

Comparison and selection of CO₂ offsetting alternatives

IAS Carbon Neutral FOA Working Group

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FOA-14 summary

- 333 attendees on-site at FOA-14.
 - 3 have already done their own compensation.
- 2.26 t_{CO2}/participant on average.
 - Updated flight emissions from Anne, based on actual FOA-14 participant data.
 - Average flight-related emissions down from 2.25 t_{CO2} to 1.91 t_{CO2} per person.
 - Overall average emissions down from 2.6 to 2.26 t_{CO2}/participant.
- ca. 746 t_{CO2} for FOA-14 (down from 858 t_{CO2}).
 - Based on 330 attendees.
- US\$21,070 collected from registration fees for CO₂ offsetting.

Glossary

- *CO₂ offset*: a third party reduces their emissions on your behalf.
- *Avoided CO₂*: CO₂ prevented from being emitted to the atmosphere.
- *Baseline*: the 'before state' that the CO₂ offset activity is compared against to determine amount of avoided CO₂.
- *CO₂ removal*: emitted CO₂ is removed directly from the atmosphere.
- *Permanence*: the duration that the avoided or removed CO₂ remains out of the atmosphere.
- *Certification standard*: a set of guidelines that define how the baseline/avoided CO₂/removed CO₂ is calculated, any requirements for permanence, and how risk of reversal is dealt with.
- *Credit*: a monetary contract that can be created, bought, and sold that represents 1 tonne of avoided (avoidance credit) or removed (removal credit) CO₂.
- *Crediting period*: duration over which the project is allowed to generate credits.
- *Additional/additionality*: reduction in CO₂ emissions would not have occurred without the market to sell the credits generated from a project.
- *MRV*: monitoring, reporting, and verification.
- *Directly funded*: payment to a specific offset or removal project whose progress can be tracked.
- *Centrally funded*: payment to a fund pool that is managed by a provider, ultimate use of funds cannot be tracked.
- *Afforestation*: converting long-term non-forested land to forest, *i.e.*, generating new forested land.
- *Reforestation*: restoring recently destroyed forested land.
- *AFOLU*: agriculture, forestry, and other land use – includes af/re-forestation, agricultural land management, improved forest management, reduced emissions from deforestation and degradation, avoided conversion of grassland and shrubland, wetlands restoration and conservation. [Further information](#).
- *Engineered removal*: CO₂ removal undertaken by engineered/technological means combined with geological storage of CO₂, e.g., direct-air CO₂ capture (DACCS), enhanced weathering (EW), bio-energy with CCS (BECCS).
- *Nature-based removal*: CO₂ removal undertaken by natural methods, e.g., AFOLU projects.
- *Community service project*: small-scale projects that are targeted towards individual users or small communities, e.g., off-grid renewable energy, cooking stove replacement, biomass digesters, landfill gas treatment

CO₂ removals vs CO₂ offsets

- Impact of greenhouse gases in the atmosphere is proportional to the duration they are present.
- Offsets and nature-based removals can take several years to be generated/effective. Therefore a credit generated by these methods is not equivalent to a credit generated by engineered CO₂ removal with long-term geological storage.
- Offsets and nature-based removals are difficult to verify, and are at higher risk of reversal.
- Offsets generated by community service projects are very difficult to determine a baseline for.
- Engineered CO₂ removals with long-term storage are currently significantly more expensive and have limited supply.

Factors to balance

- CO₂ offsetting vs. CO₂ removal
- Permanence
- Cost/budget
- Directly funded projects vs. central project funds

Goal of working group for FOA-14

- Significant changes in this sector since 2018/2019.
 - Expect similar changes over the next 3 years also.
- Achieving the perfect outcome may not be feasible.
- Do the best we can at the current time, with the funds we have.
- Meet expectations from members.
 - Offsetting $\approx 1-5\%$ of conference emissions with CO₂ removal may be received poorly.

List considered

Vendors

- My Climate
- Terrapass
- One Carbon World
- Persefoni
- C Level
- Puro.earth
- Climeworks

Certification standards

- Gold Standard
- Plan Vivo
- Verra (Verified Carbon Standard)
- Climate Action Reserve
- American Carbon Registry
- UN Clean Development Mechanism (UN CDM)

Certification standards

- Nearly all certification standards are created by private entities.
- There can be significant variation between them.
- Many do not have an explicit statement/requirement for permanence of credit.
- In nearly all cases, checks/verification are only carried out only during the crediting period.
- In nearly all cases, insurance/buffers are accumulated in a central fund of the certification body to cover all projects certified by the body.
 - This could lead to a significant deficit in the case of large-scale losses.

