# Methods for Assessing Carbon Offset Quality

*Last updated: November 30, 2023*
*Developed by Barbara Haya for the University of California*

These guidelines are a part of a larger project – Offset Program Development for the University of California. They were developed to provide detailed practical methods for assessing offset quality for project types and individual projects that could be widely used by assessors and across many project types. This is a living document and will continue to be updated as we and other research groups gain experience evaluating offset quality.

## 1. UC's offset criteria

UC's minimum offset quality criteria and other offset priorities are laid out in sections III.C.6 and V.C.6 of UC's Sustainable Practices Policy. This policy was developed in consultation with UC faculty, students, and staff over three years of engagement, including town halls, individual and group meetings, and comment periods.

UC defines its **minimum criteria** for quality offsets as credits that:

- are likely to represent no more than their actual climate benefit *(avoid over-crediting)*,
- have low risk of environmental or social harm especially in marginalized communities, and
- involve technologies that are scalable in line with reducing global emissions to no more than net zero by mid-century as outlined in the *IPCC special report on Global Warming of 1.5C*.

In addition, **priority** is given to mission-aligned projects that:

- advance research
- engage students
- have health and social justice benefits
- benefit the university and surrounding communities
- have climate benefits beyond the credited reductions

⇨ UC's offset procurement policy – sections III.C.6 and V.C.6 of UC's Sustainable Practices Policy

## 2. Methods for assessing offset quality - summary from website

Our goal was to develop a process for assessing the quality of projects that could be widely used and apply to a wide range of project types.

Offset quality can be assessed at the project or project type level. A project type is any set of projects that meets specific objective criteria. This can be all projects that use a specific offset protocol, or it can be a subset of projects using a specific protocol by objective characteristics such

as location, size, or technology. We consider credits from project types real and additional if total credits generated by that type are unlikely to exceed the true climate benefit across the whole portfolio of projects.

We developed an ***over/under crediting analyses*** to review the quality of credits generated by individual projects and project types. This analysis recognizes that methods used to calculate emissions reductions may over-credit in some ways and under-credit in other ways. Credits are considered real and additional if sources of over-crediting, such as the participation of non-additional projects for a project type, or a non-conservative baseline for an individual project, is counterbalanced in full by sources of under-crediting, treating uncertainty conservatively. *Conservative* means that estimates of the climate benefit of a project, or portfolio of projects for a project type, are more likely to under-credit than over-credit. Large uncertainties require higher levels of conservativeness.

**Over/under crediting analyses** should take into account:

***Additionality*** – would the credited reductions have occurred without the offset program or the University's climate protection policy?
***Baselines*** – what would likely have happened without the offset program or the University's climate protection policy? The baseline is the scenario against which credited reductions/removals are estimated.
***Leakage*** – do projects affect emissions outside of project accounting boundaries? Are potential increases in emissions due to project activities adequately avoided or accounted for?
***Methods for estimating reductions/removals*** – otherwise, are the methods used to estimate emissions reductions/removals conservative and aligned with the latest science?
***Durability*** – is the risk that any stored carbon will be released back into the atmosphere over a forty-year period managed and fully accounted for?

In addition, other criteria should be assessed at the project level.

Note that this quality review process is in addition to the third-party verification process run by the offset registries. Third-party verification assesses whether the project meets the eligibility criteria of the offset protocol and whether reductions have been monitored and calculated in accordance with the offset protocol. This quality review process assesses whether the type or project meets our quality criteria.

**Assessing project types**
Project types undergo a three-step review process:

1. Comprehensive over/under crediting assessment, seeking types of projects that are categorically deemed quality; the resulting procurement guidelines may include due diligence procedures that the buyer should carry out on individual projects before procuring credits from them.
2. Each assessment is then peer reviewed by at least two independent reviewers similar to informal peer reviews before journal submission or formal peer review by a journal.

3. Due diligence of individual projects before procuring credits from them as defined in the comprehensive assessments and general procurement guidelines.

Comprehensive project type assessments should start with a review of relevant literature on offset quality that has already been published (see our Repository of Articles on Offset Quality as a start). If a rigorous and up-to-date article has been published with a full over-under crediting analysis taking into account the list of factors described above, no further analysis is needed.

