Planetary's Nova Scotia Project

Field trial updates

(a blueprint for a real, successful and scalable project)

NASEM mCDR Standing Committee Meeting

September 2025

XPRIZE CARBON REMOVAL

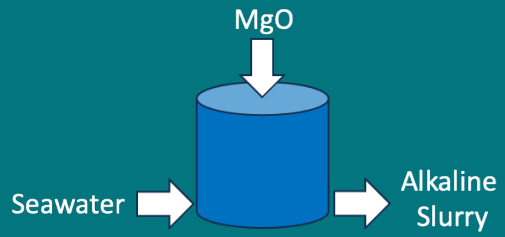
At 3,200 sq ft., removes 3x the largest DAC plant in 8% of the space

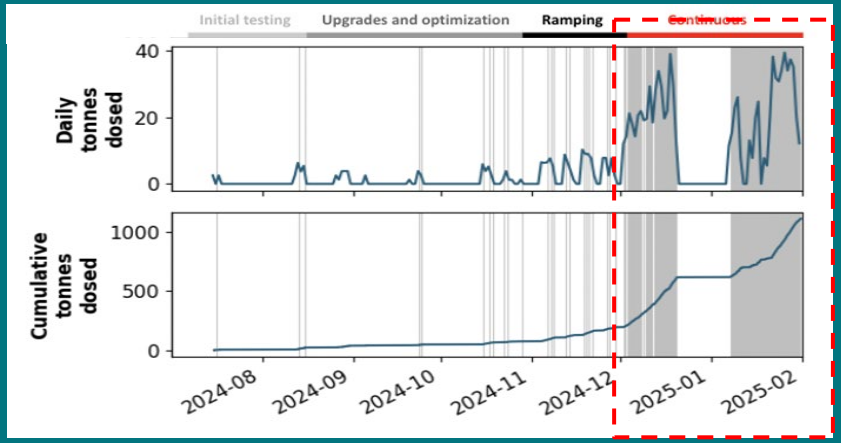
Site electricity consumption <15 kWh/tCO_2

Scalable?

Tufts Cove, Halifax, Nova Scotia, Canada

Just entered **year 3**





35 t/d ~ 10kt/y scale

Tiny Footprint, Massive Impact

13,000 tonnes/y in 2 shipping containers

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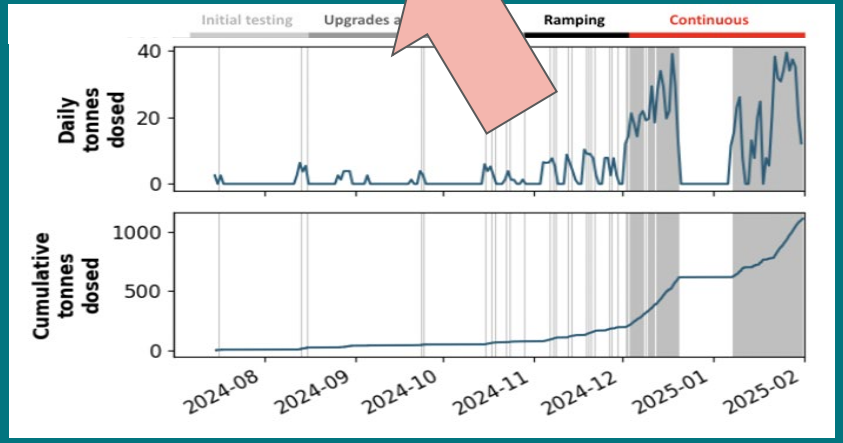
Demonstrating end-2-end OAE by delivering credits

First-of-a-kind, requiring scientific rigour, and real MRV

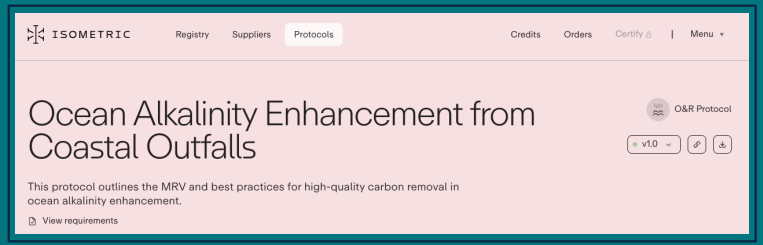
624t of credited net removals

(boat surveys, multiple ocean models, uncertainty propagation)