Gold Standard

- Established 2003
- Afforestation and reforestation projects:
 - Crediting period 30 to 50 years, 20 % of offsets must be put into a central buffer to account for future loss. Verification every 5 years during the crediting period.
- Agricultural related projects:
 - Crediting period up to 10 years, no buffer requirement. Verification once within the first 2 years.
- Community service projects:
 - Includes mini-grid, off-grid renewables, end-use energy efficiency, waste manage and handling projects.
 - Crediting period up to 15 years, certification renewal every 5 years, baseline must be re-evaluated after 10 years.
- Renewable energy projects:
 - Includes grid-scale renewable energy projects
 - Crediting period up to 15 years, certification renewal every 5 years, baseline must be re-evaluated at every certification.
- Editorial:
 - Standards for agricultural projects seem quite low.
 - No explicit permanence requirements after the crediting period has ended.

Plan Vivo

- Established 1994
- Only certifies AFOLU projects, all project types are treated equally.
- Baseline recertification every 10 years.
- 20 % of offsets are transferred to a central buffer.
- Maximum 50 year crediting period, extended in 10 year increments.
- Editorial:
 - ‘Avoiding deforestation or degradation’ is a valid project type. This is controversial as some of these projects have been found to generate false credits recently.
 - No explicit permanence requirements after the certification period has ended.

VCS (Verra)

- Established 2005
- Credits cannot be issued until they are verified. Only those that have an immediate impact can generate as they go (destruction of ozone depleting substances).
- AFOLU projects:
 - Agricultural projects can either have a 10 year crediting/reporting period, or a maximum 21 year period that is renewed every 7 years.
 - All other types have a minimum of 20 years that can be renewed a further 4 times.
 - Baseline reassessment must occur every 6 or 10 years, depending on project type.
 - Central buffer credits must be deposited for all projects, but the amount is determined by risk assessment for each project.
- Non-AFOLU projects have a 10 year crediting/reporting period, or a maximum 21 year period that is renewed every 7 years..
- Editorial:
 - Very little focus/details on non-AFOLU projects, and are thus not recommended to purchase.
 - No explicit permanence requirements after the certification period has ended.

Climate Action Reserve

- Established 2008
- Only projects located in North America are eligible to be certified.
- AFOLU projects:
 - Explicit 100 year permanence requirement.
 - Contribution to shared risk buffer based on project risk assessment.
 - Baseline update is either initial only, or annually, depending on project type.
- Standard documents are quite convoluted.
- Editorial:
 - Appears good overall. This was originally the 'California Climate Action Registry' and thus the majority of the projects are focused on the California Cap and Trade program.

American Carbon Registry

- Established 2008 (originally 1996 as GHG Registry)
- No stipulations on project location requirements.
- AFOLU projects:
 - 10 year crediting period that can be extended an unlimited number of times, baseline updates must be done each time.
 - 40 year permanence explicitly stated, contributions to a central risk buffer are based on risk assessment of the project.
- Non-AFOLU projects:
 - Maximum crediting period of 10 years. No stated permanence requirements following the end of the crediting period.
- Editorial:
 - Very similar to Climate Action Reserve, except shorter permanence requirements and no restriction on project location.

UN CDM

- Established 2001
- Vast range of project types (methodologies) are permitted.
- Af/re-forestation (A/R) projects:
 - Crediting period can be fixed 30 years, or 20 years that can be renewed a further 2 times.
 - Issues of non-permanence are addressed on a case-by-case basis, with the stipulation that it must be addressed in the project proposal.
- Non-A/R projects:
 - Crediting period can be fixed 10 years, or 7 years that can be renewed a further 2 times.
 - UN CDM classifies agricultural projects as non-A/R.
- Editorial:
 - UN CDM is considered outdated and not best practice. Reasonable discussion on [Wikipedia article](#).
 - Requirements for A/R projects are quite vague, and no explicit buffer requirement.
 - No explicit permanence requirement after the crediting period has ended.
 - Projects certified by UN CDM should probably be avoided.

Credit suppliers

- A range of CO₂ credit suppliers/marketplaces were reviewed for the available projects, and certification methods used.
- Suppliers were reviewed in December 2022, and thus costs, numerical values, and available projects may not be the same today.

MyClimate

- Established 2002, one of the longest running CO₂ avoidance credit providers.
- Options for directly funded projects, or centrally funded projects.
- Of available directly funded projects, could offset between 6 and 31 % of FOA-14 emissions with available budget.
- All FOA-14 emissions could be offset with the centrally funded projects.
- All projects are verified by an offsetting standard (varies for each). In general AFOLU projects are certified by Plan Vivo or VCS. Energy related projects are certified by Gold Standard.
- Timeline for offsetting to occur is guaranteed within 2 years for energy related projects, and non-guaranteed 10 – 30 years for AFOLU projects.
- Third-party auditing is undertaken for all projects.
- Editorial: the non-traceability of the central fund means that we cannot know the permanence of the credit.

