



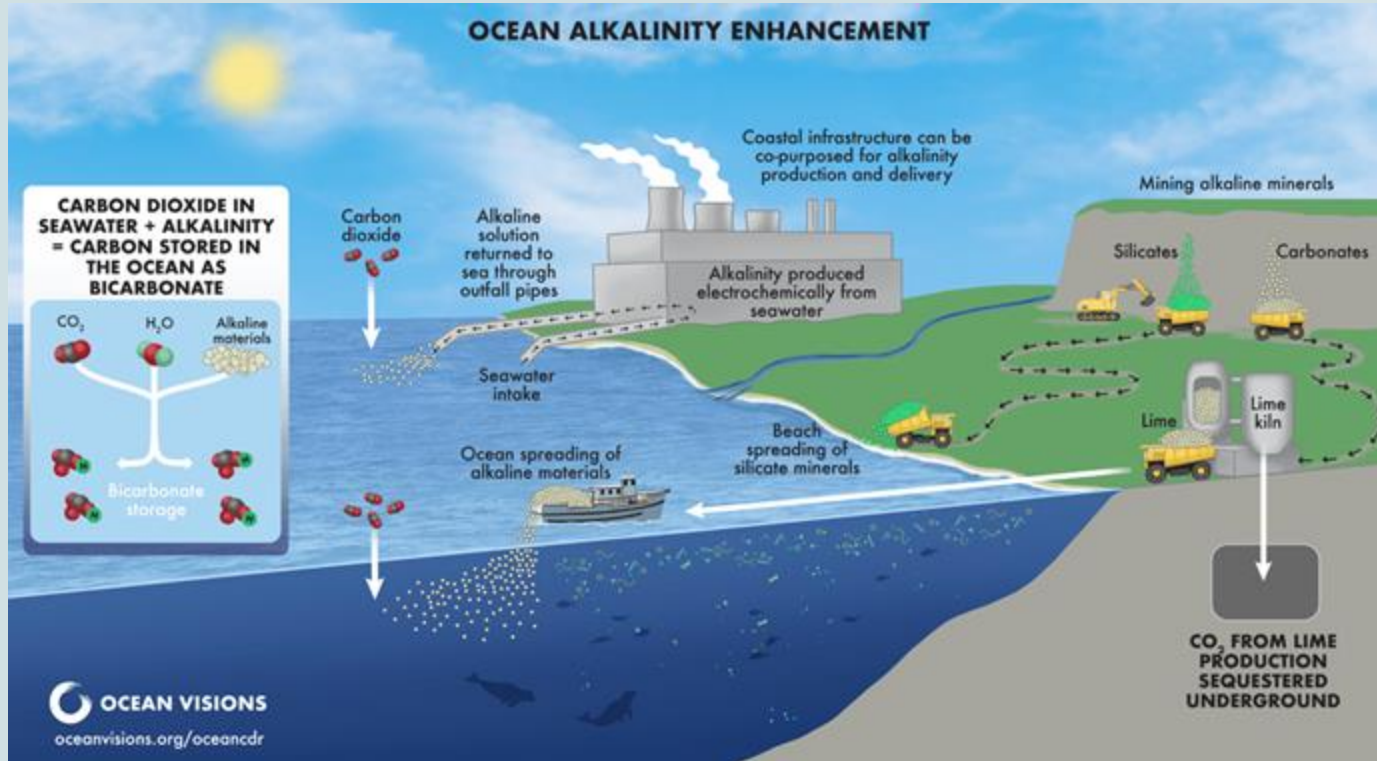
Using future scenarios to engage coastal communities on ocean alkalinity enhancement

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What is OAE? And why do we need research on communities' perceptions + priorities?