That underwent rigorous 3rd party verification



onto an ICROA accredited registry



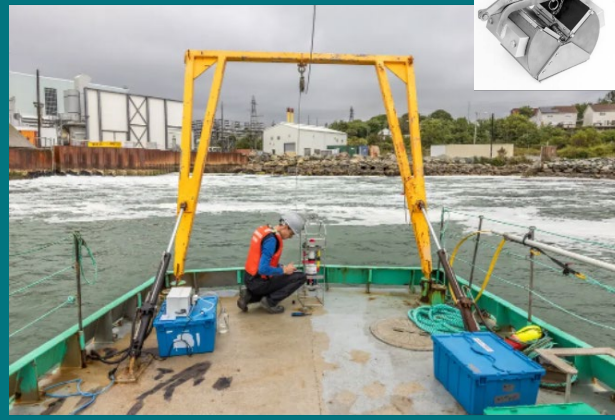
Revenue to keep the lights on

Monitoring

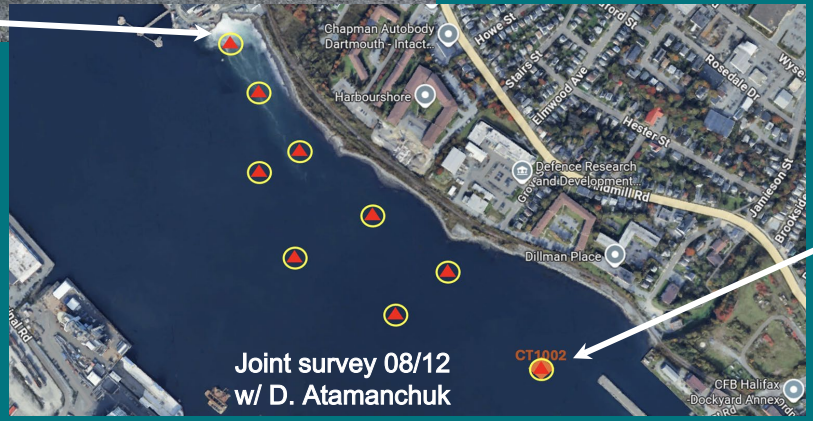
Wall-mounted mooring

~5m from addition point

Continuous effluent sensing up- and downstream of dosing



Bi-weekly surveys: CTD + water/sediment sampling



Dalhousie moorings
D. Atamanchuk

Collaborative effort w/ Dalhousie University

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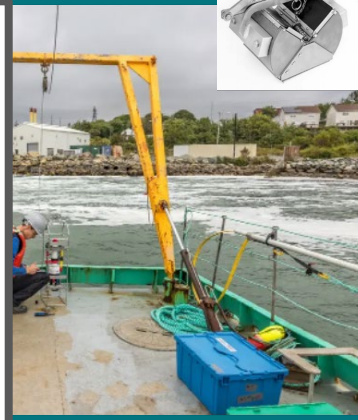
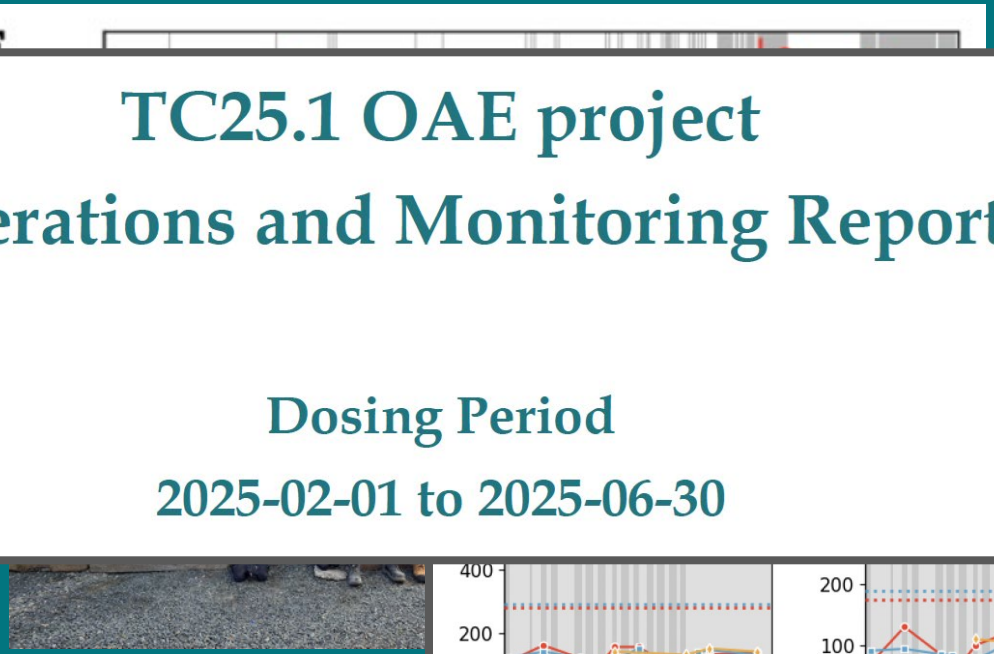
Monitori

