PLANETARY

Planetary Technologies

Impact Report 2023

Contents

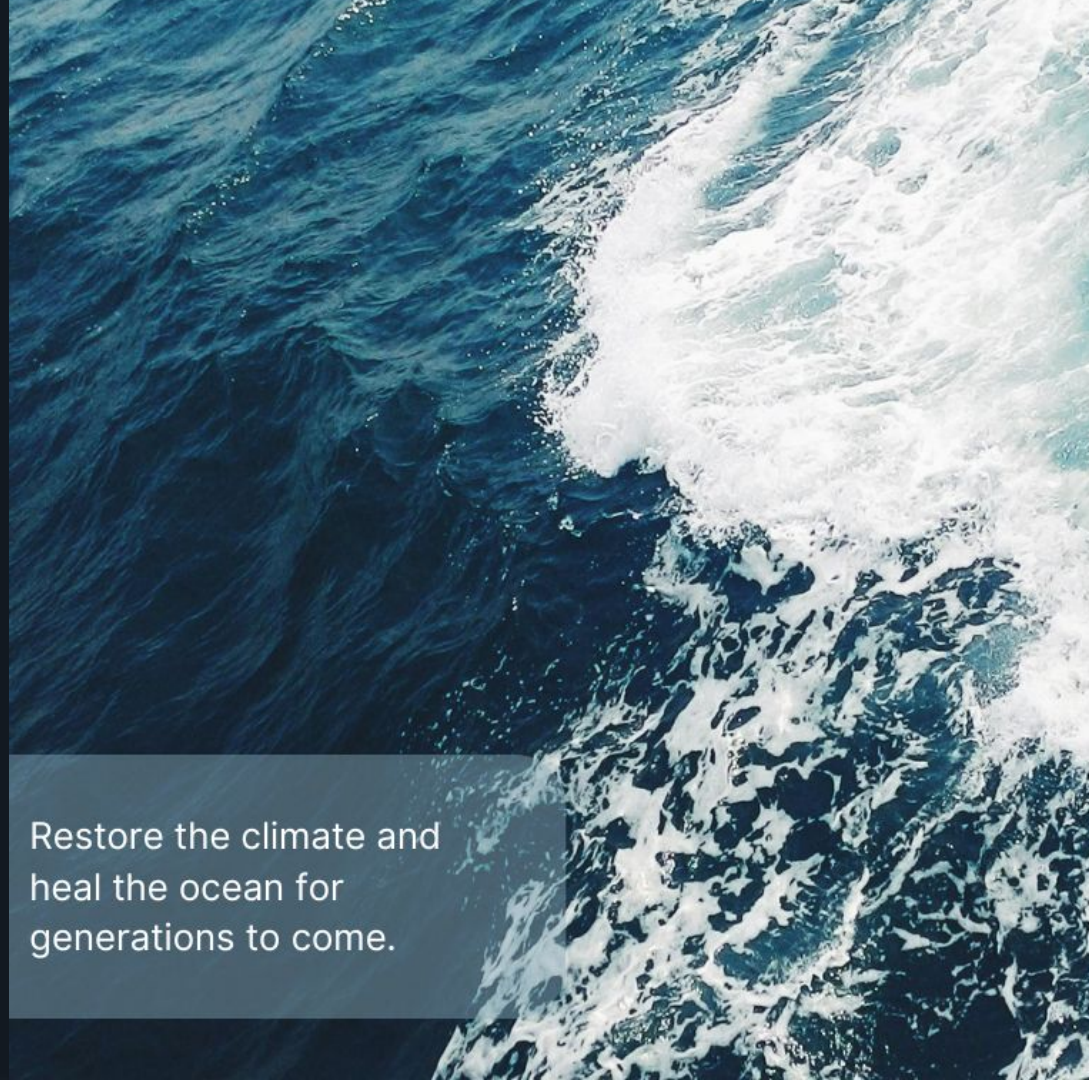
Introduction to Our Work

Planetary enhances the ocean's natural ability to fight climate change through Ocean Alkalinity Enhancement (OAE). Working collaboratively with our stakeholders, we are developing a number of ocean carbon removal projects worldwide.

At the heart of our projects is our Ocean Carbon Platform (OCP), providing a cost-effective and sustainable set of tools for use in qualifying alkalinity sources, automating alkalinity addition operations, monitoring ocean safety, and measuring and monetizing ocean carbon removals.

