Second Nature

CARBON MARKETS & OFFSETS GUIDANCE

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i. How to Use This Document

This document was developed as a resource for higher education institutions implementing one or more of Second Nature's Climate Leadership Commitments. It outlines the concept of carbon offsets, how offsetting can be used in the context of climate action planning and achieving a climate action claim such as carbon neutrality or net zero, and what constitutes a quality carbon offset project based on the latest science. It is meant to provide considerations for practitioners on how institutions should be thinking about carbon offsets in the context of rigorous climate ambition, and the role of higher education in society. This guidance will also help signatories and practitioners understand the best practices for incorporating carbon offsets into their greenhouse gas mitigation plans while aligning with institution-specific goals. This includes considerations and options for purchasing and producing offsets. This document is the third edition of Second Nature's carbon offsets guidance, setting minimum requirements as well as best practices for the use of traditional as well as innovative offsets to meet Climate Leadership Commitment requirements. This edition was developed in cooperation with Second Nature's Offsets Advisory Council, a group of higher education faculty and sustainability professionals who who first convened in 2022 and have since been meeting to discuss not only offsets best practices, but also the role higher education institutions play in contributing to integrity within carbon markets. Advisory Council participants are listed in the acknowledgements section of this document.

This edition includes important updates to the previous guidance, including sections on environmental justice, participation in compliance markets, case studies of diverse institutional contexts, expanded offset project types summaries and project type level risk evaluations based on the latest science, land management considerations, best practices for land based carbon accounting, and explorations of how institutions can participate in offsetting based on their specific values-based strategy. For those colleges and universities that don't have an offsets strategy, this document provides tips for formulating one, or for making decisions in the absence of broad stakeholder support.

For quick reference, a system of icons has been developed to help the reader quickly identify important material. These icons are as follows:

Best Practice: When you see this icon, the corresponding section refers to the current best practice as of this writing.

Recommended practice: When you see this icon, it means that the corresponding section refers to a practice that is most realistic given current realities in climate action planning. Sometimes, recommended practices and best practices will be the same. Sometimes, recommended practices and minimum practices will be the same, in recognition of the nuance of climate change demands facing colleges and universities.

Minimum Requirement: When you see this icon, the corresponding section refers to the minimum expectation for Second Nature signatories in taking meaningful climate action

Carbon markets are constantly evolving, with new methodologies arising, improvements to existing methodologies, different offset technologies, changing policies, scaling markets, and new organizations playing a role in the offsets ecosystem. Accordingly, this guidance will be a living document, adapted by Second Nature as future advances are made. For the most up-to-date information, campuses are encouraged to consult additional resources, network with peer institutions that utilize carbon offsets via Second Nature's Carbon Offsets Advisory Council, and reach out to Second Nature. To provide insights or suggestions on this guidance, contact mleigh@secondnature.org.

To view the change log for this document, click here.

ii. Second Nature and The Climate Commitments

Second Nature is a 501c3 nonprofit organization committed to accelerating climate action in, and through, higher education. Founded in 1993, the organization has worked with over 4,000 staff and administrators at hundreds of colleges and universities nationwide. Principally, Second Nature facilitates the Climate Leadership Network, a group of over 400 institutions of higher learning that have signed one of Second Nature's Climate Commitments,[1] including the Climate Leadership, Resilience, and Carbon commitments. The Carbon Commitment is focused on reducing greenhouse gas emissions. The Resilience Commitment is focused on building climate adaptation and community capacity to face the realities of a changing climate and resulting extremes. The Climate Leadership commitment integrates the Carbon and Resilience commitments to provide a systems approach to climate change mitigation and adaptation.

Through these commitments, signatory colleges and universities acknowledge the grave impacts of climate change and the unique position of the higher education sector in addressing those impacts. Signatories pledge to dedicate resources and personnel to sustainability efforts, develop a climate action plan, monitor and publicly report greenhouse gas emissions, and take action towards the mitigation of those emissions in alignment with their climate action plan.

[1] Formerly known as the ACUPCC, as well as the President's Climate Commitments.

Campuses also pledge to integrate sustainability and climate action efforts into curricula, workforce development, and research. The Climate Leadership Network serves to assist these signatories in scaling efforts, networking, accessing resources, and accelerating progress toward important sustainability goals.

The Climate Leadership Network also includes affiliate member institutions. These institutions are not signatories of the climate leadership commitments, but nevertheless have dedicated themselves to climate action and therefore bring value and receive benefits from network participation. Affiliate members are encouraged, but not required, to publicly report their greenhouse gas emissions.

Together, affiliate and signatory members of the Climate Leadership Network are advancing bold climate action at the campus, community, and global levels. Through peer exchange and collaboration, these campuses are committing significant resources in the form of research, finance, workforce development, and decarbonization within their own institutional boundaries to advance climate action. Network participation enables these schools to synthesize best practices and benchmark against each other to produce best-in-class performance. From that knowledge and innovation, campuses also work with Second Nature to co-develop guidance and resources such as this document for the higher education sector and beyond.

For more information about the work of Second Nature, the Climate Leadership Network, and the Climate Leadership Commitments, visit www.secondnature.org

Section 1: Foundations of Carbon Offsetting

1.1 Introduction to Carbon Offsets

A carbon offset is a tradable instrument that represents the reduction or removal of one metric ton of carbon dioxide equivalent[2]. Carbon offsets fund projects that reduce greenhouse gasses, ranging from reforestation to renewable energy investments. Offsets can be bought and sold to transfer climate benefits between entities. Many markets around the world have developed to facilitate the purchase and transfer of ownership of offsets, or carbon credits. Carbon offsets are different from RECs.[3]

Offsetting was introduced into the UN climate discussions in order to provide mechanisms for least-cost global GHG abatement, because the cost of reducing one ton of CO2e elsewhere has historically been less expensive at times than mitigating one ton of one's own emissions. The implications of this least-cost conceptual framework are ever changing, and have demonstrated effects on market behavior, supply and demand, project and methodology design, and issues of equity and sovereignty. The complexity of offsets, both conceptually and technically, will be explored in the sections that follow.

1.2 Introduction to Carbon Pricing

Carbon Pricing refers to a number of mechanisms for placing a cost on greenhouse gas emissions. Carbon offsetting represents one of several approaches to carbon pricing. Setting a price for carbon is considered by many economists and other policy experts to be a critical tool in addressing climate change[4]. The fact that markets treat carbon emissions (and other pollution) as "externalities" – meaning the costs of the damage done by those emissions is not accounted for, or "internalized", by the entity that caused the damage – makes energy from fossil fuels artificially cheaper than other energy sources. Internalizing the cost of carbon, through a carbon price on emissions, is seen as a way of incentivizing markets to make more investments in carbon-free technologies. Purchasing offsets is one type of carbon pricing mechanism for an individual college or university to use as a method of setting a price for their own carbon emissions and can help drive carbon reduction on campus as well as in a larger societal context. Other mechanisms of carbon pricing, including those that do not incorporate offset purchases, are covered in more detail below.

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2 CO2 equivalent is a unit of measure that standardizes the climate impact of all greenhouse gasses and expresses them according to the equivalent damage in metric tonnes of CO2. Equivalence is calculated using the global warming potential (GWP) of a greenhouse gas. See https://www.epa.gov/ghgemissions/understanding-global-warming-potentials for details.

3 Whereas a carbon offset represents a metric ton of carbon equivalent greenhouse gas emissions reductions or sequestration, a Renewable Energy Credit (REC) is an instrument representing 1 MwH of electricity to the grid from renewable sources. A REC does not necessarily represent a quantified unit of GHG emissions reduction. Possessing a REC allows individuals or institutions to claim that they use electricity from renewable sources; purchase of RECs can reduce an organization's Scope 2 emissions.

The question carbon pricing asks is: what is an appropriate cost for carbon emissions? Looking at offsets as an example of carbon pricing reveals that currently, the price of an offset is determined solely by market factors – what the buyer is willing to pay. The majority of carbon offsets available to purchase on public exchanges are "voluntary" offsets. This means they represent reductions in carbon emissions undertaken voluntarily by the developers of the offset project; much like signatories of the Commitments have voluntarily agreed to reduce their campus' carbon emissions.

Voluntary participation automatically creates an impact on the price of carbon. If an institution is not required to buy offsets, there may be a limit on their willingness to pay for them. Similarly, if every organization in the economy is not required to become carbon neutral, demand is driven only by those organizations that have voluntarily committed to neutrality, thus affecting the price and supply of offsets. Because the price of offsets is currently determined primarily by market forces, the average cost of a carbon offset is much lower than the costs of the damage done by climate change. This is because the true cost to reorient systems toward the drawdown of atmospheric greenhouse gasses is higher than the cost of business as usual. The social cost of carbon (SCC), which is covered in more detail in the next section, attempts to address this issue by estimating the costs of damages from climate change on things like agricultural productivity, human health, property degradation or loss from increased flood risk, etc. In most cases the social cost of carbon is much higher than the average market price of a voluntary carbon offset.

It is therefore important to consider and determine an appropriate cost of carbon for your individual campus. The cost of carbon then informs planning decisions around on-campus mitigation efforts, purchasing market offsets, and investing directly in projects that will produce offsets and co-benefits. For example, it could be an appropriate strategy to set aside funds equal to the social cost of your campus emissions. Those funds could then be used to purchase market offsets equal to your emissions and still have funds remaining for other sustainability investments such as a Green Revolving Fund, projects that do not have a positive return on investment such as many transit projects, or other projects that have an impact on the climate which is minimal or difficult to measure but have other positive sustainability benefits, like bike shares or community gardens.

Carbon pricing should be thought of as the first step in developing a robust strategy around offsetting because it forces leaders to internalize the cost of carbon emissions and their associated societal damages when making cost-benefit planning decisions. This approach is in line with a true dedication to responsible decarbonization because it places offsetting, and even the achievement of carbon neutrality, into a more holistic decision-making framework than simple market forces allow.

[4] http://www.wri.org/publication/putting-price-carbon

Carbon Pricing is an umbrella concept referring to a suite of instruments that shape market-based responses to the question of valuing emissions damages. Through levies and incentives, carbon pricing is an effort to make climate action the responsibility of those who cause the most impact, or to those who have the power, resources and capacity to avoid that impact. Examples of carbon pricing include not only carbon offsets, but also cap and trade markets, a corporation or institution placing an internal levy on emissions, and carbon proxy pricing. Each of these instruments have specific mechanisms, and specific contexts within which they offer solutions. Sometimes, they will combine to form hybrid solutions. For example, a University may create a carbon tax on Scope 1 emissions by department, and then pool the money to purchase carbon offsets. There are many ways that carbon pricing can be used, at the federal, regional, state, local, and entity level to inform climate action. It is important to remember, however, that even in the absence of an internal carbon pricing strategy, campuses that participate in offset markets are engaging with carbon pricing mechanisms. With this in mind, a deeper understanding of carbon pricing as a whole is recommended in shaping overall campus climate action strategy. The main instruments of carbon pricing are summarized below. The opportunities and drawbacks of each solution are explored in later sections of this guidance, or in separate documents where noted.

Emissions Trading Systems (ETS) are market-based systems wherein emitters can trade units (a unit being a token or permit equivalent to one ton of CO2 equivalent) in order to meet mandated emissions targets. The targets can be set as floors (as in a baseline-and-credit system) or ceilings (as in a cap-and-trade system), and units are exchanged among entities according to the relationship between actual and target emissions.

Baseline and Credit Emissions Trading Systems set a minimum on the emissions allowable by individual regulated entities within the system and then credits or permits are issued to those entities that have reduced their emissions below that minimum target level. These credits or permits can be sold to other entities in the system that have exceeded the baseline emissions level. Outside of a regulated system, baseline and credit is how carbon offsets work. It is listed separately here as an approach that is also used within a mandated (non voluntary) system.

Cap and Trade Systems set a maximum on the total emissions allowable by all the regulated entities in the system combined, and then credits or permits are distributed, either freely or through auctions, equivalent to the allowable emissions. Examples of regulated cap and trade systems are California's Cap and Trade system, and the Regional Greenhouse Gas Initiative employed by several northeastern States. Participation in these markets by institutes of higher education is covered in Section 1.5: Compliance Carbon Markets.

Carbon Offsets are tradable credits from specific climate mitigation projects or activities, each offset representing one ton of carbon dioxide equivalent. Offsets are issued based on adherence to a protocol specific to the project type, and tracked through a dedicated registry. Credits are used by the purchasing entity to offset the impact of unavoidable or otherwise unmitigated emissions. The voluntary carbon market (VCM) sets standards and tracks activities for offsets created and purchased by unmandated entities, from individuals to corporations to colleges and universities. Opportunities, problems, and adjacent topics to the VCM are covered throughout this publication, with more details about VCM structure included in Section 1.4: The Voluntary Carbon Market.

A Carbon Tax defines a specific levy on each ton of greenhouse gas emitted. This is achieved most commonly by taxing the carbon content of a fossil fuel, which is referred to as the fuel's carbon dioxide equivalent or MTCO2e. Examples of a carbon tax include national carbon prices in Canada, Japan, and Australia. Problems with large scale carbon taxing mechanisms surround the difficulty in creating a price high enough to meaningfully reduce emissions without creating too great of a budgetary burden on payers, and the political controversy arising from use of resulting funds.

Internal Carbon Pricing is a tool used internally by campuses or businesses to generate revenue for sustainability initiatives or to inform decision making through a lens that includes the decision's climate impact. Examples of internal carbon pricing include carbon taxes, with funds being either returned to payers relative to the difference between planned and actual emissions, or the funds being pooled to fund sustainability budgets. Another example of internal carbon pricing is a proxy or shadow price on emissions,[5] which doesn't involve money changing hands, but instead adds the cost of carbon into all activity cost analyses in order to reflect the often hidden costs of decisions. Implementing a carbon price requires intentional multi stakeholder planning and strong socialization, and may require new ways of budgeting and allocating emissions data for institutions.[6] For more information, see Second Nature's Internal Carbon Pricing for Higher Education Toolkit.

Second Nature recommends that colleges and universities develop a climate action strategy that includes some type of internal carbon pricing, either as a mechanism to inform climate-positive decision-making or as a mechanism for generating revenue estimates for decarbonization and, if applicable, offset purchases.

1.3 The Social Cost of Carbon

The Social Cost of Carbon (SCC) is an estimate, in dollars, of the total damage from emitting one ton of CO2 into the atmosphere, and as such, it is also an estimate of the value of avoiding emitting one ton of carbon. A figure was initially determined by a former Federal Interagency Working Group (IWG) on the social cost of carbon, and used complex modeling of the impact of climate changes on the economy to determine the figure. Sea level rise, temperature shifts, changes to agriculture, and their ensuing impacts on human health and labor capacity are major components of the models. Research has noted that the models leave out important or recent data[7], fail to include equity considerations, actual mortality rates due to data-backed estimates of temperature rise, and don't account for ocean acidification or biodiversity loss[8]. Another factor that makes the estimate variable is the discount rate applied during calculations. The discount rate is a complicated but important percentage used to adjust the estimated SCC figure according to the value of money over time, and to apply a present day discount on the estimated cost of climate damages for future generations[9]. Because the modeling process is based on assumptions, the discount rate varies, and there are costs unaccounted for, the total SCC will always change, and continue to be highly debated. The forces governing the estimate are not just facing modeling uncertainty, but also political agendas. For example, the concept of a federal social cost of carbon was raised in 1981 during the Reagan administration, developed unevenly across government departments and industries after a court order during the Bush administration, and the first unified federal social cost of carbon was set during the Obama administration, at $43 per ton. It was then reduced by the Trump administration to $3-$5/ton. These changes under the first Trump administration were possible by adjusting the models to assess the impact of carbon emissions on the US alone(versus the globe) and applying a higher discount rate. The Biden administration used an interim metric of $51/ton as the question of whose jurisdiction it is to alter the figure underwent litigation. Meanwhile, the EPA responded to doubts about the figure by implementing recommendations from a National Academy of Sciences study, and releasing the estimates for public comment and peer review. The findings after the EPA's process forwarded an estimate for a more accurate social cost of carbon of $210/ton, using a 2020 dollar year valuation.[10] As of January 2025, the second Trump administration issued a sweeping Executive Order that, among other things, called for the dismantling of the Interagency working group on the social cost of carbon. While it is still unclear what the second Trump administration will ultimately do, the EPA's work remains as the most unified scientific and expert approach to determining the cost. Even with uncertainty at the federal level, states and municipalities continue to consider or mandate carbon pricing or decarbonization compliance fees, maintaining the trend of carbon pricing playing an important role in climate action. Campuses would be wise to take a proactive approach and implement carbon pricing in advance of possible state or municipal mandates in their own locale.

Due to the politicization, complex modeling, and general mercurial nature of the social cost of carbon debate and cost of carbon figure, institutions seeking to use such a metric are left with the decision of which price per ton to use for internal decision making, and why. Second Nature signatories report using a social cost of carbon at their institutions that ranges from the federal rate ($51) to much higher ($200+). The use of higher rates is based on the desire to account for equity and environmental considerations that are known to be excluded from the combined modeling approach of the IWG. Some schools calculate a higher estimate by using the difference between the highest EPA figure and the federal rate ($159).

The University of California system uses a weighted figure based on their work to include equity considerations, grounded in research demonstrating that one dollar is worth more in low-income households than it is in higher income households. As a result of that work, the UC system determined a social cost of carbon of $246/ton in 2020, and ascribed a 1.5% escalation rate, meaning that as of this writing, the UC system multiplies emissions by $261 when weighing the cost-benefit of operational decisions. UC uses their weighted social cost of carbon as a proxy or shadow price only.[11]

Higher per ton prices are generally easier for schools to implement as proxy prices on carbon, whereas schools intending to implement a carbon tax tend to use a lower figure. In addition to using the social cost of carbon as a benchmark for carbon pricing, schools use other approaches, including emissions target consistent pricing, a survey of stakeholders to determine pricing, basing price on the regulatory risk of mandated carbon pricing in the future, current market prices for carbon on the VCM, and basing price on what peer institutions are doing. For each of these approaches, benchmark prices range from roughly $5 to $15 per ton on the low end up to $100+ per ton on the highest end.[12]

Stanford University developed a carbon pricing strategy for offsetting air travel that combines the average price of carbon offsets and the social cost of carbon. The student-led inquiry resulted in a recommendation to begin taxing travel emissions at a rate aligned with the average cost of carbon offsets to allow the purchase of offsets for air travel, and then over time increasing the tax on emissions to align with higher social cost of carbon estimates (medium range $51 and high range $152) as the university nears its net zero target year. Higher prices allow funds to be used for offsets as well as decarbonization projects. This mechanism ties an additional incentive to reduce emissions into the tax itself.[13]

5 Alexander R. Barron, Breanna J. Parker, Susan S. Sayre, Shana S. Weber, Dano J. Weisbord; Carbon pricing approaches for climate decisions in U.S. higher education: Proxy carbon prices for deep decarbonization. Elementa: Science of the Anthropocene 1 January 2020; 8 42. doi: https://doi.org/10.1525/elementa.443

6 O.G. Gorbach, C. Kost, C. Pickett, Review of internal carbon pricing and the development of a decision process for the identification of promising Internal Pricing Methods for an Organisation, Renewable and Sustainable Energy Reviews, Volume 154, 2022, 111745, ISSN 1364-0321, https://doi.org/10.1016/j.rser.2021.111745.

7 Rennert, K., Errickson, F., Prest, B.C. et al. Comprehensive evidence implies a higher social cost of CO2. Nature 610, 687–692 (2022). https://doi.org/10.1038/s41586-022-05224-9

8 https://costofcarbon.org/files/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon.pdf

9 https://www.epa.gov/sites/default/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf

10 https://policyintegrity.org/files/publications/SCCGHG_Overview_Policy_Brief_vF.pdf

Other examples of carbon pricing schemes used by campuses in the Climate Leadership Network include taxes for air travel or departmental emissions, and proxy (shadow) prices for building construction or renovation, or for weighing the cost benefit analysis of converting fleet vehicles to EV or downgrading to smaller internal combustion engines.

Second Nature recommends using the cost of abatement figures for internal carbon pricing that will be used as a levy or tax on emissions as a way to account for hidden costs that the market or policy alone cannot predict. These figures range from $50-$100/MTCO2e. Institutions applying the cost of abatement model for implementing a carbon tax are encouraged to apply an escalator of 3% + the rate of inflation annually.

Best practice use of the Social Cost of Carbon is using weighted figures of $210-$248 forwarded by the EPA[14] that truly reflects the costs of emissions and the value of reductions. This rate is best used when applying an internal proxy price or shadow price for use in decision making. Institutions using the SCC in a proxy price are encouraged to apply an annual escalator to the price of 3% + the rate of inflation.

These recommendations were determined via thorough research and consultation with sector experts.[15] They will be updated as models improve and targets change, and revisited in 2035.

If not using the sector prices recommended by Second Nature, other best practices for determining an internal carbon price are to involve multiple stakeholders (administration, faculty, facilities staff,sustainability staff, and students) in the process, conduct thorough research, employ economic or engineering modeling (if able), and to be fully transparent about the process as it unfolds. If implementing a carbon tax, additional decision making and transparency around use of funds is also imperative. For more detailed information on approaches, see Selecting an Internal Carbon Price for Academic Institutions.

11 University of California Implementation of a Social Cost of Carbon https://docs.google.com/document/d/19Cz04iBqAAzGeL4uKTvMO84uoo7Bwwr4fCD_xymgjyE/edit?usp=sharing

12 https://secondnature.org/wp-content/uploads/SMITH-Selecting-an-Internal-Carbon-Price-for-Academic-Institutions.pdf

13 https://sustainable.stanford.edu/sites/g/files/sbiybj26701/files/media/file/scope_3_student_working_group_air_travel_carbon_charge_program_white_paper_recommendations.pdf

14 https://policyintegrity.org/files/publications/SCCGHG_Overview_Policy_Brief_vF.pdf

15 https://secondnature.org/wp-content/uploads/2025/03/Cost-of-Carbon-for-Commitments3.0.pdf

1.4 The Voluntary Carbon Market

These recommendations were determined via thorough research and consultation with sector experts. They will be updated as models improve and targets change. If not using the sector prices recommended by Second Nature, other best practices for determining an internal carbon price are to involve multiple stakeholders (administration, faculty, facilities staff,sustainability staff, and students) in the process, conduct thorough research, employ economic or engineering modeling (if able), and to be fully transparent about the process as it unfolds. If implementing a carbon tax, additional decision making and transparency around use of funds is also imperative. For more detailed information on approaches, see Selecting an Internal Carbon Price for Academic Institutions.

Project Developers: Those involved in designing, implementing, and operating carbon offset projects. Developers can be individuals, communities, NGOs, public or private businesses, public-private partnerships, or specialized project development firms that manage multiple projects. Anyone can develop and maintain a project, provided it is approved by a registry and validated.

Registries: The non-profit bodies that govern and maintain methodologies or protocols for project types, register and track credits, and thereby create the container that drives carbon offset oversight. For carbon offsets to be considered legitimate, they must be designed according to a registry-approved methodology, verified by an approved third-party, and registered with a serial number so that they can be traced along the full chain of custody.

Validation/Verification Bodies (VVBs): Accredited firms that are approved by registries to validate carbon offset projects and to verify project data to ensure emissions reductions and the subsequent carbon offset instruments associated with those reductions. VVB firms act as consultants serving both project developers and registries.

Buyers: These are the entities seeking to voluntarily offset their emissions through the purchase of carbon credits. Platforms exist to serve a diverse buyers market, so buyers can range from corporations seeking a portfolio of offsets or a massive bulk purchase, to individuals looking to shop for boutique offsets to match their values.

Alongside these players, a vast array of consultants or adjacent players also make the VCM what it is, from brokers who work to connect developers to buyers, to tech firms working on advancing carbon offset measuring, monitoring, reporting and verification (MMRV), to businesses involved with rating carbon offset quality.

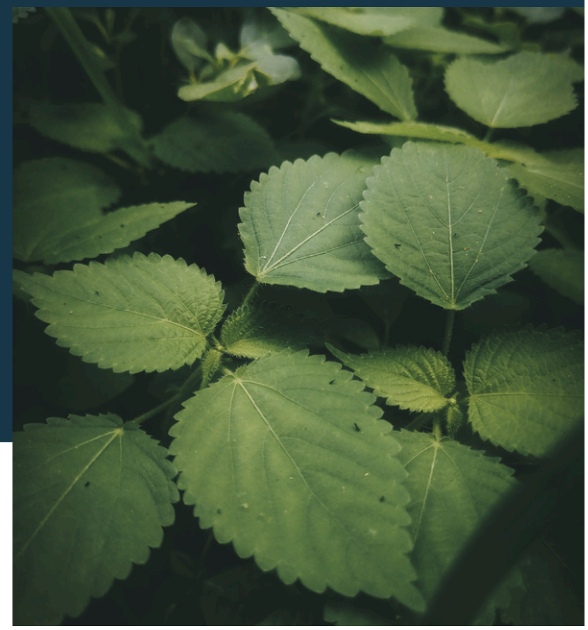
Since the beginning of offset conversations in the 1980s to today, the VCM has seen huge and varied changes and exponential growth. As climate disruption worsens, there is a widening buyers market for voluntary carbon offsets. Alongside this rising demand, there is a limited but growing supply of offsets, and capacity issues at the registry and verification level. These forces combined lead to huge spending expectations within the VCM space over the next decade.

Despite the burgeoning concept of carbon offsets, the VCM has had a rocky beginning, and might be described currently as an awkward adolescent. Uncertainties as to the soundness of emissions reductions claims, greenwashing, and lack of transparency are among many of the problems that have plagued the nascent market. While market players are collectively interested in solving problems and improving market integrity, the VCM remains a complicated and controversial space to engage with, even as pressure to decrease GHG emissions grows. Further, all players are incentivized to continue creating, verifying, buying, and selling offsets, even faster than greater transparency and integrity can be built. This inherent tension causes some campuses to choose not to engage for numerous reasons. The VCM has staunch critics from many academic perspectives. However, many higher education institutions cannot meet sustainability goals without carbon offsets, or see promise in the concept, and therefore seek to participate in the best way possible while potentially even contributing to market improvement.

Offsets or credits purchased on the VCM are eligible for campuses to count against their emissions. They are not eligible for use in any mandated carbon tax programs, unless explicitly approved by those regulated markets to meet compliance requirements. Once offsets are purchased and applied to a campus emissions balance sheet, they must be retired so that they are not claimed by multiple players.

1.5 Compliance Carbon Markets

Alongside the VCM there exist regulated carbon markets, meaning markets wherein entities participate because they are required to do so by local, state, or federal law. Federally regulated carbon markets exist outside of the US, but in the US, state regulation is the highest level, as of this writing. In the United States, compliance markets include California's Compliance Carbon Market and the Regional Greenhouse Gas Initiative.



