

2023 Report

04/21/2023
INFORMED
FTC ABOUT
OFFSETS

05/03/2023
CHALLENGED
QUEBEC OFFSET
PROTOCOL

05/19/2023
CRITIQUED
ALASKA
OFFSETS

05/17/2023
DOE PROJECT
ANNOUNCED

05/24/2023
HELPED UNFCCC
AVOID TON-YEAR
ACCOUNTING

07/24/2023
TYLER KUKLA
JOINS

09/05/2023
WASHINGTON
POST EXTREME
HEAT STORIES

08/14/2023
MAGGIE KOERTH
JOINS

09/11/2023
ENHANCED
WEATHERING
TOOL LAUNCHED

12/04/2023
SHANE LOEFFLER
JOINS

(carbon) plan

To our supporters

This year felt like an inflection point — for the climate and for our organization.

We are deeply involved in the implementation of standards and oversight around carbon removal and carbon offsets, and we're beginning to see the real-world impact of our work. Our datasets and tools are being used beyond our organization, we're helping guide regulatory policy, and we're seeing state, federal, and international programs and policies begin to reflect the requirements for scientific integrity for which we've long advocated. Looking ahead, we are developing new resources to further enable carbon market oversight, and look forward to releasing them in the months ahead.

This was also a year to lean into new fields of research. We are broadly interested in unlocking progress on hard climate problems, using a combination of open science, policy engagement, and public communication. We increasingly see major opportunities for this approach in the field of climate risk analysis, which we believe needs more grounding in high-quality, fully-public data and science. Building on our previous climate downscaling efforts, we collaborated with *The Washington Post* to build a novel dataset modeling the impacts of extreme heat at a local level, today and into the future. Doing this work during a year with temperatures continually setting record highs couldn't have felt more sobering — or more important. The more we

explore the area of climate impacts, the more opportunities we find, and we're excited about several projects we plan to develop next year that will help get actionable climate data into the hands of those who need it.

All of this work was enabled by the growth of our organization. Under Freya Chay's leadership our carbon removal team brought on Tyler Kukla to work on enhanced weathering and other "open system" carbon removal approaches. Our product team, led by Kata Martin, hired Shane Loeffler as a software engineer with mapping expertise. We were also thrilled to have Maggie Koerth join our team as Editorial Lead. She's bringing deep science editing and reporting experience to help us communicate our work to a diverse audience.

This is our fourth annual report. I couldn't be more proud of where we are as an organization and where we're headed, and I deeply appreciate your support in helping get us here.

Sincerely,



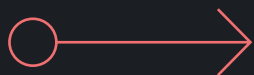
JEREMY FREEMAN
Executive Director



What we do

The world is finally taking climate change seriously. But as the public and private sectors pursue a myriad of climate solutions, there's a lot of room for hype and confusion. Ambitious promises abound, often in the absence of regulation or scientific grounding. CarbonPlan is a nonprofit on a mission to bring more transparency, accountability, and clarity to this complex present so we can look forward to a better future.

We're currently focused on three areas: carbon offsets, carbon removal, and climate impacts. All three represent complicated, growing industries that need improved oversight, established scientific standards, and transparency to ensure that solutions are accountable to the public. CarbonPlan's team collects data, runs analyses, and creates tools that can help lawmakers, scientists, and the public double down on the climate solutions that really work — and avoid the ones that don't.



We **advocate** for transparent and **accessible** climate information and build software tools and datasets to support that goal.

We **encourage** governments, nonprofits, and companies to embrace **frameworks** built on the best available science.



We **help** stakeholders make more-informed **decisions** about climate change mitigation and adaptation.

Who we are

Team



ANDERSON BANIHIRWE
Software Engineer



MAX JONES
Open Source Lead



BECKY HURST
Operations Lead



ORIANA CHEGWIDDEN
Research Scientist



FREYA CHAY
Program Lead



RAPHAEL HAGEN
Data Engineer



GRAYSON BADGLEY
Research Scientist



SAGE ORTIZ
Operations Associate



JEREMY FREEMAN
Executive Director



SHANE LOEFFLER
Software Engineer



KATA MARTIN
Product Lead



TYLER KUKLA
Research Scientist



MAGGIE KOERTH
Editorial Lead

Board



ARJUNA DIBLEY
U. of Melbourne / U. of Oxford



KELLY GANNON
NDWA Labs



GERNOT WAGNER
Columbia Business School



TRACY TEAL
Posit Software, PBC



JEREMY FREEMAN
CarbonPlan

Our impact

CarbonPlan is now almost four years old and establishing itself in the world of climate solutions and services. Our organization is sought out for its ability to bring clarity and direction to complicated projects. We are helping shape the future of climate solutions and contributing to real, practical change.