These assessments should be performed by a team with the necessary interdisciplinary, sectoral, and regional expertise for the particular project type and location, including in carbon accounting, sectoral and regional culture, and factors affecting project implementation decisions. Members of the team should be free from conflicts of interest.

An example of a quantitative comprehensive over/under crediting analysis is our analysis of cookstoves offset methodologies. Our assessments of improved forest management methodologies and REDD+ (reducing emissions from deforestation and forest degradation) methodologies are examples of comprehensive quality assessments but without full quantitative over/under crediting analyses.

Alternatively, assessment of the work of other credit raters can be performed in order to be able to use others' ratings.

**Assessing individual projects**

Individual projects or a set of projects by a project developer should also be peer reviewed by at least two reviewers. Internal reviewers can use their own expertise, consult published literature, and talk to individuals familiar with the project/location/sector as needed to assess their confidence in whether a project meets the quality and mission criteria. External reviews can also be requested, which would review the project and also the assessment of internal reviewers as appropriate.

## 3. Offset quality assessments by type

After the review process, both project types and individual projects are ranked under one of five tiers depending on their quality:

Tier 1 - Highest quality; meets the minimum quality standards listed above and also has additional co-benefits and/or climate benefits

Tier 2 - Meets the minimum quality standards

Tier 3 - Meets the minimum quality standards with some acceptable compromises. The purpose of this tier is to expand the set of acceptable project types until offset quality on the market improves. This tier includes initial project type assessments that are advanced enough to be confident that the project type meaningfully supports climate mitigation and does not significantly over-credit, but which still needs a full over/under crediting analysis.

Tier 4 - Not categorically accepted, but individual projects could meet the minimum quality standards if they meet specified due diligence requirements

Tier 5 - Protocols systematically over-credit; it is unlikely to find individual projects that meet UC criteria

Note that before procurement, credits should go through the due diligence process described in the guidelines for the particular project type.

Over time, as more comprehensive analysis is performed, we will continue to add project types into the tiered lists.

⇨ Tiered spreadsheet with links to project type reviews

## 4. Methods for assessing offset quality - detailed

### *4.1 Additionality*

Projects are considered additional if it is likely that the reductions would not have occurred were it not for offsets or for UC's climate policy.

Additionality has been the largest challenge with offset quality to date. Offset programs largely use two methods for screening project additionality. Many protocols under the United Nation's Clean Development Mechanism (CDM) and the voluntary offset market, assess additionality on a project-by-project basis. Under this approach, each project developer must demonstrate, and third-party verifiers must verify, that the project is either not cost effective on its own and/or has barriers that prohibit implementation without offsets. Research has found high rates of non-additionality which can be traced to weaknesses in a program ability to assess the additionality of individual projects.[1] Financial assessments involve multiple assumptions that can be strategically chosen to show that cost effective projects are not cost effective, and while most projects experience challenges, it can be difficult for third-party verifiers to identify which would have prevented projects from going forward.

Second generation offset protocols, like those under California's offset program and many protocols generating credits on the voluntary offset market, use a "standardized" approach to assessing additionality. Under this approach, offset registries create eligibility criteria that restrict offsetting to project types that are not common practice; any project meeting the eligibility criteria is allowed to participate and generate credits. Ideally protocols would prevent over-crediting across the entire portfolio of projects using an over/under crediting analysis—taking into account that some credited reductions may be non-additional, but that conservativeness in emissions reduction calculations can counterbalance that over-crediting. In our own assessments of protocols using the standardized approach, we have found that protocol developers sometimes choose conservative methods for estimating project benefits but commonly do not quantitatively assess whether sources

[1] Haya, B. (2010). *Carbon Offsetting: An Efficient Way to Reduce Emissions or to Avoid Reducing Emissions? An Investigation and Analysis of Offsetting Design and Practice in India and China* [(Doctoral dissertation) Energy & Resources Group, University of California]. https://escholarship.org/content/qt7jk7v95t/qt7jk7v95t.pdf; Cames, M., Harthan, R. O., Füssler, J., Lazarus, M., Lee, C. M., Erickson, P., & Spalding-Fecher, R. (2016). *How additional is the Clean Development Mechanism?* https://ec.europa.eu/clima/system/files/2017-04/clean_dev_mechanism_en.pdf

of under-crediting counterbalance crediting from non-additional projects that choose to participate and from other sources of over-crediting.[2]

Methods for independently assessing additionality will vary per project type. Additionality is rarely black and white; most often there is some uncertainty, and sometimes a lot of uncertainty, in whether a project is additional, or the proportion of participating projects or activities that are additional.