California's Compliance Market is a cap and trade market governed by the California Air Resources Board (CARB; which is also used by many as an acronym for the market itself). Regulated entities include industries and institutions emitting over 25,000 metric tons carbon dioxide equivalent (MTCo2e) per year in the state of California [16] . The Air Resources Board sets a cap on overall emissions for all entities combined, based on state-wide emissions reduction targets. The cap is designed to decrease annually, and entities must purchase allowances or permits equal to their total emissions. With a pool of permits decreasing annually, and the mandate to report emissions publicly, the idea is that entities will be forced to cut emissions at a steady rate. In addition to being required to purchase permits equal to their emissions, regulated entities are also permitted to purchase permits and bank them. Banking the permits (with no time limit on banking) allows the entities to use banked permits at a later date in order to comply with program requirements, or they may sell unused banked permits to other entities. In addition to allowances, there are programs and projects, such as California's forest offsets program, that produce carbon offsets that are eligible for cap and trade compliance. The market sets limits on how many offsets can be used by a single entity to meet the mandate, and that limit declines annually, so regulated entities may use a combination of allowances and offsets to maintain compliance.

The Regional Greenhouse Gas Initiative (RGGI) is also a cap and trade market, but it governs power plants in twelve eastern states. It is a collaborative market, so the states regulate it together, and determine together the collective cap on emissions. Each state is allocated allowances equal to its share of emissions, and power plants 25 megawatts or greater must purchase allowances via quarterly auctions that are equal to their emissions in order to comply[17]. Similarly to CARB, states also bank and trade allowances via secondary markets.

[16] https://www.law.berkeley.edu/wp-content/uploads/2019/12/Fact-Sheet-Cap-and-Trade.pdf

[17] https://www.rggi.org/sites/default/files/Uploads/Fact%20Sheets/RGGI_101_Factsheet.pdf

Some campuses participate in compliance markets because they are required to do so, and as such must remain institutionally agnostic as to their endorsement of the market's efficacy. Other campuses voluntarily participate in compliance markets, which is possible because the auctions are open to non-regulated entities, and there are also private companies that serve to assist those who want to voluntarily participate in the compliance space. As for uncertainties with compliance markets compared to the VCM, much research has scrutinized the compliance markets as being oversupplied with allowances, and having lax oversight on the banking of permits such that even if the annual cap is adjusted appropriately, the effect of banking still contributes to oversupply in the market. This matters because if the total number of un-retired allowances in existence exceeds the emissions allowable, then there isn't a true incentive to slash emissions. Market proponents argue that the price signals of the market are stable, which indicates demand and therefore functionality. They also maintain that because the proceeds from permit sales are funneled to regional energy efficiency projects and frontline communities, the financial boost from compliance markets has more positive short and long term impact than carbon finance from the VCM. But critics argue that price is not the true and only signal of whether the markets are doing their job to curb emissions. For example, in the 2022 Annual Report of the Independent Emissions Market Advisory Committee (IEMAC), it was reported that the total number of available and banked allowances as of 2022 exceeded the number of emissions reductions expected from the program over the next decade[18]. This data suggests that a permit isn't actually equivalent to one ton of MTCO2e, especially if it is not retired in the same year. Compliance market critics state that RGGI incorporates tighter oversight compared to CARB on the relationship between the annual cap and the number of permits banked in each state, however oversupply remains a concern. These issues compound to produce doubts that the biggest polluters are just polluting more, and because these entities are often located in or adjacent to environmental justice communities, critics further argue that the damage outweighs the benefit of the permit proceeds.

Campus participation in compliance markets or the voluntary market remains equally fraught. Neither compliance nor voluntary schemes can be considered a purer approach to offsetting, and campuses are urged to engage deeply with not only the intentions of the particular program but also the impacts of its mechanisms. Because of the regulated nature of compliance markets, participants may well have fewer options for deep engagement or flexible choice according to values than they do when considering voluntary offsets. In general, Second Nature cautions campuses not to assume that compliance markets are a surer bet of guaranteed emissions reductions than voluntary ones. Certainly, if participating with a scheme that purchases permits on a campus' behalf and does not retire those permits, be aware that these permits are likely not a true emissions reduction.

[18] https://calepa.ca.gov/wp-content/uploads/2023/02/2022-ANNUAL-REPORT-OF-THE-INDEPENDENT-EMISSIONS-MARKET-ADVISORY-COMMITTEE-2.pdf

2.1 A Closer Look at Carbon Offsets

Actual internal emissions reductions are the first priority of colleges and universities committed to reducing their carbon footprint. For residual emissions that cannot be reduced or eliminated, offsets may be utilized to meet carbon neutrality or net zero claims.

Offset projects reduce GHG emissions outside of an entity's boundary, and thereby produce credits that can be purchased by that entity to meet its own targets for reducing GHG emissions within its boundary. Thus, offsetting is based on the premise that reducing or avoiding one ton of carbon dioxide equivalent (CO2e) by financially supporting an activity elsewhere is equivalent to reducing or avoiding one ton of CO2e in one's own activities. This premise is backed by science showing that greenhouse gasses are readily dispersed around the globe once they enter the atmosphere, and it is the global cumulative impact that is of concern when discussing global warming[19].

While greenhouse gas dispersal is geographically agnostic, making the concept of offsetting scientifically legitimate, campuses are advised to remain aware of the quality of the specific offsets they are considering, which is often geographically relevant based on the local impacts of the projects that they are considering supporting. Subsequent sections of this guidance deal with these issues directly.

The bulk of carbon offsets are generated via offset projects, and offset projects are governed by offset protocols. Offset projects vary greatly, from tree planting to adding biochar or minerals to soil to enhance weathering, and from capturing and storing CO2 from the air to cultivating seaweed to trap atmospheric carbon. Because projects vary so widely, the offsets sector is divided into sub-sectors, and sub-sectors are governed by a range of methodologies for ensuring the offsets resulting from each project type are legitimate. Offsets developed according to these methodologies are then verified, and then traded or sold within market-based systems.

Alternative markets also emerge parallel to and within the VCM, because many offset projects are smaller in scale, and do not produce enough finance to justify the cost of the validation and verification associated with the traditional VCM. Other reasons for unverified offsets or alternatively verified offsets might be because there isn't a widely approved methodology or an appropriate methodology for the technology in question, employed at the scale of the project. Alternative markets may be blockchain based, or governed by regional or sector-specific standards. These markets are not accepted by all greenhouse gas reporting frameworks, and while carbon offset registries and players in the VCM have expressed openness to the utility of these approaches, block chain and other alternative approaches to offset verification and tracking are not widely recognized.

[19] https://climate.nasa.gov/vital-signs/carbon-dioxide/?intent=121

As such, alternative offset verification schemes are not discussed specifically in this publication, except for peer-verified offsets developed by and for higher education (see Section 3.4).

2.2 Common Problems with Carbon Offsets

The foundational concept of carbon offsets faces significant criticism. Many argue that given the magnitude of the challenge that is addressing global climate disruption, the only goal should be for every organization to dramatically reduce and eventually eliminate their direct GHG emissions, and that allowing organizations to “buy their way out” of having to reduce their own emissions only perpetuates current emissions levels and even continued growth in emissions levels. Similar arguments also assert that offsets disincentivize local and regional businesses to invest in healthy regional and local environments by allowing them to invest in the improvement of environments elsewhere. Other conceptual criticisms of carbon offsets include arguments that offsets commodify natural processes in a way that perpetuates the climate crisis, with little hope of creating positive change according to a new paradigm. Additionally, the purchase of offset credits by U.S. entities comes with intrinsic questions pertaining to equity. As one example, the average U.S. citizen is responsible for 10 times as many emissions as the average global citizen. The trend in offset markets to date, of wealthier Global North nations buying offsets from mitigation projects in Global South nations to neutralize emissions tends to concretize the harmful legacy of perception that says richer nations have an inherent right to produce more per capita emissions than poorer nations. And, while keeping temperature rise below 1.5C becomes a more urgent and demanding global imperative, Global South nations demand the right to build infrastructure that improves economy and quality of life for their own nation and its citizens, meaning that the financial incentive to develop sustainably must far exceed that of voluntary carbon finance. Section 2.4 deals with the equity considerations of carbon offsets in more detail.

In addition to conceptual criticism, carbon offsets also face problems with credibility at both the protocol and the project level. These problems are often mentioned in the market ecosystem and have their own lexicon, summarized below:

Durability, Risk of Reversal, or Permanence: Issues of durability or permanence relate to how long the carbon equivalent will be sequestered. For example, forest projects have higher durability risk/ risk of reversal and lower permanence because forests face fire risks, especially as climate impacts worsen. Forest fires destroy trees, thereby releasing their stored carbon into the atmosphere and reversing the project’s carbon gains. This doesn’t make forest projects unimportant, but it acknowledges one risk factor related to forest projects. Geological sequestration projects have a lower durability risk/ lower risk of reversal, as this is sometimes called, because by design they will lock carbon into geologic formations permanently.

Additionality: Additionality speaks to whether the carbon avoidance or removal would have happened under business as usual circumstances. A series of tests are devised for projects to determine this, and if it is deemed that the project would have happened under business as usual, it is considered non-additional, or it may be said to have a higher additionality risk. For example, grid-tied renewable energy projects, specifically in developed countries, have increased risk of being non-additional, because renewable energy has become so much cheaper, may even be mandated, or is more likely to be common practice compared to when the carbon offset market started. Additionality tests consider environmental and financial aspects, and the best combination of tests depends on the project type. An explanation of the various additionality tests carbon offset projects might be subject to can be found in Section 2.5 Principles of High Quality Carbon Offsets.

Over-crediting: Over crediting refers to an overestimation of the greenhouse gas reductions attributable to the project, and therefore the over issuance of credits. This leads to the trading of more credits than actual GHG reductions from the project, meaning that all credits from that project cannot be considered real reductions. For example, many cookstoves projects have been found to be commonly over-crediting[20] and registries are now working to fix the methodologies for these errors.

Leakage: Leakage refers to whether further emissions will occur outside of the project's boundary as a result of the project itself. An example of this would be the conservation of a forest in an area with a strong timber market leading to more logging in surrounding forests to make up for the timber lost from the project boundary's protected area. To design with this risk in mind, projects are required to determine a leakage factor based on market, environmental, behavioral or other measures, and then typically develop a buffer pool of credits. Buffer pools are also used to safeguard against project reversals.

Double-counting: Double counting happens when more than one emitting entity claims the GHG reduction of one offset. This can happen if offsets aren't well tracked or their custody agreements aren't enforced by mutual agreements or contracts. Double counting is also a risk as the market becomes more international via article 6 of the Paris Agreement. As a result of the developments in international offset trading, countries are having to create governance and transparency around which mitigation measures are being counted toward their nationally determined contributions to the climate agreements, and which mitigation measures are available to trade as offsets in the voluntary markets.

Perverse Incentives: Perverse Incentives relate to whether there were other motivations to produce the mitigation project that either prove disingenuous intent or negate the need for carbon finance. An example might be a company or sector-wide incentive to do the mitigation work in question, especially if the cost of mitigation is completely covered by the incentive provided, and no carbon offset finance is needed to produce the climate benefit. The issue of perverse incentives overlaps with additionality but is still distinctive to include discrete situations of corruption where carbon offset projects have been initiated simply to fuel the production or manufacturing of more climate harm, or when more climate harm is caused just to take advantage of the finance one can produce from developing more carbon offset projects. To read about an example of this see the Industrial Gas project type discussion in Section 2.7: Types of Carbon Offset Projects.

[20] Gill-Wiehl, A., Kammen, D.M. & Haya, B.K. Pervasive over-crediting from cookstove offset methodologies. Nat Sustain 7, 191–202 (2024). https://doi.org/10.1038/s41893-023-01259-6

Due to these patterned problems in offset accounting and integrity, scrutiny within each offsets subsector is ongoing, and revisions to standard methodology and project design are constant. Due to the technical nature of how offsets are created and measured, higher education has an important role to play, through research and workforce development, in the evolution of carbon offsets as quality instruments for climate mitigation. More specific information related to the problems and opportunities with specific offset project types, see Section 2.7: Types of Carbon Offset Projects. For more details on characteristics of offset quality, see section 2.5: Principles of High Quality Carbon Offsets.

2.3 Benefits of Carbon Offsets

On the other side of these arguments, there are benefits to carbon offsets. Conceptual proponents maintain that nature is already highly commodified, but the incentive is only for extraction of natural resources. Market-based solutions to climate change such as offsets do indeed expand on the concept of commodification, however they offer a means by which to incentivize stewardship, instead of extraction, of natural resources. The financial incentive provided by offsets (carbon finance) can make climate mitigation projects happen around the globe that would not otherwise be possible. The prospect of carbon finance is spurring innovation in the way humans think about and manage systems for climate impact. Further, carbon offset activities can often reduce more carbon per dollar in the short run than more expensive internal emissions-reduction activities, which is why offsetting is a useful tool for institutions that don't have sufficient financial resources to achieve their mitigation goals in the more immediate time frame. Offsets may also present less of a political or technical barrier than onsite emission reduction projects in some cases. From a global perspective, some argue that offsets are one of many critical mechanisms necessary to achieve an 80% or more reduction in global emissions by 2050. As of this writing, no business or organization in the world has completely balanced their carbon footprint without the use of carbon offsets.

The carbon management hierarchy stresses the priority of carrying-out internal GHG mitigation strategies first, or at least supporting them with the most resources. Internal strategies include avoiding new emissions, reducing existing emissions, and replacing sources of emissions. In this context, offsets receive the least amount of support as a mitigation strategy, and as a result, will often come last or serve as a short-term mechanism only – to buy an institution more time while more complicated on-site mitigation strategies are undertaken. Signatory institutions may choose to use them to meet self-imposed targets or achieve carbon neutrality as soon as possible. Each year, as further internal reductions are made, fewer annual offset purchases will be needed to maintain climate neutrality or a decreasing emissions profile on the way to neutrality.

Even though offsets are potentially useful for reducing global GHG emissions, not all offsets are created equal. Some offsets represent real emissions reductions with corollary social benefits, whereas others do not.

The most responsible framework for considering offsets is the carbon management hierarchy. All existing criticisms and defenses of carbon offsets are important to the conversation and should have bearing on each institution's development of their specific offset strategy.

2.4 Equity Considerations of Carbon Offsets

Equity and the Voluntary Carbon Market

Equity is of huge importance when considering engagement with carbon offsets. Buyers on the voluntary market should note that the majority of carbon offsets available come from projects based in the Global South, and the offsets from these projects are mostly purchased by entities in the Global North. Because Global North countries are higher emitters of greenhouse gas, this dynamic within the offset market perpetuates the imbalance in addressing emissions at the source. Further, offset projects in the Global South that are managed by development companies in the Global North deserve additional scrutiny, and information may not be publicly available as to whether these companies have used coercion, violence, or manipulation to develop projects. For example, several analyses of reforestation projects have shown that developers have unjustly acquired or managed land for offset projects[21], displacing indigenous communities from forests they depend on for livelihood[22], and/or regulating the use of commonly held lands in a way that conflicts with the cultural and ecological norms of local communities[23]. Similarly, hydropower projects have been criticized for displacing native people during project citing, in addition to the disastrous impacts on aquatic and terrestrial ecosystems[24]. Despite concentrated research on the equity concerns of certain project types, other project types and specific projects remain unexamined with regard to equity impacts, leaving more responsibility with offset buyers to deeply vet projects with which they are considering investment. The EJ Atlas is one tool that has emerged to assist in crowdsourcing information about the environmental justice issues associated with specific projects worldwide[25].

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21 https://www.oaklandinstitute.org/sites/oaklandinstitute.org/files/Report_DarkerSideofGreen_hirez.pdf

22 Kristen Lyons, Peter Westoby, Carbon colonialism and the new land grab: Plantation forestry in Uganda and its livelihood impacts, Journal of Rural Studies, Volume 36,2014, Pages 13-21, ISSN 0743-0167, https://doi.org/10.1016/j.jrurstud.2014.06.002. (https://www.sciencedirect.com/science/article/pii/S0743016714000692)

23 Lyons, K, Richards, C, Westoby, P, The Darker Side of Green: Plantatio Forestry and Carbon Violence in Uganda, The Oakland Institute (2014) https://www.oaklandinstitute.org/sites/oaklandinstitute.org/files/Report_DarkerSideofGreen_hirez.pdf

24 https://ejatlas.org/conflict/akosombo-hydroelectric-project-ghana

25 https://ejatlas.org/

Alongside these on-the-ground equity concerns, controversy has also arisen because the rights to offsets from Global South projects developed by Global North entities ultimately belong to the foreign, Global North developers, and the offsets, or carbon "assets" from the projects, are thereby extracted from their country and community of origin. Critics emphasize that this pattern is a fraught continuation of the legacy of Global North extraction from Global South natural resources, and as such have termed the activity "carbon colonialism." Project developers argue that the carbon asset is their return on investment after financing the project implementation, and assert that project activities improve conditions in local communities, but there is a lack of transparency related to these claims, since they come from the developers themselves, rather than the community members impacted. Some governments are stepping in to take ownership of carbon assets that are developed within their territories, partly for reasons of natural resource sovereignty, and partly because of recent authorizations via Article 6 of The Paris Agreement that require corresponding adjustments to countries' nationally determined commitments when they trade or sell offsets internationally[26]. While such moves will indeed shift power within the market ecosystem, they may not necessarily improve equity outcomes for people living directly adjacent to offset project boundaries.

Because of the nature of the voluntary market, which tends to use carbon "tunnel vision" – focusing on tons of carbon rather than all the other good and bad things that go with carbon removal – international projects are more likely to be guilty of unjust design, governance, and implementation. Separation between buyer and project exacerbates these issues when even the most integrity-concerned buyer lacks proximity or relationship to the true impacts of the project. Few entities act as communicators of project results other than those who gain from the project's successful offset production. However, this does not mean that equitable and relational international offset projects are impossible for educational institutions. Second Nature signatories do participate in international projects where relationships are strong - such as international communities where an institution supports study abroad programs or research. This type of interaction may bode better oversight.

In general, domestic projects, and further, regional projects that campuses can engage with more relationally and critically tend to be a better bet. That being said, because of skewed power structures that also exist domestically, US projects are equally prone to carbon tunnel vision, and campus leaders are advised to use the same equity lens in vetting domestic carbon offsetting projects as they would in considering international engagement.

As a result of these findings, carbon offset registries within the voluntary market have adopted regulations requiring projects to certify that they do not harm communities, and to involve local stakeholders in project development. Projects are also required to describe their co-benefits to local people, including but not limited to employment opportunities, improved air or water quality, and increased access to resources. It bears noting that the attestations of this type that

[26] https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_Article_6_Explainer_260523.pdf

are publicly available will be made by the project developer, and not the communities impacted by the projects themselves. And, research shows that these measures aren't rigorous enough or measurable enough to produce accountability, are often treated as voluntary, and that VVBs have accepted measures of compliance that are blatantly ineffective and culturally inappropriate, such as accepting email communications with local stakeholders in areas with low grid connectivity and internet access[27].

Several add-on certification schemes are also available to projects from third-party organizations, such as SOCIALCARBON and The Climate Community and Biodiversity Alliance. These services certify project co-benefits to provide an additional layer of transparency with regard to equity that standard market verification does not include. Still, it can be difficult for buyers to discern the equity considerations of a project even after standard verification, and even in the presence of additional social and environmental certifications. Second Nature is honored to be working with the University of California's Center for Climate Justice to support the development of The Climate Justice Standard[28] for carbon offsets. This partnership is contained in the Second Nature Offsets Lab.

In some cases, more accountability and transparency is being built at the project developer level, and awareness of equity issues in the carbon offset space is contributing to a new wave of holistic project development. For example, Yale University reported on a forest conservation project in Tanzania that was set up in cooperation with and with co-design input from indigenous Hadza communities[29], and payments for carbon offsets are being used to directly pay Hadza community members to implement the project and train younger generations to carry on the work. While the project has enjoyed notable success for its respect of indigenous knowledge and the participation of Hadza communities in mutual benefit, forest conservation projects (part of the REDD+ category of carbon offset projects) have faced scrutiny over offset quality and durability. It remains to be seen whether projects can balance high social benefits and guaranteed reductions. In this way, campus leaders concerned with carefully choosing projects are often asked to choose between real emissions reductions and equitable community care.

Equity concerns, along with offset quality concerns, make the ability to vet projects a complicated but critical criteria in campus project selection. Second Nature recommends that campuses explore domestic projects with lower likelihoods of carbon colonialism, or choose projects with which the campus has direct relationships to the geographic location and the community in which the project is located. The more a campus can engage with domestic and international offset project communities, the more campuses can ensure equitable and quality offsets, as well as high co-benefits and no net harm. The more a campus must rely on standard verification, third party audits, or add-on certifications to discern equitable project outcomes, the higher the likelihood for unintended negative community impacts.

Case Study:

Kawsay Ñampi (Way of Life) Conservation and Climate Mitigation Project - UC Merced.

Kawsay Ñampi, which means "way of life" in the Kichwa language, is an innovative climate change mitigation project based on climate justice principles. It is led by the Kichwa People of Sarayaku (Ecuador) and co-developed with Tracey Osborne, a University of California-Merced professor and Director of the UC Center for Climate Justice, along with her research team.

The Kawsay Ñampi project protects the Sarayaku territory (144,800 hectares), promotes traditional practices of environmental management and territorial governance, and emphasizes care for the territory as a conservation area and Living Forest—what in Kichwa is called Kawsak Sacha. The project is developed around the Sarayaku's Living Forest proposal, which recognizes the forest as sacred, inhabited by beings seen and unseen that protect the forest.[30] [31] These forests are also zones that must be free from oil, mining and other forms of extraction.

The project aims to implement a new model of value and well-being through a Life Plan that details Sarayaku's vision of a harmonious life for people and environment. The Life Plan includes a comprehensive environmental conservation plan for sustainable forest use and territorial defense from extractive forest activities.The Sarayaku territory has been threatened since large oil reserves were discovered on their land several decades ago. Oil development within forests causes severe harm to local communities and the ecosystems upon which they depend. In addition, it requires the building of roads, opening the area to other forms of extraction such as logging and large-scale palm oil production (Finer et al., 2015, Mena et al., 2017). At present, there are five oil blocks within or intersecting Sarayaku's territory that are still being considered for exploitation by the Ecuadorian State and private oil companies.

The Kawsay Ñampi project will generate hundreds of thousands of tCO_2 over the first 5 years and, although not part of the carbon calculation, will keep over 32.4 million tCO_2 underground associated with the oil blocks on Sarayaku territory. The project also raises the bar on nature-based carbon projects through attention to and implementation of climate justice principles, which to date has been missing from initiatives that aim to bring greater quality and integrity to carbon markets. This project will inform and be the first to be certified by the Climate Justice Standard, and offer units through the climate contribution model.

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[27] https://gspp.berkeley.edu/assets/uploads/page/Quality-Assessment-of-REDD+-Carbon-Crediting-EXECUTIVE-SUMMARY.pdf

[28] https://drive.google.com/file/d/16LtMbgHZlrXh1OZpg3gmO_kMO6OdzzGD/view?usp=sharing

[29] https://www.planvivo.org/news/scaling-up-nature-based-solutions-in-tanzania#:~:text=The%20carbon%20project%20enhances%20the,indigenous%20rights%20and%20protects%20biodiversity

[30] Gualinga, P., 2019. Kawsak Sacha. Pluriverse: A post-development dictionary, pp.223–226

[31] Santi, D. and Santos, M.G., 2019. Kawsak Sacha-Selva viviente: perspectivas runa sobre conservación. Vivência: revista de antropologia, 1(53).

At the core of the Kawsay Ñampi project is a community-centric approach. The Sarayaku people, with their profound connection to their land, lead the project, ensuring that their knowledge, culture, and priorities guide key decisions. This project goes beyond Free Prior and Informed Consent (FPIC) and illustrates how conservation efforts can thrive when Indigenous Peoples and Local Communities (IPLCs) are in the lead. It's a multi-dimensional project where carbon represents just one aspect of many goals. The project actively contributes to preserving the Amazon's rich biodiversity, protecting countless species while maintaining the ecological balance crucial for the forest's resilience against climate change. Social benefits are equally important. Kawsay Ñampi empowers the Sarayaku people, enhancing their livelihoods while respecting and reinforcing their cultural heritage and autonomy. The project will support electrification of Sarayaku's communities with solar energy, educational initiatives, and healthcare improvements, aligning environmental stewardship with community well-being.

Kawsay Ñampi also demonstrates high environmental integrity, recognizing the vital conservation role of IPLCs. By incorporating a broader definition of additionality, the approach not only recognizes the Sarayaku people's long-term stewardship and sustainable management of the forest but also their active resistance against extractive activities that threaten their territory. The project's emphasis on capacity building enhances the Sarayaku's ability to effectively monitor their territory, leading to more durable and successful conservation outcomes.In this way, the project meets the drivers of deforestation head-on, challenging threats like illegal logging, mining, and unsustainable agricultural practices. By securing land rights and enhancing local governance, the project strengthens Sarayaku's capacity to protect and manage their forest, demonstrating a scalable model for conservation that addresses the root causes of deforestation.

The project also aligns with the principle of equitable economic distribution, ensuring that the financial benefits from conservation efforts are fairly shared with the Sarayaku people. Project revenue will prioritize supporting Sarayaku's Life Plan, funding initiatives they identify as important for the long-term well-being of their communities.

Lastly, the Kawsay Ñampi project exemplifies the principle of transparent governance by establishing a clear framework where accountability and community involvement are central. An independent audit by a verification team has already been conducted, and periodic verifications will continue to assess compliance with the Climate Justice Standard. Furthermore, members of Sarayaku are deeply involved in decision-making processes through regular communication and feedback. This approach not only upholds the principle of transparent governance but also ensures that the project remains aligned with the Sarayaku people's values and the overarching goals of the CJ Standard.

The success of the Kawsay Ñampi project offers a blueprint for scaling the Climate Justice Standard across the Amazon, the Americas, and around the world. It demonstrates how climate justice can amplify the impact of environmental initiatives and represents a model that can be adapted and replicated in diverse contexts. It's a clear example of how climate action can be a path toward social justice, ecological preservation, and community empowerment, paving the way for a future where conservation is synonymous with equity and respect for Indigenous and local community wisdom and leadership.