We became actively involved in conversations with congressional representatives and federal agencies about the need for offsets regulation and how such regulations should work. Our experts are influencing the future of these much-needed regulatory structures.

We worked with the United States Forest Service to incorporate data and mapping tools we developed into this year's Executive Order 14072, which aims to highlight which forests in this country are most vulnerable to fires caused by climate change.

We developed a new approach to web-based mapping, moving towards a future in which a single dataset can be used for both analysis and visualization, helping address a long-standing need in exploratory analysis of earth science data. This project was done in collaboration with NASA and they have expressed interest in using our tools.

We wrote a letter to the Federal Insurance Office commenting on their proposed data request on climate-driven risks to insurance access. Our letter contributed to the FIO adding a focus on non-renewals to their data collection plan, making it harder for insurance companies to hide their behavior.

We wrote a letter to the United Nations Framework Convention on Climate Change advocating for the removal of ton-year accounting from the Article 6.4 Information Note, a document proposing possible standards for carbon removal crediting. Our letter and previous work, alongside advocacy across the community, contributed to the decision to remove ton-year accounting, preventing a misleading approach from becoming an international norm.

Over several years, we have partnered with Frontier, a consortium of businesses committed to purchasing high-quality, long-duration carbon removal, as they have designed a scientifically rigorous procurement program. When the Department of Energy launched its own procurement program this year, it adopted many aspects of Frontier's program, including several that we helped encourage.

Press coverage

A core part of our strategy is building momentum in the media around key issues in climate science and policy. Our research and data can help shift public narratives about climate solutions, and coverage of our work helps keep the press focused on holding the public and private sector accountable to scientific reality.

This year our work was covered in 37 stories across 24 unique venues, featuring five members of our team. Most notably, we developed a novel extreme-heat dataset in collaboration with *The Washington Post*, which they featured in multiple high-impact stories, including three that made the front page.



Visit carbonplan.org/press for a complete up-to-date list of our media coverage.

What we did

Articles

Modeling extreme heat in a changing climate [↗](#)

We explained our new methods and open data for modeling humid heat. PAGE 09

Climate change happens in public. Risk assessments should, too. [↗](#)

We argued for increased transparency in climate risk assessment data. PAGE 09

Climate-related financial risk in the electricity sector [↗](#)

We summarized the findings from workshops we co-convened, outlining the risks of extreme heat to electric utilities. PAGE 09

What metadata are necessary for interpreting a climate risk assessment? [↗](#)

We analyzed what information should be provided alongside climate risk products to support transparency. PAGE 09

Carbon offsets are incompatible with the Paris Agreement [↗](#)

We published a paper summarizing the physical and political shortcomings of offsets. PAGE 10

When carbon offsets and zombie forests collide [↗](#)

We wrote about what happens when forests that are increasingly vulnerable to climate change are enrolled in California's offsets program. PAGE 11

To know if an offset project is burning, first you have to find it [↗](#)

We wrote about a five-hour effort to track the precise boundaries of a Canadian offset project. PAGE 11

Buffer pool in peril [↗](#)

We reported on an offset project that burned and how its loss affects the future of California's offsets program. PAGE 11

Anomalies in offset documentation [↗](#)

We exposed missed deadlines and incomplete paperwork that imply big problems in the management of California's offsets program. PAGE 11

Carbon removal at different timescales [↗](#)

We explained how to compare carbon removal approaches that work on different parts of the carbon cycle at different timescales. PAGE 12

Geochemical measurement guidance [↗](#)

We wrote a forward to a new report that provides useful and timely technical guidance for geochemical carbon removal approaches. PAGE 13

Quantifying enhanced weathering [↗](#)

We described a new tool that helps catalog quantification methods for enhanced weathering. PAGE 13

What we did (cont.)