Our Values

Our team is on a journey to ensure everyone's needs are met with **respect**. With a sincere desire to **accept responsibility** for our actions, our feelings, and our words - in order to create **wins for us all** by applying our **curiosity and creativity** for the greater good.



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Note from our CEO, Mike Kelland

Decarbonization alone will no longer shield us from the worst impacts of climate change.

In addition to radically decreasing emissions, we also have a moral imperative to investigate and scale technologies to safely and sustainably remove CO_2 from the air. We owe nothing less to future generations.

In 2023, Planetary and Nova Scotia Power achieved a world's first: Restoring the ocean's ability to permanently remove 135 net tonnes of CO_2 from the air.

This small initial trial— carefully studied by independent oceanographers from Dalhousie University— and performed within Canada's strong social values and environmental regulations, represents a critical step forward in developing what has the potential to be the most scalable form of natural, permanent carbon removal on earth.

Planetary's mission is inclusive and forward looking. We believe that entrepreneurship can bring the creative and innovative momentum needed to achieve our collective goals. This milestone is one of the many required to responsibly scale this critical climate approach.

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Governance & Funding

Governance (As of 2023)

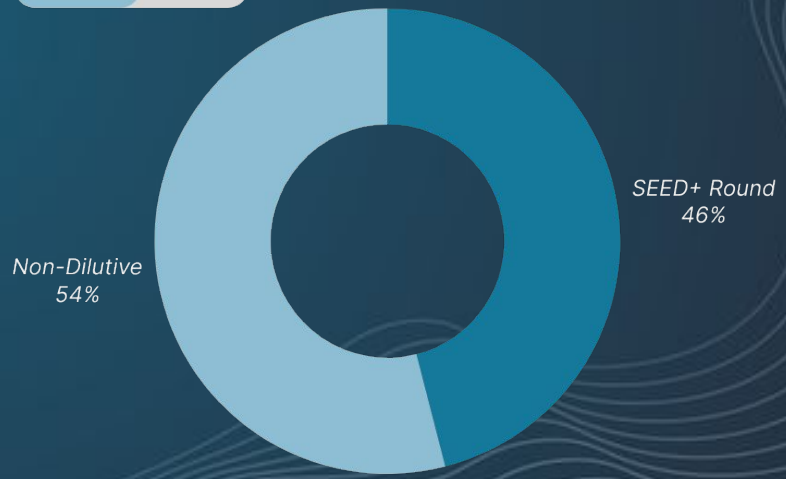
Planetary Technologies Inc. is a for-profit organization incorporated in Canada with headquarters in Dartmouth, Nova Scotia.

- Subsidiaries
  - Planetary Technologies, Inc. (American Subsidiary)
  - Planetary Technologies (B.C.) Inc. (B.C. based subsidiary)
- B Corp Mission Lock - Stakeholder Interest added to articles of incorporation (December 2022) Read more about B Corp Mission Lock here.
- Board Members
  - Michael Kelland (CEO & Cofounder)
  - Dr. Greg H Rau (CTO & Cofounder)

Funding (As Of 2023)