Here we elaborate on some key additionality assessment methods and issues. As with other elements of these guidelines, these additionality assessment guidelines will continue to evolve as we gain experience and as methods are published by other groups.

4.1.1 Methods for assessing additionality at a project type level

Project type additionality analyses should be performed by individuals without conflicts of interest, and informed by individuals who know the industry in the locations where the credited projects are taking place well, including the factors that commonly influence decisions to implement the credited project types, and common practice in the industry. Assessors should triangulate, drawing from multiple experts, data sources, and types of analysis where possible.

Project types are most likely to be additional if climate change mitigation is the sole reason to perform the project. Project types are also likely to be additional if they have been implemented at very low rates or not at all prior to eligibility under an offset protocol, and if offset income significantly improves project financial returns, such as is more common with projects that reduce methane and other high potency gases than with projects that only reduce $CO_2$.

Assessments of additionality can involve, among other things, review of published articles including gray literature; in-depth assessments of individual projects following the methods for assessing the additionality of individual projects below; input from sectoral/ technological/ regional experts; and analysis of project implementation trends over time in which an increase in implementation should be seen in response to the adoption of offset protocols and increases in offset prices.[3] For some project types, additionality assessments can involve comparisons with controls. Baselines can be set dynamically over time using control plots, defining the baseline as the actual emissions from similar facilities or plots over time.[4] For projects that rely on household level implementation, randomized control trials and other non-randomized study designs like quasi-experimental approaches can be used to evaluate additionality by providing an unbiased counterfactual that indicates how households may have acted in the absence of the project or intervention. Finally, observational studies, which differ from control trials in that researchers did not assign treatment and do not provide a counterfactual, can offer insight into factors that make a project or project activity to have been more or less additional.

[2] Haya, B., Cullenward, D., Strong, A. L., Grubert, E., Heilmayr, R., Sivas, D. A., & Wara, M. (2020). Managing uncertainty in carbon offsets: Insights from California's standardized approach. *Climate Policy*, 1–15. https://doi.org/10.1080/14693062.2020.1781035

[3] For an example of such an analysis, see: Haya, B., Cullenward, D., Strong, A. L., Grubert, E., Heilmayr, R., Sivas, D. A., & Wara, M. (2020). Managing uncertainty in carbon offsets: Insights from California's standardized approach. *Climate Policy*, 1–15. https://doi.org/10.1080/14693062.2020.1781035

[4] West, T. A. P., Wunder, S., Sills, E. O., Börner, J., Rifai, S. W., Neidermeier, A. N., Frey, G. P., & Kontoleon, A. (2023). Action needed to make carbon offsets from forest conservation work for climate change mitigation. *Science*, *381*(6660), 873–877. https://doi.org/10.1126/science.ade3535

4.1.1.1 Household energy projects

In a forthcoming article[5] we conducted a comprehensive review of the metrics and methods used to estimate additionality of household energy projects and factors that affect it across the (1) carbon offsets, (2) utility demand-side management programs (i.e., net-to-gross analysis), and (3) policy impact analysis literatures. Household energy projects include efforts to disseminate cookstoves, clean water or borehole projects, solar lighting, etc. to many households. Although most offset protocols treat additionality as a binary at the project level (i.e., the project is deemed entirely additional or not), in reality, there is a quantifiable rate of households purchasing or obtaining the energy intervention in the absence of the project activity. Thus, this guidance focuses on methods for assessing the proportion of households that would have adopted the project activity (e.g., improved stove, solar lighting) regardless of the offset project. In other words, we suggest assessing additionality at the household level. Without defining additionality clearly, there is risk of overlap with other concepts, especially the baseline. This will depend on how the baseline is defined by the protocols. For cookstoves, the baseline is the type and amount of fuel a household uses before the project, but can initially include or be updated to include more efficient or clean fuels (e.g., LPG), although this is rare.

