements, market penetration rates, and common practice. ~~If programs pre-define certain activities as automatically additional (e.g., through a “positive list” of eligible project types), then they have to provide clear evidence on how the activity was determined to be additional.~~ The criteria ~~for such positive lists~~ **used to develop standardized additionality tests** should be publicly disclosed and conservative.

~~If programs do not use positive lists, then project's additionality and baseline setting~~ **All additionality determinations** should be assessed by an accredited and independent third-party verification entity and reviewed by the program.

Finally, programs should have procedures in place to regularly review additionality tests and standards, including an assessment which project types should continue to be eligible. **Such reviews should be conducted at a minimum as frequently as revisions of countries' NDCs occur under the Paris Agreement.**

3.2 Baseline determination

The *baseline* for a carbon offset project specifies the level of GHG emissions or removals that would have occurred in the absence of any incentives provided by an offset program, and is used as a reference to quantify how much a project has reduced emissions, or increased removals.² A proper baseline is essential for ensuring that a project's GHG emission reductions or removals are not overestimated. Overly generous or inaccurate baselines can undermine the environmental integrity of an offset program by allowing too many offset credits to be generated, relative to the actual effect of a project in reducing emissions or enhancing removals.

Because baseline estimates are counterfactual, they cannot be strictly verified as a "true" representation of emissions or removals in the absence of a project. Given this inherent uncertainty, it is common for offset programs and standards to stipulate that baselines should be "conservative," i.e. assumptions and values used to determine a baseline should err on the side of underestimating emissions (and over-estimating removals) (World Business Council for Sustainable Development and World Resources Institute 2005). The prevalence and magnitude of baseline uncertainties can be greater for some types of project activities than for others. In practice, developing a "conservative" baseline often involves some subjective judgment.

The CORSIA Emissions Unit Eligibility Criteria stipulate the following with respect to baseline determination:

Carbon offset credits must be based on a realistic and credible baseline. Offset credits should be issued against a realistic, defensible, and conservative baseline estimation of emissions. The baseline is the level of emissions that would have occurred assuming a conservative "business as usual" emissions trajectory i.e., emissions without the emissions reduction activity or offset project. Baselines and underlying assumptions must be publicly disclosed.

3.2.1 How offset programs address this criterion

The four major offset programs we reviewed for this analysis all have established rules and procedures for determining baselines. Because baselines depend on the particular type of project or activity involved, all programs have established a series of approaches for determining baselines related to specific project types. The CDM has approved over 200 methodologies for different project types and sizes (some types of small-scale projects can apply simpler, more streamlined rules for determining baseline emissions than larger projects). The VCS and Gold Standard both allow CDM methodologies to be used for estimating baselines for approved project types under their programs, and have supplemented these with additional methodologies for a range of other project types. The VCS, for example, has approved a range of methodologies related to project activities in the agriculture, forestry, and land use sectors that are not covered by the CDM. CAR has approved a smaller list of methodologies (referred to as "protocols") for projects based in the United States and Mexico.

Formal procedures for baseline methodology development, approval, review and revision

Although the quality of offset credits depends on the rigor and credibility of individual baseline methodologies, an equally important consideration – especially from the standpoint of evaluating and approving programs under CORSIA – is the rules and procedures that programs

² As this wording suggests, the concepts of additionality and baselines are related; the baseline for a non-additional project would be the GHG emissions arising from the project itself, since the project would have occurred in the absence of an offset program. The CDM has explicitly recognized this connection in its "combined tool to identify the baseline scenario and demonstrate additionality."

have in place to develop, review, approve, and update methodologies. The four major programs we reviewed all have such procedures in place, though they differ somewhat in their approaches. The CDM, VCS, and Gold Standard all allow project proponents to propose new methodologies relevant to different project activities. The CDM has periodically consolidated different methodologies submitted in this way where they cover similar types of project activities. CAR differs from the other programs in following a “top-down” methodology development strategy, where program staff determine which project activities to cover. All the programs review and revise methodologies on an ad hoc basis, as issues or necessary updates are identified.

Degree of standardization

As with additionality tests, baseline estimation methods can differ in the degree to which they are “standardized” – i.e. applying standard defaults and assumptions to estimate baseline emissions for particular project types – or “project-specific,” i.e. estimating baseline emissions using project-specific data and parameters. Project-specific methods are in principle more accurate in estimating the baseline emissions associated with individual projects. Standardized baselines sacrifice some accuracy in the name of streamlining the process of baseline setting, and avoiding subjective elements that may come into play with project-specific methods. In practice, most baseline methodologies fall somewhere on a spectrum between purely project-specific methods and standardized approaches; baselines are often determined partially based on project-specific parameters or assumptions and partially based on standardized ones.

In principle, project-specific and standardized baselines can be equally effective at ensuring environmental integrity. For standardized baselines, however, effectiveness greatly depends on the rules and criteria applied in their development, and the ways in which they are developed for specific project types. Some methods proposed for developing standardized baselines under the CDM, for example, suffered from deficiencies that limited their effectiveness and may have compromised environmental integrity (Schneider et al. 2012). Moreover, environmental integrity can be undermined if project developers can cherry-pick between standardized and project-specific approaches (Spalding Fecher and Michaelowa 2013).

Three of the programs reviewed here incorporate standardized baselines explicitly. Both the VCS and CDM allow standardized baseline methodologies, and have established guidance and criteria for the development of such methodologies. CAR has organized its program around standardized approaches and all of its protocols incorporate standardized elements, in accordance with general principles and requirements established in its program manual. The fourth program, the Gold Standard, incorporates CDM methodologies by reference.

Crediting period and frequency of updates

One important aspect of baselines that all programs address is the period of time to which they apply and for which they are considered valid – often referred to as a “crediting period.” Programs have adopted different policies with respect to crediting periods. Under the CDM, project developers generally have the option of selecting a 10-year crediting period (non-renewable), or a 7-year crediting period that may be renewed up to 2 times (for a maximum of 21 years). For afforestation and reforestation (A/R) projects, the choice is similarly between a single 30-year period or up to three 20-year periods. When renewable crediting periods are used, the baseline must be updated at each renewal (although the baseline scenario itself is not re-evaluated). The Gold Standard uses 5-year crediting periods for most project types, with (usually) one possible renewal; for A/R projects, the crediting period must be a minimum of 30 years and a maximum of 50 years. Both the VCS and CAR have established standard 10-year crediting periods for most project types, with the option to renew either once (CAR) or twice

(VCS). For land use and forestry projects, the standard crediting period under CAR is 100 years; under VCS the period may be 20-100 years, renewable up to 100 years maximum.

Track record

The track record of programs in developing credible and appropriate baseline methodologies has not been perfect. Significant flaws, for example, were discovered (and subsequently corrected) in some CDM methodologies (Schneider et al. 2010; Schneider 2011). Other programs have not faced the same outside scrutiny as the CDM, but have nevertheless seen the need to regularly update baseline methodologies to address perceived issues or shortcomings (nearly all CAR protocols have been updated, for example - in some cases multiple times; many VCS and Gold Standard methodologies have also been revised and updated). This track record highlights how important it is for programs to have solid procedures for methodology development, review, and revision, as outlined above. All of the programs reviewed here have been proactive in reviewing and revising methodologies over time in response to identified shortcomings (though in some cases they have been slow to do so).