Commentary

Additionality risks in Alaska's proposed forest offsets program [↗](#)

We wrote a critique of Alaska's plan to enroll state forests in carbon markets. [PAGE 10](#)

Problems with Quebec's new reforestation offsets protocol [↗](#)

We highlighted problems with ton-year accounting and accounting for albedo changes in a new offsets protocol. [PAGE 10](#)

Comments on Green Guides Review [↗](#)

We commented to the Federal Trade Commission on environmental marketing claims. [PAGE 10](#)

Comments on UNFCCC Article 6.4 Information Note [↗](#)

We submitted a public comment to the United Nations on the problems with ton-year accounting. [PAGE 10](#)

Ethanol carbon capture and storage isn't carbon removal [↗](#)

We explained why corn ethanol carbon capture and storage (CCS) projects don't count as carbon removal. [PAGE 12](#)

Calling for a standards body for carbon removal [↗](#)

We convened a workshop on carbon removal standards and co-signed an open letter asking for independent oversight. [PAGE 12](#)

Data + tools

Modeling extreme heat [↗](#)

We built a new dataset that models how heat and humidity combine to increase risks to human health, now and in the future. [PAGE 09](#)

Fires and forest offsets [↗](#)

We updated our existing fire-monitoring tool with near real-time data to better track how fire impacts forests enrolled in California's offsets program. [PAGE 11](#)

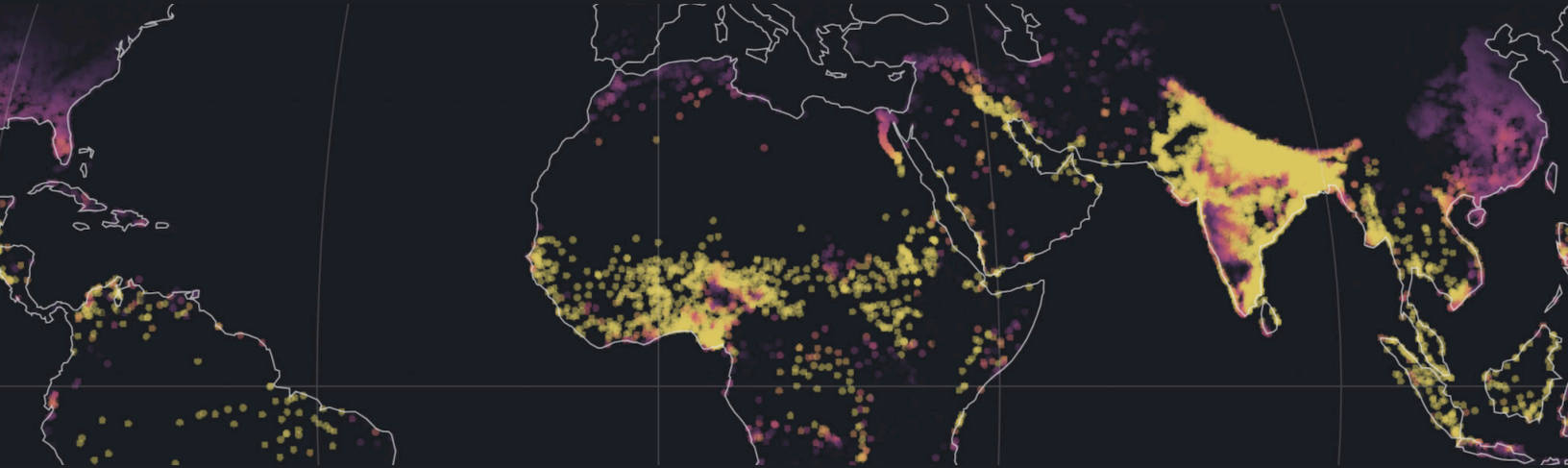
CDR Verification Framework [↗](#)

We released several updates to our tool that characterizes uncertainty across 11 different methods of carbon dioxide removal. [PAGE 12](#)

Quantifying enhanced weathering [↗](#)

We developed a tool that helps users make sense of the many possible methods used to quantify the effectiveness of enhanced weathering. [PAGE 13](#)

Extreme heat



Data from our extreme-heat modeling projects wet-bulb globe temperature in the future

Extreme heat was the primary focus of our climate impacts work this year, featuring an extensive collaboration with *The Washington Post*'s climate reporting team. We worked closely together over several months to develop a novel high-resolution extreme-heat dataset for the globe. The analysis accounted for the combined effects of humidity, sunlight, and urban heat islands. *The Post*'s journalists showcased our dataset in a data-focused story and referenced it in three other stories focused on regional impacts. Alongside their stories, we wrote an explainer to describe the methods in more detail and we released the full code and data. We also shared a blog post that used this project to illustrate the importance of doing climate risk assessments in the open. This collaboration with *The Post* and the attention on the stories they published led to dozens of new connections with heat researchers, policy makers, nonprofits, and private companies. In addition to the project with *The Post*, we released a report on the process of climate risk assessment, using the impact of heat on electric utilities as a case study. The report was based on a series of workshops we ran in collaboration with the Environmental Defense Fund and the Initiative on Climate Risk and Resilience Law, which elevated the critical role of "climate translators" in helping bridge the gap between the science of climate risk and the actions needed to address those risks.