Equity and Carbon Compliance Markets

In compliance carbon markets, equity concerns also abound. In California's Cap and Trade market, environmental justice organizations have long argued that the biggest polluters are located in environmental justice communities, and that the cap on emissions is doing nothing to curb the toxicity of living in these vulnerable locations. Research has shown[32] that the biggest regulated entities may purchase permits but not actually decrease emissions, sometimes even allowing them to pollute more. These pollutants and their co-pollutants disproportionately impact communities of color, communities of lesser education, and otherwise under-resourced communities[33]. The Independent Emissions Market Advisory Committee in 2022 noted that the number of banked or "saved" permits in the California market exceeds the total number of expected emissions reductions as a result of the cap and trade program over the next decade[34], meaning that even as the cap on emissions declines, there are still too many permits available through state auctions and secondary markets combined to confidently tie each permit to a real emissions reduction. Environmental justice communities will bear the brunt of this continued pollution. The California Air Resources Board does mandate that a minimum of 35% of the proceeds from the sale of permits be dedicated to priority populations in environmental justice communities.

Similarly, The Regional Greenhouse Gas Initiative Cap and Trade program in the northeastern US faces demands from environmental justice organizations in several northeastern states for more investment from permit proceeds into frontline and under-resourced communities, as well as tighter policies and a more rigorous cap on emissions. This came after a report revealed disproportionate pollution and the presence of co-pollutants in environmental justice communities[35]. Also, research gaps have been noted in the analysis of RGGI's impact on environmental justice communities[36]. While some campuses are regulated entities and may not be able to opt out of compliance markets, other campuses participate in compliance programs voluntarily, through the direct purchase of permits, or through brokers. More information about Second Nature's recommendations for these campuses can be found in section 2.6: Compliance Carbon Markets.

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32 https://www.frontiersin.org/articles/10.3389/fenvs.2020.593014/full

33 https://dornsife.usc.edu/assets/sites/1411/docs/CAP_and_TRADE_Updated_2020_v02152022_FINAL.pdf

34 https://calepa.ca.gov/wp-content/uploads/sites/6/2023/02/2022-ANNUAL-REPORT-OF-THE-INDEPENDENT-EMISSIONS-MARKET-ADVISORY-COMMITTEE-2.pdf

35 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0271026

36 Ibid.

2.5 Principles of High Quality Carbon Offsets

High quality carbon offsets are characterized by a number of different factors, many of which relate to the ability to measure and track the ton for ton greenhouse gas reduction represented by the offset in question. In general, offset markets and their players strive to prove or improve the market with regard to these more quantitative markers of offset integrity, and indeed, the phrase "offset quality" has historically referred only to the characteristics of assured GHG reductions associated with carbon offsets, with every other quality outcome referred to as "co-benefits." However, it is in the interest of the signatories of Second Nature's Climate Leadership Commitments to ensure that investments in carbon offsets not only result in real GHG reductions, but also that carbon offset projects add value to their education, research, and service missions while helping to create a healthy, just, and sustainable society. Therefore, Second Nature urges campuses to weigh markers of certainty around both GHG reductions and co-benefits when determining overall offset quality. Second Nature also acknowledges that all principles of quality often cannot carry equal weight in decision making, and the intersection of budget, administrative mandate, and institutional mission will help shape this checklist as it applies to offset purchasing decisions. It is advisable for those institutions that do not yet have an offset strategy to use this list of principles in the development of their strategy.

Quality standards for the voluntary market are in the process of undergoing multi-stakeholder evaluation. The Integrity Council for the Voluntary Carbon Market (ICVCM) has published its Core Carbon Principles (CCPs)[37], which integrate governance, quantitative emissions impact, and sustainable development. Second Nature integrates the CCPs with additional specificity around co-benefit and equity considerations to formulate recommendations for what constitutes a high quality carbon credit.

Some Second Nature members may remember the PAVER acronym (Permanent, Additional, Verifiable, Enforceable, and Real) for determining carbon offset quality. Below, we integrate PAVER with the Core Carbon Principles to streamline offset quality vocabulary, and add additional insight on each principle.

The Core Carbon Principles:

- Effective governance
- Tracking
- Transparency
- Robust independent third-party validation and verification
- Additionality
- Permanence
- Robust quantification of emissions reductions and removals
- No double counting
- Sustainable Development benefits and safeguards
- Contribution toward net zero transition

Effective Governance

CCP definition: The carbon-crediting program shall have effective program governance to ensure transparency, accountability, continuous improvement and the overall quality of carbon credits.

Effective Governance maps to the PAVER standard “enforceable”, though enforceability is not by itself indicative of effective governance. For example, an offset can be enforceable by being backed up by enforceable contracts. And as part of effective governance, it is important that when signatories decide on an offset strategy and process, they also have the appropriate enforcement framework as leverage to ensure their investments meet all the agreed-upon criteria. Much of this can be accomplished through contract types, and many offset registries maintain the transparency of enforceability for offsets that they track. However, enforceability doesn’t encompass deep accountability in terms of important qualitative project metrics such as equity, and doesn’t guarantee continuous improvement of policies and processes to ensure ongoing quality assurance. Effective Governance is therefore a needed update to describe the overall environment that lends to quality in offset generation, and is an important update to quality standards. In the voluntary market space, effective governance has been and continues to be a widespread problem, simply due to the fact that it is a voluntary space where multiple players, each gaining incentives from the verification and sale of offsets, serve as the oversight. Collaboration between these players to agree upon standards and best practices is vital to prevent what many see as an inevitable “race to the bottom” created by the voluntary market space.

Tracking

CCP definition: The carbon-crediting program shall operate or make use of a registry to uniquely identify, record and track mitigation activities and carbon credits issued to ensure credits can be identified securely and unambiguously.

This CCP maps to an aspect of the PAVER standard of “verifiable” and “enforceable”. If projects are verifiable it also means that they are or will be registered, meaning they are associated with a well-regarded offset registry that has been evaluated according to the appropriate accompanying criteria. While the standards for what makes a quality registry are not universally agreed-upon, and are likely to change, the following are some suggested characteristics of a suitable registry:

- Requires verification of emissions reductions by an independent third-party that is accredited by the jurisdiction in which either the project or the registry is located
- Maintains a serialized record of all emissions reductions that have been verified by an independent third-party verifier and certified by the registry as having been achieved by the project

[37] https://icvcm.org/the-core-carbon-principles/

- Maintains a clear record of the chain of custody for all emissions reductions certificates that have been certified by the registry and system to check the status of credits, including whether they have been retired
- Maintains contractual or legal standards for identifying who bears risk if project fails
- Maintains adequate requirements for transparency and annual public reporting of all significant project-related activities
- Covers a sufficient scope
    - Includes all six major GHGs
    - Reports emissions reductions from project start-up to end of engineering lifetime
    - Requires annual reporting and publication of emissions data
- Establishes baseline emissions from historical data or from a directly comparable project that might be built in the same jurisdiction in the absence of the proposed offset project
- Requires reporting of direct emissions from project-related activities and indirect emissions from electricity used within project boundaries
- Maintains transparency of project type for registered offset credits
- Maintains transparency of key source documents

Affiliation with a registry means each verified offset will be identified with a unique serial number that allows it to be tracked from issuance to retirement. Verification and registry also usually mean that offsets will be required to be retired once purchased and applied to the purchasing entity’s GHG report as an offset, and that because of proper tracking and retirement, they will not be double counted, which occurs when the same offset is claimed by multiple entities. See Section 3.2: Offset Purchasing, for more information about retiring offsets.

Transparency

<u>CCP Definition</u>: The carbon-crediting program shall provide comprehensive and transparent information on all credited mitigation activities. The information shall be publicly available in electronic format and shall be accessible to non-specialized audiences to enable scrutiny of mitigation activities.

A primary concern about offset projects is that they need to be transparent, which means that the details of the project, including the type of project, duration, standards used, tests done, measurement, location, price, etc., are all known and made clear to the offset purchaser and all other stakeholders. Transparency is essential for ensuring that all other quality requirements are being met, help ensure validity, and are particularly relevant to the Commitments, as transparency furthers the goal of education on climate change and sustainability initiatives.

Many registries and ratings firms are taking steps to standardize what types of public information will be needed in order to make projects transparent and vettable by outside parties. Even with these improvements, one of the biggest challenges to the effort toward greater transparency is the highly technical nature of many offset projects. Due to the methods of quantification of GHG avoidance or removals, the approach to determining baselines and other aspects of project accounting, projects within a type can be quite divergent in how they approach the same goal (ex: quantifying the carbon gains from avoiding deforestation). Issues with offset quality often arise from these details, and due diligence is required by trained experts to assess the specific ways in which the project not only adheres to a protocol but also chooses conservatism and integrity in determining carbon accounting methods, baseline determinations, and additionality metrics.

The effort for transparency is therefore an aspect of carbon offset quality that would benefit from more participation from the higher education sector. No other sector possesses the scientific training, research prowess, or workforce development potential that can be found within higher education. Harnessing these assets in order to provide critical assessment of offsets, improvement of best practices, and supply of skilled professionals not only ensures better impact of carbon finance, but also drives greater transparency as the market rapidly develops and changes. Sections 4.1 and 4.3 deal with the integration of teaching and research with carbon offsets, and the role of higher education in the future of the offset conversation.

Robust independent third-party validation and verification

CCP Definition: The carbon-crediting program shall have program-level requirements for robust independent third-party validation and verification of mitigation activities.

This CCP also maps to the PAVER standard of ‘verifiable’. Third-party validation and verification are important to ensure that the claimed GHG reductions of the project are checked by parties independent from the project developer, owner, or registry. Validation determines that the baseline established and methodologies used for a project are legitimate. Verification provides the necessary quantifiable evidence that claimed emissions reductions are real and additional when compared to the baseline scenario. Validation and verification are conducted by independent auditors (VVBs- Validation and Verification Bodies), and registries require that projects work with auditors that are accredited by the International Organization for Standardization (ISO).

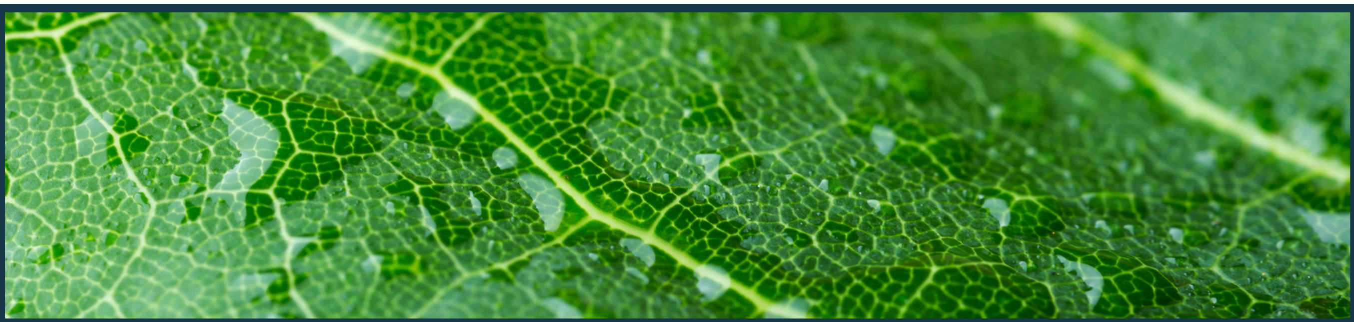
Verification and validation come with several quality assurances. For example, if a project is verified, it also means that the offsets are measurable, or can be quantified as actual GHG reductions. Typically, GHG emissions are measured in CO_2e, or carbon dioxide equivalent. Measurement practices must be transparent, and demonstrated against a baseline of performance. Measurement can be complex depending on the type and duration of the project. In the case of bio-sequestration projects, for example, it is difficult to measure how much carbon is actually sequestered in a given timeframe by a forest. Therefore, baselines and emissions reductions have to be calculated conservatively. It is important to understand when selecting offsets, how accurately a project can be – and then has been – measured.

Problems with third-party validation and verification include too few accredited third-party VVBs to meet current demand, and the fact that VVBs are hired by project developers and as such incentivized to verify GHG reduction claims in order to ensure continuation of working relationships and business success. In this way, third-party validation and verification are base level quality indicators of offset quality, but must be coupled with transparency so that the role of VVBs in the project's reported production of offsets are visible and vettable.

Additionality

<u>CCP Definition</u>: The greenhouse gas (GHG) emission reductions or removals from the mitigation activity shall be additional, i.e., they would not have occurred in the absence of the incentive created by carbon credit revenues.

Additionality means assurance that the offset project results in actual reductions of GHG emissions that would not have otherwise occurred under a reasonable and realistic business-as-usual scenario. It is worth noting that the CCP definition of additionality seems to limit additionality to financial determinations, however there are several different tests that projects apply to determine their above business-as-usual status. Finance based testing is an enduring method for determining additionality, but other tests have been added to frameworks for determining additionality due to the fact that finance metrics can often be too easily gamed by project developers by simply inflating the cost of capital. Therefore, to determine additionality, projects often have to demonstrate that they have passed more than one specific test to prove that the offsets would not have happened under business as usual.



The different types of additionality tests applied to carbon offsets are summarized below. Often projects have to pass more than one test:

- Legal and regulatory: Whether there are regulations or incentives that encourage or enforce the project
- Financial: Whether the project is financially viable without carbon revenues
- Barriers: Whether the project faces obstacles that would prevent it from being implemented without carbon credit sales. These obstacles could be financial, technological, ecological, social, or other factors.
- Common practice: Whether the project's practices are typical in the region
- Performance: Whether the project represents at least one metric tonne of additional, permanent, and unclaimed CO_2 emission reductions or removals

Consulting the project methodology to determine how additionality is determined for the project is a useful tool to ensure that vetting of additionality is occurring at the source, and assessment of additionality is using the appropriate metric.

As the market evolves, it remains to be seen whether finance-based additionality will indeed trump other measures of additionality to become the main metric of project viability.

Permanence

CCP Definition: The GHG emission reductions or removals from the mitigation activity shall be permanent or, where there is a risk of reversal, there shall be measures in place to address those risks and compensate reversals.

Permanence means an offset has a low risk of reversal. Reversal occurs when the carbon reduction associated with the offset is negated, or in other words, the 1-ton carbon dioxide equivalent represented by the offset being released back into the atmosphere. An example of reversal would be the burning of a forest and the release of that forest’s carbon stocks into the atmosphere after the forest’s carbon stocks had been quantified, verified, and sold as carbon offsets. The ability of an offset to represent a long-term or permanent carbon avoidance or removal adds to its permanence (low risk of reversal). The concept of permanence does not refer to the idea that an offset project itself should “last forever”. Offsets are by nature time-specific temporary instruments. Instead, permanence refers to the risks associated with projects that removed GHGs from the atmosphere in such a way that those removals could be reversed at some point in the future. Permanence is also referred to as durability.

Different types of offset technologies present different permanence scales. For example, Direct Air Capture is a nascent technology that promises not only direct removal of carbon dioxide from the atmosphere, but also permanent storage of that carbon, making the project type extremely promising in terms of permanence. On the other hand, forest projects have a higher risk of reversals, due to the natural cycles of trees, the greater incidence of forest fires, and rising global temperatures. Yet, the protection of forests is still vital to climate efforts, so rather than forsaking forest offsets due to reversal risk, project developers and registries attempt to buffer the risk of reversal. Projects are required to assess their risk of reversal due to circumstances beyond reasonable control, and a plan for buffering losses.

Permanence also requires offset projects to account for leakage, or any unintended increases in direct or indirect GHG emissions that result from the project activity outside of the boundaries of the project itself. In other words, while the project may be reducing GHG emissions within the project boundary, it may also cause an increase of emissions somewhere else as a result. Leakage is of particular concern within the context of forestry projects, where preservation or afforestation in one area may result in clear-cutting of a forest outside of the boundary of the offset project. Leakage cannot always be definitively accounted for and is addressed in different ways by different standards.

Permanence is particularly relevant to sequestration projects, and relates to the ability of soil, vegetation, the ocean, or geologic formations to permanently store carbon without releasing it at some point in the future. Voluntary markets have attempted to deal with permanence issues in various ways, including through the use of buffers, reserve pools, temporary credits, and insurance.

As the need for drawdown intensifies, some market players note the need for different permanence scales both short and long term in order to finance, through offset mechanisms, the preservation and improved stewardship of resources and biodiversity. As of this writing, the CCPs assessment framework asserts that permanence as a quality indicator refers to projects that compensate for reversals that happen within 40 years. This assertion certainly protects the offset investment, but not necessarily the planet when it comes to carbon sequestration and avoidance that is enduring and in line with global climate goals.

Robust quantification of emissions reductions and removals

CCP Definition: The GHG emission reductions or removals from the mitigation activity shall be robustly quantified, based on conservative approaches, completeness and scientific methods.

This CCP maps to the PAVER standard of “Real”. Robust quantification or real emissions reductions and removals is meant to prove that offsets represent actual GHG reductions. The carbon removal mechanism associated with the project can be assessed as a high level way of determining whether offsets are real, followed by assessment of the project’s implementation of the methodology and the real-time emissions reductions that are reported via project implementation data. Third-party verifiers are charged with assessing that offsets are real via quantification, by double checking data and calculations according to the methodology. While this provides a base level of assurance, a considerable amount of uncertainty exists in this category for quite a few project types, specifically with respect to over-crediting, which is when projects or methodologies have a demonstrated pattern of producing more carbon credits than can be tied to actual GHG reductions as the result of the project. Again, the interdependence of quality standards becomes apparent, because quantification is not possible without true transparency and effective governance.

No double counting

CCP Definition: The GHG emission reductions or removals from the mitigation activity shall not be double counted, i.e., they shall only be counted once towards achieving mitigation targets or goals. Double counting covers double issuance, double claiming, and double use.

Issues of double counting, where one entity or organization is claiming the offsets against their GHG emissions at the same time that another entity is counting the same offsets is generally handled by ensuring that the offsets are registered and verified. However, confusion does occur, and institutions are advised to ensure at the beginning of any exploration into offset investment that all parties involved understand clearly, and are willing to enforce via written contracts, which entity has the right to the offset claim. This can be particularly important when campuses are working collaboratively to develop offset projects with community NGOs, local governments, and landowners. For example, if a university wants to fund tree planting by a local NGO on a degraded mining site and claim the offsets, they must ensure that the landowners and the NGO that is planting the trees are not also interested in claiming the offsets. A contract should be pursued stating that the carbon rights from the project belong to the campus. Two configurations of the same project type (in this example, reforestation) may be at play. For example, the same campus may then want to pilot another site with the same project, but in this case, the land is publicly owned. Careful attention to each project boundary and all the players involved would be necessary to ensure that no one is surprised by a double counting issue. Most registries require attestations of non double counting in project monitoring, to provide an extra layer of assurance.

When it comes to international projects on the VCM, new rules for international trading of offsets under Article 6 are emerging in order to prevent double counting of offsets by both the country that produces them, and a foreign, corporate buyer. Many countries that host large or numerous offset projects are having to decide whether they will keep a percentage of domestically produced offsets to count toward their nationally determined contribution (NDC) under the Paris Agreement, whether certain types of offsets will not be eligible for international trade, or even whether all offsets from within their borders will be frozen until further notice. As of this writing, power and price are shifting in the VCM as a result of Article 6. Seller countries that have historically offered offsets from least-cost mitigation projects to Global North buyers on the VCM now foresee that they will need to guard carefully against carbon colonialism and use the most effective, least-cost emissions reductions for their own NDCs. As international trades under Article 6 are piloted, more precedent for how this affects the VCM will continue to emerge[38].

Sustainable development benefits and safeguards

CCP Definition: The carbon-crediting program shall have clear guidance, tools and compliance procedures to ensure mitigation activities conform with or go beyond widely established industry best practices on social and environmental safeguards while delivering positive sustainable development impacts.

Offset Projects do not merely avoid, reduce, or sequester GHG emissions in order to reduce contributions to climate change. Wherever they occur, projects have real impacts that are both positive and negative, and both direct and indirect with regards to other environmental outcomes, and to social and economic conditions. Therefore, investors should ask whether carbon reductions from the project, however quality, are coming at the expense of social, environmental, economic or other outcomes. Projects that meet carbon quality standards while also demonstrating co-benefits represent a more complete approach to regenerative climate action. Projects should at least take into account all direct and indirect social and environmental impacts that its activities produce. In addition, project developers should seek to mitigate any harmful impacts and take steps to produce net positive impacts. These might include providing jobs to the local community, preserving wildlife habitat, or creating healthy buildings. More details on co-benefits are included in the next section.

The inclusion of co-benefits into the quality standards represented by the CCPs is a positive sign. To comply with this mandate for quality, registries are beginning to require projects to state and monitor adherence to at least 3 of the UN Sustainable Development Goals (SDGs) in both project design descriptions and monitoring reports. There are also requirements for stakeholder engagement and attestations of no net harm required in project development and monitoring. It should be noted that SDG claims are currently unclear and only sometimes transparent. Registries are adding mounting requirements, and as this occurs, a framework for credibility and transparency in these claims is being developed. Still, SDG claims by projects do not always ensure the credible co-benefits of a project or its value of and adherence to high standards of equity and sustainability because this is a newer aspect of monitoring, reporting, and verification that faces broad lack of guidance and effective governance.

As mentioned in Section 2.4: Equity Considerations of Carbon Offsets, SDG claims and attestations of no net harm are made by project developers who have incentive to paint a picture that project co-benefits are high and coercion, violence, harm, or other injustices have not occurred. These claims are often treated as voluntary by project developers, especially those whose projects have the most impact on indigenous people and local communities. Also, VVBs have been found to provide minimal oversight, and accept culturally inappropriate metrics for stakeholder engagement. More stringent metrics need to be developed and enforced for assurance of sustainable benefits and safeguards, and greater transparency is needed to ensure that this quality measure is being implemented. Further, with respect to the UN SDGs, metrics do exist for benchmarking global progress, but translating those metrics to meaningful regional and local progress benchmarks needs more research and attention.

At present, the greatest assurance a campus can have that a project meets goals for sustainable development benefits and safeguards is via direct relationships within the community where the project occurs, real knowledge of the social, economic, and environmental challenges that community faces, and honest inquiry into the actual impact of the project on those realities. Second Nature's support through the Offsets Lab of the development of a Climate Justice Standard for carbon offsets, in collaboration with the UC Center for Climate Justice seeks to create standardized frameworks for guaranteeing equity and co-benefits in offset project design and monitoring, complete with novel MRV that is vetted by the scientific community and local and indigenous partners.

For more specific information on carbon offset co-benefits, see section 2.6 Carbon Offset Co-Benefits.

Contribution to net zero transition

CCP Definition: The mitigation activity shall avoid locking-in levels of GHG emissions, technologies or carbon-intensive practices that are incompatible with the objective of achieving net zero GHG emissions by mid-century.

This quality assurance indicator recognizes that projects reliant on status quo extractive technologies, dependency or enablement of fossil fuel based technologies, and/or reinforcement of their lucrative potential are no longer considered quality because they do not move the collective force of investment toward net zero emissions.

[38] https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_To_Trade_or_Not_to_Trade_150523.pdf

Other Considerations

Offsets that are Synchronous: Ideally, projects result in reductions of GHGs that take place during a distinct period of time that is reasonably close to the period of time during which the GHG emissions that are being offset took place. The WRl Protocol refers to the valid time length for a baseline scenario as "the time period over which baseline emission estimates, derived from a baseline scenario or for the Baseline Scenario performance standard, are considered valid for the purpose of quantifying GHG reductions. Once the valid time length for the baseline scenario expires, either no further GHG reductions are recognized for the project activity, or a new (revised) baseline scenario or performance standard must be identified." (WRl/WBCSD 2005, p.133) The baseline scenario time length can be static or dynamic and varies by project type.Dynamic time lengths tend to be more appropriate for electricity supply and land use, and use change, and forestry (LULUCF) projects. Emissions reductions should only be considered valid offsets if they are from this valid baseline scenario timeframe, which should also match the timeframe for the emissions that are being offset by the project's reductions. It is important to consider whether credits are synchronous when choosing a contract type in an offset purchase because, as discussed in the "Investment Options" section, offset transactions can involve prompt delivery, forward delivery, or forward crediting, each with its own pricing and risk implications. These risks and price implications are amplified for forward delivery and crediting when anticipating an emerging regulatory scheme and regulatory carbon market.

When considering the weight of synchronous offsets in these quality standards, Second Nature acknowledges that the voluntary carbon market faces multiple capacity challenges, and that carbon offset projects and registries are often facing lag times when it comes to validation of projects and verification of credits. Assuring absolutely synchronous offsets to the GHG reductions reported may not be possible when giving greater weight to PAVER and equity standards, and signatories should not simply disqualify credits with older vintage years if they meet all other quality standards.

2.6 Carbon Offset Co-Benefits

Carbon offset co-benefits speak to the net positive impacts of an offset project over and above its carbon reductions. These might include providing jobs to the local community, improving air or water quality, or protecting an endangered species. For higher education, research and educational co-benefits are other potential positives of offsets engagement in addition to emissions reductions. SOCIALCARBON and other third-party certifications can provide a layer of assurance that the co-benefits claimed by carbon offset developers are in fact having a net positive impact, however these additional certifications are not required to ensure co-benefit credibility. Also, the main registries are now requiring offset projects to demonstrate alignment with the UN Social Development Goals. Buyers should pay attention to the co-benefit claims being made, and understand that many of them are not vetted beyond the methodologies that project developers themselves provide in order to demonstrate their claims to the registries.

Social Benefits

Just as the social cost of carbon should be considered when pricing GHG emissions, the potential social cost of producing offsets should also be considered, especially when offset projects are located in marginalized communities or post-colonial countries. However, in cases where ethical considerations have been prioritized, the social co-benefits of offsets may be noteworthy. Common social co-benefits may include:

- Increased educational opportunities,
- Increased ability for marginalized communities to meet their needs, and
- Increased collaboration between groups.

Educationally, co-benefits have included opportunities for students to visit project sites and learn about systems dynamics. Other educational opportunities may be available to the local community. For example, at Seneca Meadows Landfill in New York, offset revenue helps to maintain nature trails and interpretative signage, while also facilitating methane capture and destruction. Other offset projects may make everyday life easier for people, like a project in Kenya designed to replace labor-intensive stoves with more efficient stoves to decrease carbon emissions and save people time. Sometimes, the development of an offset project builds a collaborative relationship where there wasn't one previously, such as a case where a humanitarian organization brings investment and useful technology to communities that don't have access to those resources through other channels. Such projects may become foundations for other exchanges of resources that are beneficial to both parties. Some offset projects also attempt to solve social problems between groups within the same community (such as competition over forest resources) by displacing the need for deforestation through more efficient farming techniques where land is the limiting factor or through more efficient burning techniques where supply of wood is the limiting factor.