We found that studies, in the process of evaluating program impacts, assess additionality through methods ranging from rigorous randomized trials to in-depth qualitative studies, yet quantitative observational studies were the most common study design.

Quantitative randomized control trials (RCTs) are well established as the most robust method for establishing an unbiased counterfactual. However, experimental or even quasi-experimental (i.e., treatment assignment is not random) designs are often not logistically feasible for offset projects to implement. Therefore, when there is an established literature from RCTs, observational, and qualitative studies, this literature can be leaned on to rigorously and cost-effectively estimate additionality at the household level without needing additional study

In the long-run, we suggest that the protocols update their additionality approach. We recommend that they construct a household level survey instrument for the project developers to implement that would collect information on the factors that affect the likelihood that the intervention for that specific household was in fact additional, drawing on the published literature. However, in the short term, a project's level of additionality can be assessed broadly through this same approach, leaning on the literature and publicly available information from the project's registry documentation. Protocols and project developers would construct and implement a robust household level survey instrument ("the protocol approach"), while credit analysts can construct a similar project level instrument based on project specific information and the types of households the project serves ("the assessor approach"). Both approaches require a number of steps. The first step is to clearly define additionality for the project type, and the relationship with the baseline. Next, is a review of the literature to assess the major factors that affect the purchase of an energy-efficient technology at the household level. If no such established literature exists on factors affecting the purchase of the energy intervention, qualitative interviews with a range of stakeholders (e.g., researchers, project developers, etc.) can help compile relevant major factors. From these identified factors from the literature or qualitative interviews, in the assessor approach, collect information specific to the project and the households they serve. For example, setting of a project can highly affect the additionality of a household energy project. If the PDD specifies that the project only operates in rural areas, it is more likely to be additional. The protocol would be able to

[5] Moridani, Gill-Wiehl & Haya (in preparation). Methods to assess additionality of household energy offset projects: A review

require the project to collect information directly from households. Data collection, regardless of approach, is then translated into an additionality percentage, indicating whether the household (protocol approach) or the majority of households (assessor approach) would have purchased a similar stove without the offset program. The project's additionality score (assessor approach) or the average household additionality score (protocol approach) will serve as a discount rate for the project's emissions for the corresponding crediting period. The protocols should have projects consider this index or score at the initial deployment of the household level intervention or the repair/replacement stage. This frequency is tailored to when the household would have to decide again (or not) to purchase the household energy product/intervention (e.g., a more efficient stove, a solar home system). Assessors are limited to the information specific to a monitoring period as this is typically how documentation is released. A project level additionality discount rate is necessary as project specifics are critical in establishing additionality. For instance, projects operating in a country with and without fuel subsidies could have have vastly different levels of additionality.

4.1.1.1.1 Example of improved/clean cookstove projects in low-middle income countries

To demonstrate how to implement the methods outlined above, we provide cookstoves as an example project type. We first define additionality as whether the household would have purchased a more efficient stove (i.e., the project stove or similar technology). Next, our review of the literature found three main categories of factors that affected the household's purchase decision: affordability, accessibility, and acceptability. We found that assessing affordability should include evaluating the cost of the stove and fuel relative to each household's expenditure or income. However, other factors of affordability, including a household's access to credit, any existing monetary incentives to purchase the stove, household size, the health, gender, age, and education level of the head of household, and their existing assets. Our evaluation of accessibility revealed that the availability of the fuel, the mobility of households, and the geographic location should all be considered. Finally, we find the likelihood of a household purchasing the stove (or rural household energy intervention) on their own without the carbon-financed project depends on the acceptability of that stove or device. This will include considering the design of the stove, the compatibility with local practices, and whether the stove has time-saving benefits or requires technical support. Other factors under this category include the social standing of the household, their trust in local government, media exposure, and internet access. An assessor could review a project's documentation to assess the project's average household income, household size, and geographic location. Unfortunately, not all of these factors are listed in the project documentation. In this case, turn to the literature and publically available data sets such as peer-review literature, national demographic and health surveys, the Energy Sector Management Assistance Program national energy surveys (called Multi-Tier Framework), or other grey/white literature on the project's location to gauge these factors. For example, an assessor may be able to find the percentage of female headed households or the relative level of poverty in the county that the project operates in a DHS or ESMAP report, even if this information is not provided by the project.

