



Research and Development Program Phytoplankton Carbon Solutions

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ExOIS Forum Summary March 2025

Ocean Visions Summit PCS Project Workshop

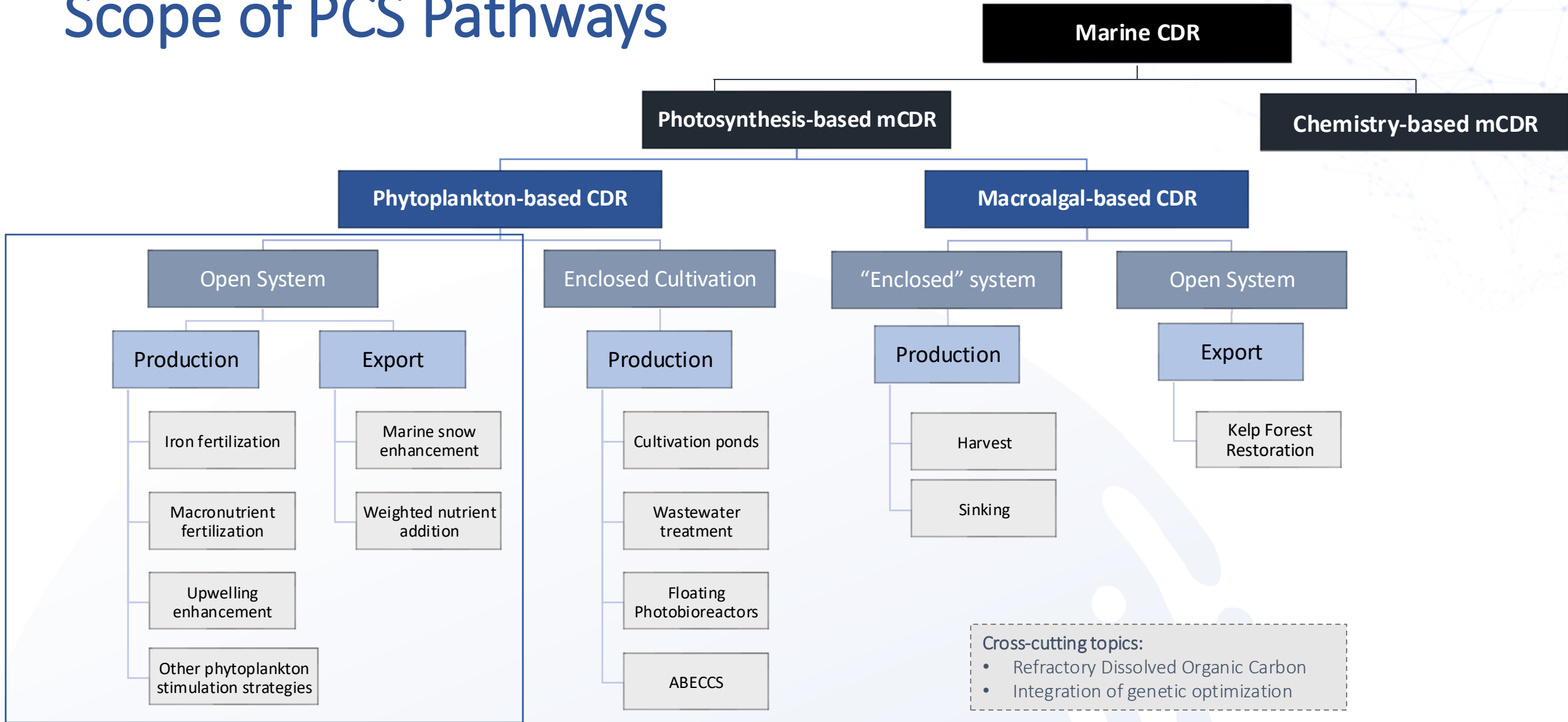
Thursday, March 27th, 11:00 to 12:30

Vancouver, BC, Canada

Program Overview

- Introductions 5 min
- Plenary Project Summary 15 min
- Breakout Working Groups by Theme 55 min
 - Theme summary and draft goals
 - Key research questions
 - Phase 3 activities
 - Ongoing work
- Breakout Groups Report Out 10 min
- Project Next Steps and Adjourn 5 min

Scope of PCS Pathways



WHY PCS pathways?

- Negative emissions are a part of every long-term climate strategy
- A wide range of CDR strategies are in use or under development
- All CDR strategies have various scaling potential, cost, material and energy inputs requirements, and environmental and socioeconomic implications
- PCS have the potential to scale with relatively low energy and material inputs
- Now is the time to fully test and understand the range of issues that might come into play in the future

WHY this Project?

- There is philanthropic interest in these pathways
- Philanthropic or government funded science is viewed most favorably
- Future societal decision-making will benefit from a comprehensive and careful consideration of this range of options
- Now is the time to invest strategically in critical science to better prepare for future decisions
- Strategic investments will also develop tools that will yield valuable information about ocean conditions, trends and responses to climate impacts

WHAT is this project?