SEED+ Round: CAD $3.3 Million

Non-Dilutive: CAD $3.8 Million



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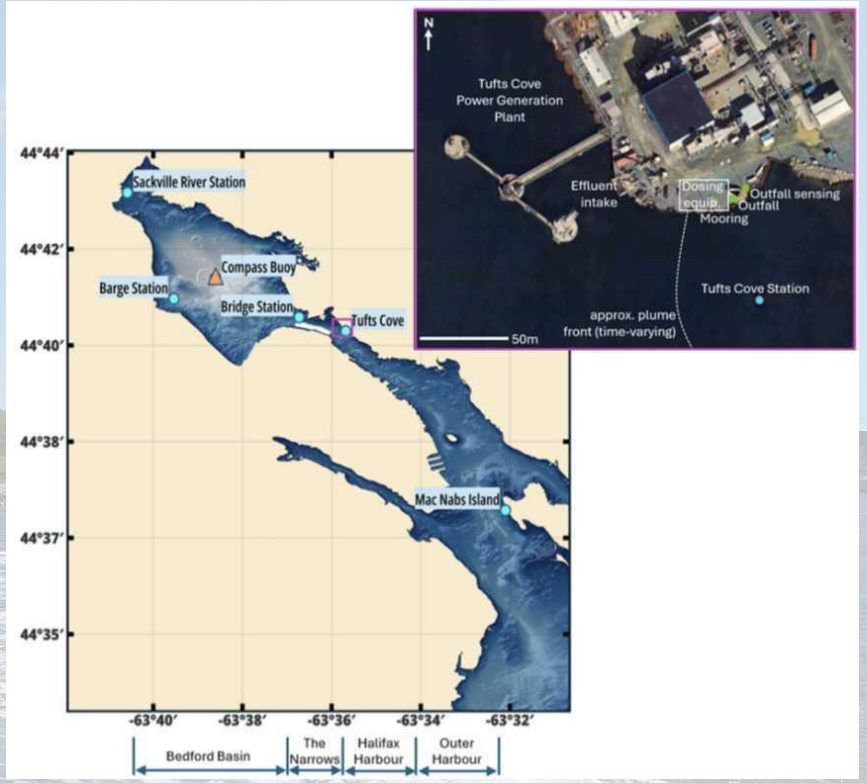
Our Projects

Nova Scotia

Trial Summary

Working with local utility Nova Scotia Power, we went through a series of field trials that added mineral alkalinity (more commonly known as antacid) to the existing water flow at the power generation station in Tufts Cove. The treated water is then released into Halifax Harbour through the plant's infrastructure.

The goal of the project was to explore whether adding an antacid to the ocean was a safe and effective way of deacidifying seawater and capturing atmospheric carbon dioxide (CO_2).



AUGUST

Set up at NSPI site + equipment testing

SEPTEMBER

Addition field study using AlkapHix

OCTOBER

Carbon dioxide removal using UM10

NOVEMBER

Carbon dioxide removal using UM10

DECEMBER

Site shut down for winter

Nova Scotia Project Page

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Nova Scotia

Pre-Trial Testing

- Baseline sampling (performed by Dalhousie University)
- Dye release studies by Dalhousie University
    - Researchers were able to successfully map how water moves and disperses away from the station's cooling water outfall.

Site Engineering & Roles

To design and develop our dosing system and site, Planetary partnered with the following organizations:

Garrison Minerals: Overall site design

Enginuity: Cutting-edge engineering firm

CTS Container: Custom container modifications for mobile laboratories

Dye Tracer Test Details

By using dye— which is commonly used in marine research with well-known environmental safety limits— researchers were able to map the movement of water. This allowed our scientists and engineers to understand and fine-tune our dosing system.

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Nova Scotia

Testing During Trial

- Sampled alkalinity testing for:
  - Suspended solids (ALS laboratories)
  - pH (Planetary, calibration samples measured by Dalhousie)
  - Feedstock composition (Dalhousie and SGS)
  - Slurry composition mixed on site (Planetary)
- Industry and academic partners in Halifax built moored sensor package (~60 m from discharge point) providing insight into:
  - Natural variability of the system
  - Measurability of our alkalinity additions
- Dosing system installed on site provided continuous and accurate measurement of the amount of alkalinity added
- Dropcam - monitoring near discharge location provided visual imagery of seabed
- Sediment coring (Dalhousie conjunction).

Preliminary Findings

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Nova Scotia

Table 2.1 Summary of samples and analyses.

Array	Sampling equipment	Parameters	Frequency	Impact areas (- = no relevance, 'x' = low relevance, 'xxx' = high relevance)			Summary
				Regulatory	netCDR	Eco-Impacts	
Feedstock Sampling	Bags	Elemental composition	Each super sac[1]	not required	xxx	x - feedstock consistency	~10g of dry material prior to batching
Eco-toxicity studies	Sample bottle	Lethal concentration 50 (LC50)	Once	Not required	Not required	xx	Incubations with organisms and feedstock performed by ECCC
Slurry Sampling	Sample bottle	Density, wt/wt, pH, DIC	Sporadic	not required	xxx		Slurry collected and analyzed
Dosing Pump Records	Discharge flow meter	Flow rate	1 minute	xx - must report values	xxx	xx context for results	Measured using flow meter, checked against pump volumetric flow and tank level sensor
Up- and downstream monitoring	Multiprobe	pH, turbidity, T, S	Hourly[2]	xxx - required downstream	x - not needed in calculation	x	Probe dipped into 1-L sample vessel.
Up- and downstream monitoring	Discrete bottles	pH, DIC, TA, TSS, total metals, phytoplankton	Daily[2,3]	xxx - sensor calibration	x - not part of calculation	xxx - phytoplankton sampling	Bottles filled and stored for subsequent analysis
Mooring	Various sensors	T, S, pH, total alkalinity (TA)	Instrument specific[4]	not required	x - not essential	xx - useful context	Internally logged and offloaded periodically
Sediment sampling	Cores and images	Metals and visuals	Once every 3-6 weeks	not required	x- perhaps if accumulating[5]	xxx - if accumulating	Multicorer and drop camera