Economic Benefits

Opportunities for economic co-benefits include job creation, increased revenue flow, and economic stability for under-resourced communities or innovative enterprises. For example, offset projects aimed at installing new technologies or building infrastructure may create jobs for construction workers and technical specialists. Or, offset sales may enable direct payments to community members for work implementing the project. If a project increases the flow of people to a community, there may also be an economic multiplier effect from the money those people spend on food, housing, merchandise, and taxes. The projects themselves may be subject to taxes, and therefore create revenue for a community. Increased revenue flow may also benefit innovative businesses that need economic stability in order to increase their customer base, hire more staff, and continue research and development. Such businesses may be important actors in creating a low carbon future.

Environmental & Ecological Benefits

Offset projects may include environmental co-benefits beyond the primary aim of reducing or mitigating carbon emissions. For example, offset projects that mitigate coal use are also mitigating acid rain deposition. Offset projects that preserve forests are not only sequestering carbon, but preserving ecosystems for the benefit of biodiversity protection and ecosystem services beneficial to humans. Other projects may work to actively restore ecosystems by planting trees or by managing existing forests to return them to a more natural, balanced state. Ecosystem restoration not only benefits organisms that live in them by providing habitat, but can offer wildlife corridors for organisms just passing through, thus having a truly global effect beyond carbon sequestration. The numerous environmental co-benefits of land use offset projects, especially forest sequestration projects, should be carefully considered when dealing with the difficulty of proving additionality for such projects.

Educational Value

A key part of the “core business” of higher education is to maintain a healthy, thriving civil society by educating students and originating knowledge through research. As schools work on reducing their own GHG emissions, engaging in the carbon offset markets can be one way of participating in, and contributing to, such education and research. Engaging students in offset research, purchasing, or project building can teach students important technical skills that will prepare them for expected expansions in voluntary and regulatory carbon markets over the coming years. Through co curricular opportunities or service learning courses, students could learn carbon standards, industry terms, financial mechanisms, and the social, economic, and environmental impacts of various types of offsets. A core element of sustainability education is systems thinking. Even students who do not plan to work in the offset industry could benefit from the systems thinking exercises that can be produced from offset discussions. From a social systems perspective, students can be challenged to consider the social repercussions for offset projects through questions like the following:

- What would certain communities do without access to carbon offset funds?
- Which aspects of their lives would be better or worse?
- How do power and privilege relate to these considerations?

From an economic systems perspective, students can study how the economy and investment strategies impact GHG emissions goals. They can wrestle with questions such as the following:

- What’s the role of money in catalyzing carbon reductions?
- What’s the role of knowledge or technology in catalyzing emissions?
- How can market forces both support and hold back efforts to build environmentally and socially-friendly communities?

For example, markets can be useful for sequestering carbon and protecting the ecosystem in a given forest, but then one must address leakage in the form of shifting of logging operations from the protected forest to an adjacent forest. Global markets for lumber and global markets for offsets can be at odds in such situations. Moreover, whenever economic forces are at odds, without precautions to ensure equity, winners and losers will emerge. More jobs may exist for ecological planners, while less jobs may exist for foresters and loggers. Finally, an exploration of various environmental impacts can also be educational, given that many offset projects have either co-environmental benefits beyond GHG emissions reductions, or unintended negative environmental impacts. Students could explore what aspects of the environment are healthier or less healthy as a result of a given offset project.

A pedagogy based on systems thinking can combine the complex cause-and-effect relationships of offset projects across social, economic, and environmental domains into a rich educational experience. For example, when Green Mountain College bought offsets in 2015 to maintain their carbon commitment, students from five classes were given the task of vetting offset providers. They used Second Nature's carbon commitment guidelines to ask critical questions about the impacts of the various projects and the practices of the vendors. Most faculty and student participants agreed that the exercise was both meaningful and educational.

SIDEBAR: The either/or of co-benefits v. GHG integrity

Colleges and Universities that have reached or are approaching their carbon neutrality year and engaging actively in the carbon offsets space face difficult decisions, especially as of this writing, when the still nascent but burgeoning offset market faces intense scrutiny around its integrity. While the most ideal carbon offset for higher education institutions will combine guaranteed emissions reductions with high environmental, educational, and social co-benefits, such offsets are rare and limited in supply, or command a premium price that higher education institutions may not be able to pay. This tension forces many procurement managers into an either/or mindset, where they feel they must choose between projects with high co-benefits and equitable implementation, or projects with higher guarantees of GHG integrity that may have fewer co-benefits involved. Once in this either/or space, leaders are then faced with additional scrutiny, especially if institutional offsets are being procured with public funding. Critics may ask, if significant investment is being put toward an offset project with so many co-benefits, and offsets aren't often high quality emissions reductions, why doesn't the university put that same money towards many other social or environmental causes that don't claim to be attached to emissions reductions? In this climate of deep and understandable skepticism around carbon offsets, some procurement managers have characterized co-benefits simply as "reasons to do the project anyway, regardless of its emissions reduction potential." In this way, the conversation can quickly become reductive, dangerously skirting the nuance that mindful conversations about offsets deserve. While co-benefits may have an inverse relationship to additionality, it is simply not always the case. And as deeper examinations into equitable carbon offset project design have shown, projects that respect the cultures and wisdom of indigenous peoples and local communities and projects that are designed to address the true causes of climate change must be able to demonstrate ample co benefits. Second Nature recognizes the tension and scrutiny that institutional leaders face, and acknowledges that the supply of truly credible offsets is limited. Strategy that favors a portfolio approach combining high quality emissions reductions, contributions to mitigation in projects with robust quantification of impact, and investments in nascent project types with high equity and co-benefits can begin to tell a story about how institutions are participating in the voluntary market with integrity as they advance further on the road to decarbonization. Such a strategy must be paired with proactive communication about the reasons for the strategy, including transparency around the due diligence process that the campus has undertaken to understand the projects garnering its investment.

2.7 Types of Carbon Offset Projects

There are many different types of carbon offset projects because there are many mechanisms by which to remove atmospheric greenhouse gasses and reduce greenhouse gas emissions. Projects can be broadly categorized as either carbon avoidance or carbon removal, and then further delineated from there.

Carbon Avoidance encompasses all projects whose mechanism focuses on avoiding further or future emissions. Common examples include energy efficiency projects, fuel switching, and forest conservation.

Carbon Removal encompasses all projects whose mechanism focuses on removing carbon from the atmosphere. Common examples include direct air capture, seaweed sinking, and tree planting.

Both avoidance and removal projects are important in the pursuit of climate action, and it is possible for projects to offer both removal and avoidance offsets. Some schools may choose to prioritize, or face pressure to prioritize removal over avoidance, and at the same time, some schools may face scrutiny with this type of either/or decision, especially if removal credits are in any way uncertain. To illustrate this, within the Carbon Dioxide Removal (CDR) category, there are mechanisms that produce potential CDR and mechanisms that could produce absolute CDR, and the status of the approach could change depending on the condition. No single approach will perform the same under all circumstances [39]. Even within each category, there are project types that present different barriers and opportunities to scalable, reliable removal or avoidance. For example, biological sequestration projects promote the protection of biodiversity and natural resources, and even a promotion of better management norms when it comes to biological resources, while remaining relatively low cost. The risk associated with these projects is less-predictable sequestration rates and risk of reversal via natural disasters. Geological sequestration presents a greater chance of permanence than biological, however it comes with high costs and does not promote a move away from fossil fuel

[39] https://cdrprimer.org/read/chapter-2

consumption or many system management shifts. Even still, each approach appears on the list of project type options to help decision makers begin to see the suite of avoidance and removal approaches as components of a portfolio of options for planetary drawdown. As with all offsets, it is critical to be able to evaluate the specific project and then to do so diligently, using the best tools of higher education.

In keeping with the direction of greater integrity as the offset market shifts, schools are urged to determine whether it is appropriate to equate investment in a particular project with emissions reductions, or with a contribution to mitigation activities that does not also offset institutional GHG emissions for the investor. As collective accountability in climate action necessarily increases, both within and beyond higher education, incentives for continuing to invest in climate mitigation that are not tied unequivocally to emissions reductions claims signal a more holistic and sound approach to climate action.

The revised Oxford Principles for Carbon Offsetting synthesize data on climate impact in line with science as it relates to offset engagement. The principles use the latest data to elucidate the importance of engagement with both avoidance and removal offsets, and a portfolio that begins to invest more heavily in removal offsets as the global community moves toward mid-century. This approach emphasizes the vital need for investment in both avoidance and removal activities. In the near term, carbon avoidance projects can and will dominate portfolios, due to the availability, accessible cost, and important ecosystem services they protect and enrich. As climate targets approach, offset actors should place more resources toward high capital emerging technologies in carbon removal that promise greater durability [40].

Campuses procuring offsets are advised to use a portfolio approach that includes several types of offsets, if possible, and as always seek to engage as much as possible with the specific project in question.

With this ethos in mind, carbon offset project types that schools may encounter are summarized in the following pages according to the latest science.Then, a visual key can be found below each project type describing the relative market availability of offsets associated with the project type; the cost range from low to high in terms of average offset market price; the risk associated with offset quality standards such as durability, over-crediting, additionality, and double counting; and lastly, whether the project type might be more suited to a emissions reduction claim or a contribution to mitigation that is not tied to institutional footprint reductions.

[40] Principles for Net Zero Aligned Carbon Offsetting (revised 2024) https://www.smithschool.ox.ac.uk/sites/default/files/2024-02/Oxford-Principles-for-Net-Zero-Aligned-Carbon-Offsetting-revised-2024.pdf

KEY TO PROJECT TYPE SUMMARY TABLE

Type: This cell indicates whether the project type offers removal or avoidance offsets, or both

COST:

This cell approximates the price range of these offsets based on market averages. Low= $5-$25; mid= $25-$150 high=$150+

AVAILABILITY:

This cell indicates whether offsets from the project type tend to be widely available or not common on the VCM, based on a range of reasons from demand to scalability barriers, or to nascency of the associated technology

DURABILITY:

This cell speaks to the relative permanence of offsets associated with the project type. Determination is not absolute but in relation to other project types. Note that individual projects have differing permanence risk within various project types.

ADDITIONALITY:

This cell indicates whether the project type is associated with well-known additionality issues based on scientific review. Note that individual projects can have varying additionality within project types, and sometimes individual project design and accounting can elevate a specific project within a project type that hasn't reviewed well. As always, due diligence is recommended.

DOUBLE COUNTING:

This cell indicates whether this project type carries the risk of double-counting. Note that individual projects can often correct for these risks.

OVERCREDITING:

This cell indicates whether this project type has known over-crediting problems. Note that individual projects can vary within a type.

CLAIM: This cell indicates Second Nature's current assessment of whether this project type is best suited to a potential institutional GHG reduction claim or as a mitigation contribution opportunity. The latter best describes project types that are certain or potential necessary climate mitigation approaches, but face issues with reliable GHG integrity and need more research and due diligence. Symbols in this cell include:

✓	?	$	()
Reliable offset claim provided individual project meets due diligence checks	Research is urged to answer important questions and/or significant due diligence is needed into the carbon accounting methods of projects within this type	Investment into this project type is important for climate benefit but schools are urged to make a mitigation contribution claim rather than an offset claim when investing in this project type	A parentheses around a symbol means that the application of that symbol is highly dependent on due diligence of the individual project. This usually means that within the project type, high integrity is possible, but not guaranteed, and engagement with the project will be the only way to determine if the project meets quality standards.

Project Type Summaries and Evaluations Based on the Latest Science

Energy Efficiency Projects

Energy efficiency projects replace or improve products or systems so that they perform the same tasks using less energy, and therefore less fuel. One key benefit of energy efficiency projects is that they save money over time, so investments in energy-efficient equipment thus have a payback. Examples of this type of project would be converting a fleet of vehicles to a fleet of more fuel-efficient vehicles, replacing inefficient HVAC mechanical systems or water heating systems, renovating a building to be more efficient at retaining thermal energy, or replacing incandescent light bulbs with light-emitting diodes (LEDs). Efficiency opportunities exist in many creative applications across a range of industrial sectors. For example, offsets were produced from the installation of auxiliary power units (APUs) in tractor-trailer trucks to produce heat and light more efficiently for truckers sleeping in their cabs than idling large diesel engines all night. Energy efficiency projects are beneficial in their ability to reduce emissions through the conservation of energy and reduced fuel consumption. In the U.S. energy efficiency projects carry great climate drawdown potential due to the current extent of inefficiencies in building systems, transportation, and even manufacturing sectors. However, there are some challenges worth considering when undertaking energy efficiency activities as offset projects. Energy efficiency projects tend to have straightforward accounting and methodology, but there can be challenges such as establishing a baseline, determining additionality, and the need for labor-intensive continued monitoring and evaluation. Continued monitoring is important to ensure that reductions are consistent and not erased by a rebound effect from users consuming more energy because of a perception that the price is now cheaper or that they must be less vigilant in minimizing their environmental impact. Even aside from a rebound effect, energy efficiency technology often requires maintenance to ensure that it sustains its efficiency over time. Furthermore, establishing clear ownership of the reductions is difficult, and the potential for double counting must be taken into consideration to ensure, for example, that upstream power generation entities do not also take credit for the reduction in emissions that come with the increases in efficiency by an end-use consumer. The complexities around this project type could grow as regulatory frameworks are imposed that cap emissions from the power generation sector. Lastly, perverse incentives are something to watch out for with energy efficiency projects, because more regulation mandating energy efficiency measures or legislation incentivizing it may negate project additionality.

Note: As of this writing, grid-tied energy efficiency and fuel-switching projects in non-LDC (least-developed countries) are no longer eligible for verified offsets.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Avoidance	Low	High	Good	Some risk	Some risk	Low risk	✓

Fuel Switching

Fuel-switching projects reduce the amount of fossil fuels consumed and the associated emissions from such consumption by switching to cleaner or renewable fuel sources. Examples of this would be switching from oil to natural gas to power an on-campus electricity generating plant or powering a fleet of vehicles with ethanol instead of gasoline or biodiesel instead of fossil diesel. Fuel switching can produce legitimate offsets by reducing the number of emissions produced from the use of the fuel for the same activity. Fuel switching offsets are permitted under most voluntary offset standards, other than grid-tied projects.

Note: As of this writing, grid-tied fuel-switching projects in non-LDC (least-developed countries) are no longer eligible for verified offsets. District-scale projects, however, are still within scope.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Avoidance	Low	High	Good	Some risk	Some risk	Low risk	✓

Improved Cookstoves

Improved cookstove projects are a suite of projects that seek to reduce the health and climate impacts of fire cooking or kerosene cooking, which is used by billions of people worldwide. These projects can either replace traditional smoky biomass stoves with more efficient stoves that require less fuel or use fuel with a less intensive climate impact, and/or replace fuels with those that burn more efficiently with less off-gassing. Fuel combustion releases carbon dioxide but also methane and other pollutants into the atmosphere, so a more efficient fuel and/or a more efficient stove can improve GHG impact while also reducing fine particulate matter inhalation by the people using the stove. Because of these benefits, and the relative ease of perceived solutions, cookstoves projects have been popular and fast-growing in the voluntary carbon market. Projects typically also claim high co-benefits, because of the health impacts of improved cookstoves, improved quality of life for women, and reduced labor and environmental degradation for communities that depend on biomass gathering for cooking.

Measuring the impact of improved cookstove adoption can be difficult, and as such, cookstove projects are likely to be over-credited[41] . Over-crediting is due to several factors. Firstly, families who receive improved stoves may not use them, or may use them for only some of their cooking needs, leading to “stacking,” or the use of multiple stoves (including the old, less efficient cooking method) in one household. Stacking sometimes also leads to higher fuel consumption in a home, which contributes to “rebound,” or the release of more pollutants into the atmosphere. Further, the change in fuel consumption must be measured and converted to CO_2 equivalent based on the specific fuel being used. Additionally, there is a calculation for determining the fraction of biomass that is non-renewable which also affects credit integrity. This factor should ensure that no project credits come from renewable biomass used for the stove that would have released its carbon into the atmosphere anyway. The combination of stacking, rebound, and inappropriate fuel conversion or fraction of non-renewable biomass factors lead to varying, and sometimes inadequate methods for monitoring of the actual GHG benefit of cookstove projects. Methodologies use surveys, kitchen performance tests, standardized conversion factors, and even stove meters in some cases to try to overcome these obstacles, but not all methodologies require or enforce adequately[42].

The University of California at Berkeley's Berkeley Carbon Trading Project conducted a thorough over/under crediting analysis of the main cookstove methodologies in the VCM. While the team confirmed that over-crediting is a major problem within the cookstoves project type, this work also identified specific ways that project developers can monitor projects to produce quality offsets and specific methods that can be used to ensure good results. The team at Berkeley went further to identify and assist specific project developers who wanted to improve their monitoring and methods and produce quality offsets according to the latest science. This research and work show that within a generally problematic project type, there are ways to guarantee high-integrity offsets. A comprehensive overview of the Berkeley Carbon Trading Projects' analysis of cookstove methodologies, and a guidance for buyers and project developers can be found on their website.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Avoidance	Low to mid	High	Some risk	Some risk	Low risk	High risk	(✓)

Renewable Energy

Renewable energy offset projects include both thermal and electric applications. Thermal projects may consist of building infrastructure for geothermal, solar thermal, or biomass (e.g. wood chips). Electricity projects may consist of installations of photovoltaic solar power, wind, hydro, and biomass in the form of waste wood, wood chips, cow manure, or other organic products. Whether electric or thermal, these projects have the benefit of moving energy production away from reliance on fossil fuels and promoting long-term sustainability. It is important to distinguish between renewable energy projects that are tied to the grid and feed electricity into it, and those that are standalone and provide energy for a specific use or facility. Projects that produce electricity and are tied to the grid present unique challenges related to double-counting emissions reductions and the greater possibility that regulation played a key role in incentivizing the project, making it non-additional. Electricity projects that are not grid-tied or thermal energy projects may have less potential for double-counting but should still be examined to make sure they are additional to existing or proposed regulations. The environmental impacts of some of these projects are complex and can offer more than one offset product. For example, anaerobic methane-digestion-to-energy projects include the capture of the GHG methane, the transformation of that gas into less potent gasses, and then

[41] Gill-Wiehl, A., Kammen, D.M. & Haya, B.K. Pervasive over-crediting from cookstove offset methodologies. Nat Sustain 7, 191–202 (2024). https://doi.org/10.1038/s41893-023-01259-6

[42] Ibid

the creation of electricity as a means of displacing fossil fuels. Since many renewable energy projects have high up-front costs, offsets can play an important role in investing in such projects and getting them off the ground. Investment in renewable energy projects was an important part of the early development of the renewable energy market, bringing costs down, and eliminating our dependence on fossil fuel. However, prices for renewable energy are much lower than they used to be, and there are policies and incentives to support the switch to renewable energy sources without carbon finance. For signatories considering purchasing offsets from such projects, it will be important to ensure that it has met proper additionality standards, and that the offsets are not double counted. With grid-connected projects, there is potential for double counting between the project developer and the utility, and uncertainty around how zero-emissions projects impact system average emissions rates (which other end-users use in calculating their GHG emissions). Current offsets from solar and wind face the need for additional scrutiny for additionality, and hydropower projects are not advised because they do not meet quality standards.

One additional concern with renewable energy projects is the overlap of offset and REC markets. Buyers should take care to examine the REC to ensure that the carbon reduction benefits of the project are included ("bundled") with the purchase of renewable energy.

Note: As of this writing, renewable energy projects in non-LDCs (least developed countries) are not eligible for verified offsets. However, renewable energy projects in least-developed countries are major pathways for carbon finance, as the global community seeks ways to alleviate energy poverty while also meeting targets determined by the Paris Agreement. Large, grid-connected renewable energy offsets are currently the most popular offsets on the VCM, with more credit retirements than the REDD+ category that has dominated the market previously. The popularity of these credits is understandable given issues of energy supply imbalance globally, however, the GHG integrity of these projects still faces questions concerning additionality, particularly over time. Careful research and consideration of specific projects are advised.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Avoidance	Low to mid	High	Good	High risk	High risk	Some projects	(✓) $

Methane Gas Destruction

Methane is a potent GHG with a global warming potential 21 times that of CO2 in a 100-year timeframe. Two types of methane projects can produce carbon offsets: methane capture and combustion, and methane capture for energy production.

Methane is most often emitted from landfills, livestock manure lagoons, and from coal mining. Methane projects can capture the methane produced from such activities and simply flare it (i.e., burn it) so that it is released as CO2, which is less potent than methane on a 100-year timescale and therefore represents an emissions reduction, or use it to produce heat and electricity. Some landfill operations alternate between flare and electricity generation activities depending on the concentration and quality of gas at various stages in the organic material's decaying process. In the case of biofuel facilities that use methane produced by anaerobically digesting agricultural or forestry waste to produce electricity, such projects are considered renewable energy projects rather than methane capture and are mentioned above in the renewable energy section. Methane projects are a popular offset project type given their credibility, cost-effectiveness, and straightforward approach. It is usually quite easy to establish additionality for methane projects because there is generally no other source of revenue from the activity aside from the sale of offsets. Moreover, methane projects can include the ability to measure gasses as they flow through a pipe, which can be a more straightforward way of estimating GHG emissions reductions than many other offset project types that rely more heavily on estimates, models, or predictions.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Avoidance	Low	High	High	Good	Low Risk	Low Risk	✓

Industrial Gas Destruction / Destruction of Ozone-Depleting Substances (ODS)

Industrial gasses are a special class of non-CO2 gasses that are manufactured for use in the industrial sector, and many of them have high global warming potential. Industrial gasses are also known collectively as ozone-depleting substances (ODS), and as such, industrial gas destruction projects on the voluntary carbon market are called "ODS projects", and the project type can be referred to as ODS.

Examples of these gasses include PFCs, NF3, SF6, HCFCs, and others that have well-documented and diverse potent effects on the environment[43]. While ozone-depleting substances such as these are being phased out globally through regulation, there are many old tanks of these gasses found in refrigeration systems, building insulation, fire suppression systems, and chillers. These tanks can begin to rust and leak their contents into the atmosphere, maintaining the threat of ODS to the environment well after their production is banned. Many of these substances have global warming potentials of over 10,000 times that of CO2 over a 100-year time horizon.

Depletion of the ozone layer doesn't just warm the planet, but also increases UVB radiation which leads to skin cancer and cataracts, adversely affects plant growth and nutrient distribution, and damages marine ecosystems[44]. As such, the social and environmental co-benefits of ODS projects are significant.

ODS projects seek to collect and safely destroy the tanks of gas, removing the threat of their release into the atmosphere. Projects have high greenhouse gas integrity because the tanks can be reliably measured, and the energy emissions to collect and destroy them can be accounted for. Destruction of industrial gasses can provide many emissions reductions at accessible cost. ODS reduction credits can be found in relatively high supply in the voluntary market.

In the past, industrial gas projects have been associated with perverse incentives, due to a controversy in the CDM in 2008 that found companies producing additional HCFC-22 (a gas that did not at that time have regulatory limitations) to claim carbon credits for the destruction of a HFC byproduct from production[45]. The argument against ODS projects commonly heard because of this scandal is that incentivizing their destruction runs the risk of discouraging regulation to phase them out. However, all ozone-depleting substances are now under phase-out regulation, with a few exceptions and extended phase-outs until 2030. The regulations now include all HCFCs, of which EPA regulation banned production after 2020[46 47].

What remains, however, are the tanks produced and decommissioned from legacy infrastructure, and currently, the only incentive to collect and destroy them rests with the carbon markets. As such, Project Drawdown lists refrigerant destruction as a #1 "emergency brake", or immediate opportunity to reverse global warming[48].

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Avoidance	Low	High	High	Good	Low Risk	Low Risk	✓

43https://ozone.unep.org/system/files/documents/Scientific-Assessment-of-Ozone-Depletion-2022-Executive-Summary.pdf

44https://www.epa.gov/ozone-layer-protection/health-and-environmental-effects-ozone-layer-depletion

45Schneider, Lambert. (2011). Perverse incentives under the CDM: An evaluation of HFC-23 destruction projects. Climate Policy. 11. 851-864. 10.3763/cpol.2010.0096.

46https://www.epa.gov/ods-phaseout/phaseout-ods-under-clean-air-act

47HFCs are also regulated for phase out due to their high global warming potential, however they are not considered ozone depleting substances, and thus are governed by non-ODS methodologies. These projects face higher durability/permanence and additionality risks than ODS projects.

48https://drawdown.org/solutions/refrigerant-management

Orphaned and Abandoned Oil Wells

Orphaned and abandoned oil wells are oil wells that are no longer producing oil and have no documented owner, or the owner is insolvent or unavailable. Because many of these wells predate state and federal mandates for oil and gas companies to plug or safely decommission oil wells upon depletion of the accessible oil resource, and because of loopholes or poor design in the regulation, hundreds of thousands of abandoned and orphaned wells remain unplugged but left to be decommissioned by the public or the government. Abandoned wells risk the leaking of oil and other chemicals into groundwater and can also leak methane into the atmosphere[49].

The voluntary carbon market now recognizes capping and safely decommissioning oil wells as a legitimate offset project based on the methane avoidance that capping the wells ensures. The methane leakage from a well must be measured and must be of a certain amount to justify the carbon project or to qualify for the methodology. Not all oil wells are methane emitters, however, some wells are "super-emitters[50]" and carbon finance can be a valuable tool in paying part of the expensive cost of plugging them safely.

This project type offers high promise for avoiding further climate warming in the near term, even though the total snapshot of impact is still being built. Data on the location, leakage potential, and governance of abandoned wells is still mounting, but based on the small sample size of super emitter wells that have already been measured, this project type is promising to direct finance to a much needed and often ignored social and environmental hazard. Colleges and Universities may start by seeking to learn whether there are orphaned and abandoned oil wells located near their campus or in the contiguous community, potentially near schools, residential developments, or daycare facilities. The combined impact of emissions reductions and co-benefits from investment in such mitigation could meet multiple sustainability, justice, and community engagement goals.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Avoidance	Mid	Mid	High	Good	Low Risk	Low Risk	✓

[49]Boutot J, Peltz AS, McVay R, Kang M. Documented Orphaned Oil and Gas Wells Across the United States. Environ Sci Technol. 2022 Oct 18;56(20):14228-14236. doi: 10.1021/acs.est.2c03268. Epub 2022 Sep 26. PMID: 36162410; PMCID: PMC9583604.

[50]Stuart N. Riddick, Mercy Mbua, Arthur Santos, Ethan W. Emerson, Fancy Cheptonui, Cade Houlihan, Anna L. Hodshire, Abhinav Anand, Wendy Hartzell, Daniel J. Zimmerle, Methane emissions from abandoned oil and gas wells in Colorado, Science of The Total Environment, Volume 922, 2024, 170990, ISSN 0048-9697, https://doi.org/10.1016/j.scitotenv.2024.170990.