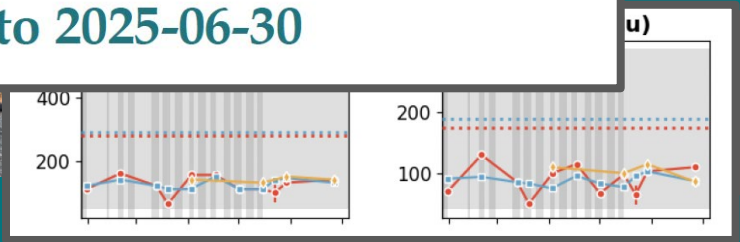
TC25.1 OAE project
Operations and Monitoring Report

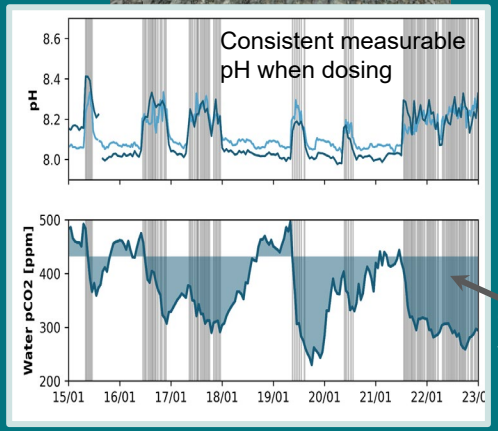
Dosing Period

2025-02-01 to 2025-06-30

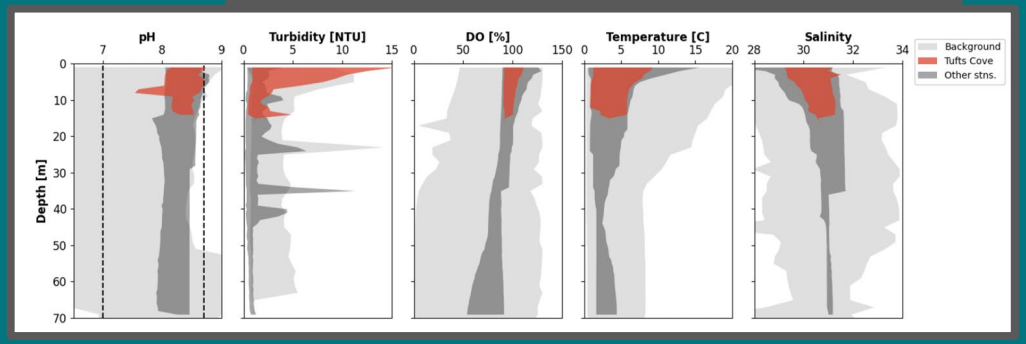








Reduced pCO2 in the plume "Creating the vacuum"