3.2.2 Potential gaps

The EUC related to baseline determination incorporates essential principles related to ensuring environmental integrity, including the stipulation that baselines must be “defensible and conservative,” and the requirement that baselines and their underlying assumptions must be publicly disclosed. There are several ways that the EUC could be improved, however:

- ▶ One issue is that the EUC as written pertains to “carbon offset credits.” In practice, ICAO and/or airlines will not be evaluating the appropriateness of baseline estimates for each offset credit, or even individual projects. Instead, CORSIA makes it incumbent upon approved programs to apply reasonable and conservative baselines in quantifying GHG reductions and removals for offset projects. Thus, from a practical and operational standpoint, the EUC should include a requirement that baselines be determined in accordance with fully vetted, program-approved methodologies, and that such methodologies should be developed according to formal rules and procedures established under ICAO-approved programs. This would guard against the possibility that offset credits are issued against “bespoke” baseline estimation methods tailored to a particular project – in the absence of a formal and transparent review – which programs in some cases could allow.³ Such methods may be difficult to objectively evaluate, and may contain elements biased in favour of the project proponents.
- ▶ The EUC does not differentiate between project-specific and standardized baseline methodologies. In principle, both types of baselines can be effective at maintaining environmental integrity. However, it may be important to stipulate that any standardized approaches should employ benchmarks, stringency levels, and other parameters that are conservative and appropriate to sector-specific circumstances. Furthermore, in order to avoid cherry picking of methodologies by project developers (i.e. choosing a methodology that provides the best results in terms of quantified emission reductions), the EUC should

³ The four programs reviewed here do not currently allow such individually tailored approaches, though CAR is launching a sub-program that may allow them, albeit with review by program staff.

require that programs maintain no more than one active methodology for any single project type.⁴

- ▶ Currently, the EUC makes no reference to the crediting period associated with baselines. Because of the uncertainties that can arise in projecting baseline activities and emissions, a reasonable crediting period is needed to ensure that emission reductions or removals are not over-estimated (and, in some cases, to ensure that project activities continue to be additional). Some observers now argue that, for the period after 2020, baseline emission estimates should expressly take into account NDCs, and should likewise be reviewed at 5-year intervals in alignment with NDC revision cycles (i.e., they should effectively have a 5-year crediting period) (Warnecke et al. 2018; Blandford et al. 2017). The Gold Standard has already begun to implement this approach, with a limit of only one renewal. Accordingly, the EUC should make reference to crediting periods and propose specific parameters around maximum length and renewal options.

Note that among the existing programs we reviewed, the 100-year crediting periods allowed by both the VCS and CAR for forestry and land-use projects could be seen as insufficiently conservative given the large baseline uncertainties that can arise over that length of time. When the California Air Resources Board adopted CAR's forest project protocol under its regulatory emissions trading system, for example, it modified the crediting period to 25 years, renewable up to four times.

- ▶ Formally, the wording of the EUC is not quite correct. "Carbon offset credits" themselves are not "based on a... baseline"; rather, the emission reductions associated with offset credits should be determined using a realistic and credible baseline.

Also, the current EUC's definition of a baseline could be seen as problematic, i.e. "[the] emissions [that would have occurred] without the emissions reduction activity or offset project." The issue here is that if a project activity is not additional, then baseline emissions should be equivalent to the emissions from the project itself, not emissions "without the project." The EUC definition of a baseline would be technically correct only if it also specifies that the project is additional.

3.2.3 Recommendations for revising the EUC

Based on the potential gaps identified above, we make the following recommendations for improving the EUC related to baseline determination:

High priority

- ▶ The EUC should include a requirement that baselines be determined in accordance with fully vetted, program-approved methodologies, and that such methodologies should be developed according to formal rules and procedures established under ICAO-approved programs (as is required for programs under the EUCs related to "program design elements").

⁴ Note that individual methodologies may still combine standardized and project-specific methods, including options to choose from conservative "default" approaches and possibly more generous project-specific quantification methods

- ▶ The EUC should also stipulate that any standardized baselines must be developed following program-established criteria for standardized approaches; that they must apply benchmarks, stringency levels, and other parameters that are conservative and appropriately tailored to sector- and geographic-specific circumstances; and that no more than one methodology (standardized or project-specific) can be used for any single project type.
- ▶ The EUC should explicitly reference crediting periods. At a general level, the EUC should stipulate that crediting periods must be appropriately conservative for each project type. The EUC could also propose specific parameters around maximum length and renewal options, e.g., no more than 5 years for most project types and no more than 30 years for forestry and land-use projects, with no more than one allowable renewal.

Lower priority

- ▶ In principle, by requiring that carbon offset credits be based on a “realistic and credible” baseline, the EUC sets a relatively low bar for ensuring offset credit quality (although the EUC also states that baselines should be “conservative”). Following established standards, the EUC should require that baselines be conservative in order to avoid over-estimating emission reductions (World Business Council for Sustainable Development and World Resources Institute 2005).
- ▶ The text of the current EUC definition of a baseline should be amended in some cases for greater technical accuracy. This includes clarifying that baselines represent emissions “without the emission reduction activity” only if the activity is additional.

Suggested text

Emissions reductions associated with carbon offset credits must be based on **a defensible and realistic and credible conservative** baseline. ~~Offset credits should be issued against a realistic, defensible, and conservative baseline estimation of emissions.~~ The baseline **should be below** is the level of emissions that would have occurred ~~assuming a conservative “business as usual” emissions trajectory i.e., emissions without the~~ **in the absence of an** emissions reduction activity or offset project, **assuming the activity or project is additional. Baselines should be determined in accordance with fully vetted, program-approved methodologies. Such methodologies should be developed according to formal rules and procedures established under approved programs (per Program Design Element #1). If standardized baselines are used, they should follow program-established criteria for standardized approaches and apply benchmarks, stringency levels, and other parameters that are conservative and appropriately tailored to sector- and geographic-specific circumstances. Baselines should be defined for an explicit and appropriately conservative crediting period, determined in accordance with relevant program policies. Standard crediting periods should be no longer than 5 years for most project types, with no more than one allowable renewal.** Baselines, **crediting periods**, and underlying assumptions must be publicly disclosed.

3.3 Ensuring permanence

Permanence is another essential criterion for offset credit quality. Because offset credits will be used to compensate for emissions that will effectively raise atmospheric concentrations of CO₂ for many thousands of years (effectively in perpetuity), they should be associated with emission reductions that are similarly permanent. If an emission reduction or removal is “reversed” (e.g., subsequently emitted so that no net reduction occurs), then it can no longer function as an offset. Technically, a “reversal” occurs any time an activity reduces emissions below baseline levels for a time, but in a later period emissions rise above baseline levels.⁵ In theory, this could happen with any kind of project or activity, but for most sectors there are few if any mechanisms by which emissions can rebound above baseline levels in later periods. The most significant exceptions are the forestry and land-use sectors, where enhanced carbon storage in trees, vegetation, and soils can be reversed due to natural or human-caused disturbances (geologic carbon capture and sequestration projects may also be subject to reversal).