Biological Sequestration

Forests

Forest-based activities include planting forests (afforestation and reforestation or ARR); increasing the carbon density of existing forests through improved forest management (also known as IFM); expanding the use of forest products that replace fossil fuels; and avoiding deforestation activity, also referred to as reduced emissions from deforestation and degradation (REDD).

Given the ability of forests and other biological systems to remove CO2 from the atmosphere, and the fact that deforestation is a large source of anthropogenic GHG emissions, any activities that promote the protection, replanting, and sustainable management of forests are positive and should be pursued and supported to fight global climate disruption. The co-benefits of these activities concerning soil, water, biodiversity, and human use are also significant. For these reasons, maintaining and restoring healthy forests is extremely valuable and all appropriate mechanisms should be employed by colleges and universities to those ends as part of their Climate Action Plans; Special attention to project details is essential for determining whether offset projects are appropriate mechanisms for doing so.

For forest projects permanence (also referred to as durability and irreversibility), is a special concern. Planting trees on land that has not been forested previously may remove carbon from the atmosphere in the short term; however, forests may be lost altogether due to a disturbance such as a forest fire or insect outbreak. In such cases the carbon sequestered by the forest would be re-released into the atmosphere, the removal would not be permanent, and any offset credits produced from the initial activity would no longer be valid, even though they would have already been applied to emissions inventories and retired in years past. Placing a conservation easement on an existing forest does not necessarily reduce GHG emissions, because that forest may well have been conserved in the absence of the easement. While conservation easements have numerous other benefits and should be pursued as part of institutional climate action plans, they are not likely (in many circumstances) to automatically produce high-quality offsets. While easements may play a part in attempts to ensure permanence, factors beyond human control such as fire and insect outbreaks could still threaten the permanence of any removals of carbon from the atmosphere claimed through biological sequestration. The global community has agreed upon 40 years as the minimum required durability for forest carbon projects to ensure that they contribute to carbon removal in line with 1.5C goals.

Determining appropriate baselines for forest projects is an ongoing problem within the offset ecosystem, and research from The Berkeley Carbon Trading Project with respect to Improved Forest Management as well as REDD+ forest projects shows that baseline determination is leading to project over-crediting. Determining a baseline requires project developers to say what would have happened under a counterfactual scenario and allows them to use regional or forest carbon density to determine their baseline, even if the carbon stocks of the project area have higher carbon stocks than the regional average at project start. Several measures have been suggested by the research to improve baseline determination in forest projects, including “dynamic baselining” against adjacent forest plots, historical management when it is known, or setting the baseline of a project equal to the project’s initial carbon stocks.

Leakage is another issue with forest projects. Leakage refers to a decrease in the amount of carbon sequestered by the project because planting or conserving forests in one area cannot prevent and may even trigger clear-cutting in another, possibly adjacent, area because of the project. Protocols attempt to count for this by asking project developers to assess leakage risk, however, some protocols allow the project developer to choose, leading to a lower stated risk.

REDD+ projects have concerns around additionality, as it can be difficult to determine if areas would be deforested or degraded in the projects’ absence. There are several offset standards that even when allowing for forestry projects, will not permit REDD projects. All the same, forestry offsets comprise the largest share of voluntary carbon market sales.

In response to criticism, registries are making changes to improve methodologies for forest projects, particularly for REDD+ projects, because they represent the largest share, by far, of carbon market sales. Even as improvements to protocols are gaining adoption by registries and project developers, the level of due diligence needed to assess projects as to what approaches they are using requires time and expertise that many schools may not have.

Where appropriate due diligence is possible, forest projects can be important parts of viable reduction strategies and valuable components of climate action plans. The difficulties associated with securitizing such activities as offsets should not discourage institutions from making these important investments in conservation, reforestation, and avoiding deforestation, and incorporating those activities into their climate action plans. An institution’s investment strategy should focus on the dual goals of absolute reductions in emissions and on removing atmospheric carbon through sequestration, even though the latter may not qualify as offsets. Indeed, with the tightening scrutiny on carbon offsets as durable 1:1 emissions reductions, institutions wishing to act with the highest integrity may still direct their investment toward biological sequestration projects as a contribution to mitigation efforts, without claiming the investment as an emissions reduction.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Both	Mid	High	Low	Some Risk	Some Risk	High Risk	$

Soils

Soil carbon offsets are growing in popularity, as the world begins to recognize the vast carbon sink that the soil provides and the direct correlation between the soil's carbon content and the way humans practice agriculture. Stewarding soil by reducing tillage, maintaining roots in the ground and soil cover year-round, cover cropping, planting woody and perennial plants on farms, rotational grazing, and other practices are considered "carbon farming practices" for their ability to increase soil organic carbon stocks. Colleges and universities have a unique advantage in the development of soil carbon sequestration methodologies and monitoring. Not only do higher education institutions manage vast amounts of land, but many possess labs where dry combustion of soil can be used to measure soil carbon content. Currently, measurement is the greatest barrier to quality soil carbon offsets from improved agriculture and grazing. Soil sampling requires time and skilled labor, and lab analysis of soil cores can be costly. And, because soil carbon varies greatly both between regions and within regions, setting appropriate baselines can be difficult. Soil organic carbon builds slowly, and more readily when the soil is not disturbed, meaning that projects take a long time to produce credits, and require a lot of upfront investment across many acres to produce significant results. Advancements in remote sensing and the development of soil carbon tools to measure sequestration is a huge focus within the carbon offsets ecosystem, however, more research is needed to determine the efficacy of these tools against tried-and-true methods of sampling and dry combustion. More due diligence is needed for regenerative agriculture and regenerative grazing project types, to assess additionality, durability, leakage, and carbon accounting for soil carbon offsets. The Ohio State University, in partnership with other institutions of higher education, embarked on a multi-year applied research project in 2022 to implement and monitor the carbon impact of several carbon farming practices [51]. Similar projects are in the beginning stages at Cornell University, and with the issue of government grants across sectors, the effort to generate more reliable data on soil carbon sequestration is happening in earnest. Staying informed on these research methods and their outcomes will be important across the sector, and other institutions are well advised to research improved agricultural practices on institutional land, to both increase soil carbon stocks and join the effort to understand the carbon benefits of many regenerative agriculture practices. These projects are great investments for schools as part of climate action planning, because of their high social and environmental co-benefits and opportunities for living laboratory applications that can help reduce uncertainty and maximize benefits.[52]

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Both	Mid	Mid	Low	Some Risk	Low Risk	High Risk	$

51 https://carbon.osu.edu/c-farm

52 https://insights.carbon-direct.com/hubfs/gated-assets/challenges-and-opportunities-in-soil-carbon-credits.pdf

Biomass Burial

Biomass Burial refers to locking away tree and forest biomass to prevent the carbon release from its decay from entering the atmosphere. This project type has been driven by the increase in dead trees and tree waste from increasing forest fires, as well as from thinning projects launched in forests after decades of poor management that will help to reduce future fire threat[53].

In biomass burial projects, wood is buried or contained in stable "vaults" that prevent the natural carbon release from wood decomposition from entering the atmosphere. Vaults range from underground pits that are either stable because of the soil type and the climate where they are located, or because they have been lined with natural or synthetic material that helps control moisture and airflow- two key contributors to wood decomposition. Research is also underway[54] that looks at storing wood in extreme cold temperatures, underwater, or preserved in salt to stabilize its carbon.

Research is ongoing[55] for this project type, related to the above points about wood decomposition and vault stability. Questions also arise about whether this project type (along with bio-oil projects) will create perverse incentives to clear and thin more forests than necessary for ecosystem health. Critics wonder whether the emissions associated with logging, prescribed burns, thinning, and the transport and burial of wood will negate the carbon benefits of biomass burial. Perhaps most importantly, removing biomass from forests also removes nutrients from the forest ecosystem cycle, and ecologists are asking where preventing tree decay entirely is in the best interests of natural systems. Overall, this project type needs more research, both to determine the project type GHG integrity and to assess the impact of gigaton-scale implementation on whole forest ecosystems.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Avoidance	High	Low	High	Some Risk	Low Risk	High Risk	?

[53] https://www.technologyreview.com/2022/12/15/1065016/a-stealth-effort-to-bury-wood-for-carbon-removal-has-just-raised-millions/

[54] Zeng, N., Hausmann, H. Wood Vault: remove atmospheric CO2 with trees, store wood for carbon sequestration for now and as biomass, bioenergy and carbon reserve for the future. Carbon Balance Manage 17, 2 (2022). https://doi.org/10.1186/s13021-022-00202-0

[55] https://carboncontainmentlab.yale.edu/projects/wood-carbon-containment

Coastal Blue Carbon

Coastal Blue Carbon refers to a suite of project types that promote carbon storage in coastal wetlands. These include marshes, mangroves, seagrass habitats, and other tidally influenced ecosystems[56]. These ecosystems, which are estimated to store upwards of 44% of the world's biological carbon, are under threat from human activities including draining for coastal development and destruction for fish farming and other aquaculture[57]. Projects range from preservation of these ecosystems to avoid reversal of their carbon storage, to restoration and even construction of high-carbon capacity wetlands for carbon removal. Wetland ecosystems not only store carbon in vegetation but also (and primarily) in underwater soil carbon stocks.

Project types in the Blue Carbon category vary and can include:

- Re-wetting drained coastal wetlands
- Re-establishing salinity levels in coastal wetlands (which minimizes methane release)
- Planting trees (commonly mangroves) and seagrasses in coastal ecosystems
- Removing dams to restore sediment levels
- Creation of wetlands
- Preserving biodiversity in coastal ecosystems

As with terrestrial biological sequestration projects and soil carbon projects, blue carbon projects can face problems in determining appropriate baselines, establishing additionality, and ensuring the integrity of carbon accounting across a diversity of ecosystem variables. Wetlands are highly connected ecosystems that are almost all managed by humans, even indirectly. As such, they are sensitive to changes and impact can be difficult and costly to accurately measure. The many threats to coastal ecosystems including from impacts of climate change need to be carefully accounted for in projects to lessen durability concerns. Research questions remain, about how different wetland ecosystems sequester carbon at depth and the impact of the salinity limits of specific ecosystems on carbon and methane sinks and emissions. Furthermore, because such large carbon stocks exist in these ecosystems already, human-made increases in stocks can be hard to quantify[58]. Legal concerns and issues of double counting are often special challenges with blue carbon projects because large areas of coastal wetlands are controlled by federal, state, and tribal governments[59]. It is also important to consider social safeguards and evaluate the equity of blue carbon projects where indigenous peoples and local communities live in a dynamic relationship with coastal ecosystems.

The importance of wetlands cannot be overstated; restoration and protection of these ecosystems are vital. As with terrestrial biological sequestration, due diligence is needed at the individual project level to determine the greenhouse gas integrity of offset claims.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Both	Mid	High	Low	Some Risk	Low Risk	High Risk	$

Biochar

Biochar is a carbon-rich product created from gasification[60] or pyrolysis[61] of biomass. Biochar stabilizes the carbon in biomass so that it is much more durable against decomposition than the biomass would be in its raw state. Biochar can be produced in a standalone operation but can also be combined with pathways that produce energy via heat, liquid, or gas. Biochar can be added to soils to increase water absorption and retention, promote soil microbial activity, improve soil structure, and contribute to fertility and plant growth[62]. As such, biochar offers multiple pathways to carbon avoidance, removal, and sequestration.

While biochar technology is promising, research as to biochar's specific carbon benefits and industry in biochar production are both in the early stages. The carbon stability of biochar varies greatly depending on the production conditions and the type of biomass used, furthermore, because soil carbon varies so widely across soil type and climate, adding biochar to variable soils also produces varying sequestration results[63]. More field research is needed to determine the GHG integrity of this project type as a reliable quality offset option, and more finance is needed to back that research while also developing biochar production capacity.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Removal	High	Low	High	Some Risk	Low Risk	Some Risk	$

[56] Crooks, S., Sutton-Grier, A.E., Troxler, T.G. et al. Coastal wetland management as a contribution to the US National Greenhouse Gas Inventory. Nature Clim Change 8, 1109–1112 (2018). https://doi.org/10.1038/s41558-018-0345-0

[57] IPCC. https://www.ipcc-nggip.iges.or.jp/public/wetlands/pdf/Wetlands_separate_files/WS_Chp4_Coastal_Wetlands.pdf

[58] Mengis N, Paul A, Fernández-Méndez M (2023) Counting (on) blue carbon—Challenges and ways forward for carbon accounting of ecosystem-based carbon removal in marine environments. PLOS Clim 2(8): e0000148. https://doi.org/10.1371/journal.pclm.0000148

[59] https://estuaries.org/wp-content/uploads/2022/06/Legal-Issues-Affecting-Blue-Carbon-Projects.pdf

[60] conversion of biomass through high temperature heating with controlled, low oxygen input

[61] pyrolysis is the heating of organic material in the absence of oxygen. https://pyrolysis.cals.cornell.edu/

[62] https://lehmannlab.cals.cornell.edu/research/biochar/

[63] Kurt A Spokas (2010) Review of the stability of biochar in soils: predictability of O:C molar ratios, Carbon Management, 1:2, 289-303, DOI: 10.4155/cmt.10.32

Geological Sequestration

This type of sequestration involves capturing carbon dioxide emissions at point sources and injecting that CO2 into underground geological formations to store it and prevent its release through the surface. This is typically done by large industry businesses such as mines or fuel production companies. CO2 is injected into unrecoverable coal seams, saline formations, declining oil fields, and gas fields. Proponents of geological sequestration suggest that this method has the potential to store carbon for up to thousands of years. There are several concerns over geological carbon sequestration. While some forms of this sequestration are better understood, some have not been implemented as much, and the potential for leakage of the CO2 back into the atmosphere is unknown. Other complications also arise[64], such as determining the proper reservoirs for the CO2, and pressure build-up in the reservoir leading to clogging or cracking. In the case of oil fields, the injection of CO2 has been happening for decades via a process called Enhanced Oil Recovery[65] , which uses injected CO2 to force out any trapped oil in a reservoir. While enhanced oil recovery has contributed to a better understanding of geological sequestration mechanisms, there is still the chance that stored CO2 could revitalize oil fields, leading to further oil recovery and its burning and associated emissions. In the case of coal beds, injection of CO2 often releases methane, which would then need to be captured and used for energy so that the carbon sequestered by injection would not be negated by more potent methane release. Geological sequestration is also very expensive and not common practice[66]. This project type could have some reversibility concerns, in the case of an earthquake, for example, though the permanence risk for geological sequestration varies based on the stability of CO2 and the characteristics of the reservoir used. Though many approaches are still undergoing lab study, geological sequestration is considered to present a highly permanent approach to storing CO2. It is important to note that geological sequestration does not promote a shift away from fossil fuel consumption, however successful geological sequestration allows for other project types, such as Direct Air Capture and Biomass Energy Production with Carbon Capture and Storage, to become emissions-negative[67]. There are documented equity concerns about the citing of carbon capture and storage, most notably as covered by the media in response to broad regulatory relaxation allowing the state of Louisiana to welcome untested CCS business into the infamous Cancer Alley, where residents have endured generations of environmental justice violations[68].

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Removal	High	Low	High	Low Risk	Low Risk	Low Risk	? $

[64] Kelemen Peter, Benson Sally M., Pilorgé Hélène, Psarras Peter, Wilcox Jennifer. An Overview of the Status and Challenges of CO2 Storage in Minerals and Geological Formations. Frontiers in Climate VOL 1, 2019 https://www.frontiersin.org/articles/10.3389/fclim.2019.00009

[65] https://pubs.usgs.gov/fs/2010/3122/pdf/FS2010-3122.pdf

[66] https://www.cbo.gov/publication/59832#

[67] CDR Primer

[68] https://www.washingtonpost.com/nation/2023/06/22/biden-carbon-capture-climate-environmentalists/

Concrete Injection

Concrete production presents another opportunity for CO_2 removal and associated offsets. As with geological sequestration CO_2 is captured at point sources and stored, then injected into cement to produce the carbonation reaction that stabilizes concrete. While this project type is promising, more research and development is needed where promising strategies exist to ensure that the emissions required to capture CO_2 do not negate the benefits of injection into concrete[69].

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Both	High	Mid	High	Low Risk	Low Risk	Some Risk	?, $

CO2 Mineralization & Enhanced Weathering

CO_2 mineralization refers to carbon dioxide being converted to a solid form, such as carbonate, and thereby stabilized so that it does not contribute to global warming[70]. Mineralization is a natural process and includes the chemical weathering of rocks that occurs over huge time periods in the natural mineral cycles of the earth. Under these circumstances, rocks break down and absorb CO_2, mostly from rain. The CO_2 in the rain becomes tied up with elements in the rocks such as calcium and magnesium, forming bicarbonate. The bicarbonate travels with the water cycle and ends up stored on the ocean floor. Mineralization therefore requires alkaline reagents such as silica, calcium, and magnesium in the rock that often are available in situ, or mineralization can be engineered by bringing CO_2-rich waters in contact with alkaline substrates, including recovered industrial wastes. In practice, this means that mineralization and removal of CO_2 can happen passively at existing mining sites, or captured CO_2 can be channeled through existing alkaline geologic formations. While not currently a threat, mineralization at the gigaton scale may begin to rely on continued mining or other land acquisition and destruction to produce the proper reagents [71].

CO_2 mineralization is used as an insetting technique in industrial mining operations, and as such not all offsets from this practice are commonly sold on the VCM. However, Enhanced Weathering is an offset project type that refers to speeding up natural chemical rock weathering and CO_2 mineralization by pulverizing alkaline rock to produce a high surface area, and then spreading that rock into agricultural soils where it can stabilize carbon. Speeding up the mineralization process also contributes more alkalinity to the water cycle, thereby counteracting ocean acidification. The most common enhanced weathering projects pulverize basalt, a common volcanic rock rich in silica, and apply the silicate rock to arable farmland. The rock powder not only mineralizes CO_2, but also has benefits to soil structure, productivity, and stability while also providing carbon storage. Enhanced weathering is a promising project type for the multiple benefits of CO_2 removal, enhanced agricultural productivity, and reduced ocean acidification. Pulverization and spreading of rock produce emissions and can negate the carbon benefit of enhanced weathering by 10-30%. More research is needed to understand how to measure the true carbon benefit of enhanced weathering across a range of soil types, and the long-term impacts of the rock powder on soil chemical profiles and microbial ecosystems.

Type	Cost Range	Availability	Durability	Additionality	Double-Counting Concerns?	Over-Crediting Concerns	Best Bet
Removal	High	Mid	High	Low Risk	Low Risk	Some Risk	?, $

BECCS: Biomass Energy (with Carbon Capture and Storage)

BECCS is a very broad project type that speaks to the conversion of any biomass (e.g. cornstalks, sawdust) into energy including heat, electricity, and liquid or gaseous fuels. The most common example of biomass energy conversion that many are familiar with is the production of ethanol fuel from corn. However, such processes don't become carbon removal projects (and therefore offset projects) unless they are coupled with a carbon capture and storage component. This is because the energy emissions from the production and processing of biomass often exceed the carbon benefit of their conversion to energy or biofuel (depending on the conversion process) and carbon capture and storage can enable these processes to become carbon-negative[72] .

The scalability of BECCS is difficult, and projects are rare on the VCM as of this writing. Wider scale adoption of BECCS is limited because scaled production of biomass requires scaled land use (for both CO2 storage and biomass production) and should not threaten food security or conservation of natural resources. And, as with geological sequestration, the capture and storage of CO2 requires proper siting of BECCS facilities and additional land requirements to accommodate carbon storage. Energy distribution considerations abound with BECCS, and some contend that processes should be cited close to biomass stocks rather than storage sites. In this way, BECCS faces governance and policy barriers to implementation, in addition to the normal carbon accounting questions associated with removal technologies [73]. Despite contention and challenges, this project type is inclusive of several important technologies in the carbon removal effort, including biological fermentation of cellulosic biomass, hydrogen syngas production from gasification (important to sustainable aviation fuels markets), and scaling of pyrolysis and biochar production.

Type	Cost Range	Availability	Durability	Additionality	Double-Counting Concerns?	Over-Crediting Concerns	Best Bet
Removal	High	Low	High	Some Risk	Low Risk	Some Risk	?, $

[69] Ravikumar, D., Zhang, D., Keoleian, G. et al. Carbon dioxide utilization in concrete curing or mixing might not produce a net climate benefit. Nat Commun 12, 855 (2021). https://doi.org/10.1038/s41467-021-21148-w

[70] https://cdrprimer.org/read/chapter-2#sec-2-1

[71] Salvatore Calabrese, Bastien Wild, Matteo B. Bertagni, Ian C. Bourg, Claire White, Felipe Aburto, Giuseppe Cipolla, Leonardo V. Noto, and Amilcare Porporato. Nano- to Global-Scale Uncertainties in Terrestrial Enhanced Weathering Environmental Science & Technology 2022 56 (22), 15261-15272 DOI: 10.1021/acs.est.2c03163

[72] Blanc-Betes, Elena, et al. "Climate vs Energy Security: Quantifying the Trade-offs of BECCS Deployment and Overcoming Opportunity Costs on Set-Aside Land." Environmental Science & Technology 57.48 (2023): 19732-19748.

[73] Galik, Christopher S., et al. "Accounting Considerations for Capturing the GHG Consequences of BECCS." Energy Futures Initiative, Washington, DC (2023).

Direct Air Capture (DAC)

Direct air capture is a technology that uses chemical reactions to separate CO2 from ambient air. DAC operations are collections of machines called contactors that contain synthetic sorbents, or solids that will bind to the CO2 in the air. In contrast, the other molecules in the ambient air continue to move through the system. Then, heat is used to break the bonds between the CO2 and the sorbents and compress CO2 in pipes which transport it to tanks for offloading and storage. Other DAC operations use liquid solvents to absorb CO2, instead of using solid sorbents. The liquid approach can avoid some supply chain issues in sorbent manufacturing; however, it requires more heat. Both approaches use heat and electricity to operate, and both approaches require long-term storage options for the CO2. Currently, the costs to develop DAC and the energy and infrastructure required to separate CO2 from ambient air are high. DAC is a nascent technology, with research being directed at the infrastructure, energy, and land requirements to develop the technologies to scale[74]. Because carbon removal is highly important to global climate action goals, DAC is high on the list of developmental priorities before 2030.

Due to energy needs, most DAC operations are co-located with both power plants and geological storage options, so they require significant land. Additionally, ongoing research about how far apart contactors must be spaced for the air leaving them to become re-saturated with CO2 has further implications on the land use requirements for DAC. Successful early DAC plants exist where siting considerations favor their function. For example, in Iceland, where adequate land holdings allow space, high-silica basalt rock formations allow for in situ carbon mineralization and ideal conditions for geothermal energy allow the operation to be powered by low-carbon energy[75]. In other contexts, however, many questions surround the scaling of DAC across diverse contexts within the current energy reality, and how rapid scaling of DAC will impact global energy demand from fossil fuels or efforts to decarbonize the grid. While powering DAC facilities with renewable energy seems obvious, global efforts to develop renewable energy are first being directed at displacing fossil fuels, not at direct air capture. And, land requirements for wind or solar power add to the footprint of DAC facilities. Not only does DAC require high energy inputs to move air, apply heat, and compress gas, it also requires commercially available solid sorbents to adsorb CO2. The adsorption potential and surface area of these materials are directly related to their efficiency in removing CO2 from ambient air, which drives further research and energy into the manufacturing of novel, synthetic sorbents. Each hypothetical improvement to DAC systems comes with its own alterations to the carbon benefits of DAC systems, and unique environmental trade-offs[76].

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[74] Motlaghzadeh, Kasra, et al. "Key uncertainties behind global projections of direct air capture deployment." Applied Energy 348 (2023): 121485.

[75] https://cdrprimer.org/read/chapter-2#sec-2-8-6

[76] Qiu, Yang, et al. "Environmental trade-offs of direct air capture technologies in climate change mitigation toward 2100." Nature Communications 13.1 (2022): 3635.

It is estimated that to develop DAC to scale, the world must contribute $1 trillion annually to DAC research and development efforts. Still, DAC remains a popular element within the suite of carbon removal technologies. It offers credible carbon reductions that are measurable, durable, and additional[77]. As the technology develops, credits are available at high cost and may be of interest to schools as part of a portfolio that emphasizes both measurable reductions and dedicated finance to support emerging technologies.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Removal	High	Low	High	High Risk	Low Risk	Low Risk	?, ✓

Ocean Alkalinity Enhancement

Ocean acidification results from the ocean's absorption of roughly ⅓ of the atmospheric CO2 that has accumulated since the Industrial Revolution. The rapid buildup of CO2 in the world's oceans leads to chemical changes in the waters, particularly a rise in hydrogen ions that leads to acidification. More acidic sea waters not only have a declining capacity to buffer atmospheric CO2, but they also lack the chemical balance upon which marine ecosystems depend. Particularly, coral reefs and mollusks depend on alkaline ions that are only present at a certain pH to form their structures. Acidity also affects hunting success in fish communities[78].

Ocean alkalinity enhancement refers to a suite of approaches that seek to infuse the oceans with bicarbonate (alkaline) ions, via rock minerals, to counteract the rapid accumulation of acidifying CO2. Methods of enhancing ocean alkalinity include weathering minerals in seawater tanks or spreading minerals into the ocean directly. Most technologies are in the developing stages, and even as operations are scaling, there are regulations against adding minerals to oceans at scale[79]. Other challenges with these methods have to do with distribution, because the ocean forms or reacts to alkaline ions differently at different depths, and because extreme localized alkalinity can have negative effects. Other complications include the increase in carbonate production by coral reefs and mollusks as ocean pH rises (becomes less acidic) which releases CO2 into the water, presenting a special kind of "leakage" when it comes to assessing the carbon benefit of ocean pH manipulations. Lastly, whole ecosystem questions arise concerning ocean alkalinity projects, like biomass burial experiments. Human interventions that seek to increase or decrease specific minerals or elements can be reductive, causing impacts to the web of life in oceans and forests that are unintended or unforeseen[80].

Currently, carbon mineralization insetting efforts at the industry scale are connected to this category and offsets available on the voluntary market that might be encountered by campus buyers include enhanced weathering projects, discussed on page 41. Because these project types pulverize alkaline rocks and spread them on terrestrial surfaces, they allow bicarbonate formation via natural rain events and slow release into the oceans via the water cycle.

In addition to carbon mineralization and enhanced weathering, another offset project type that is connected to ocean alkalinity is seaweed sinking. These projects cultivate seaweed on bicarbonate tiles or weights and then sink them into the ocean. The seaweed is beneficial in absorbing CO2 (also called ocean afforestation), while the carbonate weights eventually dissolve and enhance the alkalinity of seawater. Ocean afforestation as a project type is still in its infancy, as research is ongoing into carbon accounting and the complex ecosystem impacts of the bicarbonate rafts on phytoplankton, and on existing seaweed at the bottom of the ocean. Legal concerns can also arise, about ocean treaties and regulations that govern adding any materials into the open ocean.

