

# A controversial plan to refreeze the Arctic is seeing promising results. But scientists warn of big risks

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A Real Ice trial pumping seawater over the ice in Cambridge Bay, Canada, on 23 January 2024. The aim is to thicken and restore disappearing Arctic sea ice. Real Ice

## **CNN —**

Deep in the Canadian Arctic, scientists and entrepreneurs brave sub-zero temperatures, whipping winds and snowstorms to drill holes through the sea ice to pump out the seawater below and freeze it on the surface.

The group from the UK start-up Real Ice is in Cambridge Bay, a tiny coastal village in Nunavut, to try to prove they can grow and restore Arctic sea ice.

Their ultimate plan is to thicken ice over more than 386,000 square miles of the Arctic — an area more than twice the size of California — with the aim of slowing down or even reversing summer ice loss and, in doing so, help to tackle the human-caused climate crisis.

It's a bold plan, and one of many controversial geo-engineering proposals to save the planet's vulnerable polar regions that range from installing a giant underwater

“curtain” to protect ice sheets, to sprinkling tiny glass beads to reflect away sunlight.

Some Arctic scientists and experts have criticized Real Ice’s methods as unproven at scale, ecologically risky and a distraction from tackling the root cause of climate change: fossil fuels.

But the company says its project is inspired by natural processes and offers a last chance to protect a disappearing ecosystem as the world fails to act swiftly on climate change.

Arctic sea ice is shrinking as humans continue to heat up the world by burning fossil fuels. Since the mid-1980s, the amount of thick, multi-year ice has shrunk by 95%. The ice that remains is young and thin. Some scientists predict the Arctic could have an ice-free summer as early as the 2030s.

The loss of sea ice is a global problem. Its bright white surface reflects the sun’s energy back into space, cooling the planet. When it melts, the darker ocean exposed beneath is able to absorb more of the sun’s rays. It’s a doom loop — global warming melts the ice and melting ice supercharges global warming.

This technology may help refreeze the arctic

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Real Ice’s plan for protecting this icy ocean landscape involves inserting electric-powered, submersible pumps under sea ice to pump seawater onto the surface. The water freezes as it pools across the ice like a huge puddle, creating an extra layer of ice.

The process also removes snow from the top of the ice, stripping it of an insulating layer and triggering extra growth on the underside of the sea ice, said Andrea Ceccolini, co-CEO of Real Ice.

The startup has been conducting field tests in the Arctic for almost two years. The first were in Alaska last year, mostly to check that the equipment worked and could stand up to the brutal cold.

The group started tests in Cambridge Bay in Canada in January this year. They covered around 44,000 square feet of ice and added an average of 20 inches of additional thickness between January and May compared to the control area, Ceccolini said.



A member of the Real Ice team takes measurements on the sea ice in Cambridge Bay in January 2024. Real Ice

A new round of tests in Cambridge Bay began in November and they have so far covered 430,000 square feet. In the first 10 days of the trial, the ice was already 4 inches thicker in the places they were testing, said Ceccolini.

They will return in the new year and again in May to measure how much ice has been created. Based on previous results, they expect between around 16 to 31 inches of ice gain, Ceccolini said.

“It is early days,” said Shaun Fitzgerald, director of the Centre for Climate Repair at the University of Cambridge, which has been working with Real Ice on the trials. But early results have been encouraging, he told CNN. “I am optimistic, but we need more experiments and more data.”

The ultimate plan is to automate the process using underwater drones, each about 6.5 feet long and powered by green hydrogen. These will melt holes in the ice from below using heated drills.

Ceccolini estimates around 500,000 drones would be used at full scale, and would be deployed carefully to avoid animal migration paths or shipping lanes, he said.

If all goes to plan, he expects they can scale up within eight to 10 years.



A member of the Real Ice team testing the submersible pump during field trials in Nome, Alaska, in February 2023. Real Ice



The trials in Alaska were aimed at establishing whether the equipment could withstand brutal Arctic conditions. Real Ice

It won't be cheap. Real Ice estimates the cost to be between \$5 billion and \$6 billion a year to thicken ice over 386,000 square miles, an area it believes is large enough "to be effective in slowing down and even reversing the losses of summer sea ice in the Arctic," Ceccolini said.

Real Ice is mostly self funded with some money from investors. Eventually, they see a global fund or governments stepping in to pay. They also envision selling "cooling credits," where polluters pay toward ice refreezing in order to "offset" their own pollution.

It's a compelling vision but many scientists remain doubtful it could work at scale.



‘Extremely questionable’

The science is sound, said Jennifer Francis, a senior scientist at Woodwell Climate Research Center, “ice will be made measurably thicker and brighter in local areas surrounding the pumps.” But a big question, she told CNN, is whether enough sea ice can be grown over a long enough period to make any difference to the climate crisis. “I have serious doubts,” she said.

The scalability of Real Ice’s solution is “extremely questionable,” said Liz Bagshaw, associate professor in polar environmental change at the University of Bristol. She also warned of potentially wide-ranging ecological impacts on a vulnerable region. “Such interventions are morally dubious at best, and at worst, ethically irresponsible,” she told CNN.

Dozens of scientists expressed concerns in a recent report about polar geoengineering projects, including ice thickening. They warned of “the possibility of grave unforeseen consequences,” including the environmental impact of “an unprecedented level of human presence” in the Arctic.

Ceccolnini does not deny the project could cause changes to the marine environment – for example, they are looking at algae growth that can be affected by ice thickness – but believes overall impacts will be limited.

The project’s future depends on whether they can prove ice thickening is effective and that it creates no significant side effects, he said.

“Everything we do has an impact,” Ceccolini said. “The problem is there is a much more dramatic impact in just letting things go on like this.”