Our study: Engaging coastal communities in Washington State + the Olympic Peninsula



Engaging with coastal communities: A scenario approach

- **Two day-long workshops (n=38)** with Olympic Peninsula eNGOs, local government, Tribal staff, educators, marine resource committees, tourism + recreation groups, shellfish farmers
- **Presentations and discussions** on CDR + OAE
- **'Best-case' and 'worst-case' exercise** for OAE in 2050
- Small-group **discussion of four future scenarios** for OAE deployment in region



Sequim Bay. Image credit: PNNL

Components of four scenarios

- **Year** (e.g., 2032, 2043, 2056)
- **Type of OAE** (e.g., electrochemical, mineral-based, coastal enhanced weathering)
- **Deployment scale**
- **Purpose** (e.g., meet corporate targets? Restore ocean health?)
- **Funding**
- **Climate progress** (how much climate progress has been made?)
- **Ownership**
- **Ecological impacts**
- **Energy needs**
- **Material sourcing**
- **Waste disposal**
- **Monitoring**

IMPORTANT NOTE: This scenario is intended as a tool for reflection and discussion. It is NOT a prediction of the future nor a recommendation about what 'should' happen, nor does it reflect scientific consensus, as many aspects of possible OAE deployment are unknown at present.

It is 2056, and the world has missed its 2050 targets for achieving any sort of significant emission reductions. With investments in renewable energy insufficient, polluting sectors rely heavily on carbon capture and storage (CCS) to mitigate their emissions. While a set of mission-oriented start-ups piloted OAE techniques in the 2020s and 30s, these companies were almost all acquired in the late 2030s by fossil fuel companies looking to hedge their bets against a possible large-scale carbon tax that never came to be. Now, most OAE projects in the U.S. are small-scale side-projects owned by the fossil industry, funded out of their corporate social responsibility departments.

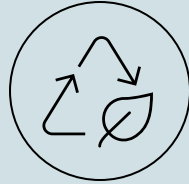
In the PNW, there are several such small OAE projects. These projects utilize small reactors that have been added to ships already circulating in the region. These reactors take up seawater, process it electrochemically to make it more alkaline, and then reintroduce the alkaline water back into the ocean. Given the small scale, there is minimal additional energy required for the operation of these reactors, and it can be supplied via on-board solar panels. Small amounts of hydrochloric acid are generated as byproducts of these electrochemical processes, and innovative approaches have been developed by local scientists to repurpose these byproducts to the cultivation of sea lettuce in suitable coastal environments. Monitoring and measurement efforts are limited, but no adverse impacts on marine life have been observed thus far.

YEAR	2056
TYPE OF OAE	Already operating ships are retrofitted with reactors to take up seawater, use electrochemical processes to make it more alkaline, and then reintroduce that water
PURPOSE	Corporate social responsibility for fossil fuel companies
FUNDING	Funded by corporate profits
DEPLOYMENT SCALE	Very small (relative to the CDR needed given emissions trajectories)
CLIMATE PROGRESS	Failure to make significant reductions in emissions; fossil energy production and use is still widespread
OWNERSHIP	Fossil fuel companies
ECOLOGICAL IMPACTS	No adverse impact on marine life observed
ENERGY NEEDS	Minimal energy required due to limited operations
MATERIAL SOURCING	n/a
WASTE DISPOSAL	New efforts to utilize byproducts from electrochemical OAE to cultivate sea lettuces
MONITORING	Limited emphasis on monitoring and measuring

What did we learn about people's thinking on OAE?



- It's **not just marine** ecological impacts that matter



- 'Circular' approaches that **repurpose existing infrastructure and byproducts** are more supported



- **Ownership and financing** really matter

Where are people still wrestling with tensions & trade-offs?



Questions of **climate urgency**

- ‘We need to act quickly, but not at the expense of ecological and social impacts’
- ‘Climate change is the most pressing issue, since **biodiversity loss will occur anyways** in a climate-changed world’



Questions of **scale**

- ‘Possible OAE deployment at scale brings so many issues in terms of costs + impacts—but **if we don’t do it at scale, it’s pointless**’
- ‘**Community ownership** is preferable, but **can it get big enough fast enough**’

Reflections: Benefits of the scenario method

*A note: framing and scenario components really matter!

- Made **complexities and unknowns more tangible and wrangle-able** to participants
- Brought tensions to the surface and encouraged people to **think about values in practice**
- Left people **more confident** in ability to discuss + think through OAE

Thanks for listening!

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