Type	*Cost Range*	*Availability*	*Durability*	*Additionality*	*Double-Counting Concerns?*	*Over-Crediting Concerns*	*Best Bet*
Removal	**High**	**Mid**	**High**	**Low Risk**	**Low Risk**	**Some Risk**	**?**

[77] Küng, Lukas, et al. "A roadmap for achieving scalable, safe, and low-cost direct air carbon capture and storage." Energy & Environmental Science 16.10 (2023): 4280-4304.

[78] https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification

[79] https://cdrprimer.org/read/chapter-2#sec-2-2

[80] Ross Finnley, Tarbuck Patrick, Macreadie Peter I. Seaweed afforestation at large-scales exclusively for carbon sequestration: Critical assessment of risks, viability and the state of knowledge. Frontiers in Marine Science VOL9. 2022 https://www.frontiersin.org/articles/10.3389/fmars.2022.1015612

Section 3: Offsets within the Climate Action Planning Context

3.1 Building an Institutional Offsets Strategy

Second Nature's Climate Commitments foster a strategic approach to carbon management on campuses by providing signatories with a common framework through which they complete an inventory of their current GHG emissions, identify key target areas for reductions, and evaluate and prioritize potential solutions for decarbonization. Offsets can be an effective piece of a Climate Action Plan on the path to decarbonization - and for hard to mitigate emissions and contributions to mitigation outside the campus boundary. As part of fulfilling their Commitment, each signatory determines for itself what role, if any, carbon offsets will play in their Climate Action Plan. These decisions will depend on the institution's unique circumstances, goals, and culture.

While incorporating offsets into Climate Action Plans is not necessary under the Commitments, internalization of at least some of the true costs of carbon emissions is an important consideration in taking a strategic approach to climate action, and a potentially effective accelerator of internal reductions. It is possible to develop a plan that does not include the use of offsets at any stage. While some contend that there will always be a certain portion of irreducible net GHG emissions, particularly scope 3 emissions, others argue that the moral imperative is to focus on decarbonization of Scope 1 and 2 emissions and eschew offsets entirely.

This question of investing in internal reductions versus offsets need not be an either/or proposition. Effective strategies might take varying approaches to the use of offsets in Climate Action Planning to achieve different goals. For example, offsetting might be approached by GHG scope, offsetting scope 3 emissions (for aspects that are generally considered to be "unavoidable") while at the same time working on internal mitigation projects to reduce scope 1 & 2 emissions. Producing and selling offsets to capitalize a Green Revolving Fund may be an effective strategy to accelerate internal mitigation. Selling offsets through Second Nature's C2P2 program may provide a portion of the finance needed to do direct decarbonization, or use the sale of offsets from those decarbonization efforts for other sustainability initiatives. The possibilities presented by developing institution-financed offset projects (i.e., "local" offsets) can also potentially meet other sustainability goals such as community education and economic development, particularly around the goals of the Resilience Commitment.

Overall, signatories should think of carbon markets and offsetting as additional tools for achieving their climate and sustainability goals. Offset markets are designed to provide incentives and flexibility for achieving carbon neutrality as quickly as possible, at least cost. There are pros and cons to this reality. Second Nature advises signatories to develop offset strategies that move the institution toward the most feasible suite of actions in line with science, and in the sections below we provide examples of how to do this regardless of the institutional approach to offsets engagement. Of paramount importance is the development of a dedicated strategy on offsetting that is relative to overall institutional ambition. Such strategy development does not happen quickly or easily, given the complexity of the carbon offsets landscape. However, gathering the right stakeholders to do the work of offset strategy development is what leads to generative conversations about climate ambition that tend to move the needle on institutional progress. Offset strategy development, then, can be seen as a way of adding to, and deepening the campus climate action plan, and efforts toward the milestone of carbon neutrality can set the stage for success in deep decarbonization.

Offsets Strategy and Commitments 3.0

The updates to Second Nature's Climate Commitments, or Commitments version 3.0, improve climate action guidance for the higher education sector with an eye for appropriate rigor and a way to stretch ambition from climate neutrality as an end goal to a milestone on the path to meaningful decarbonization. The Commitments still recognize climate neutrality as an important short term target, but offer additional metrics and recognition for action. Within this framework, special attention has been paid to how and when offsets can be used as tools for financing mitigation with integrity, and to developing thresholds or guardrails for their use when decarbonization is the highest priority.

The supply of high quality carbon offsets is limited compared to the demand for offsets across sectors, and that is expected to continue as the global imperative to mitigate emissions heightens. The tight supply of offsets therefore encourages leaders to prioritize science-aligned decarbonization, and to finance massive energy systems change and meaningful reductions in the use of fossil fuels. Institutions wishing to set and maintain science aligned targets for climate action should prioritize direct decarbonization of Scope 1 and 2 emissions by as much as 90% by 2045[81] . Use of carbon credits on this journey, as tools for carbon pricing, finance, and emissions offsetting should ideally occur at a declining rate. The rate of decline, in line with science, should equate to 10% annually, however Second Nature recognizes that rigorous decarbonization does not happen at a steady rate year over year. Therefore, it is reasonable to expect public GHG reports to show modest decline in offsets reliance across scopes in some years, and more substantial declines in other years, corresponding with milestones such as the completion of extensive energy systems change projects or other changes on campus.

These thresholds are recommendations for best practice, and not requirements under the new iteration of the Climate Leadership Commitments.

Finally, Commitments 3.0 adds additional transparency in offsets reporting, allowing institutions to demonstrate leading ambition, and to allow improved data synthesis for tracking sector trends and collective impact. More information about reporting and tracking improvements can be found in Section 3.6.

Best Practices for Strategy Development

First and foremost, a good offset strategy happens in relation to clear climate targets. Second Nature recommends that institutions determine near term climate neutrality dates, and further net zero or decarbonization dates, with the further-term decarbonization targets as close to mid-century as possible to stay aligned with science. Once these dates are determined, an offset strategy can be developed that integrates with and deepens the short term and long term goals.

Alongside clear targets for greenhouse gas reduction ambition, Second Nature also recommends the development of stated priorities and values beyond emissions targets, such as equity and justice goals, priorities for financial sustainability, campus and community resilience, educational integration, and inclusive governance, and community stakeholder engagement. Pairing qualitative values alongside quantitative GHG reduction goals provides a foundation for offset engagement strategy development that will feel more manageable when you begin assessing the offset projects themselves. Groups without clear goals outside of GHG reduction ambitions spend more time in the weeds of project due diligence, whereas schools with robust holistic values for their offset program can implement a process of elimination, removing offset projects that don't fit, and continuing to do due diligence on the remaining project types that do.

The most effective way to identify values and begin holistic strategy development is through working groups and task forces, usually made up of cross departmental and multidisciplinary teams. These groups of sustainability staff, operations staff, financial staff, faculty, researchers, and others can assess offsets engagement from all the relevant angles to ensure integrity, integration with institutional mission, and efficient alignment with sustainability and financial goals.

Once a task force has been developed and values around both GHG reduction targets and qualitative goals have been identified, it can be helpful to develop a system that weights each value identified by the group in order of importance. This works because not only will no offset project meet all goals, but most offset projects will require decision makers to balance significant tradeoffs between one or more values of the institution. Adding weights to your list of values helps with evaluation and prevents avoidable paralysis in project vetting later.

A survey of Second Nature members about the values impacting their offset purchasing and evaluation revealed in the following table. Note that the values were pre-determined by Second Nature for the purposes of surveying. This data provides institutions with some insight into common values held by peer institutions and their relative importance. It is not meant to be an exhaustive list of possible values to consider in offset strategy development or project vetting.

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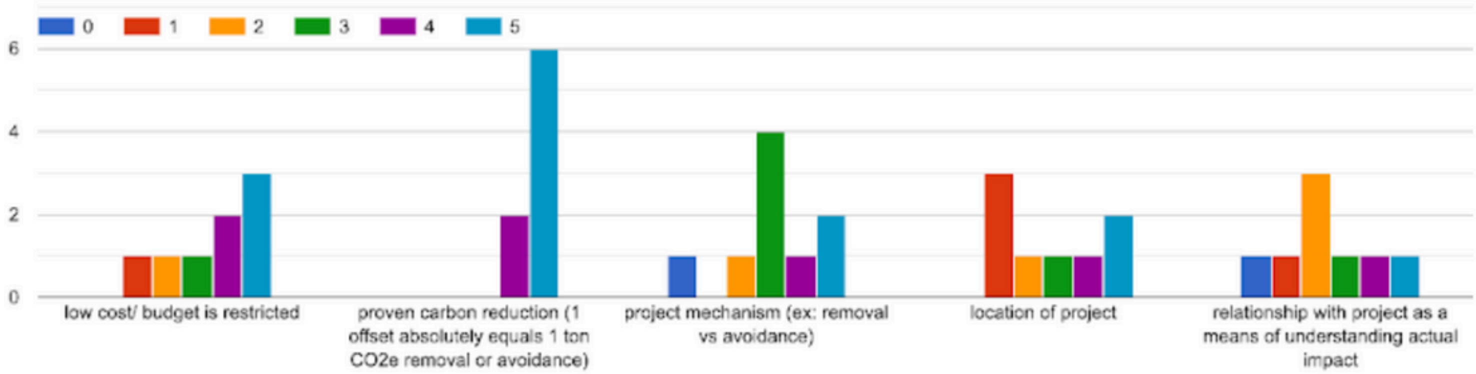
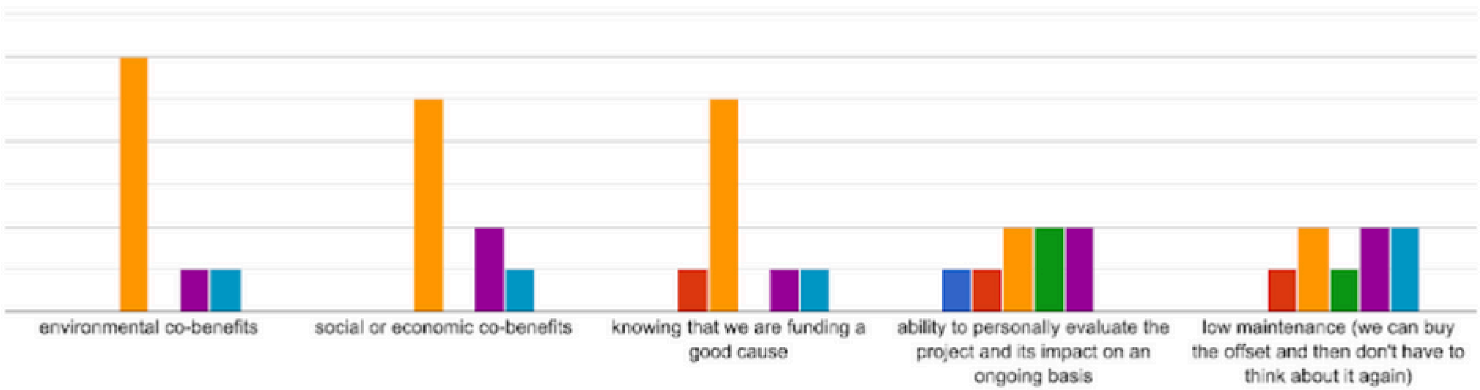
[81] This target was developed by balancing the assertion in Anderson, K., Martin, P., & Nevins, J. (2021). Introduction and Abridged Text of Lecture: "Laggards or Leaders: Academia and Its Responsibility in Delivering on the Paris Commitments." The Professional Geographer, 74(1), 122–126. https://doi.org/10.1080/00330124.2021.1915809 that academia should reduce 100% of emissions by 2035, the Biden administration's commitment to netzero across all industries by 2050, and work by Alex Barron, Aaron Strong, and Lucy Metts suggesting 100% decarbonization by 2050.

In the tables below, you will see how institutions ranked certain priorities in offsets engagement as follows:

0= “We don’t prioritize this”
1= “Low priority”
2= “We value this, but we value other factors more”
3= “We are agnostic about this”
4= “We value this highly, but it can’t be top priority”
5= “This is a top priority and takes precedent in decision making”





At the time of surveying, two-thirds of respondents stated that their institution did not have a unified strategy for offset engagement, and that these values were largely determined by the sustainability department. The sustainability department managed offset engagement among 46% of survey respondents. Only two respondents mentioned a multi-stakeholder task force.

Considering the best practices for offset engagement reviewed so far in this document, the prospect of sustainability departments handling offset strategy with little support across the institution, or in a vacuum, points to considerable opportunity for positive growth in the sector. The overlapping complexity of factors to consider range from carbon pricing and values alignment to project vetting according to the latest science and assurance of equity and co-benefits, just to name a few. Beyond these deep considerations, the sourcing, financial, administrative, and communications tasks continue to unfold. For this reason of complexity alone, Second Nature strongly recommends the formation of cross-silo task forces and dedicated attention across the institution as the best practice for offset strategy development.

Case Study: University of Loyola Chicago-Offset Strategy Development

The University of Loyola at Chicago adopted its initial climate action plan in 2015, setting a target of climate neutrality by 2025. While the institution has made significant progress in decarbonization toward that goal (70% reduction across all emissions as of 2021), it became clear to the office of sustainability that eliminating the carbon emissions from Scope 1 activities (including use of natural gas, university-owned vehicle fuels, fertilizer, and refrigerants) would not be completed by the 2025 timeline. In order to develop the values, policies, and processes by which Loyola would engage in offset purchasing, the University formed the Carbon Offset Purchasing Policy Working Group. The working group is composed of faculty, facilities and sustainability staff, business office staff, and students. The goal of the working group was to provide guidelines for purchasing value-appropriate carbon credits to meet carbon neutrality goals by 2025.

The working group set broad value parameters for Loyola's carbon offsets engagement first, agreeing to institute an internal carbon price in capital planning to reinforce the assertion that the institution prioritizes direct emissions reductions over offset purchases. The group also spelled out specific values of carbon offset integrity that were of utmost importance, naming additionality, durability (permanence), quantification, enforceability, and real emission reductions as key priorities. They indicated a preference for a portfolio approach, and a project that matched the offset mitigation to when Loyola's actual emissions occurred. The working group further specified that the institution would not fund carbon capture and sequestration projects that allow off-site fossil fuel extraction, refining, industrial processing, or combustion to continue.

The working group also identified preference to projects which (in priority order):

1. Demonstrate permanence via certification protocol,
2. Provide educational and research opportunities,
3. Address economic development, and
4. Have the project location within the United States or near LUC activities.

The group further identified ways in which offset procurement would follow existing procurement guidelines set forth by the University, and how the procurement process for offsets might differ.

Once the guidelines were adopted in 2022, facilities and sustainability staff initiated a request for information (RFI) process and vetted vendors who responded to that request. After a thorough review of vendors, the initial procurement process was updated in the following ways:

1. Less emphasis on "vintage-matching" for the emissions-producing and the carbon-removing activities.
2. The preference to have a portfolio of projects became less important through Loyola's procurement process.
3. The preference for education-aligned projects (supporting research, student-learning, etc) became stronger through the procurement process.

As of this writing, Loyola University Chicago has completed its initial procurement of carbon offsets from Tradewater in pursuit of the institution's 2025 neutrality target. Included in the offset purchase agreement with Tradewater for offsets from the destruction of ozone-depleting substances (ODS), Loyola also secured an educational agreement so that students can visit the project and learn about ODS through university coursework.

The procurement guidelines will continue to inform Loyola's engagement with offsets annually, and will also guide the institution's Decarbonization Plan and associated Capital Master Plan as Loyola's action beyond neutrality takes shape.

Some Offset Strategy Examples

The simplified offset strategy approaches may assist campuses early in their journey by showcasing the range of initiative possible when beginning to consider carbon offsets engagement.

Least-Cost Approach

This strategy evaluates the cost of offsets alongside the marginal cost of abatement of internal mitigation projects, comparing the cost-per-ton of on-campus projects to the price-per-ton of a carbon credit. Above a certain cost threshold for internal reductions, investments in offsets may be more effective in terms of overall tons reduced per dollar invested. In some cases, this is economically more feasible than financing on-campus mitigation, or it may be the only avenue supported by administration. And, this strategy comes into play for reaching near term climate neutrality goals once the "low-hanging fruit" of on-campus emissions reductions have been picked. Second Nature does not recommend this approach across the board, and considers it the minimum practice, prioritizing deeper investments in decarbonization and thought toward the true cost of carbon whether emitted or mitigated. (see Sections 1.2 & 1.3 on Carbon Pricing and the Social Cost of Carbon). However, we include this approach here because in many ways it can be a first step for campuses to begin putting a price on carbon, and starting difficult conversations about what it will take to pursue climate mitigation with increased ambition over time. Second Nature also recognizes that many campuses are on the learning edge of a climate action journey, may have only one champion on campus in support of sustainability, or have little institutional support for climate action goals. Under these circumstances, a least cost approach can be a brave step, often because of the controversy it may stir.

Neutrality First Approach

Some institutions reverse the usual carbon management hierarchy and achieve carbon neutrality through offsetting before beginning other mitigation efforts. These institutions feel that the threat of climate change is so pressing that it is their moral responsibility to become immediately carbon neutral. Typically, such institutions have a manageable carbon footprint and also commit to reduce the number of offsets they purchase each year through on-campus mitigation efforts. As with least-cost approaches, Second Nature does not recommend this approach as best practice. The neutrality first approach is still included here as a reminder that the very act of offsetting puts a price on GHG emissions. This price signal can drive internal emission reductions, because every ton of carbon that is not emitted represents one less offset that needs to be purchased. Sustainability leaders who don't have support for even the lowest hanging fruit of mitigation options on their campus may consider the neutrality first approach as a way to start the conversation with decision makers. The short-term purchase of offsets for a public neutrality claim can be an effective way to drive the institution toward real reductions. If using this strategy, Second Nature recommends pairing the neutrality first intention and announcement with a clear "stretch" target that communicates how the institution will progress with on-campus emissions reductions going forward.

Offsets by Scope

Approaching offsetting by scope can be an effective strategy for a Climate Action Plan. Control over and measurability of emissions differs greatly across scopes. An institution has direct management of its scope 1 emissions, whereas by definition scope 3 emissions are produced by a different entity (and are that organization's scope 1 emissions), which can often only be controlled though choice of vendor or reduction of those purchases or activities. Also, scope 1 emissions are very precisely calculated based on the direct fossil fuel use of an institution. Scope 3 emissions, on the other hand, can only be roughly estimated based on available data. Determining which sources of scope 3 emissions to track can also be open to interpretation. The Greenhouse Gas Protocol identifies 15 categories of scope 3 emissions, and the corporate sector is moving toward standards that require tracking and reduction of all 15. The Second Nature Climate Commitments require signatories to track and report 2 of these – institution-funded air travel and student/faculty/staff commuting– and campuses are recognized for tracking and mitigating more categories. This limitation on the requirement of Scope 3 categories is intentional, so that the sector can focus more on direct decarbonization of Scope 1 and 2 emissions, and rely on offsets for a limited number of scope 3 emissions that contribute a large number of emissions to the overall inventory.

Best practice in alignment with science is to focus offsetting more so in Scope 3 categories. This also aligns with reality in the higher education sector, where many institutions have high international research projects, and cannot quickly reduce air travel and stay true to the teaching and research missions of the institution. These campuses typically offset those emissions instead.

Case Study:

American University

American University purchases verified carbon offsets as a third-tier strategy in their sustainability plan, emphasizing on-campus carbon reductions and changes to indirect emissions first. The University selects a portfolio of carbon credits that align with different sources of emissions. AU purchased offsets from a clean cookstoves project in Kenya to offset their study abroad travel emissions. AU also looks for projects that have additional benefits included benefits to the community where the project is located or information from the projects that can be used in classrooms. The cookstove project was selected because it occurs in the Kenyan communities where the University already has relationships, and the project fulfills community and economic co-benefits over and above the offsets it provides. This strategy and these projects are evaluated on an ongoing basis to ensure the impact is in line with the goals.

Further, the uncertainty in estimating scope 3 emissions provides an excellent opportunity for signatories to utilize their research capacity to develop new and innovative offsetting practices for these emissions. By providing additional flexibility in developing new types of "local" offsets in this area the Commitments hope to provide new opportunities for signatories to account for and reduce their scope 3 emissions while at the same time bringing new research to the existing offset markets and protocols. For more details see Section 3.4: Peer Reviewed and Innovative Offsets.

Despite ideals around direct decarbonization, offsets by scope are not only applied to Scope 3 categories. For example, if an institution is located in a region with a very carbon intensive electric grid, and little to no policy activity or investment in decarbonizing the electricity supply, it may be advantageous to aim for zero-carbon electricity through purchases of offsets or renewable energy (RECs). Institutions with highly efficient stationary combustion, or capital planning challenges that limit the accessibility of deep infrastructure changes may be required by administration to consider offsets for Scope 1 emissions in order to maintain climate action. Second Nature recommends that institutions taking an offsetting by scope approach also clearly state how the offset reliance may change over time for the emissions category, and why. While we recommend a 5-10% decrease in reliance on offsets compared to the year prior to show meaningful leadership in line with science, we recognize that context matters. Clear communication in climate action plans, offset strategy documentation, and reporting goes a long way to demonstrating how offset strategies integrate with overall priorities for integrity and best practice.

Producing & Marketing Offsets

It is possible for an institution to develop marketable offset projects as part of its overall mitigation process. For example, if a campus were to undertake suites of energy efficiency projects or initiate a fuel switching project, it is possible that the associated emissions reductions could be documented as carbon offsets and sold on a state exchange or voluntary carbon market. Sold offsets cannot be counted towards an institution's carbon neutrality target, but can be an important tool for achieving carbon neutrality more quickly by generating funding that can be applied to further mitigation efforts (perhaps through the mechanism of a green revolving fund). Offset sales can also be timed in such a way as to foster the achievement of a carbon neutrality target. For example, a plan might include the sale of offsets from a project until any debt accrued to finance the project has been repaid at which point the offsets would be retired toward the buyer's carbon neutrality target. This is the classic use of offsets – to finance a project that would not be possible without the additional source of funding. Second Nature's Carbon Credit and Purchasing Program may be a viable option for campuses wishing to explore this approach. For more details, see Section 3.3: Offset Project Development.

Targeted Offsets

In some cases, it may be beneficial to purchase or produce offsets to mitigate specific emissions sources or meet additional sustainability goals. For example, an institution might decide to ensure all the activities of an overseas study abroad program are carbon neutral for educational purposes. Offsets might be purchased from projects within the host country or the institution might finance projects to produce offsets at the study abroad site. Another case might be where a signatory determined an emission source generated "unavoidable" emissions that needed to be offset. For example, if a campus was deciding to invest in a geothermal system or a natural gas-fired cogeneration system, the projects could be evaluated including the cost of offsetting the thermal load of the cogeneration plant. If a campus were to unexpectedly fall short of an interim GHG target, a limited-time purchase of offsets could be an effective strategy to meet the immediate goals without altering their Climate Action Plan until emissions were reduced to the target level. Disclosure of these approaches is advisable, and Second Nature's annual offset purchasing survey can be a way to provide additional reporting on campus tactics, and the nuance associated with complex decision making. Access the survey here for 2024.

3.2 Offset Purchasing

Second Nature collected data on higher education offset purchasing trends in 2023 to secure a baseline of information about college and university procurement. The survey was sent to 75 institutions, and the sample included all 17 institutions who had reported offset purchases as of their 2022 SIMAP reporting year. Exactly 50% of respondents to the survey reported no offset purchases on their campus, and the other 50% reported purchases of as few as 30 MTCO2e to as many as 75,000 MTCO2e. It is worth noting that the largest offset purchase was associated with a compliance market, of which the university is a regulated entity.

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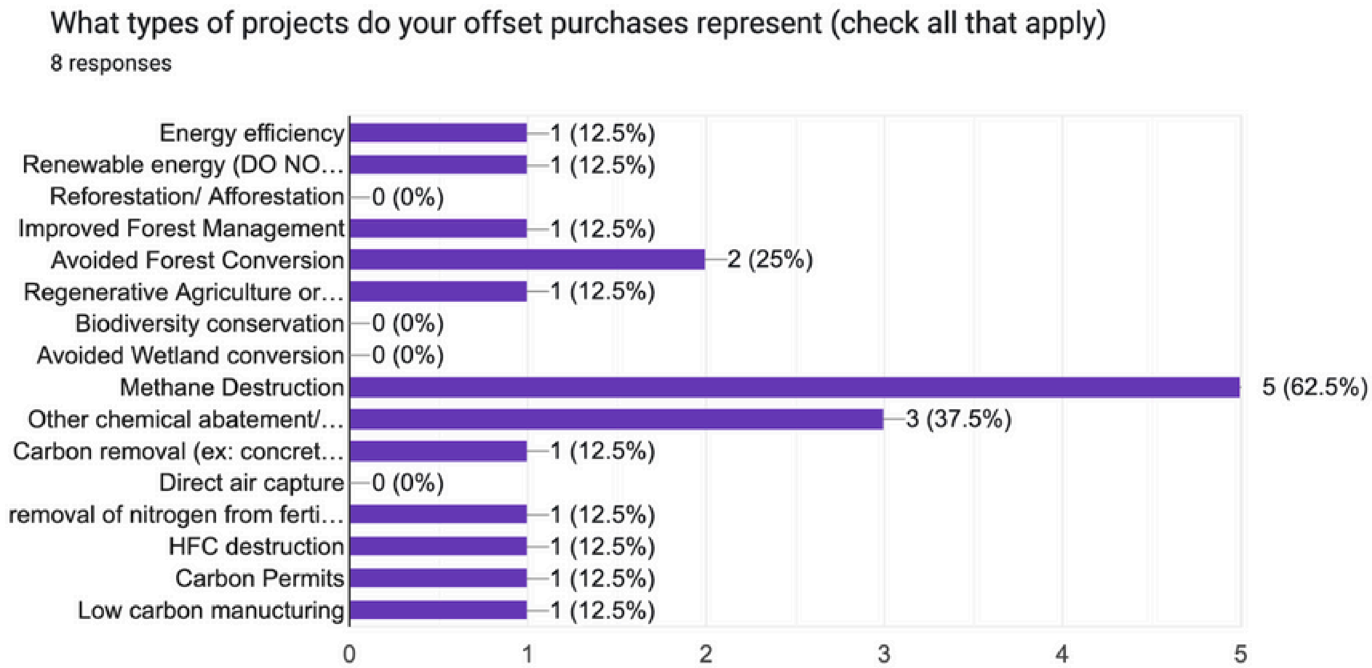
Campuses report an average offset price of $1-$20 per ton, and all campuses are purchasing ISO third party accredited offsets. Peer-reviewed offsets (see Section 3.4) have been used by a number of campuses in the Climate Leadership Network, however these campuses were not among the survey respondents.