The CORSIA Emissions Unit Eligibility Criteria stipulate the following with respect to permanence:

Carbon offset credits must represent emissions reductions, avoidance, or carbon sequestration that are permanent. If there is risk of reductions or removals being reversed, then either (a) such credits are not eligible or (b) mitigation measures are in place to monitor, mitigate, and compensate any material incidence of non-permanence.

3.3.1 How offset programs address this criterion

Ensuring permanence requires establishing mechanisms to compensate for reversals when they occur, even if they occur in the indefinite future. The programs reviewed here have adopted variations on two basic types of mechanisms for compensating for reversals: temporary crediting, and the use of buffer reserves (insurance).⁶

The CDM uses a temporary crediting approach for afforestation and reforestation (A/R) projects. Under this approach, offset credits issued to A/R projects expire after a predefined period (either 30 years, or at the end of the subsequent Kyoto Protocol commitment period) and must be replaced with other units issued under the Kyoto Protocol. If a 30-year period is used, offset credits also expire if a reversal occurs before the end of this period. When A/R project crediting periods are renewed, expired credits may be reissued, and in principle buyers can repurchase these credits – effectively creating a stream of payments for the project proponents. At the end of a project’s final crediting period, however, no more credits may be issued and all expiring credits must be replaced with other Kyoto units. This approach guarantees permanence by ensuring that all offset credits associated with potentially non-permanent reductions or

⁵ In this case, “baseline levels” refers to emissions that would have occurred in the absence of the activity over the long term, not necessarily the time-limited baseline defined for a project for crediting purposes.

⁶ A third possible approach is for countries to assume liability for any reversals and commit to compensate for them. This effectively happens under the temporary crediting, if temporary credits are acquired and used by countries (i.e., the buyer of these credits is responsible for replacing them). Under the CDM, host countries are also liable for reversals occurring at CCS projects. Finally, the VCS acknowledges host country guarantees as one way to compensate for reversals associated with jurisdictional REDD+ programs. As an approach for programs to follow in guaranteeing permanence, however, relying on country liability is not generally a viable option, and could create perverse incentives (e.g., where programs and project owners fail to take measures to safeguard against reversals because they face no liability). We therefore do not examine this as an option here.

removals are replaced with units representing permanent reductions – even if no reversals occur during a project’s crediting period. Potential future reversals are therefore fully covered.

For geologic carbon capture and storage (CCS) projects, the CDM applies an approach using buffer reserves. Under buffer reserves, a certain percentage of offset credits that would be issued to a project are instead set aside in a buffer – in the case of CCS projects, the CDM requires a standard 5% set-aside of all credits issued to a project. The buffer acts as an insurance mechanism: if a reversal occurs, then buffer reserve credits may be cancelled to compensate for the reversal, thus preserving the integrity of offset credits that were already issued to the project. In the case of CCS projects, the buffer reserves are activity-specific. This means that these projects are effectively self-insured; the expectation is that any reversals are likely to involve only a portion of a project’s emission reductions, and therefore can be compensated with a partial set-aside of project credits. One risk of this approach is that it does not provide a guarantee against “catastrophic” losses, i.e., reversals that involve a large percentage of total emission reductions achieved.

The VCS, CAR, and Gold Standard all apply different versions of a pooled buffer reserve approach to address non-permanence in the agriculture, forestry, and land-use (AFOLU) sectors. Under this approach, offset credits are set aside from individual projects into a common buffer reserve, which can be drawn upon to cover reversals from any project. The size of the contribution to the buffer reserve is usually based on a project-specific risk assessment to determine the likelihood that reversals may occur over a certain time period.⁷ An important advantage is that this approach can fully cover catastrophic losses affecting individual projects, as long as the buffer reserve is sufficiently stocked with credits from projects across an entire program.

Liability for intentional reversals (buffer reserves)

Buffer reserves can be effective at compensating for reversals due to natural disturbance risks, such as fire, disease, or drought affecting forests and soils. They can present a “moral hazard” problem, however, if used to compensate for human-caused reversals, such as intentional harvesting. If a landowner faces no penalty for harvesting trees for their timber value, for example – because any reversals caused by harvesting would be compensated out of a buffer reserve – then the landowner could face a strong incentive to harvest. Such perverse incentives can make a buffer reserve approach unviable. The three programs using pooled buffer reserves address this issue in different ways. CAR uses its buffer reserve only to compensate for natural disturbances, and imposes contractual obligations on landowners to compensate for any “avoidable” reversals (including reversals due to negligence or wilful intent) by retiring offset credits. The VCS covers “non-catastrophic” reversals (e.g., due to poor management or over-harvesting) out of its buffer reserve, but will not issue further offset credits to a project until the reversal is remedied.⁸ If project monitoring ceases, however, the VCS will compensate for all VCUs issued to a project from its buffer reserve – in principle allowing intentional reversals to be fully covered. The Gold Standard holds project owners liable for “underperformance” during a project’s crediting period (though this term does not appear to be defined).

Length of permanence guarantee (buffer reserves)

Another issue with buffer reserve approaches is the length of time for which permanence is guaranteed. No risk can be insured against in perpetuity, including reversal risks (over the very long run, the chance of reversal for any given project approaches 100%). Programs adopting

⁷ The exception here is the Gold Standard, which requires a standard 20% set-aside for land-use and forest projects, regardless of specific project circumstances.

⁸ VCS AFOLU projects are also required to “put in place management systems to ensure the carbon against which VCUs are issued is not lost during a final cut with no subsequent replanting or regeneration.”

buffer reserves are therefore implicitly or explicitly transferring an obligation to maintain carbon storage (or compensate for reversals) to future decisionmakers. The programs reviewed here differ, however, in the length of time that they effectively insure against reversals. Some programs are not explicit about the length of coverage, which can make judging their effectiveness challenging. CAR is the most explicit, imposing a contractual obligation on landowners to maintain credited carbon stocks for a period of 100 years after credits are issued (which may be up to 200 years after a project's start date), and committing to cover natural disturbance reversals using its buffer reserve over the same period. The VCS formally compensates for reversals only through the end of a project's crediting period, meaning a maximum of 100 years from a project's start date; however, a portion of the project's credits is retained in the VCS buffer reserve to cover potential reversals after this date. The Gold Standard likewise provides no formal coverage for reversals beyond the end of a project's crediting period (either through its buffer reserve or legal obligations imposed on landowners).

Monitoring requirements

Monitoring is essential to determine whether reversals have occurred and require compensation. Again, programs differ in their approaches to monitoring requirements. CDM monitoring requirements for A/R projects differ based on whether they have 30-year crediting periods, or crediting periods linked to Kyoto commitment periods. The former projects are required to monitor and compensate for reversals if they occur prior to credit expiration. The latter are not required to monitor for reversals (on the premise that all credits must be replaced once they expire). For CCS projects, monitoring for reversals is required for 20 years after a project's last crediting period.

Among the programs that use buffer reserves, CAR requires monitoring and onsite verification of reversals at least once every six years until 100 years after credits are issued. If required monitoring ceases, this is treated as a full, "avoidable" (intentional) reversal of all credited carbon, and project owners are required to compensate. The VCS and Gold Standard also require regular monitoring for reversals, but only through the end of a project's crediting period. Furthermore, as noted above, the VCS imposes no penalty of project developers if monitoring ceases (other than forgoing future issuances). Similarly, the Gold Standard will decertify projects if annual monitoring reports are not submitted, but otherwise does not identify any penalties for project cessation.