Ideally, each of these factors would be measured through household survey, conducted at initial stove deployment, or at the repair/replacement stage. The survey results will then be used to construct the additionality score, averaged, and then applied to a project's credits as described above.

4.1.2 Methods for assessing the additionality of individual projects

Since assessment of additionality for an individual project is aided by specific knowledge of the project and the factors leading to its development, institutions should draw on their own knowledge-base and the knowledge-base of their extended community on the specific projects,

project region, and developer organization in assessing project additionality. An individual project can be considered additional if the reviewers, using their expert judgment, are reasonably confident that the project needed the offset income to move forward. Reviewers should look for red flags that might point to the lack of project additionality, such as contradictory statements made about project viability or the factors that went into the development decision.

Additionality assessments of individual projects can involve, among other things, review of project documents, news articles, meeting minutes, and public comments; project financial assessment; and discussion with individuals involved with project development or who otherwise know about the project and what is common practice in the project region.

The timeline of project construction (decision, start, end) and interaction with the offset registry (first contact, listing, registration, validation, and first issuance) can be informative. One additionality red flag is if the project was enrolled as an offset project years after the project was completed. This would indicate that offsets may have not been an important factor in the development decision and that the income is not important to project financial feasibility. If the decision to move forward with the project was made before a protocol existed for that project type, it could be hard to justify the additionality of the project, unless perhaps if the project developer was involved in the development of the protocol. Note that if the timing does line up, this is not evidence that the project is additional. Also note that registration, validation, and verification can be costly, and so project developers may choose to go through those processes only after the projects are ready to issue their first tranche of credits. Please see Haya (2010) for an example of applying these methods.[6]

One strategy for assessing additionality is for the reviewer to rate the project on the following two ranges.[7] Purchasing campuses can decide how certain additionality needs to be.

Did the offset program enable the project to go forward?

- I am reasonably certain that the project is additional
- I am confident (it is highly likely) that the project is additional
- It is clear that the offset program helped make the project happen but I am not confident that the project would not have gone forward without the offset program
- The additionality of the project is questionable
- The additionality of the project is unlikely

Consider scenarios where the project went forward without the offset program:

- I cannot think of a scenario in which the project would have happened without the offset program
- I can think of one or several scenarios in which the project is non-additional, but none seem likely
- I can easily think of one or several scenarios in which the project is non-additional
- It seems that the project would most likely have occurred without the assistance of the offset program

[6] Haya, Barbara. (2010). *Carbon Offsetting: An Efficient Way to Reduce Emissions or to Avoid Reducing Emissions? An Investigation and Analysis of Offsetting Design and Practice in India and China* [PhD, University of California, Berkeley]. https://escholarship.org/content/qt7jk7v95t/qt7jk7v95t.pdf

[7] Modified from the Duke Carbon Offsets Initiative Validation Checklist, 1.2

4.2.3 When a project has multiple revenue sources

Additionality can be particularly tricky to assess if there are multiple sources of supportive revenues, such as government incentives, philanthropic funding, or multiple sources of payments for environmental services. Additionality in the context of multiple funding sources can be addressed in several ways, depending on the specific project, context:

1. The other revenues are considered in the same manner as product sales revenues, and the offset project is considered to be additional only if it is very likely that the project would not have gone forward without the offset program or UC's climate protection policy.
2. Payment stacking: when there are multiple sources of climate-driven funding, to avoid double counting, responsibility can be claimed in proportion to the supportive funds provided. For example, if philanthropy and carbon offsets both contribute half of the needed funding, each can claim responsibility for half of the resulting reductions. Offset credits would only be generated for half of the greenhouse gas (GHG) benefit estimated for the project or the two funding sources would each receive half of the credits.
3. If the offset project is run by a non-profit or business devoted to climate mitigation projects, and if the offset income is sufficient to have provided the total incentive funds needed by the project to move forward, an offset project could be considered additional even if the project was also supported, or even primarily supported, but other support revenue. Offset funds would be fully invested in future climate mitigation projects of at least similar GHG benefits. A potential con of this approach is the timing of credit generation and the impact of those funds–credits would be generated for past non-additional activities, and the impact of those offset credits is to enable other future activities with similar GHG impact. A benefit of this approach is that a combination of initial philanthropy and a steady stream of offsets revenues can enable an organization or business to be viable. An inherent challenge of offsets as an incentive system is that credits are generated for reductions only after they occur, and so do not provide the upfront capital needed to get a project off the ground. This approach to additionality could overcome that fundamental challenge resulting in real additional climate benefits over time. Examples of this approach could be a cookstoves business that needs upfront funds to get going but then can expand as offset funds come in, or a conservation organization that would reinvest offset funds proportionally in more land easements or purchases. Of course a drawback of this approach is that credits are effectively generated ex-ante and additional reductions happen over time as the offset funds are invested in new projects.

## *4.2 Baselines*

Offset projects measure their emissions/carbon impact against estimates of the emissions/removals that would have taken place without the offset program. All or most offset protocols calculate the project effect, and number of credits generated, as the difference between the estimated emissions or removals in the project scenario, minus the emissions/removal in the defined baseline scenario. Additionality is related to baselines; if the project is non-additional, the baseline *is* the project and the project has no impact.

Like additionality, baselines assessments are also often very uncertain, since it is impossible to directly measure a scenario that never happened. Studies of offset quality have found that some protocols have defined baselines in a way that exaggerates climate impacts, for example studies have found significant exaggeration of baseline emissions and therefore credit generation from "clean

coal" CDM projects,[8] US improved forest management projects,[9] and international reduced deforestation projects (REDD+).[10] Critical case studies of the baselines of individual offset projects have also been published.[11]

Assessments of protocol baselines will be specific to the project type, and can draw from published literature, market and technology trends, and sector-specific knowledge to assess the accuracy and conservativeness of the methods used to estimate baseline emissions. Assessments of baselines and additionality should take into account adverse selection and information asymmetries. Adverse selection can occur when offset protocols define baselines as the average, or more conservative than average, across the portfolio of *possible* projects, but because the financial benefits are greatest for those projects that need to make the smallest change to participate, such as non-additional projects, so that the actual pool of participating projects is dominated by those with the least real GHG impact. For some project types like improved forest management and REDD+, the dynamic control plot method can be used to assess the baseline.[12]

### *4.3 Leakage*

A project meant to reduce emissions can cause *leakage* when it causes emissions to increase outside of project accounting boundaries.

The most common form of leakage is market leakage. An offset project that reduces emissions by decreasing production of a product can lead to an increase in production, and associated emissions increases, elsewhere to meet demand for that product. For example, improved forest management projects that increase carbon on participating lands by reducing timber harvesting can lead to increased timber harvesting elsewhere to meet timber demand. Protocols should be designed to minimize the risk of leakage as possible and otherwise account for it conservatively.

Assessments of market leakage accounting can focus on leakage timing and leakage rates. California Air Resources Board's U.S. Forest offset protocol commonly credits a large reduction in

---

[8] Lazarus, M., & Chandler, C. (2011). *Coal Power in the CDM: Issues and Options*. https://www.sei.org/publications/coal-power-in-the-cdm-issues-and-options/

[9] Badgley, G., Freeman, J., Hamman, J. J., Haya, B., Trugman, A. T., Anderegg, W. R. L., & Cullenward, D. (2021). Systematic over-crediting in California's forest carbon offsets program. *Global Change Biology*, gcb.15943. https://doi.org/10.1111/gcb.15943; Coffield, S. R., Vo, C. D., Wang, J. A., Badgley, G., Goulden, M. L., Cullenward, D., Anderegg, W. R. L., & Randerson, J. T. (2022). Using remote sensing to quantify the additional climate benefits of California forest carbon offset projects. *Global Change Biology*, gcb.16380. https://doi.org/10.1111/gcb.16380; Stapp, J., Nolte, C., Potts, M., Baumann, M., Haya, B. K., & Butsic, V. (2023). Little evidence of management change in California's forest offset program. *Communications Earth & Environment*, *4*(1), 331. https://doi.org/10.1038/s43247-023-00984-2