The projects most favored by higher education are shown in Figure 2 (below), with a strong preference for methane destruction, industrial gas destruction or chemical abatement.

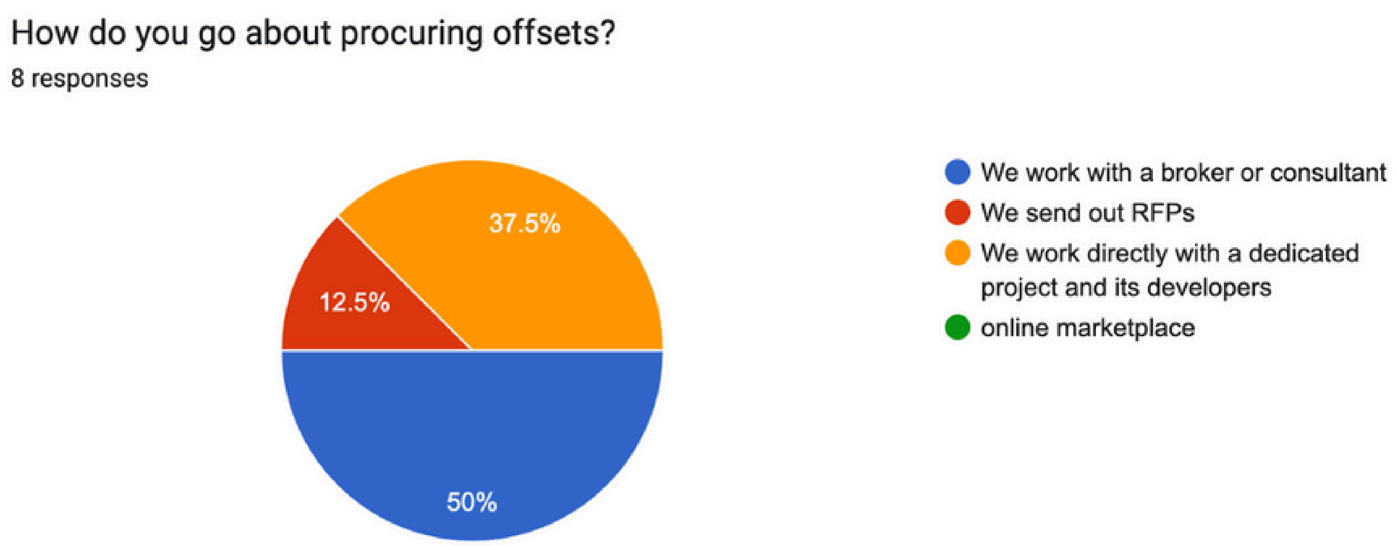
Figure 2: Offset Projects favored by purchasing higher education institutions



Sourcing Offsets

Campuses use a range of methodologies to source offsets, and the approach tends to depend on institutional mandate. For example, public institutions are usually required to issue a Request for Proposals (RFP), to which offset project developers and offset brokers can respond. Private institutions can be pickier, for example, choosing to work with an alumni who happens to be an offset consultant. Other factors affecting the offset sourcing approach include the weight of values (see section 3.1), for example if local projects are a high priority, campuses may pursue inquiries with local project developers only. Working with a broker or consultant was the top method of sourcing, followed by direct contact with project developers, as shown in Figure 3, below.

Figure 3: Higher Education Offset Sourcing Methods



There are several different kinds of offset providers – some are for-profit, some are non-profit; some develop the projects themselves, some secure the credits from other project developers; some provide offsets in any amount to individuals and small organizations, some primarily deal with large organizations purchasing large volumes of offset credits. Each of these options has pros and cons, and each institution's unique circumstances will be important in determining which provider(s) is the best option.

Tax implications, transparency, and the make-up of their portfolio of projects are among the key issues in selecting the right provider. For example, some non-profit offset providers categorize the purchase of credits as charitable donations, which could make it difficult or impossible for some institutions to purchase them, depending on existing charitable giving and purchasing policies. It is beyond the scope of this document to thoroughly evaluate the range of offset providers, and which offer credits that would meet the principles of the Commitments, however, we offer a number of traits by which to consider offset providers, including:

- Objective traits
- Provider's supply/inventory access
- Provider entity and project locations
- Project portfolio or specific project type
- Does the provider register credits?
- Does the provider have services for energy audits, measuring footprint, carbon management plan?
- Financials
- Subjective "fit" traits
- Industry experience
- Scope of knowledge
- Staff backgrounds
- Project types and prioritized characteristics

The range of wholesale and retail carbon prices on the voluntary market is significant: from less than $5 to over $500 per metric ton of CO2e. Prices depend on several factors: implementation, verification, and monitoring costs; level of investment (i.e. direct project investment or purchasing through a broker). Sellers should consider the risks and benefits relative to prices and offset quality.

Most campuses purchasing offsets in quantity are using a portfolio approach, which allows them to invest in a range of project types, including both avoidance and removal offsets, and to pursue a range of prices. This is often a strategic way of investing in projects that reflect an institutions sustainability values while meeting their GHG reduction requirements at an affordable price.

The portfolio approach is considered best practice, because it partially solves for the problematic fact that no single offset type is a silver bullet, and it allows schools to use their investment power to support diverse and important climate mitigation where there may not be finance to do so otherwise. The Revised Oxford Principles for Offsetting advocate for a portfolio approach that prioritizes lower priced and important near term avoidance projects and accessible removal projects with a higher risk of reversal between now and 2030, and demonstrates the need for portfolios to include a greater number of highly durable removal projects as we approach mid century. Some campuses are also using multi-year purchase agreements to lock in specific pricing on credits and plan ahead to reach climate action targets. Multi year agreements are possible when working with brokers or individual project developers and can be combined with a portfolio approach to design a procurement strategy that balances multiple institutional values with the global climate action imperative.

Use a portfolio approach to balance institutional values with affordability, and to plan multi-year offset purchases in such a way that prioritizes both avoidance solutions and removal solutions with a higher risk of reversibility in the short term, and then prioritizes durable carbon removal projects as we approach mid-century.

Vetting Projects

Vetting projects is one of the top uncertainties cited by campuses who are thinking about or already directly engaging with offset procurement. This is largely due to the combined issues of uncertainty, complexity, and controversy within the offset space. While the number of campuses purchasing offsets remains small as of this writing, Second Nature expects to see more campuses undertaking offset engagement as more schools reach climate neutrality targets between 2025 and 2030. The top reasons for uncertainty in offset project vetting are lack of support from administration and finance in decision making, lack of knowledge about the offset market and how to vet quality projects, pressure due to scrutiny from the campus community, and lack of time to give adequate attention to the complexity of offset quality assessment. Campuses that have a unified offset strategy developed by (or with feedback from) multiple stakeholders including administration, sustainability, finance, and faculty report a greater certainty about their offset values and ability to assess projects that align with the institutional mission. Campuses working with a broker or consultant often depend on the broker's quality assessment of projects, however most brokers are not conducting analysis of projects above and beyond the registry-approved methodologies and third-party verification of ISO-accredited consultants. While this approach offers some quality assurance measures, research continues to show that neither the methodologies nor the current market integrity standards are consistently producing quality offsets, and campus actors are aware that additional due diligence, sometimes extensive, is needed to build confidence around purchasing decisions.

The Berkeley Carbon Trading Project, an initiative of the University of California, has directed substantial resources to project quality assessment, and provides a framework for analysis of project types and individual projects, available on their website. It is important to note that the over/under-crediting analysis used and outlined by the Berkeley Carbon Trading Project cannot be undertaken easily. It requires academic subject-matter expertise, and most likely, a working group of experts to assess project types or individual projects for a dedicated period of time. That being said, colleges and universities could choose to direct their research and educational assets toward project type and project vetting in line with the campus sustainability strategy, and use the Berkeley Carbon Trading Project's approach to vet offsets.

Then, pairing the outcomes with the weighted values determined by a campus could lead to greater confidence in the procurement process. Campuses pursuing this approach are encouraged to share their work and results with Second Nature and other institutions of higher education.

Collective Vetting of Offsets

One of the highest needs in market-based mitigation approaches is comprehensive greenhouse gas quality assurance vetting as well as vetting for social equity and justice of projects. Entities governing the voluntary carbon market have forwarded the intention and frameworks for raising the bar on these fronts, however the outcomes remain uncertain, with many of those same entities benefiting greatly from the continued financial growth of the offset market. The consensus among Second Nature affiliated campuses who participate in the Offsets Advisory Council is that higher education needs to pursue its own quality assurance vetting according to unified scientific and equity standards. Second Nature is working to support and encourage collaboration with respect to vetting offsets, with the understanding that cross-institution and transdisciplinary research and work are essential to robust and transparent quality assessment that can benefit the sector as a whole. The Offsets Lab, a program of Second Nature, is beginning to facilitate Offset Project Type Focus Initiatives, in a first attempt to create a container for collective vetting work. These initiatives attempt to pool capacity from several academic experts and higher education leaders and focus on a single offset project type for a set number of academic years. The goal of the collaboration is to produce recommended changes or additional criteria to standard offset methodologies, thereby increasing the GHG integrity for projects adopting the updated or additional practices in project design or implementation. The Offsets Lab is also partnering with The Climate Justice Standard, to ensure equity and justice is embedded into the collective vetting effort. Outside of the Offsets Lab, Second Nature encourages and is eager to support engagement from academics, sustainability professionals, graduate students, and other offset thought leaders in the sector to produce prototypes for collective vetting that can be used across higher education institutions and the market.

Retiring Offsets

In order for offsets to meet quality assurance standards for tracking and no double counting, they must be retired once counted against an institution’s greenhouse gas emissions. There are three basic ways in which an offset credit can be retired:

- Through a third-party, such as a registry where the offsets are tracked. To ensure transparency, this is the suggested retirement method;
- By the original owner on behalf of the purchaser; or
- By the end-user after the credits are purchased and applied to offset their own emissions.

Institutions relying on a third party to verify the retirement of offsets purchased should request documentation of the retirement of credits, and inquire with brokers or consultants about the standard operating procedure for providing transparency around the retirement of credits. Offsets associated with a compliance market also need to be retired in order to be considered meaningful greenhouse gas reductions. Offsets that are “banked” are technically still able to be traded or sold to another entity, and run the risk of being double counted.

Contributions to Mitigation or Beyond Value Chain Mitigation

There is a growing conversation within higher education and in the corporate sector about developing models for financing meaningful mitigation without issuing offsets that would be used to compensate for the investor's residual emissions. This approach, which moves away from the problematic GHG integrity of offset schemes without abandoning critical finance needs for climate mitigation is called a contributions to mitigation, or Beyond Value Chain Mitigation (BVCM). There is not a universally accepted contributions approach, and it remains to be seen if emerging BVCM models will serve both investors and mitigation project stakeholders. However, the concept is featured in highly visible schemes such as the Energy Transition Alliance[82], The Science Based Targets Initiative [83], and the Revised Oxford Principles for Net-Zero Aligned Offsetting[84] . Contributions to mitigation is also backed by interdisciplinary research into the efficacy of carbon markets and the best way to finance true mitigation[85] [86].

Contribution frameworks will quantify emissions reductions much like offset schemes currently do, however the result will not be compensatory credits that can be counted toward a buyer's emissions inventory, but rather some other unit or financial disclosure that will allow investors to communicate their contribution to climate mitigation. Through Commitments 3.0, Second Nature is considering multiple routes to recognition of mitigation contributions, including:

- Through Second Nature's recommended sector social cost of carbon, which can provide a snapshot of the approximate emissions associated with a financial contribution to climate mitigation. Schools could disclose financial investments into community organizations working on behalf of climate, or campus mitigation projects, and be recognized for contributions to mitigation equivalent to the sector social cost.
- Climate Justice Certificates via the Climate Justice Standard could be issued for projects that pass peer-review through The Offset Network and the Climate Justice Standard (see Section 3.4 for more information)
- Qualitative disclosure of contributions to mitigation through Resilience Commitment reporting.

82https://www.etaccelerator.org/_files/ugd/17314c_ce8fabc2fce04e8cb29bdd3cc85f0f37.pdf

83https://sciencebasedtargets.org/resources/files/Raising-the-Bar-Report-on-BVCM.pdf

84https://www.smithschool.ox.ac.uk/sites/default/files/2024-02/Oxford-Principles-for-Net-Zero-Aligned-Carbon-Offsetting-revised-2024.pdf

85https://www.sciencedirect.com/science/article/abs/pii/S2590332224002987

86https://ssir.org/articles/entry/forest-contributions-carbon-offsets

3.3 Offset Project Development

Colleges and Universities can be both buyers and sellers of carbon offsets. In either case, project development is a common consideration. On the buyer side, campuses wishing to deeply engage with projects as a way of conducting appropriate due diligence while meeting institutional values may choose to finance offset project development or engage through research or teaching. Schools may also develop projects and sell offsets, both to finance particularly difficult mitigation and to raise money for future decarbonization efforts.

Investing in Projects

Instead of going through a retailer, institutions may opt to invest directly in projects that they want to support. In exchange for money invested, the institutions can negotiate with the project developer for ownership of some or all of the emissions reductions produced by the project. This approach may provide more options with regard to project types and projects that are closer in proximity to an institution. In addition, investing in projects allows an institution to support innovative or unusual projects that may be more closely tied to the institution's core interests. This option often reveals the reality that the true cost of mitigation is much higher than the market price of offsets, and can carry high transaction costs, including the expense of third-party verification. Institutions pursuing this approach are advised to do so in partnership with community organizations or other partners to share the load of responsibility and up front capital needed to produce a good project. While this approach can be significantly more time, money, and labor intensive than buying ex-post offsets on the VCM, it is considered a best practice simply because of the many positive assets that higher education institutions can contribute to early stage project development. The opportunity is not limited to financial investment. Schools can leverage research, academic expertise, and student learning to thoroughly vet and co-develop innovative technologies, and subsequently tell a story to stakeholders that not only exhibits integrity with approach to offset engagement, but also meets broader institutional teaching and research goals that are often considered "at odds" with offset purchase costs.

Developing Projects

Institutions may decide to develop their own carbon offset projects off campus (or outside of their system boundary). The credits produced by these projects could either be used to offset the institution's emissions, or potentially be sold in the carbon markets if the institution has a surplus. Developing projects has the benefit of providing educational and training opportunities to students, staff, and other stakeholders. Many schools are initially drawn to this approach, but it is important not to underestimate the costs associated with the time, expertise needed, and risk involved in carbon market project development, verification, monitoring, etc. An important distinction must also be made between investing in "in-house" projects, and on-campus emissions reduction projects. For example, an on-campus renewable energy project that reduces an institution's GHG inventory cannot also be counted as an offset for institution-funded air travel.

In 2019, The University of California System issued an RFP across all of its campuses seeking offset projects that the UC could invest in and plan on procuring a portfolio of offsets from as their carbon neutrality date approached. This effort highlighted innovation and research activity around 10 projects spanning a range of technologies, with ties to UC students, faculty, postdoctoral fellows, or other university-based stakeholders. The system offered direct investment into development and implementation of these projects. In 2023, the UC system decided not to purchase offsets in pursuit of a neutrality goal, and instead announced an ambition system-wide direct decarbonization and fossil-free target. However, their investments in research and development were critical to the projects that benefited, some of which are now offering carbon credits on the VCM.

The RFP model not only catalyzes institutional expertise around project technology, but places the onus on project teams to understand and comply with carbon market registration and project third-party validation and verification details, which can be helpful to mid-size or low capacity sustainability offices that may not have the ability to navigate the significant complexities involved with leading project development. These complexities and rules are specific to the project type and while any sustainability office should pursue enough knowledge of the requirements to conduct due diligence on the associated offsets, relying on teams of campus-supported individuals to lead these efforts is a way to distribute responsibility according to capacity and expertise.

Steps to Producing Third-party Verified Offsets

If a sustainability office or institutional carbon committee cannot rely on an RFP process to rally institutional expertise around project development, a campus can still engage in project development of quality, verified offsets. The process requires the institution to identify and develop a project according to a methodology, register the project with a regarded offset registry, and then pursue third-party validation of that project and regular verification of the project's emission reductions. This process allows the institution to clearly show the quality of the offset and to sell any excess offsets produced.

Step 1: Identify a registry and methodology or protocol

To develop a project that is third-party verified, an institution must first identify the registry and protocol they will use for their project type. Protocols (also called methodologies) outline the requirements that the offset project must meet in order to qualify for registration with the associated registry. It is important to review protocols carefully as multiple protocols can apply to the same project type and can differ in the way they measure and calculate offsets. For example, the Climate Action Reserve's forestry protocols use a 100-year timespan to show permanence, whereas the American Carbon Registry uses a 40-year timespan. This can have significant impact on the project Design.

Step 2: Develop the project according to the protocol

Once an institution has identified the registry and protocol to use, it can either complete the entire project development process itself (ideally involving students and faculty), or hire a private contractor/consultant to help develop the project. The options for contract help are numerous and can range from a set fee to the contractor for assistance with project development, the contractor receiving a portion of offset sales, or a set fee assessed by the contractor for each offset registered.

Step 3: Contract with ISO-accredited contractors to validate the project and verify carbon credits

All projects must go through third-party verification, a requirement that can be costly and time consuming. The institution must hire a third-party contractor to review their project and the data collected to ensure that the project meets the requirements outlined in the protocol. This contractor cannot be the same as a contractor hired to help develop the project in order to avoid conflict of interest. Though the process is onerous, it is necessary to ensure that all offsets are of the highest recognized quality and result in real and additional carbon offsets.

To provide flexibility and encourage innovation in the field of offsets, the Commitments allow for scope 3 offsets up to 30% of your total campus footprint to forego third-party verification and use a peer review process instead. The next section covers peer reviewed offsets in detail.

3.4 Peer-Reviewed Offsets

Following the example of academic journals, peer-reviewed offsets rely on the shared expertise of institutions to develop projects and innovate protocols that lead to local, campus-based, or small scale emissions mitigation in pursuit of campus climate commitments. Peer reviewed carbon offsets provide real-world case studies in carbon offset implementation that create opportunities for knowledge co-production and transfer, research innovation, and climate mitigation. Peer reviewed offsets catalyze a hands-on approach to meeting carbon neutrality goals and broaden the options for addressing climate change. These projects provide hands-on educational opportunities for students, while preparing them to enter the workforce and impact sustainability with real-world carbon accounting and project management skills gained in pursuit of their campus' Commitments.

Many existing carbon offset protocols assume a scale of project much larger than many colleges and universities are considering. In particular, the difficulty of fulfilling project requirements for monitoring and verification can add to project cost. This, in turn, makes it difficult for institutions to meet existing protocol requirements for developing small scale, local offset projects at a reasonable cost – projects that also engage students and the community in meaningful ways and provide significant co- benefits. Peer-reviewed offset projects are intended to unlock institutional access to these smaller-scale projects that would not be feasible following industry standard protocols.

In addition to cost barriers, technological barriers and integrity issues in the voluntary market may discourage some institutions from participating, however colleges and universities are uniquely positioned to use their academic resources to develop new and innovative protocols and projects that tie back to their research on campus, local community needs, and educational goals. Universities can also use their research apparatus to offer improvements to existing methodologies on the market. While the standard offset registries encourage the development of new protocols, it is a rigorous process that can take anywhere from a few months to a few years to complete. Until the protocol is officially accepted by the offset registry, any offsets produced through pilot projects cannot be counted and registered. This places significant risk on the institution in regards to developing innovative projects as the institution is essentially investing resources in the possibility that their innovative project type and future offsets from that project will eventually be accepted. It is therefore imperative to provide institutions with a less expensive way to verify offset projects and the flexibility to develop innovative project types, without penalizing first actors, and simultaneously involving students in the real world questions about carbon offset integrity and market function. By providing the option for peer reviewed offsets, the Commitments aim to encourage innovative offset projects while still maintaining a rigorous standard for achieving climate goals.

To address the potentially high cost of third-party verification, better provide educational opportunities with real-world application, expand the types of offset projects available, and encourage the development of innovative offset projects, the Commitments allow for a small portion of an institution’s carbon offset credits to be peer-reviewed following the guidelines laid out in the sections below. Offsets from Peer-reviewed Projects are reported through the Second Nature Reporting Platform by each institution and monitored through a peer-to-peer network that will provide third-party monitoring and review. Peer reviewed offsets may be applied only to Scope 3 emissions, and cannot be applied to more than 30% of the total emissions of an institution.

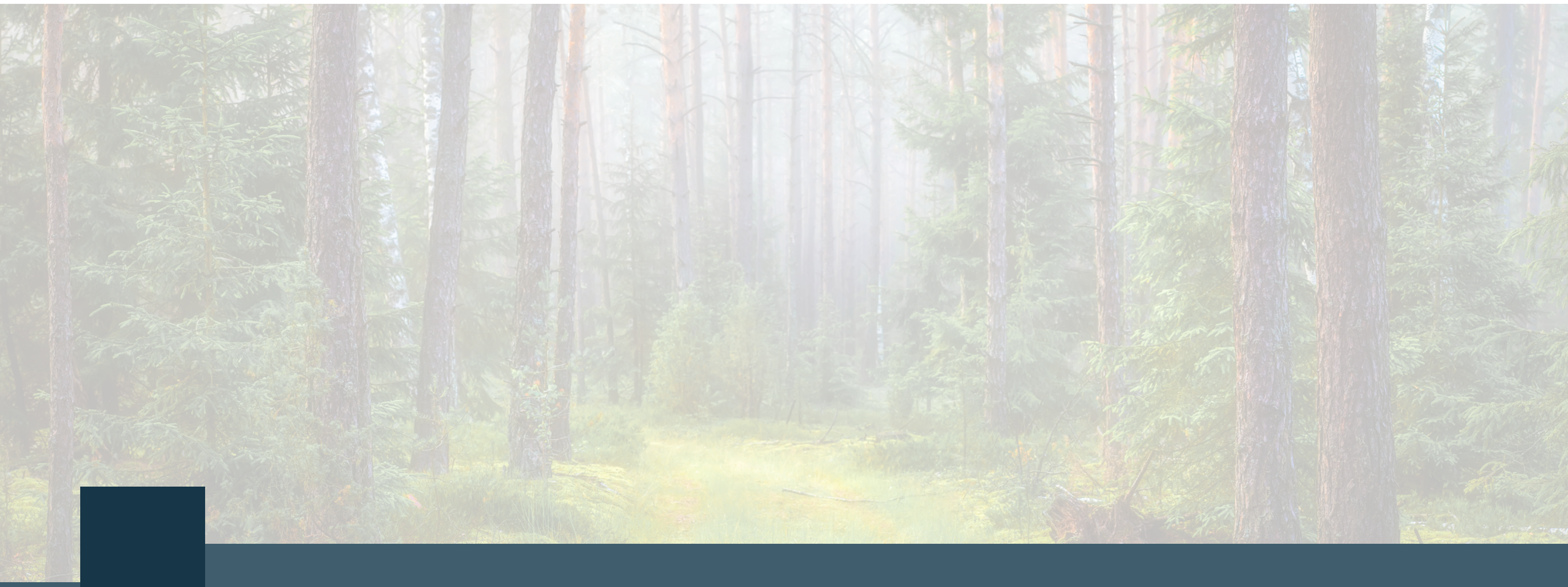
Peer-reviewed offset projects are required to meet all requirements of high-quality offsets. However, for verification, institutions are allowed to consider peer institutions with considerable knowledge in offset projects as a qualified third-party project auditor. In this way, an institution that has developed an offsets project may have a peer institution verify that their project’s outcomes meet the principles of high-quality offsets. This review and the number of offsets produced by the project is facilitated through the Second Nature Offsets Lab (formerly Offset Network) and must be documented and available to the public through the Second Nature Reporting Platform. As Colleges and Universities develop their own protocols for small-scale projects of various types within their climates and habitats, these protocols can become available for replication by institutions pursuing the same project types.

Offsets produced via peer-reviewed offset projects may not be sold by the institution. In addition, these offsets can only be used to offset scope 3 emissions. These projects should be maintained by the institution that developed the project and all offsets produced from these projects must be tracked internally and retired accordingly just as they would if registered with one of the listed well-regarded registries. To avoid any conflict of interest, any institution that has had their work peer reviewed by another institution may not peer review the work of that institution within the same year.

For both Peer-reviewed and Innovative Offsets it is encouraged that projects are located relatively close to the institution developing the project. This helps reduce the risk of project reversal while allowing for site visits for student research and class trips. Local projects inherently reduce the risks that accredited programs attempt to mitigate through extensive monitoring and verification requirements, but they also enable environmental and social benefits for campuses' and their surrounding communities. It is up to the institution to determine what is considered "local", but some common definitions might include:

- The project is accessible by students from the College or University from which project funds produced without requiring greater than 1 day of round-trip travel to visit the project site; or
- The project is within the same state; or
- The project is within 100 miles of the College or University campus or study abroad program.

As more institutions develop offset projects, more resources will become available to the Climate Leadership Network regarding climate action planning, offset project selection, innovative offset project types, and more. Second Nature provides access to these resources via The Offsets Lab.



Case Study:

Carleton College offsets peer-reviewed by Clarkson University

In partnership with a local non-profit, students at Carleton College in Minnesota developed an avoided methane carbon offsets project to quantify the avoided landfill emissions from food recovered in the local community. Students volunteer to recover food from several grocery stores, and then distribute it to the Northfield Community Action Center's food shelf, making the food available to underserved individuals and families. Food that is non-recoverable goes to compost or to a local pig farmer. Students used a protocol from the voluntary market to develop their project, and estimate the avoided emissions from food recovery using the WARM tool by the EPA.

The project was peer reviewed by Clarkson University, led by Dr. Susan Powers, and verified by environmental engineering students over the Spring 2024 semester. In this way, the project provided educational and community engagement opportunities for students at two campuses. The avoided methane project produces carbon offsets that are retired against Carleton's Scope 3 air travel emissions.