WASHINGTON
POST DATA
STORY [↗](#)

WASHINGTON
POST PAKISTAN
STORY [↗](#)

EXTREME HEAT
EXPLAINER
ARTICLE [↗](#)

EXTREME HEAT
CODE AND
DATA [↗](#)

OPEN DATA
BLOG POST [↗](#)

CLIMATE RISK
ASSESSMENT
REPORT [↗](#)

RISK METADATA [↗](#)

Offsets oversight

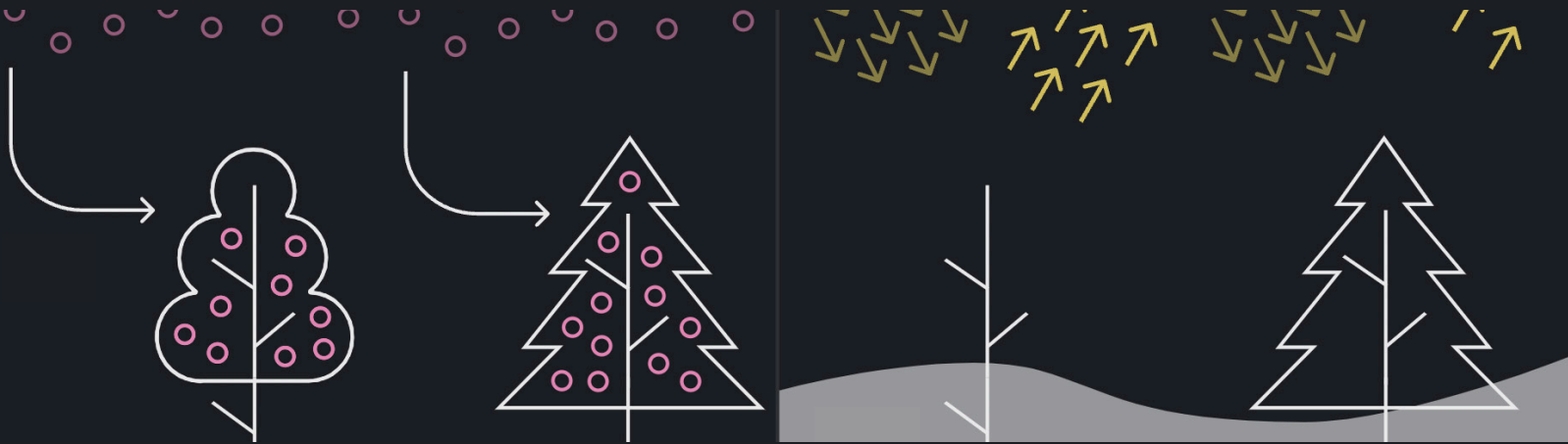


Illustration from our commentary on the effects of albedo on offsets crediting

We continue to push for scientific integrity and accountability in the complex and under-regulated carbon offsets market. In a pair of commentaries, we analyzed a new reforestation protocol from Quebec that likely overestimates claimed carbon benefits because it uses ton-year accounting and ignores albedo effects. We also wrote about how a new forest offsets program in Alaska will likely generate offset credits that are not additional. We provided comments to the United Nations Framework Convention on Climate Change on the concerning treatment of ton-year accounting in an Information Note regarding the Article 6.4 mechanism. Ton-year accounting was subsequently removed from consideration by that body. To summarize our overarching concerns in the academic literature, we co-authored a review article in *One Earth* on how carbon offsets are incompatible with the Paris Agreement. As examples of policy engagement, we met with congressional representatives and federal agencies to talk about agricultural carbon markets, and staff at the Commodity Futures Trading Commission to discuss regulatory efforts around offsets under consideration. We also submitted comments to the Federal Trade Commission on concerns regarding environmental marketing claims related to offsets. Finally, we began exploring new modeling work around how to quantify the value of temporary carbon storage, and we made substantial progress on new resources that will help organize data across the carbon market and make it more accessible.