Reversal risk mitigation requirements

Finally, CAR, VCS, and the Gold Standard all either incentivize or require project proponents to implement measures to mitigate the risk of reversals. CAR provides project proponents an incentive to mitigate risks, by allowing a lower buffer reserve set aside where mitigation measures are present. The VCS applies a similar approach, while also requiring some forms of risk mitigation. The Gold Standard requires mitigation measures related to identified high risk factors (which range from natural disturbances to political, financial, and project management risks).

Track record

Partly because carbon offset programs have been in operation for only 10-15 years at most, evidence of the effectiveness of their various approaches to addressing non-permanence is limited. In principle, the CDM's method of issuing temporary offset credits is the only approach that guarantees permanence. However, A/R projects under the CDM have seen very little uptake, in large part because temporary crediting effectively imposes liability for reversals on credit

buyers, meaning that buyers have much less willingness to pay for these credits (Schneider et al. 2018).

The buffer reserve approach adopted by CAR, the VCS, and the Gold Standard has been much more attractive to buyers, because reversals are effectively insured against, or liability is imposed on project owners. This allows offset credits from AFOLU projects, for example, to be transacted on the same basis as offset credits from projects that do not face non-permanence risks. It is still an open question, though, how well these approaches will work to safeguard against reversals over the long run.

3.3.2 Potential gaps

As currently formulated this EUC is mostly sufficient, but it could be more explicit about appropriate mechanisms to address non-permanence. Potential gaps include:

- ▶ The EUC does not indicate that monitoring, mitigation, and compensation mechanisms must be administered and enforced by programs, and is vague about what effective monitoring, mitigation, and compensation would entail. In particular, the EUC could be improved by explicitly referring to mechanisms that could be used to ensure permanence (e.g., temporary crediting or buffer reserves), and including requirements for bolstering the effectiveness of these approaches (e.g., sufficiently stocking buffer reserves; requiring ongoing monitoring; requiring or incentivizing risk mitigation measures; and avoiding perverse incentives for intentional, human-caused reversals).
- ▶ As currently worded, the EUC implies that emission reductions must be truly permanent. It does not specify a timeframe over which reversals must be compensated, suggesting that such a timeframe is indefinite. Whether or not this was intended, the EUC sets a high bar if strictly interpreted. Only a temporary crediting approach would be sufficient to provide a guarantee of true permanence over an indefinite period. Given the track record of temporary crediting under the CDM, however, this may not be practical, and – given the current practice among major programs of using buffer reserves – the EUC may not be interpreted to require true permanence in any case. The EUC could thus be improved by defining an ambitious but more practical threshold for “permanence,” e.g., that program mechanisms must be sufficient to compensate for any reversals within 100 years from the date an offset credit is issued.
- ▶ The wording of the EUC is imprecise in some places.

3.3.3 Recommendations for revising the EUC

High priority

- ▶ The EUC should be explicit that monitoring, mitigation, and compensation mechanisms must be administered and enforced by programs.
- ▶ The EUC should explicitly refer to either buffer reserves or temporary crediting as viable alternatives for ensuring permanence.
- ▶ The EUC should define an ambitious threshold for “permanence,” e.g., program mechanisms to address non-permanence must be sufficient to compensate for any reversals within 100 years from the date an offset credit is issued.

► If buffer reserves are used:

- Buffer reserves should be sufficiently stocked with offset credits, based on a conservative assessment of reversal risks associated with registered projects.
- The EUC should stipulate that programs must monitor for reversals, and require or incentivize reversal risk mitigation measures.
- The EUC should also explicitly require that programs avoid perverse incentives for intentional, human-caused reversals by assigning liability for such reversals to project owners.

Lower priority

► The wording of the EUC could be improved in some places:

- Technically, emission “reductions” and “removals” are the correct terms to use when referring to projects that sequester or store carbon, not “reductions, avoidance, or carbon sequestration.”
- The statement that “such credits are not eligible” should refer to emission reductions or removals, not credits.

Suggested text

Carbon offset credits must represent emissions reductions or removals, ~~avoidance, or carbon sequestration~~ that are permanent. If there is risk of reductions or removals being reversed, then either (a) **programs must make credits emission reductions or removals from such activities ineligible for crediting are not eligible** or (b) **programs must establish robust mechanisms to ensure that any [material] reversals are monitored, verified and compensated for if and when they occur. Permanence shall be ensured for a period of at least 100 years from the date an offset credit is issued. Appropriate mechanisms to address potential reversals include the issuance of temporary credits, or the maintenance of buffer reserves to insure against reversals. Such mechanisms should be supplemented by requirements or incentives for project owners to mitigate reversal risks. If a buffer reserve mechanism is used, programs shall ensure that:**

- **The reserve is sufficiently stocked with credits based on a conservative assessment of reversal risks associated with registered projects;**
- **Any reversals are monitored and verified for a period of 100 years after offset credits are issued;**
- **If monitoring is discontinued within this period, all emission reductions or removals attributed to a project are deemed as intentionally reversed; and**
- **Perverse incentives for intentional, human-caused reversals are avoided by enforcing appropriate penalties against project owners for such reversals.**

~~mitigation measures are in place to monitor, mitigate, and compensate any material incidence of non-permanence.~~

3.4 Avoiding double counting

For an offset credit to be effective, the party retiring the credit against an emissions obligation must have an *exclusive claim* to the credit's associated emission reductions or removals. If another party – including the country where the emission reductions occur – also claims the reductions, then global net emissions would be lower if the offset credit was not issued. The avoidance of double counting is thus essential for offset credit quality.

Double counting of emission reductions or removals can occur in three different ways, which are enumerated in the current EUC:

[Emission reductions or removals are] only counted once towards a mitigation obligation. Measures must be in place to avoid:

- a) Double issuance (which occurs if more than one unit is issued for the same emissions or emissions reduction).
- b) Double use (which occurs when the same issued unit is used twice, for example, if a unit is duplicated in registries).
- c) Double claiming (which occurs if the same emissions reduction is counted twice by both the buyer and the seller (i.e., counted towards the climate change mitigation effort of both an airline and the host country of the emissions reduction activity)). In order to prevent double claiming, eligible programs should require and demonstrate that host countries of emissions reduction activities agree to account for any offset units issued as a result of those activities such that double claiming does not occur between the airline and the host country of the emissions reduction activity.

3.4.1 How offset programs address this criterion

The four programs reviewed for this analysis all have rules and procedures in place to avoid double issuance and double use, and to avoid at least some forms of double claiming. Looking forward, however, a major concern for CORSIA is how to avoid double claiming of emission reductions or removals that are covered under the nationally determined contributions (NDCs) of Parties to the Paris Agreement. Avoiding double claiming with NDCs will require robust international accounting rules (Schneider and La Hoz Theuer 2019; Schneider et al. 2017). For such rules to be effectively implemented with respect to carbon offset credits, however, programs will have to adopt new rules and procedures to facilitate international accounting by countries. Currently, none of the programs reviewed here have such rules and procedures in place (though several programs are actively considering them).