3.5 Land Use Management & Carbon Accounting

As institutions of higher education navigate the complexities of climate responsibility, the question of land use and land-based carbon accounting rightfully arise on the journey toward decarbonization. North American colleges and universities manage a vast amount of land on the continent. Beyond the built environments of their main campuses, institutions of higher education manage farms, forests, wetlands, rangelands, and other diverse landholdings that offer both challenges and opportunities for climate action. The total acreage of land holdings managed by higher education is not well documented. The 105 original land grant institutions alone comprised more than 17 million acres of US land when initially established[87]. Today these institutions are just a fraction of the total number of landholding institutions in question, and the top 10 landholding institutions in the U.S are not even all land grant schools. The magnitude of the land question for higher education has implications for climate action on several fronts. Land is a climate mitigation resource and a sink for carbon when managed well, and land is a source of emissions as it is disturbed by business, agriculture, education, and other human activities. Furthermore, the stories by which many colleges and universities acquired and continue to acquire their land are steeped in the history of land-grabbing, extraction, and cultural erasure that is foundational to the climate crisis. Some schools manage land outside of their main campus boundary for teaching and research, farming, ranching, and forestry, leading to activities that both sequester and emit. Schools also manage land in conservation, thereby preserving it as a carbon sink and preventing it from becoming developed and thus a larger emissions source.

[87]https://www.nea.org/sites/default/files/2022-03/Land%20Grant%20Institutions%20-%20An%20Overview.pdf

Current greenhouse gas reporting practice includes all sources of emissions from land as Scope 1 emissions on the entity's inventory, however best practice around accounting the sequestration benefits of land is still developing. The carbon markets, in fact, have been the impetus for widespread adoption of methodologies for measuring the benefits of land stewardship, and working to place a value on the sequestration potential of working lands as well as nature preserves. In this way, schools wishing to quantify the carbon benefit of their forests, farms, and other lands in addition to quantifying those land-based emissions tend to turn to carbon offset methodologies to begin their efforts. These endeavors are not straightforward or simple. Quantifying the carbon sequestered in trees, wetlands, and soil takes dedicated work, requiring trained personnel, representative sampling, and adherence to models for extrapolating the data across the entire land base.

Current developments to create accessibility in this realm center on advanced modeling, remote sensing, and machine learning that is quickly evolving in real time as more actors gather and report more data across diverse landscapes and climates. Considering the huge variation between soil types, tree species, and other natural features, there is much to learn about the potential mitigation risks and benefits of specific management on any given landholding. The complexity of the data, along with the labor and specialization involved can be a barrier to understanding the carbon benefit of land, or further, the carbon impact of land use changes. However, campuses striving to exist as living laboratories for learning often employ students and apply research to the task. In this way, efforts to measure and report the environmental benefit of campus land holdings can offer teaching tools, research fodder, and sustainability initiatives, while also contributing trusted data to the collective effort to understand best practices for land stewardship in a warming climate.

Institutions wishing to understand the carbon footprint of their landholdings can begin with computer tools such as the Trust for Public Land's Conservation Carbon Mapping Tool[88] or the USDA's COMET Planner[89] to begin to understand potential carbon storage of specific land areas under their management. These tools are merely a starting point to begin to understand the risk or benefit of specific land use changes or land stewardship decisions. What comes next is actual measurement to begin to compare real data with data from the models. COMET, for example, uses weather adjusted average regional data over ten years time to estimate averages in carbon sequestration for the soil type and climate in question. Not all practices and not all regions and soil types are included, as the data is still being built. Once schools have a projected baseline of carbon stocks in landholdings based on current management practices, carbon offset methodologies can be used to pursue a real inventory of landholdings. For example, forestry protocols outline the methods for developing representative samples on a landbase and calculating the climate benefit of trees. Once the sampling method has been established, allometric equations that use tree height and diameter data combined with species data can show the carbon stored in the above-ground biomass. Emerging technology includes many software applications that automate allometric calculations. For example, the US Forest's Services iTree[90] program is a tool that can be used to estimate carbon sequestered by trees based on peer-reviewed data. For soil carbon, the approach to inventorying requires development of a sampling methodology that produces measurable soil cores from appropriate depths, and then uses dry combustion of samples to quantify soil carbon stocks[91]. Because of the expense and labor associated with soil carbon sampling and dry combustion analysis, soil carbon stocks can be extremely difficult and expensive to monitor on an ongoing basis, and as such are excluded from most campus efforts to understand the carbon benefit of their lands. However, new technologies will emerge for soil monitoring, and institutions of higher education are participatory in these efforts through research. Identifying a manageable subset of campus land within the larger boundary could allow schools to involve students and researchers in determining a baseline of soil and above ground carbon in working lands, and develop active ongoing mitigation projects such as tree planting to produce measurable additional carbon in green spaces over time.

As of this writing, once campuses have an initial measured inventory of the carbon stocks in their land holdings, they can input the metric ton equivalent into SIMAP as "non-additional sequestration." This means that the carbon sequestered is not considered "additional carbon", and therefore is not counted as a sink against emissions, however it is visible in the story of that campus footprint. Campuses using this approach report advantages beyond the visibility of the carbon benefit. For example, monitoring non additional sequestration also helps the campus community see the climate mitigation value of the campus' land management, and gives a value to those lands that might otherwise be overlooked when making decisions about new construction or other disturbances. Campuses maintaining carbon inventories of their landholdings also report the project's benefit as a teaching and research tool, and the lands themselves as benefits to campus living. These schools tend to also have environmental projects on their working lands that go beyond carbon measurement, for example, biodiversity monitoring, bird sanctuaries, or endangered species conservation for specific known species living within a campus boundary. Non-additional sequestration must be monitored on a regular basis (for example, every 5 years for forest inventories). The monitoring periods are defined by the particular monitoring method and type of land resource under management, so research into appropriate methodologies is needed to develop the initial inventory as well as the ongoing plan to maintain the practice.

Schools wishing to claim the carbon sequestered on their land holdings against greenhouse gas emissions must engage in continued monitoring of the landholdings according to an approved methodology in order to demonstrate gains to carbon above the initial baseline. This carbon would then be considered "additional". Steps to demonstrate additional carbon are what separates non-additional sequestration from an "insetting" or an offsets project. Insetting refers to expressions of additional sequestration within the campus boundary or supply chain. Schools usually need to develop an official offset project, either traditional on the VCM, or a peer-reviewed project through Second Nature's Offsets Lab is what allows that campus to claim additional carbon from land management practices against campus emissions. Some campuses have developed offset projects on their lands and sold the offsets to outside buyers as a way to finance other sustainability initiatives, or an ongoing land stewardship or mitigation project. Note that peer reviewed offsets may only be counted against scope 3 emissions, not to exceed 30% of total emissions.

Case Study:

Cornell University Land-Based Carbon Sinks Working Group

Second Nature signatory member Cornell University has a carbon neutrality goal of 2035 for their Ithaca, New York campus. Their CAP, which has evolved since its original development in 2009, prioritizes high performance buildings, changes in heat source generation and distribution away from fossil fuels, and renewable energy first and foremost. But Cornell is also innovating toward their 2035 goal by investigating available sinks and sequestration on the University's 23,000 acres, through a complex project that identifies a suite of climate positive land practices. Because the University does not favor procuring external offsets, their deep commitment to understanding what land management practice changes or additions could result in additional carbon sequestration on land within their campus boundary is a great case study for demonstrating the complexity and opportunity of land based carbon accounting.

The Sustainable Cornell Council developed a working group of the Carbon Neutral Campus Committee to focus on land based carbon sinks. The group has been working since 2022 to identify and evaluate carbon sequestration and carbon sinks approaches, investments, and projects which have the potential to advance Cornell's operations, climate action plan, and academic mission at scale. The group will select an appropriate GHG accounting methodology for this work, identify areas of potential impact, and create a prioritization matrix evaluating carbon reduction potential, cost to administer projects, and living laboratory research, teaching, and public engagement potential.

First, the working group compiled and researched a list of carbon positive practices that might be feasible on Cornell's lands. These practices include land management strategies within four functional groups: Afforestation, Forest Thinning, Agriculture, and Grounds & Turfgrass. Then, the working group developed a GIS map to project the historical and ongoing use of any of these practices on campus lands, and areas where each practice might be feasible in the future. This work involved collaborations with land managers across Cornell's operations, some of whom have been stewarding land resources for over twenty years. Now, the group is working to estimate the cost per acre to implement the practices, and the potential carbon benefit of each so that they can present a high-level cost benefit analysis for campus land use in service of the carbon neutrality goal.

If the University ends up pursuing any of the practices, baseline data will need to be gathered, and the ultimate effort will be to develop and maintain measurement, monitoring and reporting of the actual sequestration of each practice instance, to demonstrate the additional carbon sequestered against estimates and land carbon baselines. The opportunities for teaching and research through this effort are immense, and even if Cornell's sequestration doesn't match perfectly with their projected totals, the service the University is providing to the ongoing efforts to capture land use carbon sequestration data by region and practice will represent an incredible and beneficial contribution to collective good [92].

Common practice around land use management and carbon accounting is changing. The corporate world is in the process of adopting more rigorous practice around land use change and management in emissions inventorying, led by the Science Based Targets Initiative (SBTi). The SBTi's Forest, Lands and Agriculture (FLAG) Guidance [93] provides expectations for companies who count land-based emissions as more than 20% of overall emissions to set specific targets to reduce land-based emissions and to monitor land use change. Other provisions within the guidance are requirements for companies with significant activities in forestry and agriculture to set targets that would amount to a 72% reduction of land based emissions by 2050, and a no-deforestation by 2050 commitment. Under this guidance, companies that set land-based emissions targets (or FLAG targets) may only count the emissions benefit of carbon sequestered in company-managed lands to emissions that originate from company-managed land. In other words, FLAG targets can only be set for FLAG emissions. The Greenhouse Gas Protocol likewise has been updating its Land Sectors and Removals Guidance, working closely with the SBTi. This updated guidance is expected to be released in 2024. Second Nature's reporting partner, SIMAP, follows the Greenhouse Gas Protocol frameworks, and thus any changes to land sector and removals best practice set forth in the new guidance will be mirrored in reporting and tracking of land use changes and land-based sequestration for higher education.

Monitoring and mitigation work on campus lands offers many opportunities for schools to deepen their climate action work while also serving the institutional mission for teaching and research. Advancing the technologies around monitoring, measurement, reporting, and verification, as well as establishing best practices through research for increasing ecosystem potential for climate mitigation are places where higher education has a role to play in advancing local, regional, and global climate action. For these reasons, incorporating land use carbon accounting into a college or university climate action plan is considered best practice for schools within the Climate Leadership Network. Efforts to monitor and improve landholdings that involve students and faculty as well as sustainability staff represent exemplary leadership in higher education climate action.

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88 https://web.tplgis.org/carbonmap/

89 http://comet-planner.com/

90 https://www.itreetools.org/

91 Smith P, Soussana JF, Angers D, Schipper L, Chenu C, Rasse DP, Batjes NH, van Egmond F, McNeill S, Kuhnert M, Arias-Navarro C, Olesen JE, Chirinda N, Fornara D, Wollenberg E, Álvaro-Fuentes J, Sanz-Cobena A, Klumpp K. How to measure, report and verify soil carbon change to realize the potential of soil carbon sequestration for atmospheric greenhouse gas removal. Glob Chang Biol. 2020 Jan;26(1):219-241. doi: 10.1111/gcb.14815. Epub 2019 Oct 6. PMID: 31469216; PMCID: PMC6973036.

92 For more information on Cornell's efforts, visit https://sustainablecampus.cornell.edu/our-leadership/governance/sustainable-cornell-council/charge-priorities

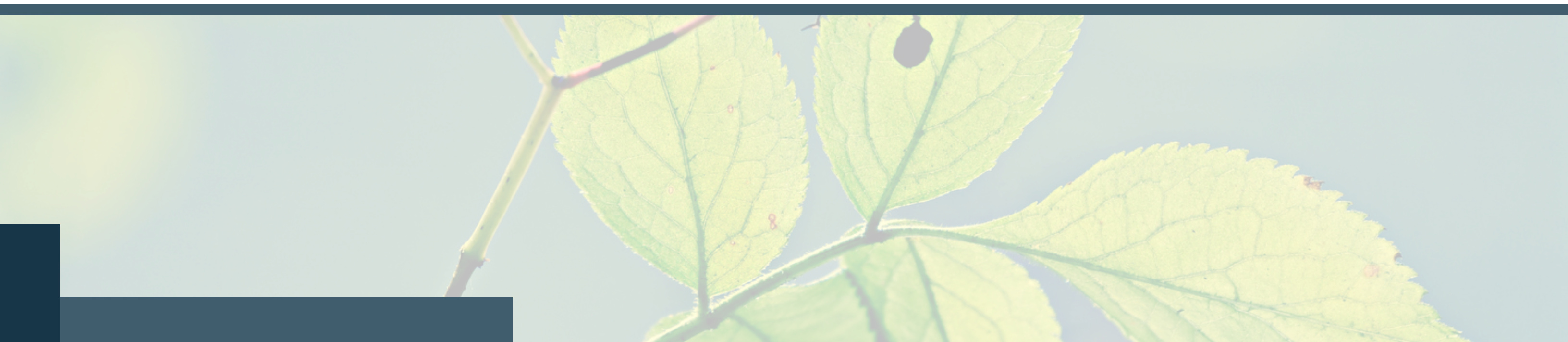
93 https://sciencebasedtargets.org/sectors/forest-land-and-agriculture

3.6 Offsets Reporting and Tracking

Second Nature partners with the University of New Hampshire's Sustainability Institute (UNHSI) to offer reporting and tracking functionality for Climate Leadership Network members. UNHSI's Sustainability Indicator Management and Analysis Platform (SIMAP) is an online carbon and nitrogen calculator that houses the reporting platform for signatories of the CLN to report their greenhouse gas emissions and reductions. Affiliate members of the network are not required to report, but are encouraged to do so to heighten accountability and transparency and to contribute to the sector-wide data collection effort that drives progress and benchmarking in higher education. Many signatories and reporting affiliates may use another tool to report their greenhouse gas emissions and reductions, and it is beyond the scope of this guidance to include the requirements for offsets reporting in all active GHG calculators and reporting platforms that campuses might use. While the use of SIMAP is not required for signatories, public reporting is, and a separate license can be obtained for schools with signatory status to achieve the public reporting requirements even if they use a calculator other than SIMAP. As such, members of the CLN receive discounts on SIMAP registration to assist with this collective reporting effort.

As of this writing, SIMAP asks for specific information about campus offset purchases. There is a place to enter non-additional sequestration from campus landholdings and compost (see previous section for details), and then the following information will be asked about carbon credits purchased from external sources and counted against the campus carbon footprint:

- Quantity (MT carbon equivalent purchased or sold)
- Origination (required)
  - Third-party project developer (i.e., purchased)
  - On-campus, by institution or through partnership (i.e., produced)
  - Off-campus, by institution or through partnership (i.e., produced)
- Type (required)
  - Land-based (e.g., afforestation, reforestation)
  - Other (e.g., anaerobic digester, community energy project)
  - Verification (required)
  - Third party verified
  - Peer-reviewed
  - Unverified



With the development of updates to the Climate Commitments via Commitments 3.0, Second Nature is proposing the following updates to SIMAP's offsets reporting framework and will work to incorporate the following updates for the 2025 reporting year.

- Offsets reliance reporting by scope: This will require campuses to clearly report the ratio of emissions reductions attributable to decarbonization versus reductions attributable to offsets, by scope. SIMAP will then report percent mitigation by scope, with all three scopes distinguished rather than combining scopes 1 & 2 and holding Scope 3 separately. Simultaneously, SIMAP will be able to show the ratio of mitigation to offsets for overall emissions, and campuses will be able to clearly track and report offsets reliance against decarbonization goals year over year.

- Optional place to input registry ID link: This will be a voluntary function for campuses, allowing for the pasting of a simple link in the report that leads to the offset project registry page, project description document, and other publicly available documents pertaining to the offset project. Such information can be provided without too much additional work on the reporting side, while still offering fuller transparency into the projects that have garnered campus investment.

In the co-production of this guidance with campus leaders, Second Nature determined additional information about offsets strategy and purchasing that is valuable to disclose, but reached consensus that such information should be gathered outside of the SIMAP reporting platform. Second Nature now distributes an annual Offsets Strategy and Purchasing Survey to all campuses in the network. The information gathered via the survey is anonymized and compiled for a report back to the network, and includes the following:

- Quantity offsets procured and registries associated with purchases
- Details about strategy and decision making
- Average cost per ton
- Relative weight of values or priorities when considering offset project investment
- Method of offset procurement
- Opinions or understandings related to offset quality
- Project type or mechanism
- Main challenges in offset decision making and strategy development

The most recent report from this survey reveals data from the year 2022.

Section 4: Carbon Offsets Next Steps

4.1 Offsets Teaching and Research

Just as efforts to decarbonize the campus require deep collaboration across traditional silos of the institution, the question of how higher education can optimally participate in the offsets space is one best answered through the combined efforts of multiple departments on campus. Colleges and Universities are not only concerned with integrity in purchasing, but also in connecting their main missions to questions of global good. Teaching and research are areas where higher education has the potential to contribute to quality and integrity in the offsets space. Methods for measuring and monitoring the mitigation of offset project types and individual projects are in constant need of expert review and innovation, and new technologies require not only technical expertise but also attention from social scientists to understand the non-technical implications of the activities in society including equity impacts. Furthermore, as the offsets realm grows and changes, educated leaders are needed to steward the space with integrity, and make brave decisions about the costs and benefits of maintaining or radically changing the market as we know it.

However, as of this writing institutions are still growing in their abilities to align offsets strategy with available research, to integrate research with real world offsets questions, and to embed offsets literacy into the curriculum. There are ideological divides that dominate these disconnects: many academics engaging in the offsets space have done so from the standpoint of pointing out shortcomings in methodologies and the market in general, and fewer academics are engaged in improving the market or methodologies, unless they are working in the private sector. There is also a lack of funding to collaborate between the operational and academic side of institutions in a campus as a living lab model, where faculty are incentivized to build course material and steward students through offsets education, and where operational staff are able to design low risk strategies to involve students and academics, or fund the most rigorous decision based on the best research.

Even still, campuses within the Second Nature network are working hard to bridge the divide. For example, some campus facilities managers are beginning to understand the critical need for monitoring and measurement of mitigation activities, and are beginning to build campus energy systems or land stewardship protocols in such a way that they can be learning tools. Campus sustainability professionals have convened meetings with academics on their campus to present the institutional offsets portfolio, gather feedback on methodologies, and offer research questions. And, campuses are innovating around integrating offsets into pedagogy, from developing study abroad opportunities to engage directly with an institution's offset project, to funding additional research based curriculum modules focused on offset market literacy and portfolio development.

This Guidance document will continue to be a place for gathering examples of campuses working on solutions to leveraging offsets questions to promote teaching and research, and leveraging teaching and research to increase integrity in the market. Second Nature is working with advisory council members to identify needs around education and facilitation for convening across campus roles, collaborative curriculum development opportunities, and funding and support for responsive, transdisciplinary research.

Case Study:

The University of Wisconsin- Eau Claire (UWEC)

The University of Wisconsin- Eau Claire (UWEC) received funding from a Second Nature Catalyst Grant to integrate the vetting and procurement of offsets for Scope 3 air travel emissions into a new ESG course. The course, which will be offered in academic year 2025-26 will be cross listed between two departments within the College of Business and the College of Arts & Sciences, with support from faculty in those departments. Outside of content on social impacts and governance, the course will also explore strategies to reduce business travel (when possible), learning what certified carbon offsets are, and when it is appropriate to purchase offsets. UWEC will be the case study for each learning outcome. Students in the course will build a portfolio of certified carbon offsets, which will then be purchased by UWEC. This project's main goal is to support student learning in equity and the environment. The most challenging aspect of this portion of the project has been recruiting faculty champions to take on this project. When students complete the purchasing of certified offsets, they will contribute to UWEC’s carbon neutrality efforts and open the door to other University of Wisconsin-System Universities implementing travel policies and offset procurement strategies.

4.2 Communicating Offset Strategy & Policy

Colleges and Universities face intense scrutiny when it comes to the specifics of their climate commitments, and the use of offsets to achieve those commitments. While energy-intensive, this scrutiny is understandable, given the overall uncertainty in the carbon markets and the wealth of research exposing flawed outcomes sometimes even with the best intentions in mind. If campuses are to be thorough and diligent about developing an offset strategy in partnership with faculty, students, and other stakeholders on campus, it can set the stage for easier times when it comes to communicating offset decisions. In some cases, internal resources can be prioritized or allocated to focus university efforts around this important agenda. Even when campuses do not have the resources or capacity to form and maintain multi-stakeholder and interdisciplinary groups on campus to create ultimate transparency, there are many options available to garner this additional attention.

The strategies proposed below can support sustainability offices in broadening their base of support and sharing in many of the decisions and outcomes. The following approaches are advised for proactive communication about offsets that can sometimes get out in front of criticism or suspicion on campus, or in the community:

1. Be Clear about the emissions you are considering offsetting

- Strive to attach the offsets to unavoidable emissions only, and be clear about this in your communication
- If avoidable emissions are going to be offset, in service of a carbon neutrality goal, provide education about why the institution has made this decision. Is it because the technology doesn't exist to directly mitigate? Lack of funding? Relative energy efficiency of equipment that was a semi-recent investment?

Whatever your reason for offsetting avoidable emissions, strive to tell the story of why purchasing offsets now supports movement toward institutional decarbonization. There are some that would say an offsets purchase, or even a conversation about offsets is never a means to further on-campus mitigation, but Second Nature's work in the sector has proven that this is not always true.

In many cases, the sustainability office beginning to talk about offset purchasing can start the conversation about campus climate goals, and the reason for those goals. This can lead to education about the true drivers of campus climate impact, which can be different than what many faculty and students understand them to be. Transparency around the fact that the institution is not providing a blank check for decarbonization must also then be a part of this conversation, and that can lead to discussions of offsets that go beyond the surface assertion that they are thoughtless representations of denial, or a sloughing of responsibility. In many cases, they can be the beginning of the conversation about how an institution will actually pay for its climate impact. The key is for sustainability leaders to begin talking about and investigating offsets long before an intended purchase, or carbon neutrality year. This not only avoids uninformed scrutiny of the decision making and intentions behind the campus climate goal, it also sets the stage for a more robust cost-benefit analysis of the means employed to reach those goals.

2. Stress that offsets are only one way of putting a price on emissions

- And they are usually not the best way, as this publication has thoroughly explored. But, in a cash strapped environment where campuses are working to stay committed to long range goals, sometimes offsets can be the only way to start a conversation about carbon pricing.
- If you can, work backwards from offsets communications to invite a deeper conversation about internal carbon pricing.

3. Disclose the Decision Making Process[94]

- If possible, produce a short report of how offsets were considered, who was involved, and what values or systems were used to determine priorities and eventual decisions. A great example can be found in the University of Southern California's Report from the Task Force on Carbon Removal and Offsets[95]
- Determine avenues for communication, so you can stay transparent throughout the process. Will you hold campus meetings? Disseminate information through student engagement groups and the faculty senate? Give a series of presentations? Make flyers? Open a discussion forum online?

4. Identify and deploy internal resources for internal action:

Designed to effect lasting change within higher education institutions, targeted grants that are designed with transformative impact in mind can be helpful in prioritizing important university agendas. Grant programs like these may be employed for the purpose of engaging faculty, staff, students, or even departments/units/colleges into the climate change agenda. Though the incentive structure for academic and student affairs' participation in issues of public engagement differ depending on discipline and affinity, many stakeholders across college campuses crave the connection to content that spurs community-engaged learning.

Whether it be for the integration of an active case study into existing coursework, a focused research effort that gets students out of a lab-based setting, or to activate registered student groups, the carbon offset agenda is ripe for the solicitation of internal proposals that help activate universities to collectively achieve their desired targets. By directing strategically-designed funding through small grants, broad-based requests for proposals can bolster the networked involvement of allies, advocates, and champions into roles traditionally held in campus sustainability offices. Cornell University's Einhorn Center for Community Engagement partners closely with their Office of Campus Sustainability on a number of nested strategies that expand the living lab opportunities for students, develop faculty capacity to better educate its student population with real-world content, and bridge the divides between climate-oriented teaching and research to help achieve their sustainable development goals.

[94] See Section 3.1 on best practices for building an institutional offset strategy

[95] https://sustainability.usc.edu/wp-content/uploads/2023/10/Final-Report-Task-Force-on-Carbon-Removal-and-Offsets-2023.pdf

5. When a purchase is made, provide all relevant information about the offsets

To summarize Section 3.6: Offsets Reporting and Tracking, be prepared to communicate all of the following information about your offsets purchase:

a. Quantity (MT carbon equivalent purchased or sold)
b. Origination
  - Third-party project developer (i.e., purchased)
  - On-campus, by institution or through partnership (i.e., produced)
  - Off-campus, by institution or through partnership (i.e., produced)

c. Type
  - Land-based (e.g., afforestation, reforestation)
  - Other (e.g., anaerobic digester, community energy project)

d. Verification
  - Third party verified
  - Peer-reviewed
  - Unverified

e. Quantity offsets procured and registries associated with purchases
f. Details about strategy and decision making
g. Average cost per ton
h. Relative weight of values or priorities when considering offset project investment
i. Main challenges in offset decision making and strategy development
j. Method of offset procurement
k. Project type or mechanism
l. Which emissions are being offset and what is being done to mitigate that emissions category directly
m. A link to the registry ID of the offsets so individuals can study publicly available project documentation

4.3 Conclusion: Higher Education's Role in the Carbon Markets

This publication has attempted to synthesize almost two years worth of research into carbon markets, corporate offsets engagement, and higher education offsets engagement trends in order to provide an analysis of the options, risks, and best practices available to higher education. The carbon offsets space continues to be a rapidly changing ecosystem, such that options, trends, and risk assessments cannot remain static. As such, this will continue to be a living document, updated annually with available strategy and purchasing data from the higher education sector, and updated as much as possible with respect to market and project realities.

This document also stands as a call to action for higher education institutions with serious climate action commitments. Carbon markets continue to expand even as numerous entities go about trying to improve the integrity of the market ecosystem. Many are asking whether the entities seeking more integrity will truly deliver on their promises, or if they stand to benefit too much from business as usual to enact meaningful change. Early signals in the quest for integrity are promising[96], however, higher education institutions have a role to play. Not only are college and university campuses responsible for large carbon footprints, they are also the sector of society focused on rigorous scientific research and workforce development. In this way, campuses contribute a trifecta of assets desperately needed in the fight to mitigate climate change. Even if a college or university decides not to purchase offsets, the institution bears a responsibility to educate students who can lead and participate in reality, and to contribute to the betterment of society. Institutions cannot simply rest on their laurels and wait for other entities to “fix the problems”- either of climate change or of the carbon markets. Second Nature hopes this Guidance document helps institutions move toward action in engaging with high quality carbon offsets, contributing research that improves methodologies and MMRV[97], and shaping the capacity of the next generation of climate action leaders.

[96]https://calyxglobal.com/blog-post?q=176

[97]MMRV = Measurement, Monitoring, Reporting, and Validation of mitigation impacts

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