[QUEBEC
REFORESTATION
PROTOCOL ↗](#)

[ALASKA OFFSETS
PROGRAM ↗](#)

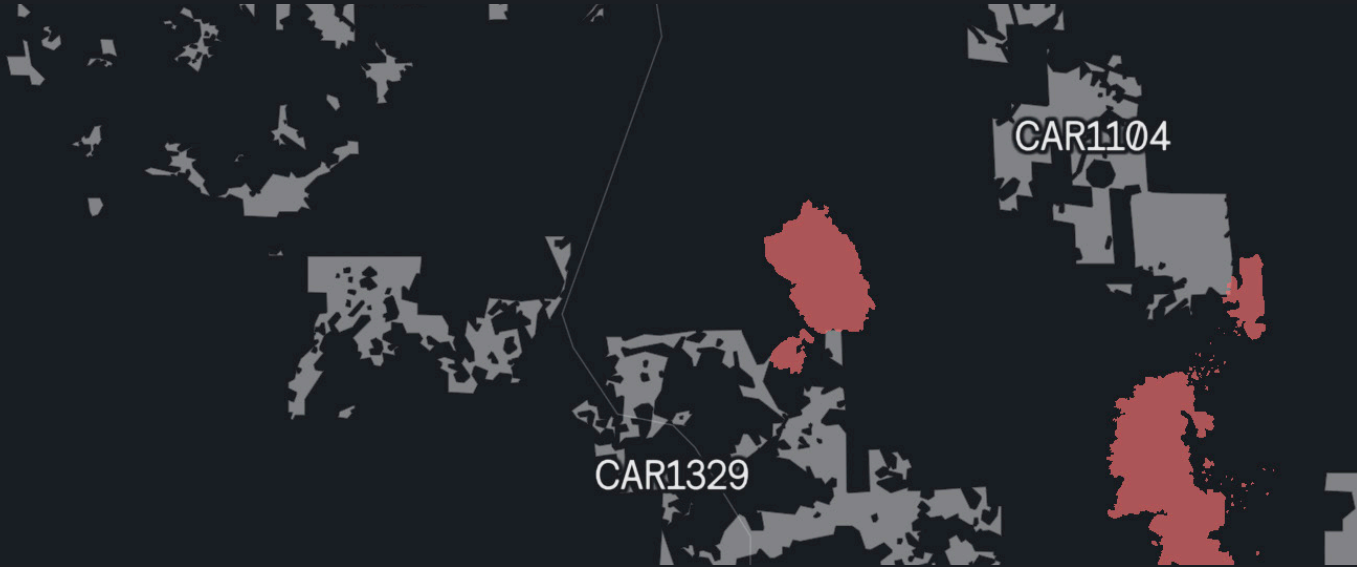
[THE NEW
REPUBLIC STORY
ON ALASKA ↗](#)

[COMMENTS TO
THE UNFCCC ↗](#)

[OFFSETS REVIEW
ARTICLE ↗](#)

[FTC GREEN
GUIDES ↗](#)

Forest fires and offsets



Carbon offset projects and nearby fires from our monitoring tool

Offset projects meant to counteract climate change are, unfortunately and ironically, impacted by the forest fires that climate change exacerbates. Our researchers are tracking how and where fires burn offset projects, and advocating for increased transparency and better regulatory structures that account for the risks that forest fires pose. We participated in investigative reporting on the effects of wildfires on forest offset projects in Oregon, and the impact those fires have more broadly on voluntary offset programs. We updated our fire tracking tool to include a new data layer with near real-time fire data, and conducted our own investigation to demonstrate how limited data availability can make it nearly impossible to even find out whether a forest fire is affecting a specific offset project. We also analyzed how climate change is creating other threats to forest ecosystems in California. Finally, we acquired and published documents that show what happened to one project in the wake of the 2020 Lionshead Fire. This analysis is tied to our ongoing efforts to track the long-term viability of California's program, by monitoring the depletion of the buffer pool — a sort of insurance system that aims to protect the program against wildfire and other causes of carbon loss, but is falling short of its goals.