[10] West, T. A. P., Börner, J., Sills, E. O., & Kontoleon, A. (2020). Overstated carbon emission reductions from voluntary REDD+ projects in the Brazilian Amazon. *Proceedings of the National Academy of Sciences*, *117*(39), 24188–24194. https://doi.org/10.1073/pnas.2004334117; West, T. A. P., Wunder, S., Sills, E. O., Börner, J., Rifai, S. W., Neidermeier, A. N., Frey, G. P., & Kontoleon, A. (2023). Action needed to make carbon offsets from forest conservation work for climate change mitigation. *Science*, *381*(6660), 873–877. https://doi.org/10.1126/science.ade3535

[11] E.g. van Kooten, G. C., Bogle, T. N., & de Vries, F. P. (2014). Forest Carbon Offsets Revisited: Shedding Light on Darkwoods. *Forest Science*, *61*(6), 370–380. https://doi.org/10.5849/forsci.13-183

[12] Haya, B. K., Evans, S., Brown, L., Bukoski, J., Butsic, V., Cabiyo, B., Jacobson, R., Kerr, A., Potts, M., & Sanchez, D. L. (2023). Comprehensive review of carbon quantification by improved forest management offset protocols. *Frontiers in Forests and Global Change*, *6*, 958879. https://doi.org/10.3389/ffgc.2023.958879; Stapp, J., Nolte, C., Potts, M., Baumann, M., Haya, B. K., & Butsic, V. (2023). Little evidence of management change in California's forest offset program. *Communications Earth & Environment*, *4*(1), 331. https://doi.org/10.1038/s43247-023-00984-2; West, T. A. P., Wunder, S., Sills, E. O., Börner, J., Rifai, S. W., Neidermeier, A. N., Frey, G. P., & Kontoleon, A. (2023). Action needed to make carbon offsets from forest conservation work for climate change mitigation. *Science*, *381*(6660), 873–877. https://doi.org/10.1126/science.ade3535

timber harvesting in the first year of a project, but deducts the associated leakage evenly over 100 years leading to significant over-crediting at the start of the project.[13] This has led to significant over-crediting in the first decades of many projects. Assessments should also compare the leakage rates used by the protocol with published studies of leakage rates for the commodity and region. The California U.S. Forest offset protocol uses a leakage rate far below rates from published literature.[14] Also, leakage assessments can be complex and often involve significant uncertainty.

Offset protocols should also be evaluated for other potential perverse incentives that increase emissions. Examples of perverse incentives include creating incentives for facilities to increase emissions in order to be paid to decrease them, increasing profits from higher emitting products/activities that reduce some of their emissions but that compete with lower emitting products/activities, and creating disincentives for governments to regulate emissions.[15]

### *4.4 Methods for estimating emissions reductions*

Reviewers should carefully review all methods used to estimate emissions reductions, including emissions factors used and whether they reflect the latest science, and emissions pools that are excluded from emissions accounting.

### *4.5 Durability*

Carbon removals are considered durable if there is a high likelihood that they will remain out of the atmosphere for forty years on-site, in materials created by the project, or through commitments to replace credits. Forty years is chosen because it is a period of time that should be well past peak atmospheric concentrations of greenhouse gases and so would serve the function of "buying time" while also being contractually feasible and enforceable.

### *4.7 Avoiding negative health and social outcomes, especially for marginalized populations*

UC is committed to avoiding procuring offsets from projects that negatively impact people and ecosystems, especially affecting low-income and marginalized populations and communities of color. A critical goal of the review process is determining whether UC can be confident that such negative impacts are not occurring. UC takes a do-no-harm approach and only procures credits from projects we are confident do not cause harm.