[1] This sampling commenced on November 8th, thus no data available prior to this day.
[2] Measurements typically only taken on days when dosing took place.
[3] Samples collected on a M-F schedule, for more details see outfall monitoring in section 2.3
[4] Temperature (T), salinity (S) = minute. pH = 10 minutes, Total alkalinity sensor = 3-6 hours. Sensor maintenance and troubleshooting cause blackout periods. Calibration bottle samples for pH and TA collected sporadically.
[5] Recent study by Bach et al. (2023) suggest that accumulation on seabed could suppress natural alkalinity release, further research ongoing

[Nova Scotia Project Page]

Dosing Results

- pH and TSS within regulated limits 6.5-9, and <40 mg/L
- TA, DIC, pH, trace metals and phytoplankton analyses indicated no significant effect due to OAE additions in the immediate receiving waters or outfall
- **Projecting approximately 100 tonnes of net carbon dioxide removal (final numbers to be verified)**

In the Year Ahead

- Planetary will be returning to Nova Scotia in 2024 to perform a longer OAE trial to help researchers investigate the potential for ocean alkalinity enhancement to safely store atmospheric CO_2

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Cornwall

Following the methods test in 2022, and consultation with the community (group, individual and online sessions) Planetary set out to do Baseline tests in May 2023. This included:

- **A dive survey of the site where we sampled for chemical and biological parameters**
- **Collecting sea floor samples**
- **Report was shared with the community and discussed at subsequent community event**
- **See the blog post for details**

Cornwall Project Page

- **Released in 2024:**
  - In August 2023, The Environment Agency works with the Water Research Centre (WRC) to independently evaluate Planetary's project proposal. The report is released in Feb 2024
  - Findings from the 2022 methods test continued under a peer review process which led to a publication in Nature Communications Earth and Environment in July 2024
- **Current Status:**
  - Project on pause. Planetary is currently sourcing alkalinity that is viable for the long term in the UK.

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Future Projects (2024 and Beyond)

- **Chesapeake Bay**
  - Working with the University of Maryland Center for Environmental Science (UMCES) and HRSD to develop plans for field experiments in 2024
  - Planetary sub-awardee on NOAA funding led by UMCES
    - Learn more on the UMCES website

- **Metro Vancouver**
  - Working with Metro Vancouver; University of British Columbia (Department of Earth, Ocean, and Atmospheric Sciences as well as Institute for Resources, Environment and Sustainability); and BC Centre for Innovation and Clean Energy (CICE) - ongoing planning and consultation stages to explore viability of a field trial in the region.

Chesapeake Bay Project Page

Vancouver Project Page

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The Science

MRV Timeline

Our MRV provides a strong foundation and is a valuable proposal to the field. However, a certified protocol from an independent body like Isometric remains the gold standard.

GGR Grant Produces Model
Planetary is awarded a grant from the UK Government Greenhouse Gas Removal Innovation Program that explored the potential impacts of OAE and how to measure it.

Planetary Posts MRV V2 on Github We published Version 2.0 of our protocol in February of 2023 on GithHub for public comment for a period of 2 months.

Planetary's OAE MRV Protocol
Planetary's OAE MRV protocol, one of the first created for marine CDR projects, was developed in the first half of 2022. It was reviewed by independent experts and accepted by our customer Shopify in order to issue credits agains their August 2022 purchase.

V3 & Verification
Planetary incorporates comments to form MRV V3 in close collaboration with Isometric, who begin developing a system-wide MRV protocol for OAE.