Double issuance

The programs reviewed here have adopted a series of procedures and requirements to avoid double issuance:

- ▶ All four programs have procedures in place to ensure that offset credits are only issued after final program approval of verification reports and any other supporting documentation related to a project's asserted emission reductions or removals, thereby reducing the risk for multiple issuances for the same reductions/removals.
- ▶ All four programs aim to ensure that different projects cannot be issued credits for the same emission reductions or removals due to overlapping accounting boundaries. For example,

the CDM only allows the producers of renewable electricity to claim carbon offset credits, whereas the consumption of renewable electricity is not eligible as an activity, since allowing this would result in more than one offset credit being issued for the same reductions.

- ▶ The programs all have procedures in place that avoid double issuance due to double registration of projects, although the CDM's approach is limited in this regard. Double registration can happen if a project is mistakenly registered twice within the same program, or if the same project is registered under more than one program. All programs reviewed here – including the CDM – have procedures to ensure that projects cannot be registered more than once within their own programs. In addition, the VCS, CAR and the Gold Standard actively monitor project registrations among other programs, and have procedures in place to ensure that a project cannot be issued valid credits by more than one program for the same emission reductions. In particular, these programs require legal attestations from project owners stipulating that they will not request issuance of offset credits for emission reductions or removals from more than one program, unless such offset credits are cancelled under one program prior to reissuance under another program. The CDM does not check for double registration with other programs.

Double use

Double use of offset credits can be avoided by maintaining a robust offset credit registry system that:

- ▶ Is capable of securely and transparently effectuating the issuance, transfer, and cancellation of offset credits;
- ▶ Allows the tagging of each offset credit with a unique identifier (e.g., serial number) that conveys information about a credit's vintage and origins, and that allows the tracking of each offset credit's use and cancellation; and
- ▶ Incorporates offset credit cancellation procedures that ensure that cancellation is clearly indicated, irreversible, and unambiguously designated for an intended purpose.

The latter requirement in particular is necessary so that upon cancellation (or “retirement”) of an offset credit, no more than one party can claim to have used the offset credit towards an emission reduction obligation.

All four programs reviewed here have registry systems in place that perform the functions listed above, although the programs vary in the specificity of their requirements for designating the purpose of cancellations.

Double claiming

Double claiming of emission reductions or removals can arise in a number of ways, and involve a range of different parties. Competing claims can occur, for example, if an offset project claims emission reductions associated with sources owned or controlled by other entities. A straightforward example could occur if a renewable energy offset project claims emission reductions associated with displaced generation at fossil fuel power plants, while at the same time the owners of those power plants count the reductions towards their own emission

reduction goals or obligations (e.g. if the power plants are covered by an emissions trading system).

The offset programs reviewed for this analysis differ somewhat in their approaches to avoiding double claiming. Under the VCS, project owners are required to legally attest to exclusive ownership of emission reductions. However, the VCS formally distinguishes between “double claiming” and “double monetization” of emission reductions. Under the VCS’s definition, “double claiming” refers only to double claiming of emission reductions by both an offset credit buyer and a national government, where the national government does not “monetize” or otherwise issue or trade emissions units associated with the claimed reduction. The VCS prohibits “double monetization”, but allows “double claiming” as narrowly defined. This policy may be modified in the future, however, to address the specific situation of potential double claiming with a country’s NDC.

Under CAR, all project owners must sign a legal attestation asserting exclusive ownership of credited emission reductions. This is intended to guard against any instances of potentially overlapping claims; project owners must effectively certify that they have reconciled any potential conflicts.

The Gold Standard similarly requires project owners to demonstrate “full and uncontested legal ownership of any Products that are generated under the Gold Standard,” including “carbon credits.” (However, it is not clear how or whether the Gold Standard distinguishes ownership claims to offset credits from the underlying emission reductions or removals associated with those credits; in principle, a project owner may have an exclusive claim to offset credits as tradable units, notwithstanding competing claims to the underlying reductions.) For some project types, the Gold Standard requires demonstration of uncontested legal title or tenure to project land.

The CDM requires a Letter of Approval from the host country where projects are located, which effectively authorizes a project owner’s claims to emission reductions generated by the project. However, the CDM has no express system to check that the project owner does in fact have exclusive ownership.

Finally, none of the programs reviewed here has rules and procedures in place to effectively avoid double claiming with commitments that countries have made under various international agreements, including NDCs under the Paris Agreement. In principle, other relevant commitments may include economy-wide targets adopted under the Kyoto Protocol (and Doha Amendment); voluntary pledges made by countries at Cancun under the UNFCCC (“Cancun targets”); commitments to reduce emissions of ozone-depleting substances under the Vienna Convention and Montreal Protocol; and commitments related to any future agreement under the International Maritime Organization to address emissions from international maritime transportation. The VCS, CAR, and the Gold Standard are all in the process of updating their requirements to avoid double claiming with countries’ climate targets, focusing on the Paris Agreement (Carbon Market Watch 2019). However, as noted above, fully avoiding double counting with CORSIA will require robust international accounting rules implemented by countries.

Track record

Schneider, Kollmuss, and Lazarus identify three essential elements of a comprehensive approach to avoiding double counting: international accounting rules; rules for the design of mechanisms (needed to avoid double issuance); and a system for consistent tracking of units (to avoid double issuance and double use) (Schneider et al. 2015). Programs to date have largely been effective at

realizing the latter two elements, and with the possible exception of the CDM, have mostly been vigilant in addressing possible instances of double claiming.⁹ Going forward, however, double claiming against international commitments will become a more salient issue, and programs will need to develop rules and procedures for assisting countries with robust international accounting rules. One requirement should be that programs obtain authorization from countries to issue offset credits and qualify them for use under CORSIA.¹⁰

3.4.2 Potential gaps

The EUC is comprehensive in requiring that all three types of potential double counting be avoided (double issuance, double use, and double claiming). It only elaborates requirements related to double claiming, however – noting that programs should demonstrate that host countries agree to account for any offset units – and the scope of how it defines double claiming is fairly narrow. Possible improvements include the following:

- ▶ The EUC could be more specific about the procedures or requirements needed to avoid double issuance, double use, and double claiming – making reference to best practices among current programs. Such procedures and requirements include policies on credit issuance, monitoring of overlapping emission reduction claims among project types, and procedures to avoid double issuance due to double registration; operation of robust registry systems that clearly and unambiguously indicate the purpose for credit cancellations; and requiring legal attestations from project owners asserting exclusive ownership of credited emission reductions.
- ▶ The EUC could explicitly expand the scope of double claiming to include other potential competing claims to credited emission reductions or removals (not just host country claims). In addition, the EUC could specify general requirements and procedures that programs should follow to facilitate international accounting and obtain appropriate authorization and assurances in order to certify offset credits for use under CORSIA. Basic requirements for programs in this regard could include the following:
 - Reporting on where and when credited emission reductions or removals occurred
 - Identification of potential overlap with countries' climate targets
 - Identifying the need for accounting by countries if offset credits are used by airlines
 - Obtaining authorization from countries to issue offset credits for use under CORSIA, along with assurances from countries to perform appropriate accounting
 - Transparent reporting
- ▶ The EUC's wording could be improved in some places, including:

⁹ One possible exception is double claiming with respect to countries' Cancun targets; given the voluntary and interim nature of these commitments, no consensus has been reached on how and whether offset claims should be reconciled against them.

