Retired scientists try to design a "cloud whitener" to fight global warming

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Aqua Metrology Systems' Armand Neukermans, 73, poses for a portrait behind a cloud condensation nuclei spraying system prototype at Aqua Metrology Systems in Sunnyvale, California, June 24, 2015. LiPo Ching/Bay Area News Group

In Sunnyvale, California, a team of elder Silicon Valley scientists is building a bold new device. They hope it can solve one of humanity's most profound dilemmas. The device is a "cloud whitener" and is designed to cool a warming planet.

The team is made up of retired physicists, engineers, chemists and computer experts from some of the top tech companies in Silicon Valley, an area of California near San Francisco, known for high-tech companies like Apple and Google. They have met four days a week for seven years in the Sunnyvale lab of the Marine Cloud Brightening Project. The team is designing a tool that creates perfectly suspended droplets of water resembling fog.

"Insurance Policy For Global Warming"

They hope to launch the nation's first open-air field trial of "geoengineering," a controversial new science of intervening in the Earth's climate to bring down temperatures.

The team aims to test the ability of an energy-efficient machine to hurl tiny seawater droplets into the air. It would be the first step of a research project to boost the brightness of clouds to reflect rays of sunlight back into space.

“We are interested in an insurance policy for global warming,” said Jack Foster, 79, a physicist and laser pioneer. “We are not interested in deploying it unless it’s necessary." Foster says they would like to have something available though, "so we know what works and what doesn’t work.”

The effort to conduct even a small-scale test represents a dramatic shift in thinking in the scientific community. Until recently, scientists resisted conversations about deliberate manipulation of the climate. They focused instead on how society could reduce emissions of carbon dioxide, methane and other substances warming the planet.

Is The World Ready For This?

Now there is scientific agreement that even if the world succeeds in shifting away from fossil fuels, warming of the planet is inevitable.

Critics of geoengineering, however, warn against altering nature’s patterns. They argue that we do not yet understand all the potential consequences. They also worry that if people see a quick fix for climate change, they may not try as hard to reduce greenhouse gas emissions themselves.

“Personally, I doubt that the world is ready for this,” said Stephen Gardiner, a University of Washington professor who studies the ethics of environmental policies. “Geoengineering raises huge ethical and political questions, nationally and internationally.”

The Silicon Valley scientists say the world might not have a choice. “We need to research the technology,” said project leader Armand Neukermans, 74, whose achievements include the development of the earliest ink jet printers.

For Their Children And Grandchildren

None of the men will be alive by the end of this century, when the concentration of carbon dioxide in the atmosphere is expected to be double what it is now — and temperatures are likely to be so high they will harm ecosystems and human health and welfare.

They may not be around to see it but all of them "have children or grandchildren,” Neukermans said. “We’ve got to preserve the future.”

The cloud-brightening idea was first proposed in 1990 by British physicist John Latham, who published an article in the journal Nature called “Control of global warming?” Over two decades later, the prestigious National Academy of Sciences said the concept deserved greater research.

As of now, no one has ever successfully brightened a cloud.

Lab and computer studies “can only tell us so much about the potential viability of some proposed climate-intervention technologies,” said Michael Thompson of American University’s Forum for Climate Engineering Assessment.

It Beats Playing Golf!

The project seemed like a worthy challenge for longtime friends who’d rather invent things than play golf.

After it was conceived at a 2006 meeting between Latham and top atmospheric scientists, the team began a feasibility study with Neukermans’ leadership and $300,000 from the Bill Gates-supported Fund for Innovative Climate and Energy Research.

The team, whose members range in age from 60 to 79, also includes pharmaceutical chemist Gary Cooper.

For instrumentation, “we’ve had to beg, borrow and steal,” joked Cooper.

Some tools come from the University of Washington, others from NASA and Stanford University. A lot come from their own garages.

Can I Borrow That Gadget?

“We couldn’t do what we’re doing, if not in the heart of Silicon Valley,” Cooper said. “Everything we need is next door, or we know somebody who has it.”

Through painstaking trial and error, the scientists are designing and building a nozzle that emits water particles that are small enough to rise and remain suspended in air. The particles would measure about one-tenth the size of the period at the end of this sentence. The nozzle’s holes are so narrow that they fit only two strands of human hair.

In one early effort, tiny nozzle holes got clogged. Another was more successful, but required too much energy and was corrosive.

Funding, not science, could prove to be the group’s biggest challenge. Because geoengineering straddles the fields of physics, atmospheric science and engineering, it’s not eligible for traditional government money grants, the group says.

The next phase of the project is a small, land-based “proof of concept” experiment in Moss Landing, California, near Monterey. Planned for next year, it would cost about $6 million.

Saving Redwoods And Coral?

Phase Three — conducted out at sea, with blowers mounted on a small ship, propelling droplets that reach real clouds — is scheduled for 2018 or 2019 and would cost about $10 million.

The technology could be used for creating fog to cool stressed redwood forests or overheated coral reefs, the team says. The day may come, according to the National Academy of Sciences, when more global strategies might be explored.

That could mean injecting droplets more than 10 miles into the stratosphere, a far more ambitious and controversial endeavor.

The scientists say there will be deep satisfaction if their project succeeds, but far better would be a future without global warming.

“We would be perfectly happy,” Cooper said, “if our method works beautifully — and it never needs to be used.”

Quiz

1 Read this main idea of the article.

> *They hope to launch the nation's first open-air field trial of "geoengineering," a controversial new science of intervening in the Earth's climate to bring down temperatures.*

Adding which of these details would MOST strengthen the above main idea?

(A) details about the kind of places that geo-engineers work

(B) information about what makes geoengineering troubling to some

(C) information about previous trials in other engineering fields

(D) information about what the national government thinks about this trial

2 Which selection from the article MOST clearly represents a central idea from the article?

(A) The effort to conduct even a small-scale test represents a dramatic shift in thinking in the scientific community. Until recently, scientists resisted conversations about deliberate manipulation of the climate.

(B) Critics of geoengineering, however, warn against altering nature's patterns. They argue that we do not yet understand all the potential consequences.

(C) The Silicon Valley scientists say the world might not have a choice. "We need to research the technology," said project leader Armand Neukermans, 74, whose achievements include the development of the earliest ink jet printers.

(D) None of the men will be alive by the end of this century, when the concentration of carbon dioxide in the atmosphere is expected to be double what it is now — and temperatures are likely to be so high they will harm ecosystems and human health and welfare.

3 Why is the subject of golf brought up in the section "It Beats Playing Golf!"?

(A) To show how much better making technology is than playing golf.

(B) To illustrate the differences between playing golf and being a scientist.

(C) To showcase the world of golf and how it interacts in the world of science.

(D) To point out that people the age of the cloud whitener team would normally be spending their time golfing.

4 Which of the following LEAST represents the perspective of those who question geoengineering?

(A) We need to concentrate on decreasing fossil fuel use.

(B) We cannot prevent the warming of the Earth by shifting away from fossil fuels.

(C) We need to do anything possible to prevent a global warming crisis in the future, no matter the cost.

(D) We need to take some time to study what happens when weather patterns are altered before we implement new technology.

Answer Key

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