
SEAO2
CDR
STRATEGIES FOR THE
EVALUATION & ASSESSMENT
OF OCEAN BASED CARBON
DIOXIDE REMOVAL

SEAO2-CDR

LUISS
Research Center
for International
and Strategic Studies

Climate Interventions as Climate Risk Reduction Tools

LUISS / Vision Conference 2026

Friday, October 16, 2026

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101081362

Why Consider Climate Interventions?

Climate change may outpace mitigation and adaptation efforts

Global temperatures are likely to exceed 1.5°C for several decades

Risks include:

- Extreme heat
- Sea-level rise
- Ecosystem collapse
- Climate tipping points

Mitigation and adaptation remain essential

Exploring additional tools to manage high-consequence climate risks

Focus on research, governance, and preparedness

LUISS
Research Center
for International
and Strategic Studies

SEAO2-CDR — Horizon Europe Grant Agreement No. 101081362

A Diversified Climate Risk Portfolio

- **Five Pillars of Climate Policy:**

1. Mitigation: reduce greenhouse gas emissions
2. Adaptation: reduce vulnerability to impacts
3. Carbon Dioxide Removal (CDR): remove legacy emissions
4. Solar Radiation Management (SRM): reduce warming temporarily
5. Glacial Interventions: slow ice-sheet loss and sea-level rise

- **Key message**: Climate interventions as a part of a broader climate portfolio present an opportunity to buy time for decarbonization without crossing tipping points

SEAO2-CDR — Horizon Europe Grant Agreement No. 101081362
LUISS
Research Center
for International
and Strategic Studies

Solar Radiation Management (SRM)

What is SRM?

- Increases Earth's reflectivity (albedo)
- Reduces absorbed solar radiation
- Intended as a temporary risk-reduction measure

Proposed Approaches

- Stratospheric Aerosol Injection (SAI): 1% of sunlight –> 1C cooling
- Marine Cloud Brightening (MCB)
- Mixed-Phase Cloud Thinning (MCT)

LUISS
Research Center
for International
and Strategic Studies

SEAO2-CDR — Horizon Europe Grant Agreement No. 101081362

SRM Benefits and Risks

- **Potential Benefits**
  1. Rapid cooling effect
  2. Lower peak temperatures
  3. Reduced extreme heat events
  4. Slower Arctic sea-ice loss
  5. Reduced climate damages during transition towards decarbonization
- **Potential Risks**
  1. Regional precipitation changes
  2. Possible monsoon disruption
  3. Ozone chemistry impacts
  4. Governance and geopolitical challenges
  5. Does not address ocean acidification

LUISS
Research Center
for International
and Strategic Studies

SEAO2-CDR — Horizon Europe Grant Agreement No. 101081362

Marine Carbon Dioxide Removal (mCDR)

Purpose

- Enhance the ocean's ability to absorb and store CO_2
- Proposed Approaches
- Ocean alkalinity enhancement
- Ocean fertilization
- Direct ocean carbon removal
- Blue carbon restoration
- Seaweed and kelp farming

Key Challenge

- Determining scalability and legal frameworks applicability

LUISS
Research Center for International and Strategic Studies

SEAO2-CDR — Horizon Europe Grant Agreement No. 101081362

Marine carbon dioxide removal (mCDR)

Approach	Benefits	Costs & risks
Ocean alkalinity enhancement	Very durable storage; can ease acidification	Energy for mining minerals; uncertain ecology
Ocean fertilization	Low cost; uses natural biology	Algal blooms, low oxygen; short storage
Direct ocean removal	Engineered, controlled, measurable	Energy-intensive, costly, early stage
Blue carbon restoration	Coastal protection, biodiversity, fisheries	Limited scale; carbon can be re-released
Seaweed & kelp farming	Co-products, habitat, local livelihoods	Needs large areas; permanence uncertain

Key challenge: proving scalability, and clarifying which legal frameworks apply (e.g. London Protocol, UNCLOS)

Glacial Interventions

Objective

- Slow glacier retreat and ice-sheet instability
- Reduce future sea-level rise
- Greenland and WAIS: potential to raise sea level by 65m

Proposed Approaches

- Subsea barriers
- Artificial pinning points
- Ice-shelf stabilization
- Surface hydrology management

LUISS
Research Center
for International
and Strategic Studies

SEAO2-CDR — Horizon Europe Grant Agreement No. 101081362

Glacial Interventions

- **Potential Benefits**
  1. Delay ice-sheet collapse
  2. Reduce sea-level rise risks
  3. Protect coastal populations and infrastructure
  4. Buy time for mitigation and carbon removal efforts
- **Potential Risks**
  1. Significant engineering challenges
  2. High infrastructure costs
  3. Ecological impacts in polar regions
  4. Operational difficulties in remote locations
  5. Uncertain long-term effectiveness
  6. Governance and legal challenges

LUISS
Research Center
for International
and Strategic Studies

Why Research Now?

- Often cited worries: slippery slope, moral hazard, termination shock
- Research does not equal deployment
- Provides evidence on:
  - Effectiveness
  - Environmental impacts
  - Economic feasibility
  - Ethical acceptability
  - Governance requirements
- Avoids crisis-driven decision making
- Builds scientific and institutional preparedness
- Risk-reduction during highly likely climate overshoot

LUISS
Research Center
for International
and Strategic Studies

SEAO2-CDR — Horizon Europe Grant Agreement No. 101081362

Policy Recommendations and Conclusion

- **Policy Recommendations**
  - Keep emissions reductions as the primary priority
  - Fund interdisciplinary climate intervention research
  - Strengthen international collaboration
  - Create governance and oversight frameworks
  - Promote transparency and public engagement
- **Conclusion**
  - Climate interventions are not substitutes for mitigation
  - SRM and glacial interventions may reduce high-consequence climate risks
  - Responsible research expands future policy options
  - Climate intervention research represents preparedness, not commitment

SEAO2-CDR

@seao2_cdr seao2-cdr www.seao2-cdr.eu

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101081362