

Panel: Consider tinkering with oceans to suck up more carbon

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The United States should research how to tinker with the oceans—even zapping them with electricity—to get them to suck more carbon dioxide out of the air to fight climate change, the [National Academy of Sciences](#)

recommends.

The panel outlines six ways that could help oceans remove more heat-trapping [carbon dioxide](#) from the atmosphere. The scientists said the most promising possibilities include making the seas less acidic with minerals or jolts of electricity, adding phosphorous or nitrogen to spur plankton growth and creating massive seaweed farms.

But it's unknown if they would work, would cost too much or cause more harm than good. So the panel of science advisers to the federal government Wednesday proposed spending more than \$1 billion over the next decade to figure out the potential pitfalls and most effective methods of getting the world's oceans to suck up more carbon.

The issue needs to be examined, the academy said, because something more than reducing [carbon emissions](#) likely needs to be done to take heat-trapping gases out of the air if the world is to meet the 2015 Paris climate goals of limiting future warming to a few more tenths of a degree from now.

By mid-century, the world will probably need to take about 10 billion metric tons of carbon dioxide out of the air annually, the report said.

Previous academy reports looked at geoengineering as well as efforts to take in carbon, including planting more trees. This new report, funded by the non-profit ClimateWorks, examines what's now absorbing most of excess carbon dioxide: the seas.

The report doesn't advocate geoengineering the oceans, just exploring how it could be done.

"We don't answer the question, 'Should we'?" said panel chairman Scott Doney, a biogeochemist at the University of Virginia. "The question is,

'Can we?' And if we do, what would be the impacts, and one of the things we try to highlight is that all of these approaches will have impacts."

"What are the consequences to the environment?" Doney said.

The report looked at the following ways for oceans to take more carbon dioxide from the air:

— Electrical jolting the oceans to make them less acidic. Water that's more alkaline can suck up more carbon. It also helps fight one of [climate change](#)'s harms—acidic [ocean](#) waters that damage shellfish and reefs. Scientists are confident the approach would work because it is basic chemistry, Doney said. But it bears the highest cost and medium to high risks. The report recommends \$350 million in research.

— Using minerals to make the ocean to make it less acidic. This would be somewhat expensive and risky, and the report recommends \$125 million to \$200 million for research.

— Adding nutrients such as phosphorus or nitrogen to the ocean surface. This would spur photosynthesis by plankton, which would breathe in the carbon dioxide then sink. The panel had medium to high confidence that it would work, with medium environmental risks, and recommended \$290 million in research and field experiments.

— Seaweed farming with the plants taking up carbon then sinking into the deep ocean or getting pumped there. There's medium confidence this would work with medium to high environmental risks. The panel suggests \$130 million in research.

— Ecosystem recovery would help marine animals, plants and the coastal environment become healthier and absorb more carbon. It has

low environmental risk but also low to medium chances of working. The report estimates \$220 million in research.

— Artificial waves creating upwelling and downwelling to stimulate plankton growth. The confidence in this working is low, the risks high, and the [report](#) recommends \$25 million in research.

Breakthrough Institute climate scientist Zeke Hausfather, who wasn't part of the study, said the electricity and chemical approaches to change ocean acidity "have the highest potential for long-term carbon removal at a scale large enough to make a meaningful impact." But he said he's more skeptical of ocean fertilization to stimulate plankton.

Cornell University climate scientist Natalie Mahowald, who also wasn't part of the study, said, "Carbon removal and sequestration is required to reach low climate targets. ... The ocean represents huge un-understood and untapped potential."

But Pennsylvania State University climate scientist Michael Mann said merely by exploring the idea of tinkering with the ocean is harmful because polluters and government officials can use it as an excuse "to delay and downplay the only safe climate solution—dramatically curtailing our burning of fossil fuels."

It makes sense to just be prepared, said panel chairman Doney. "If we don't start down this road now of the research, we might have to make decisions with insufficient information."

It's up to the president and Congress to fund the research. Earlier this week the Department of Energy asked companies and organizations [to demonstrate technologies](#) that could remove [carbon](#) dioxide from the air or cut emissions, saying there's funding for such work in the infrastructure law that passed last month.

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