[OPB STORY ON OREGON WILDFIRES ↗](#)

[FIRE MONITORING TOOL ↗](#)

[OFFSET DATA AVAILABILITY POST ↗](#)

[LIONSHEAD FIRE INVESTIGATION ↗](#)

[BUFFER POOL ANALYSIS ↗](#)

[ZOMBIE FORESTS ↗](#)

Carbon removal



Simplified schematic tracking the carbon accounting of corn ethanol production

Our carbon removal team has focused on practical tools that make it easier to understand and compare different carbon removal methods, and establish rigorous standards for reporting and verifying outcomes. One of our central contributions has been the CDR Verification Framework, which maps the key uncertainties associated with different removal pathways. This year, we expanded that tool to include new pathways, such as biochar, alkaline waste mineralization, and direct ocean removal. We are kicking off a Department of Energy project as the lead non-government partner alongside a consortium of national labs — Lawrence Livermore National Lab, Lawrence Berkeley National Lab, and the National Renewable Energy Lab — that will build on the CDR Verification Framework to provide cross-cutting technical foundations for quantification standards. This project will also provide the opportunity to leverage the labs' convening power and advance the conversation around how carbon removal standards should be developed and maintained over time. Our participation will be informed in part by a workshop we co-hosted in June on the topic of financial incentives for carbon removal measurement, reporting, and verification. Throughout the year, we have provided technical support to a process led by the Linden Trust around the design of a technology-neutral carbon removal tax credit. We wrote a commentary explaining why corn ethanol carbon capture and storage (CCS) should not count as carbon removal. Finally, we published an article about how to make fair comparisons between carbon removal approaches that act over different timescales, in order to address questions we heard repeatedly arising in policy contexts.

CDR VERIFICATION
FRAMEWORK [↗](#)

PATHWAY UPDATES
RELEASE [↗](#)

DOE PROJECT
ANNOUNCEMENT [↗](#)

COMPARING
CARBON REMOVAL
TIMESCALES [↗](#)

ETHANOL CARBON
CAPTURE AND
STORAGE ISN'T
CARBON REMOVAL [↗](#)