¹⁰ Paragraph 77(d) of the Katowice decision text indicates that a country may "authorize" the use of mitigation outcomes "for international mitigation purposes other than achievement of its NDC."

- The EUC could be more explicit that programs must put measures in place to avoid various types of double counting.
- The EUC should be clear that double claiming must be avoided between airlines and the countries where emission reductions occur (not only “host countries” where a project activity is located).
- Since programs cannot require compliance from countries, the EUC may need to avoid suggesting that programs should “require” host countries to account for use of offset units.

3.4.3 Recommendations for revising the EUC

High priority

- ▶ The EUC should be more specific about the procedures or requirements needed to avoid double issuance, double use, and double claiming – making reference to best practices among current programs.
- ▶ The EUC should explicitly expand the scope of double claiming to include other potential competing claims to credited emission reductions or removals (not just host country claims).

Lower priority

- ▶ With regard to double claiming, the EUC should specify general requirements and procedures that programs should follow to facilitate international accounting and obtain appropriate authorization and assurances in order to certify offset credits for use under CORSIA.
- ▶ The wording of the EUC should be improved for clarity.

Suggested text

Emission reductions or removals are only counted once towards a mitigation obligation. Programs must have rules and procedures ~~Measures must be~~ in place to avoid:

a) Double issuance ~~(which occurs if more than one unit is issued for the same emissions or emissions reduction or removal)~~. **Programs must have procedures in place within their registry systems to prevent issuance of more than one offset credit for the same emission reduction removal. In addition, programs must have policies in place to monitor and avoid overlapping emission reduction claims between different projects (e.g. a project claiming emission reductions from reducing fertilizer consumption and a project abating N₂O from nitric acid used for fertilizer production), and must have procedures to avoid double issuance due to double registration of projects.**

b) Double use ~~(which occurs when the same issued unit is used twice, for example, if a unit is duplicated in registries)~~. **Programs must operate robust registry systems that are capable of securely and transparently effectuating the issuance, transfer, and cancellation of offset credits. Rules and procedures must be in place to avoid duplication within a registry of offset credits for the same emission reductions or removals. Program registries must incorporate procedures that require that offset credit cancellations are clearly indicated, irreversible, and unambiguously designated for an intended purpose.**

c) Double claiming (~~which occurs if the same emissions reduction is counted twice by both the buyer and the seller (i.e., counted towards the climate change mitigation effort of both an airline and the host country of the emissions reduction activity)).~~ **Programs must have rules and procedures in place to reconcile or avoid competing claims to emissions reductions or removals for which offset credits are issued. Such rules should include a requirement for legal attestations from project owners asserting exclusive ownership of credited emission reductions or removals. In order to prevent double claiming, eligible In addition,** programs should require and demonstrate **that, prior to the use of any offset credits to fulfil offsetting requirements under CORSIA, the host country (or countries) where credited of emissions reductions or removals occur activities has authorized the use of the offset credits under CORSIA and has** agreed to account for any **use of offset credits, units issued for as a result of those activities** such that double claiming does not occur between ~~the an~~ airline and the ~~host~~ country. ~~of the emissions reduction activity~~ **To facilitate such accounting, programs must establish procedures and rules for:**

- ▶ **Determining and reporting on where and when credited emission reductions or removals occurred;**
- ▶ **Identifying whether credited emission reductions or removals are covered by countries' climate targets**
- ▶ **Identifying the need for accounting by countries if offset units are used by airlines;**
- ▶ **Obtaining from countries an authorization that credited emission reductions or removals may be used to fulfil offsetting requirements under CORSIA and assurances from countries not to use the credited emission reductions towards achieving their own climate mitigation targets and to perform appropriate accounting;**
- ▶ **Transparently reporting on all offset credit issuances and their use by airlines.**

3.5 No net-harm

The implementation and operation of carbon offset projects can have wider socio-economic and environmental impacts – both positive and negative – beyond the reduction of emissions. Negative impacts or 'harms' can be unintentional (e.g. disrupting traditional practices and livelihood of communities as a result of an afforestation project) or deliberate (e.g. displacement of people and inundation of forests for the construction of a hydro power plant). Although not directly related to the effect of carbon offsets on GHG emissions, ensuring social and environmental safeguards is nevertheless a critical element of maintaining credit quality.

The ICAO Council adopted the following eligibility criterion with respect to 'no net-harm' (ICAO 2019):

Carbon offset credits must represent emissions reductions, avoidance, or carbon sequestration from projects that do no net harm. Offset projects should not violate local, State/provincial, national or international regulations or obligations. Offset programs should show how they comply with social and environmental safeguards and should publicly disclose which institutions, processes, and procedures are used to implement, monitor, and enforce safeguards to identify, assess and manage environmental and social risks.

Furthermore, the following ‘program design element’ is relevant to the discussion on ‘no net-harm’ (ICAO 2019):

Safeguards System: Programs should have in place safeguards to address environmental and social risks. These safeguards should be publicly disclosed.

To determine if a project ensures ‘no net-harm’, it is necessary to assess the type and magnitude of harms, corrective actions to address these (e.g. giving fair compensation for displaced communities), as well as the project’s benefits. While some subjectivity may be unavoidable in making this assessment, setting out clear rules and prescriptions on safeguards are critical for operationalising ‘no net-harm’.

3.5.1 How offset programs address this criterion

There are clear differences in the extent to which the reviewed programs go in assuring against harms from project activities. The exact phrasing ‘no net harm’ is not of common use and not all programs define program-level safeguards against risks of impacts. Where program-level safeguards are defined, these include high-level criteria or principles, complemented by mechanisms/tools to check if principles are complied with (e.g. stakeholder consultations, complaints mechanisms). Yet the level of detail in which different programs define safeguards and guidelines for procedural requirements vary significantly.

Use of phrasing ‘no net-harm’

All three non-governmental standards include a mandatory principle or eligibility criterion on avoiding, reducing and managing harms from projects registered under them. However, the exact phrasing ‘no net harm’ is not common. Only VCS standard uses the phrase ‘no net harm’ but its definition remains unspecific on defining ‘net’ harm (Verra 2017b).¹¹ Verra’s sustainability focused standards - Climate, Community & Biodiversity (CCB) standard and recently released Sustainable Development Verified Impact Standard, which complement VCS, go beyond the preventive principles to require net positive impacts¹². CAR’s Program Manual sets a project eligibility criteria that the project ‘...do not cause adverse environmental, social or economic impacts’ (CAR 2015). The Gold standard does not use the phrase harm or net-harm but lays out mandatory safeguarding requirements on a number of social and environmental risks under its ‘safeguarding principles and requirements’ (Gold Standard, 2018). The CDM has perhaps the weakest phrasing among the four standards. Its modalities and procedures (CDM M&P) only refer to ‘analysing’ impacts and have no specific language on avoiding or minimising harms in a net manner or otherwise (UNFCCC, 2006).