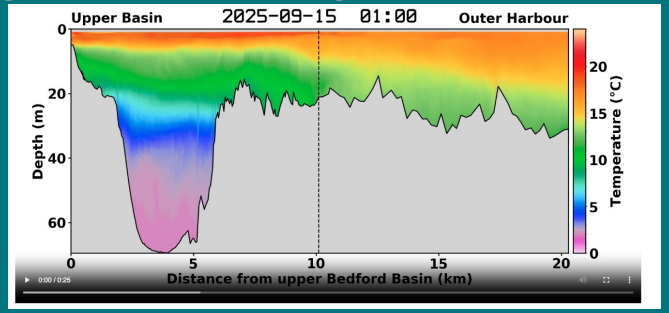


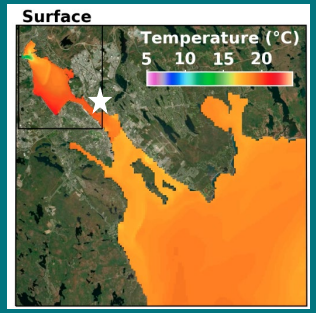
Vertical Profiles

Ocean models

Used in logistical planning, understanding safe thresholds, and quantification

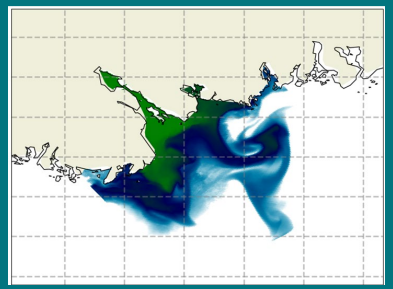
https://memg.ocean.dal.ca/memg/forecasts/#temp





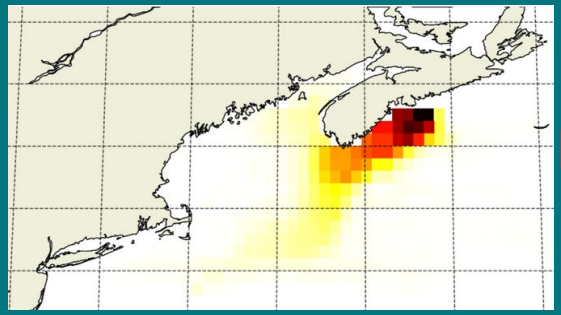
https://memg.ocean.dal.ca/memg/forecasts/#temp

Forcing with measured feedstock properties and dosing timeseries



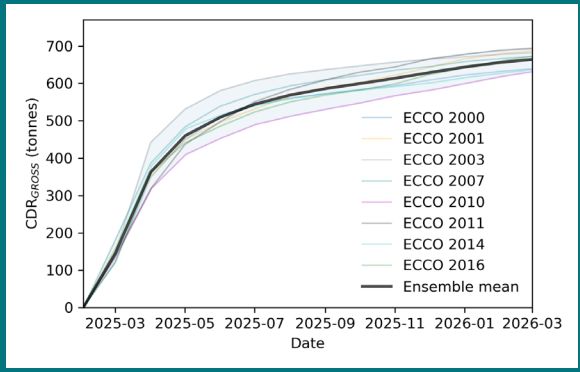
Regional Model Halifax Harbour (ROMS, Laurent et al., 2025 and others)

Upscale regional model output into global model



Global Model (ECCO, He & Tyka, 2022 and others)

Run multiple simulations ('ensemble') to **determine 'uncertainty' of model estimate**



Building trust in OAE by continuously iterating and improving

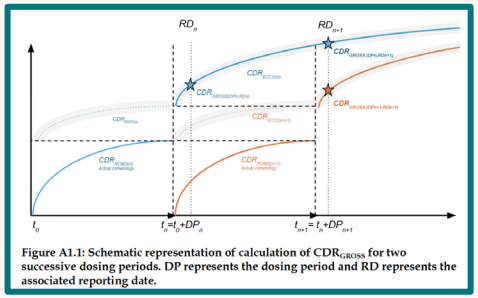


Figure A1.1: Schematic representation of calculation of CDR_{GROSS} for two successive dosing periods. DP represents the dosing period and RD represents the associated reporting date.