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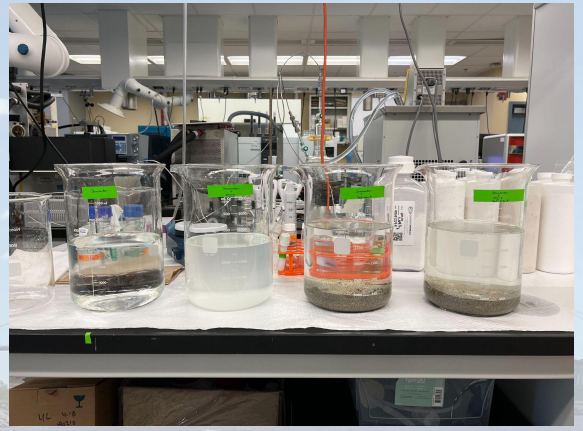
Lab Experiments

Alkalinity Sediment Sample Testing

In order to identify the alkalinity to be used in our Halifax trial, Planetary ran multiple lab experiments prior to the trail start date to better understand: How quickly the alkalinity dissolves in seawater, how much CO2 can be captured for a given amount of alkaline material, and how the alkaline material interacts with underlying sediments



Results

1. The estimated dissolution rate was used in model simulations to better predict how the material dispersed and the rates of CO2 removal in Halifax Harbour.
2. The carbon removal 'yield' provided confidence that the material was viable for use.

3. No obvious impact to marine life in sediments when alkaline material introduced, but natural alkalinity release may have been suppressed. More experiments are planned to further investigate this process.

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Ecotox Testing

Planetary submitted several alkalinity sources for ecotoxicological testing by an independent laboratory, TOXEM; the testing is sponsored by Carbon to Sea.

Read more on our Blog

Our Team

Our Team

as of December 31, 2023

- 21 Full Time Employees
  - Canada: 16
  - United States: 3
  - United Kingdom: 2
- 5 full time hires
- Turnover
  - 5.6% (1 person)

JEDI

Planetary is dedicated to being a company for good. As such, we have adjusted our articles of incorporation to encourage Planetary to consider the needs of all stakeholders in business decisions instead of focusing solely on the needs of investors and shareholders. Additionally, we have adopted the three pillars of focus from B-Corp to support our JEDI strategy. Under racial equity, we have adopted diversity practices - from recruitment to education and retention - to create an inclusive space where different lived experiences thrive. Under distribution of power, we apply financial transparency and have systems that enable self-management and empowerment. Under accountability, we have a public code of conduct and engage with stakeholders for each of our ocean CDR projects. All JEDI practices are integrated into prioritized organizational goals to ensure best possible outcomes for all.

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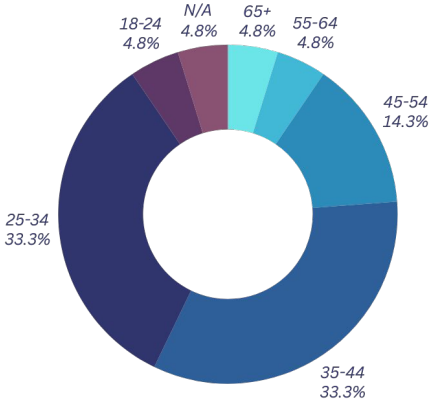
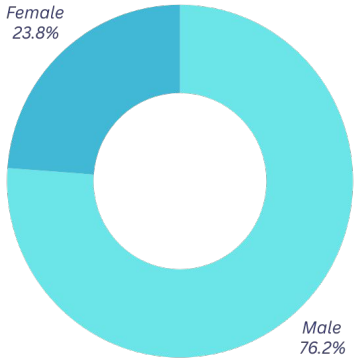
AGE PROFILE



GENDER PROFILE



Looking Forward to 2024 - Objectives at Planetary

Safely de-risk an economically viable OAE operation.

- Focused on a single active field trial, key results include renewed and ongoing commitment to operate safely at all times and this includes:
  - Ocean and biological safety
  - Social safety
  - Operational safety
  - Alkalinity material sourcing and use safety

Maintain a viable project pipeline of at least 2 projects.

- Ongoing refinement and understanding of field trial projects and continued exploration viable sites.

Build a resilient business.

- Ongoing investments here include securing funding as well as talent recruitment and growth that aligns with our mission and values.

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