Environmental and Social safeguards

Not all programs define safeguards. The CDM does not outline any social and environmental safeguards. Carbon capture and storage (CCS) projects under the CDM are an exception, as CDM rules require detailed characterization of the geological storage site, a site development and management plan, a risk and safety assessment, and a socio-economic impact assessment (Horstmann and Hein 2017).

Where safeguards are defined, practices include defining common safeguarding criteria for all project types or defining safeguards specific to sectoral scopes. The Gold Standard defines 11

¹¹ The definition states: ‘The project proponent shall identify potential negative environmental and socio-economic impacts, and shall take steps to mitigate them.’ (Verra 2017b, p.24)

¹² For e.g. under the CCB pillar ‘community impacts’, the standard requires projects to “Demonstrate that the net well-being impacts of the project are positive for all identified community groups compared with their anticipated well-being conditions under the without-project land use scenario” (Verra 2017a, p.35)

high-level environmental and social safeguard principles that all projects follow.¹³ Each safeguarding principle further specifies the risks to that safeguarding principles and detailed requirements for projects if such risks are identified. VCS standard per se does not identify specific safeguards but recommends use of complementary standards which address negative impacts in much greater detail, e.g. its CCB standard. CAR also does not define any common safeguarding criteria similar to the other two non-governmental standards, although All CAR protocols require that projects comply with all applicable laws & regulatory requirements, including environmental, worker safety, and other laws. Safeguards may be set for specific project scopes called 'protocols', e.g. safeguard requirements in the Forest Project Protocol.

Risk identification and impact assessment

Some non-governmental programs define clear requirements for identifying risks and provide further instructions on how to go about it (e.g. using a causal chain analysis, doing impact assessments). The Gold Standard goes the farthest in setting out mandatory requirements for risk identification. Project developers are required to identify key risks or issues using pre-set questions for all safeguarding principles. Mandatory requirements are identified under each principle which should be complied with through 'project design, management or risk mitigation' (Gold Standard, 2018). For questions responded with a 'yes', which means risks are foreseen, project developers must include all laid out requirements in their monitoring and reporting plan and in future monitoring reports. VCS-CCB has published own manuals for carrying out impact assessments.

In comparison, CDM's risk identification requirements are unspecific. The CDM M&P requires projects to 'analyze' environmental impacts, without outlining any detailed requirements. Environmental and social impact¹⁴ assessments (EIA/SEIA) are not required by the program and are to be conducted only if local regulations mandate them (CCS projects are an exception here, as impact assessments are mandatory).

Conducting stakeholder consultations

In response to criticisms on vague guidelines, and cases of disregard of procedures and oversight of human rights abuses (CDM Policy Dialogue, 2012; Verles, Braden, Taibi, & Olsen, 2018; Carbon market watch, 2018; Schade & Obergassel, 2014), the CDM Executive Board improved its stakeholder consultation requirements in 2014 and 2015. Changes included starting a complaints procedure where stakeholders can submit complaints to the DNA if their input was not incorporated in the project's design, defining minimum standards for various scoping issues such as identifying types of stakeholders, methods of invitation, information provision etc. (Horstmann and Hein 2017, p.43). However, according to some observers, the reform process is still not complete (Verles et al., 2018).

While these reforms bring CDM's procedures closer to those of non-governmental standards such as VCS and Gold Standard, some additional good practices are worth noting. For instance, both the Gold Standard and VCS stress the need for gender inclusive consultations and standard documents provide examples for carrying out gender sensitive consultations. The Gold Standard further requires a mandatory second stakeholder meeting to brief stakeholders on how their input was incorporated in project planning and to discuss any further issues. However, this

¹³ Gold Standard's safeguarding principles are: Human rights; Gender equality and women's rights; Community health; Safety and working conditions; Cultural heritage; Indigenous peoples, displacement and resettlement; Corruption; Economic Impacts; Climate and Energy; Water; and Environment, ecology and soil.

¹⁴ (UNFCCC, 2006). CDM Afforestation and reforestation (A&R) projects must address socio-economic impacts as well according to the M&P.

consultation need not be a physical one. Both Gold Standard and VCS explicitly demand recognition of human rights in their rules, a requirement that is not part of the CDM's mandate.

Note that CAR does not require stakeholder consultations for projects in the United States of America – on the premise that this would be redundant with state (and in some cases national) legal requirements with regard to projects with significant social & environmental impacts (e.g., NEPA law nationally, CEQA law in California, etc.)

MRV requirements

All non-governmental standards have requirements to document potential risks as well as measures to mitigate them in the project design. CDM makes a reference to 'analysing environmental impacts' in project design (also socio-economic impacts in the case of A&R and CCS projects), it does not require identifying and documenting measures taken to mitigate and/or minimise risks.

Validation includes checking project design documents for the reported negative impacts and measures identified to mitigate/minimize them. Both Gold Standard and VCS-CCB require validation to include negative impacts and mitigation measures. Gold Standard additionally does a preliminary review of the draft Safeguarding Principles Assessment before validation. CDM requires project developers to submit documentation on analysis of environmental impacts and EIA (if done) to the validators (para 37 c, CDM M&P, Annex - Decision 3/CMP.1). Validation is not a separate step under CAR (CAR 2017, p.15).

Both Gold Standard and VCS-CCB require monitoring plans to mandatorily include updates on the costs and risks of negative impacts; and a review of measures taken to avoid or limit them. This review should clarify the relative success or failure of measures taken. Monitoring of negative impacts is not required under the CDM (with the exception of A&R and CCS projects).

Verification of monitoring reports by approved auditors is mandatory under GS, VCS-CCB. CAR's Verification Program Manual only refers to checking compliance with applicable laws, including environmental regulations (CAR 2017, p.35). CDM does not require verification of negative impacts. Under Gold Standard, failure to complete the Safeguarding Principles Assessment and the monitoring and reporting requirements is seen as a non-conformity and can lead to suspension of the project.

Both Gold Standard and VCS-CCB provide detailed instructions as to what exactly should be assessed by DOEs as part of the validation and verification process, and lists knowledge of risk assessment techniques and methodologies as a required competence in a DOE among others.

Grievance mechanism

Clear mechanisms should be defined for receiving and addressing complaints from stakeholders about environmental or social harms caused by projects and conflicts. The CDM has also over the years (and due to increasing criticism) added a couple of interfaces for receiving grievances. These include, among others, a complaint mechanism set up in 2015 submit any issues to the Designated National Authorities (DNAs), and a possibility to send letters to the CDM Executive Board which are then addressed and answered. We could not find information on CAR's grievance mechanism. Grievances/complaints are not included in the various thematic areas on their contact us webpage¹⁵.

Setting up grievance mechanisms at the local level is a useful tool as all affected stakeholders may not have the agency to reach out to international governance bodies. Among the reviewed

¹⁵ as of 28th March 2019

standards, Gold Standard and VCS-CCB standard require project developers to set project-level grievance redressal mechanisms. Gold Standard further requires project developers to report on all stakeholder grievances and actions taken to address them in an annual report.