Dosing period	Carbon intensity (kg CO_2e/t feed)
TC24	0.136
TC25.1	0.112

Credit Delivery

Tufts Cove Ocean Alkalinity Enhancement Project
Operations and Monitoring Report

Operational Period
January 1st 2024 - January 31st 2025

May 2025

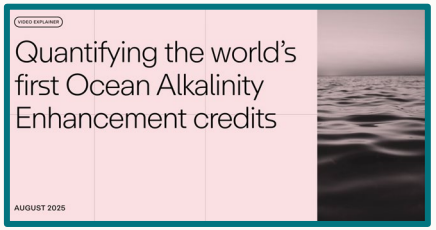
Presentations, Webinars, Reports

Improved Outcomes & New learnings

Continuous Iteration & Improvement

Improved MRV

Feedback



Novel surveys, Experiments, Analyses

Success is built on collaboration and transparency across numerous groups

1. Scientists - Dalhousie and elsewhere
    - Dal - weekly meetings, constant communication, asset/data sharing
    - External collaborations, JLO's, regular web/live presentations
      (Peer-review publication will remain a challenge)

2. Regulators/government officials
    - ECCC (federal), NS-ECC (provincial), DFO (federal)
    - Proactively reaching out, creating traction (slowly)
    - Notify, send reports and data (typically nothing comes back)

3. Broader community
    - Miles beyond a 'scientific field trial'

Project integrates into existing regulations:

- NS-ECC regulate outfall discharges
- ECCC enforce 'fisheries act'
- EQS define environmental thresholds

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Scaling Through Trust, Equity, & Social License

Framework: Inform, Consult, Involve, Collaborate, and Empower:

CMM (Representing 8 Indigenous groups), visits our Tufts Cove site

Planetary Presentation to Indigenous and Municipal Leaders

Community Celebration Event

Community <u>Collaborations</u>: Increased support and feedback integration

- Through key representative organizations including Pitupaq, the Confederacy of Mainland Mi'kmaq (CMM), and the Atlantic Policy Congress (APC), we have engaged all 13 Mi'kmaw communities.
- Lobster larvae eco monitoring implemented in response to input from the fisheries community.
- Ulnooweg research partnership through the Joint Learning Opportunity.
- Speaker series launched to highlight and uplift local Indigenous leaders and their voices.
- 35+ community groups consulted, fostering meaningful dialogue.

"Planetary's approach to ocean alkalinity is truly revolutionary. The Tuft's Cove project represents a new and exciting tool that Nova Scotians can be proud is homemade."

— Eric Christmas (Mi'kmaq, Membertou Nation)

"Where were you 20 years ago?"

— Pam Lovelace, Former Halifax City Councillor

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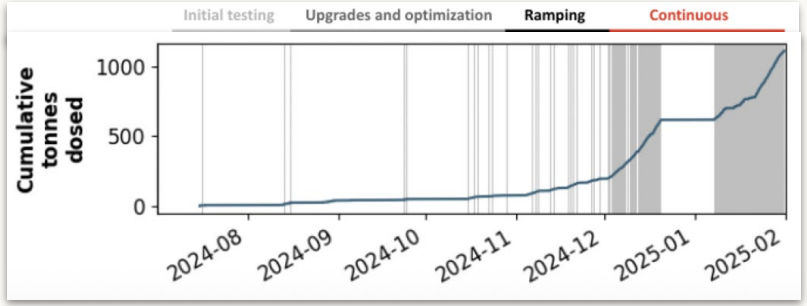
Advancing the field via stage -gated scaling towards continuous dosing



Continuous dosing at detectable levels facilitates:

- **A realistic and robust assessment of ecosystem impacts** (including potential co-benefits)
- Evaluation of MRV protocols and standards
- Pressure testing operations (feedstock QA/QC, real-time sensing & measurements, dosing equipment, stop-trigger framework, etc.)
- Running experiments in different environmental conditions

Strong and transparent communication with regulators and government

- Facilitating trust across various stakeholders
- Building toward effective governance structures

"Creat(ing) the conditions for learning by doing —safely, transparently, and at a scale that begins to matter." - Phil de Luna in *Forbes*

We Marine Microbes — LaRoche Lab

Bi-weekly sampling for plankton/eDNA

SEQUOIA

DOT Dartmouth Ocean Technologies Inc

PRO Dissolved Gas Sensors OCEANUS

Equilibrator Inlet Mass Spectrometry

K. Niva & N. Cassar, Duke

Duke UNIVERSITY

Carbon to Sea Initiative

DALHOUSIE UNIVERSITY

Halifax Ocean Alkalinity Enhancement Joint Learning Opportunity:

https://www.carbontosea.org/2025/04/23/spotlight-chris-algar-field-research/

Thank you!

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