Enhanced weathering

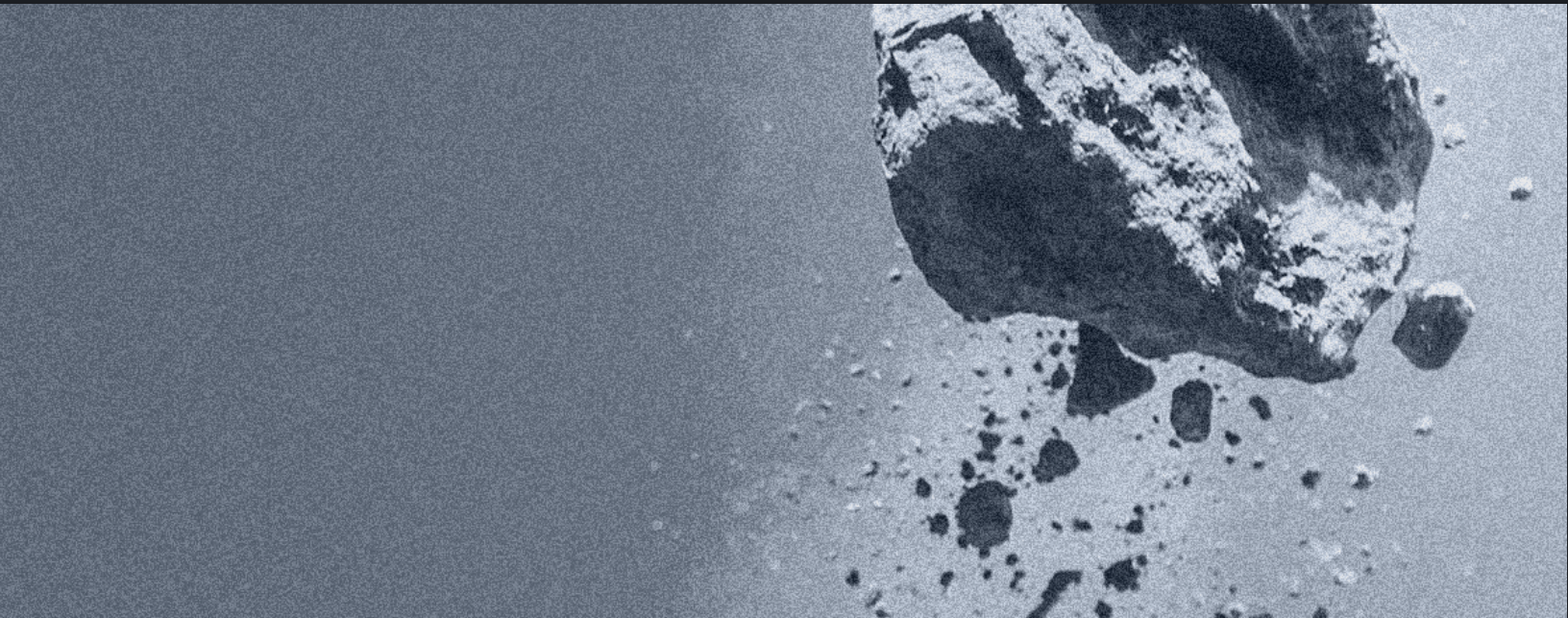


Illustration from our explainer article on enhanced weathering quantification

Our carbon removal team has been paying particular attention to enhanced weathering — an approach that uses natural chemical reactions between rocks, water, and air to remove carbon from the atmosphere. Although enhanced weathering could be a low-cost and scalable approach to carbon removal, significant uncertainties remain around when and where it will be effective, and how to measure whether or not it's working. Our team published a tool and explainer cataloging the quantitative methods that could be used to estimate enhanced weathering outcomes. The goal of this project was to provide more clarity around what different quantitative methods can actually tell us about net carbon removal, and to lay the groundwork for interpreting and comparing emerging approaches to enhanced weathering measurement, reporting, and verification. We also updated our CDR Verification Framework to account for how enhanced weathering projects might interact with the pre-existing use of agricultural lime. Finally, we wrote a forward for a new report that consolidates technical best practices for geochemical measurements that are relevant to enhanced weathering.

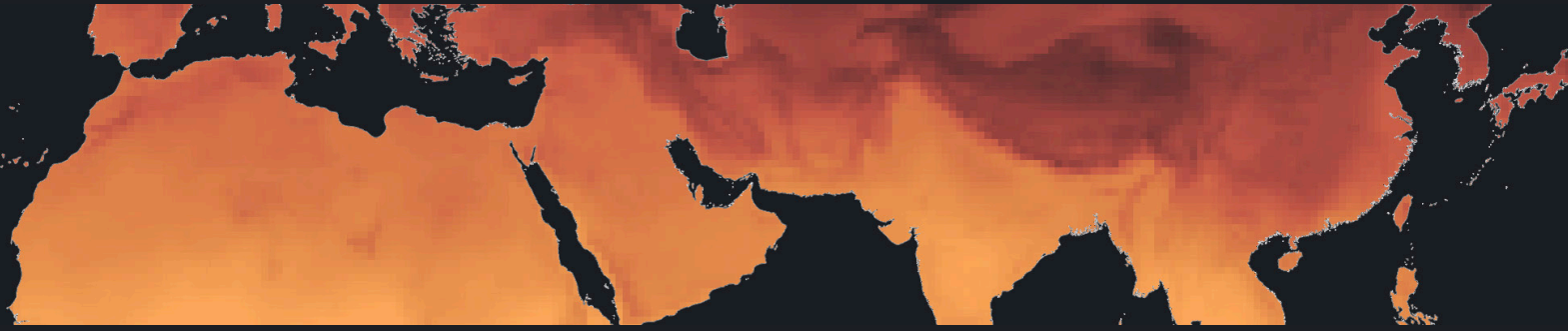
ENHANCED
WEATHERING
QUANTIFICATION
TOOL [↗](#)

ENHANCED
WEATHERING
QUANTIFICATION
EXPLAINER [↗](#)

AGRICULTURAL
LIME ANALYSIS [↗](#)

FORWARD TO NEW
RESOURCE ON
GEOCHEMICAL
CARBON DIOXIDE
REMOVAL [↗](#)

Open source tools



Example map from our Zarr-based web map rendering library

Our team built out a next-generation ecosystem of tools this year for accessing and exploring climate data on the web. As part of a new collaboration with Development Seed, we built a prototype for rendering web maps using the latest version of the Zarr format, and we've engaged with NASA on the effective adoption of the Zarr format through their standards coordination office, technology spotlight series, and community working groups. This new format makes it possible to use the same dataset for both analysis and visualization purposes, rather than create separate copies for the two use cases. Avoiding such data duplication has long been a goal in the earth sciences community and is of special interest to NASA, given the large data collections they hope to make more accessible. We've also continued work on Python libraries, such as Kerchunk and Pangeo-Forge, that enable cloud-optimized access to Earth science datasets. Together, these tools aim to accelerate research by making large-scale data more accessible to new analysis methods. We've also been able to use our open source tool development to support our offsets work. We received a grant from Earth Science Information Partners (ESIP) Lab to build an open source pipeline for near real-time fire data, and added a layer with this data to our forest fire monitoring tool, making it easier to track the impacts of fire on offset projects across the United States. Finally, we began a second year of partnership with Columbia University's Center for Learning the Earth with Artificial Intelligence and Physics (LEAP), including work on data visualization, data processing, and interactive storytelling about emerging climate science.