Transparency and Public disclosure

CORSIA's EUCs include public disclosure as a key requirement. All four programs that we have reviewed disclose information on rules and procedures on their websites. However, the ease of finding required documents (e.g. related to the themes discussed above) varies. The public disclosure practices of all standards appear to be limited to substantive and procedural requirements. For instance, we could not find any consolidated reports on how many projects were deregistered due to non-compliance with safeguards. Such meta-level evaluations can provide further evidence on the extent to which program's requirements safeguard against harmful impacts.

Track record

The track record of the standards we reviewed highlights the merit of defining clear rules and procedures for operationalizing the do no harm principle. Assessing sustainable development impacts is more nuanced than mitigation outcomes as it involves a myriad of different outcomes and determining cause and effect relationships objectively is more difficult. The limitations of the CDM in defining clear requirements for identifying risks (along with co-benefits) and avoiding and/or managing them created in part a niche for non-governmental standards such as the Gold Standard and VCS CCB. They have set very detailed processes for identifying risks in an inclusive manner using stakeholder input, monitoring and evaluating claims of avoiding risks, and tracking progress on risk mitigation/management measures for a price premium on the generated offsets.

3.5.2 Potential gaps

The EUC text sets out high level requirements for setting rules for ensuring no net-harm. In its existing form, the EUC text will admit programs that approach 'no net harm' in very different ways and propose different rules and practices to avoid harm. Without further specification, the EUCs may not be effective in preventing the use of offsets from projects that have harmful consequences for affected stakeholders and the environment.

- ▶ The EUC text sets out CORSIA's aspiration that "offset units intended for compliance use under CORSIA originate from projects that do no net-harm". The text does not explicitly clarify how to assess that there is no 'net' harm, what tolerance there is for accepting harm i.e. if the harm can be balanced by corresponding positive impacts or whether adequate compensation to those directly affected by the harm would suffice. Balancing positive and negative impacts is difficult because these are often not comparable (i.e. measured in similar units). A simpler terminology may avoid confusion and misinterpretation of the principle.
- ▶ The EUC requires programs to "...comply with social and environmental safeguards" but does not prescribe any minimum safeguards. Only two of the four programs we reviewed (Gold Standard and VCS-CCB) define clear safeguards. To ensure standardised application of the EUC, the language of the EUC text could be elaborated to include minimum safeguarding principles that all programs should have in their safeguarding systems. These criteria could be drawn from international good practice standards such as IFC's Performance Standards on Environmental and Social Sustainability, UNDP's social and environmental standards,

Adaptation Fund’s environmental and social policy (IFC 2012; UNDP 2015; Adaptation Fund 2013).

- ▶ The EUC text requires programs to “...publicly disclose which institutions, processes, and procedures are used to implement, monitor, and enforce safeguards” without stipulating their adequacy in any way. As the assessment above shows, the clarity and comprehensiveness of procedural requirements of programs varies substantially. The EUC text could be expanded to include minimum expectations from programs on procedural elements they should have in place. Good practice procedural requirements for safeguards are discussed both in literature (Spalding Fecher and Schneider 2017; Arens and Mersmann 2018) and adopted in practice in international standards mentioned in the previous paragraph.

3.5.3 Recommendations for revising the EUC

Based on the potential gaps identified above, we make the following recommendations for improving the EUC related to no net harm:

High priority

1. **The EUC text should require programs to establish a list of ‘social and environmental safeguards’ that must be adhered to by all projects.** This list could draw on global good practice standards mentioned above as well as good practices in non-governmental standards such as the Gold Standard and VCS-CCB standard and can include, as a minimum, safeguards towards:
 - upholding core labour rights, no human rights abuses, ensuring gender equality and women’s rights, rights of indigenous people, no involuntary resettlement, protection of natural habitats and biological diversity, maintaining and protecting physical and cultural heritage.
2. **The EUC text should further specify the necessary procedural elements of program’s safeguarding systems.** These include, among others:
 - Setting clear requirements on using participatory methods for identifying risks, their severity and mitigation measures to mitigate risks with stakeholders, e.g. through local stakeholder consultations.
 - Defining clear avenues for stakeholders to provide input at all stages of the project cycle, etc.
 - Some form of program-level screening of projects for their ‘riskiness’ in terms of the potential to cause harm and requirements to carry out impact assessments for high risk projects.
 - Clear procedures on how programs evaluate if safeguards and mitigation measures are being enforced throughout the project duration.
 - Establishing a requirement that issuance of CORSIA compliant credits is only possible if all program requirements relating to safeguards have been met.

- A project-level grievance mechanism for expressing concerns and resolving conflicts, with some form of oversight from the program.

3. The word 'net' should be removed from the wording of the EUC text.

Suggested text

Carbon offset credits must represent emissions reductions, avoidance, or carbon sequestration from projects that do no ~~net~~ harm. Offset projects should not violate local, State/provincial, national or international regulations or obligations. Offset programs should **establish a list of 'social and environmental safeguards' that must be adhered to by all projects. These can include, in the minimum upholding core labor rights, no human rights abuses, ensuring gender equality and women's rights, rights of indigenous people, no involuntary resettlement, protection of natural habitats and biological diversity, maintaining and protecting physical and cultural heritage.** Programs should show how they comply with social and environmental **safeguards and set minimum mandatory requirements on risk identification and management, stakeholder engagement, monitoring and ex-post evaluation of impacts and mitigation measures, and grievance management.** Programs should publicly disclose which institutions, processes, and procedures are used to implement, monitor, and enforce safeguards to identify, assess and manage environmental and social risks.

4 Conclusions and recommendations

Our analysis finds that the current EUCs are mostly sufficient in covering basic conceptual elements related to each of the “carbon offset credit integrity assessment criteria” adopted by ICAO. However, all of the EUCs we reviewed could benefit from more elaboration on essential program requirements and procedures needed to ensure that the criteria are realized. High priority items include:

- ▶ For additionality, explicitly requiring that programs exclude from eligibility project types that have a high risk of being non-additional because they are legally required and/or frequently profitable without carbon offset revenues.
- ▶ For baseline determination, including a requirement that baselines be determined in accordance with fully vetted, program-approved methodologies; stipulating that any standardized baselines must be developed following program-established criteria for standardized approaches and apply benchmarks, stringency levels, and other parameters that are conservative and appropriately tailored to sector- and geographic-specific circumstances; and explicitly prescribing the use of appropriate crediting periods.
- ▶ For permanence, noting that programs must administer monitoring, mitigation, and compensation mechanisms; explicitly referring to buffer reserves and temporary crediting as viable alternatives for ensuring permanence; defining an ambitious (e.g., 100-year) threshold for permanence; and – if buffer reserves are used – stipulating essential requirements for buffer reserve approaches to effectively address non-permanence risks, including holding project owners liable for intentional reversals.
- ▶ For avoidance of double counting, specifying the procedures or requirements needed to avoid double issuance, double use, and double claiming – making reference to best practices among current programs; and explicitly expanding the scope of double claiming to include other potential competing claims to credited emission reductions or removals (not just host country claims).
- ▶ For no net harm, requiring programs to establish a list of social and environmental safeguards that must be adhered to by all projects; specifying the necessary procedural elements of program’s safeguarding systems; and removing the word “net” from the text of the EUC.

In most cases, the formal wording and terminology used in the EUCs could also be improved.

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