For individual projects in the United States that have the potential to impact marginalized communities, the review process should involve search for evidence of local opposition to the

---

[13] Haya, B. (2019). *The California Air Resources Board's U.S. Forest offset protocol underestimates leakage*. University of California, Berkeley.
https://gspp.berkeley.edu/assets/uploads/research/pdf/Policy_Brief-US_Forest_Projects-Leakage-Haya_4.pdf

[14] Haya, B. & Stewart, W. (2019). *Response to comments by the California Air Resources Board on The California Air Resources Board's U.S. Forest offset protocol underestimates leakage*. University of California, Berkeley.
https://gspp.berkeley.edu/assets/uploads/research/pdf/Response_to_comments_by_ARB_on_leakage_under_forest_protocol_2.pdf

[15] Cames, M., Harthan, R. O., Füssler, J., Lazarus, M., Lee, C. M., Erickson, P., & Spalding-Fecher, R. (2016). *How additional is the Clean Development Mechanism?*
https://ec.europa.eu/clima/system/files/2017-04/clean_dev_mechanism_en.pdf (see adiptic acid analysis); Haya, B., Cullenward, D., Strong, A. L., Grubert, E., Heilmayr, R., Sivas, D. A., & Wara, M. (2020). Managing uncertainty in carbon offsets: Insights from California's standardized approach. *Climate Policy*, 1–15.
https://doi.org/10.1080/14693062.2020.1781035; Schneider, L., & Kollmuss, A. (2015). Perverse effects of carbon markets on HFC-23 and SF6 abatement projects in Russia. *Nature Climate Change*, *5*(12), 1061–1063.
https://doi.org/10.1038/nclimate2772; Wara, M. (2014). Measuring the Clean Development Mechanism's Performance and Potential. *UCLA Law Review*, *55*, 1759–1803.

project including in local newspapers. It should also involve conversation or email exchanges with at least one local environmental, social justice organization, or community organization.

Individual international projects that have the potential to impact marginalized communities have a higher bar for do-no-harm assessments, since further distances and cultural difference can make understanding project impacts more challenging. In addition to the review process described just above for domestic projects, UC must also trust the organization carrying out the project through performing due diligence on the organization and/or should hear from a trusted party who knows the local context that the project does not cause harm. At least one internal or external peer reviewer should either be familiar with the project or developer, or talk to at least one person associated with the project or developer. The review process should also involve consultation with academic and gray literature, a web search, and other investigative research as needed to seek criticism and praise of the project.

### *4.8 Scalability*

UC is committed to only supporting offset project types that avoid locking in levels of emissions, technologies, or carbon-intensive practices that are incompatible with deep decarbonization in line with new zero by mid-century.[16] UC is committed to supporting innovation, best-available technologies, and technologies that are a part of a net zero world rather than incrementally better technologies. This assessment can involve reference to sectoral decarbonization pathways assessments if available. Also, drawing from the work of the ICVCM, UC will avoid "a technology or practice that constitutes an inefficient use of a resource, such as biomass, that might be important for climate mitigation."[17]

## 5. Peer review process

All offset credits procured by UC must pass a peer review process as UC's way to ensure credits it purchases meet its offset criteria.

The peer review process is overseen by UC's *Carbon Offsets Peer Review Board*, which serves a similar role as a journal editorial board. Once a project type or project analysis is complete as described above, the peer review committee identifies key quality issues for the specific project or project type that require attention, requests peer reviews from individuals with the expertise needed to assess offset quality for the specific project or project type, facilitates any questions between the peer reviewers and the project type assessors or UC-initiated project developer, requests additional peer reviews as needed, maintains anonymity of the peer reviewers if they wish to remain anonymous, and comes to a final determination as to whether the projects meet UC's quality criteria for offset credit procurement.

Each reviewer shall attest that they do not have a conflict of interest that could prevent the performance of an unbiased review of the project or project type. Examples of a conflict of interest include: having financial or personal stake in offsets from the project or project type being reviewed, having collaborated with an author of a project type assessment or individuals involved in the development of a project under review in the prior three years, or working on the same campus an author of a project type assessment or a project developer (such as for a UC-initiated offset project).

---

[16] This language is taken directly from Part 2 of the draft consultation report of the Integrity Council for the Voluntary Carbon Market ICVCM, which captures our intent well.

[17] See Criterion 11.1, p113 of the draft consultation report of the Integrity Council for the Voluntary Carbon Market ICVCM

Individuals with such conflicts of interest can give an informal review, but two peer reviews without such conflicts of interest are needed.

- This folder has a list of materials project developers should provide for peer review and a basic set of peer review questions for project types and individual projects that will be customized for each review and to the expertise of the specific reviewer