WEB MAP
RENDERING
LIBRARY ↗

KERCHUNK ↗

PANGEO-
FORGE ↗

FIRE
MONITORING
MAP DATA
UPDATES ↗

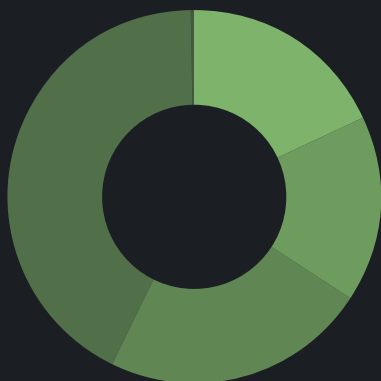
LEAP ↗

Finances

We are committed to financial transparency, and to maximizing the impact of our generous donors. Here we provide data on our 2023 revenue and expenses by category. The same data will also be released in 2024 as part of our public 2023 tax filings.

Revenue

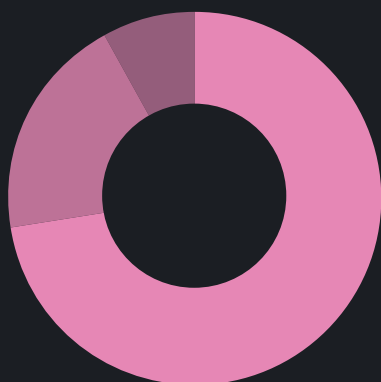
\$5,391,455



- Project-specific (contracts) (18.1%)
- Project-specific (grants + in-kind) (16.2%)
- Unrestricted (individuals) (23.0%)
- Unrestricted (foundations) (42.6%)
- Consulting (0.1%)

Expenses (by type)

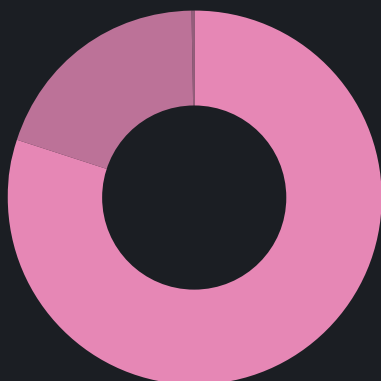
\$3,039,542



- Staff (salary + benefits) (72.5%)
- Services (legal + design + consulting) (19.5%)
- Operations (computing + SaaS) (8.0%)

Expenses (by area)

\$3,039,542



- Program work (80.2%)
- Administration and fundraising (19.7%)
- Decision support (0.1%)

Thank you

Our work would not be possible without the generous support of our donors and partners. Here we provide a list of funding sources in 2023 greater than \$1,000, all of which are included in the totals listed previously. Some funding in 2023 supported projects that were not completed or announced in 2023. Those sources are included in our 2023 revenue totals, but not listed below, and will be in next year's report.

See carbonplan.org/funding for an up-to-date list reflecting all funding sources.

Unrestricted

ROBERT + MARTHA PARKE
WILLIAM HARRINGTON
ROSS GARON + HONG SUH
JANDON FOUNDATION
JACOB TREFETHEN
EUTOPIA FOUNDATION
HAMPUS JAKOBSSON
NICHOLAS SOFRONIEW
SILICON VALLEY COMMUNITY
FOUNDATION

BENIFICUS FOUNDATION
CHAN ZUCKERBERG INITIATIVE
ADDITIONAL VENTURES
PAMELA MENSCH
COLIN RUST + JEANNIE TSENG
VANGUARD CHARITABLE
LIONEL DRIPPS + REBECCA RICE
JOHN WOLTHUIS
SHAWN LIU

Project-specific

CLIMATEWORKS FOUNDATION
LINDEN TRUST
NASA / UNIVERSITY OF WASHINGTON
DEVELOPMENT SEED
GRANTHAM FOUNDATION
ADAM WINKEL + ABIGAIL WINKEL
PATRICK J. MCGOVERN FOUNDATION
COLUMBIA UNIVERSITY
NASA
QUADRATURE CLIMATE FOUNDATION
EARTH SCIENCE INFORMATION
PARTNERS LAB

CDR timescale accounting
Technical guidance on CDR policy
Xarray-lite
Next-gen Zarr visualization
DOE grant support
DOE grant support
Carbon market and CDR projects
LEAP
Pangeo-ML
CDR research synthesis
Fire monitoring improvements