- We are focused on open ocean strategies that stimulate phytoplankton growth as a carbon uptake and sequestration strategy
- This project is a short-term effort to develop by late summer a proposed five-year Research and Development program to guide future philanthropic investments
- Help shape the research agenda that will enable societal decisions about future use of these PCS pathways both alone and in relation to other CDR opportunities
- Considers and builds on the wide range of work already underway
- Seeking to build greater focus on the pathways of greatest potential and the priority work needed to inform future decisions

Project Topics

Benefits

- Durability
- Scalability
- Measurability
- Safety

Environmental Risks

- Oxygen depletion
- Nutrient robbing
- Harmful algal blooms
- Direct habitat impacts

Socio-economic Risks

- Direct economic
- Indirect economic
- Health
- Regulatory

Cross-cutting mCDR Needs

- Understand baseline conditions
- MRV capacities and approaches
- Ocean observation and modeling
- Environmental risk assessment
- Community engagement
- Communications
- Governance

Sectors

- Scientific
- Engineering
- Social
- Political
- Economic
- Legal
- Governance

Scales

- Site
- Regional
- Global

PCS Project Plan

Phase

Phase 1: Define project focus

October – December 2024

Phase 2: Research & Program Design

December 2024 – March 2025

WE ARE HERE

Phase 3: Feedback & Revision

March – July 2025

Phase 4: Final Recommendation

July-August 2025

Key Activities and Deliverables

- Advisory Board Workshop I
- Phase 2 Research Plan
- Develop webpage
- Advisory Board input on Phase 2 (January)
- Desktop research / Landscape Assessment
- Focus on the work already underway
- Develop draft R&D Program
- Advisory Board Workshop II
- Phase 3 Engagement plan
- Attend conferences, conduct expert interviews
- Second Draft R&D Program
- Advisory Board Workshop III
- Scope & recommend limited grantmaking to inform final recommendations
- Final R&D Program Design
- Public-facing materials
- Advisory Board Workshop IV

Ongoing Activities

- Advisory board engagement
- Monthly steering committee meetings
- Message building and communications
- ExOIS Monthly webinars
- Other mCDR community presence

Working Goals & Priorities

Developing R&D Priorities

Ten Year Goal:

In 10 years develop an adequate understanding of the risks and benefits of PCS pathways. Enable societal decisions on these pathways as potential solutions, alone and compared to other mCDR or CDR pathways

Note: Any future consideration of employing these pathways would only proceed in addition to and following sufficient mitigation of fossil fuel pollutants.

Five Year Goal:

Prioritize and support the right research and development (R&D) work to adequately inform decisions on continued development of PCS toward the ten-year goal

Note: All materials presented here today are DRAFT to stimulate discussion and support further development and refinement of the R&D program.

[draft] Ten Year Target

Be in position to know on whether PCS should be part of the global CDR portfolio, including:

Durability. PCS pathway carbon benefits can be sustained on the level with or better than other CDR approaches.

Scalability. PCS interventions are confidently confirmed to be capable of achieving more than one Gt CO₂ scale in defined ocean regions.

Measurability. MRV methods are comparable to other CDR pathways and yield clear delineation of carbon benefits. Execution costs, including energy expenditure are quantified.

Safety. Clear understanding of environmental and socio-economic risks enables full risk / benefit consideration.

[draft] Five Year Target

Have completed or underway high priority R&D work to inform the decision to continue PCS R&D towards the Year 10 target, including:

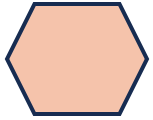
Durability. PCS and locations that maximize durability are known and uncertainty of PCS durability potential has been reduced.

Scalability. Uncertainty in the realistic scalability of different PCS approaches has been reduced.

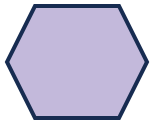
Measurability. In field & model-based MRV methodologies have been advanced and provide moderate-high confidence insight on durability and cost of PCS.

Safety. Knowledge of environmental and socioeconomic risks have advanced sufficiently to enable decision-making on the continuation of PCS R&D.

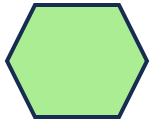
What is needed to achieve these goals?



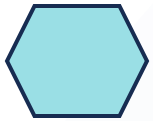
Monitoring, Reporting and Verification – Can PCS pathways yield **durable** carbon benefits, and can we sufficiently and quantifiably **measure** cause and effect? Can cost of implementation be developed for sufficient comparison with other CDR opportunities?



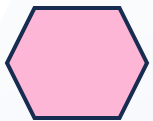
Environmental Impacts – Can we gain sufficient knowledge about environmental and socio-economic risks to effectively inform future societal cost/benefit decisions? This scoping includes both test sites and broader regional or global impacts.



PCS Pathways and Innovations – What PCS pathways and other innovations should be prioritized as a focus of a R&D program?



Inclusive decision-making – As PCS pathway, MRV, and environmental impact understanding improves, what governance, community engagement, and other steps are required – both for field trials and potential future scaling – to effectively move forward?