Terrapass

- Only offers centrally funded projects. All FOA-14 emissions could be offset with the available budget.
- They do not specify where specific projects are taking place, or which body they are certified by. They only list which bodies they work with.
- There are no specifications for timeline by which offset will be achieved.
- Editorial: based on information available to us, this supplier should be avoided.

One Carbon World

- Afforestation projects are certified by VCS, and energy projects by the UN CDM.
- Agricultural projects are offered but seem to be uncertified.
- All projects are directly funded.
 - There are two projects available which could offset all emissions from FOA-14 with budget available.
 - Reduction of ozone depleting substances (ODS) in India (UN CDM certified)
 - Afforestation in South America.
- Credits are sold in 100 tonne increments.
- Editorial: ODS project seems promising, as combustion and subsequent treatment of ODS cannot be reversed.

Persefoni

- A marketplace for directly funded projects.
- Several are available at a cost which would enable all of FOA-14 emissions to be offset.
- Most projects are not certified.
- Editorial:
 - Any projects that are certified use the easiest certification to achieve for that project type.
 - Most offsets seem to be the lowest quality type – e.g., AFOLU projects are mostly preservation projects instead of afforestation or reforestation.
 - Based on information available to us, this supplier should be avoided.

C Level

- All projects are certified by Plan Vivo.
- Only centrally funded projects available.
- All emissions from FOA-14 could be offset.
- Editorial:
 - Several of the centrally funded projects are forest protection. There is no definite way to prove that the forest was going to be destroyed if this protection was not in place.

Puro Earth

- Only focus on engineered CO2 removal with long-term storage.
- Currently no credits available for sale/in stock.
- Direct sale is the decision of each supplier listed on the website. Currently available suppliers are not wanting direct sale, but rather long term contracts. Website must be checked regularly to see if any new suppliers have registered for direct sale.
- Puro are also shifting focus from direct sale and is now a lower priority. Focusing on becoming a regulatory/standards body, and large agreements to scale-up projects.
- For reference, with the lowest-cost credits previously available for sale, we could offset 25-35 % of FOA-14 emissions.

Climeworks

- Removal will be undertaken within 6 years of payment date.
- Only 2 % of FOA-14 emissions could be offset based on current cost.
- Certification process used seems rigorous and is validated/audited externally. Net CO₂ removal is explicitly stated in the terms and conditions.
- Editorial:
 - Realistically, the best currently available option for CO₂ offsetting/climate change mitigation as the vast majority (≈80%) of FOA-14 emissions are attributed to flight-related emissions, however, cost is prohibitive.

Shortlist

- ODS recovery and destruction project from One Carbon World.
 - Approximately US\$6,000.
- Centrally funded projects from MyClimate.
 - Approximately US\$22,500.
- Centrally funded projects from C Level.
 - Approximately US\$17,000

ODS recovery project

- Disposed equipment containing refrigerant is recovered.
 - Refrigerant from this waste is recovered and mixed with undesired by-products from the fresh refrigerant manufacturing process.
 - This mixture is combusted and the formed gases treated before being released to the atmosphere.
 - Gases with very high GWP (GWP \approx 1,000 – 12,000) are converted to CO₂ (GWP = 1), thus generating a (low cost) CO₂ avoidance credit.
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- After further/specific investigation by Working Group members, it was determined that these ODS recovery projects are very likely not additional and are thus false credits.
 - This is due to a loophole in the original UN CDM standard which has since been corrected, but there are now no projects operating based on the updated standard.
 - It seems that many refrigerant producers increased waste production on purpose to generate additional income through credits. Useful refs: [here](#) and [here](#).
 - As a result, this project type is excluded.

MyClimate central fund

- A range of projects that generate CO₂ avoidance credits.
- Certification standards used are among the best currently available.
- Third party verification is also undertaken.

- The primary risk associated with this type of project is that their actual CO₂ avoidance may not be the stated amount over the long-term (higher risk of reversal/low permanence).
- IAS will need to provide a small top-up in order to cover all FOA-14 emissions

C Level central fund

- A range of projects that generate CO₂ avoidance credits.
- Certification standards used are okay, but not the best available.
- Same issue as MyClimate regarding the permanence of the credits.
- As mentioned, many projects are forest protection, which have a greater risk of generating false credits.
- The additional cost of MyClimate (≈US\$5,000 extra), is likely worthwhile given the above points.

Conclusions

- Having evaluated the certification standards and credit providers to the best of our abilities, and considering the constraints imposed by budget and the quality of CO₂ avoidance credit, we have determined that MyClimate is the best alternative for the IAS and the FOA conference at this point in time.
- This is with the understanding that the IAS community vastly prefers the in-person FOA experience, based on the post-FOA survey responses, and feedback received from members.
- CO₂ avoidance credits are not the best solution for climate change mitigation, as CO₂ removal with long-term storage is preferred. However, these alternatives are currently cost prohibitive.