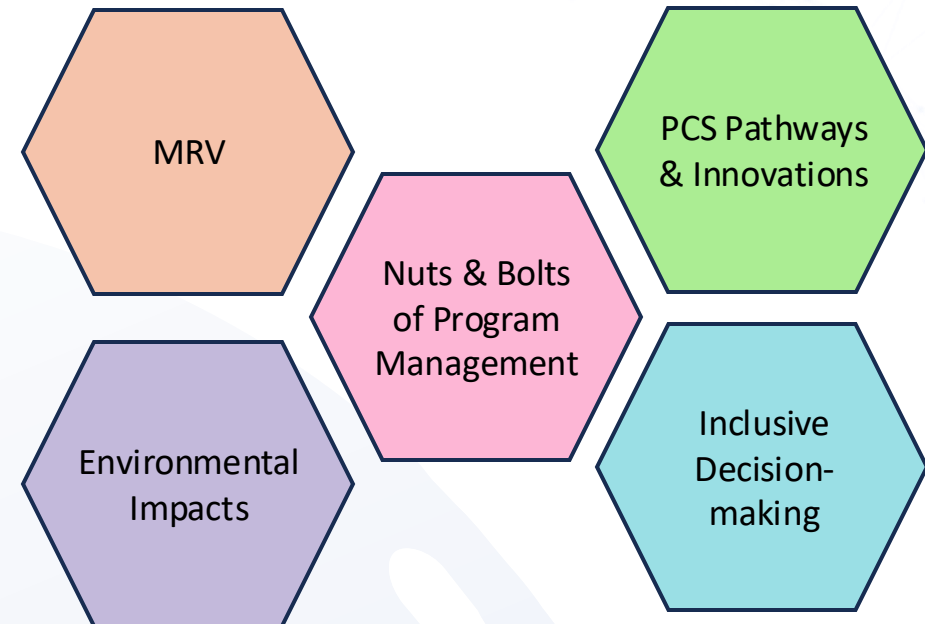


Nuts and bolts of program management – What are the key elements of a future R&D program needed to ensure progress? These include priority management, funding decisions and alignment, communications, coordination across the landscape of other CDR / mCDR opportunities, and identification and adherence to off-ramps.

Next Steps

Over the next six months we will:

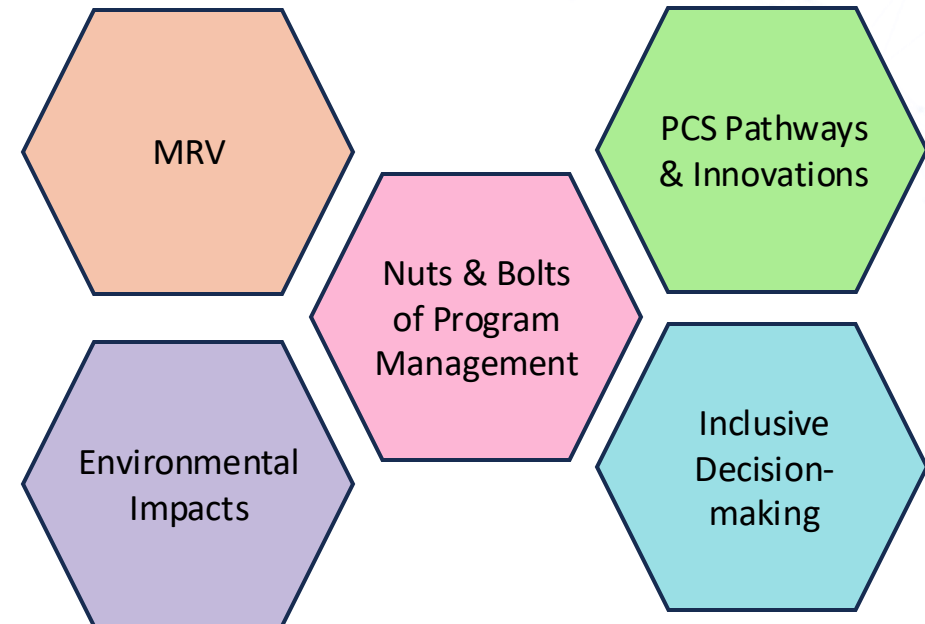
- **Further define, test and refine key research questions** on durability, measurability, scalability, and safety.
- **Further develop a five-year R&D strategy** to answer those questions by:
 - Leveraging and building on ongoing research and expertise.
 - Identifying and refining research and development priorities.
 - Commissioning short term workshops and other focused work and conducting further testing and expert interviews.
- **Outline the operational program management approach** to ensure inclusive and informed decision-making can be achieved with the research outcomes at the 5-year stage gate.



Next Steps At the Ocean Visions Summit

We will include breakout groups to:

- **Ask questions and provide additional general comment on this project**
- **View and provide additional input on goals of this R&D design project**
- **View and provide additional perspective on key research questions**
- **Consider short term actions (next three months) that could further inform the R&D program**
- **Further identify ongoing work for consideration**



Questions?

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