

A Plan for U.S. Emissions to Be Buried Under Sea

By **Kate Galbraith**

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In an ambitious proposal to counter global warming, an upstart power developer wants to build a coal-fired electric plant on the outskirts of New York City that would capture its emissions of carbon dioxide and pump the pollutant 70 miles offshore. The gas would be injected into sandstone a mile beneath the ocean floor in the hope that it would stay there for eons.

Experts have thought for years that capturing the emissions from power plants will be a crucial technology for limiting climate change. But high cost projections and scientific uncertainty have meant that progress on the technique has been limited, even as the effects of global warming are starting to be felt around the world.

Now SCS Energy, based in Concord, Mass., contends not only that it can build the world's first such plant and get it to work, but also do so profitably, despite costs that could approach \$5 billion. If it succeeded, the plant might become a model that could be copied elsewhere.

A key to the proposal is location: an old industrial site near the shore in Linden, N.J., just across the Arthur Kill waterway from Staten Island. Generating power there would allow the company to sell it into one of the country's most expensive markets, and injecting the gas deep beneath the ocean floor, where pressure would help keep it down, would eliminate some of the uncertainty that might attend a similar project on land.

The proposal raises many environmental and political questions, and it is far from clear that the company can overcome the opposition that seems to crop up to any new power plant in the Northeast. But if the proposal wins approval and if it succeeds in burying 90 percent of its carbon dioxide emissions, as planned, it could be a major step toward finding a technological fix for global warming.

“If this succeeds, it's going to be very hard for utilities to say, ‘Oh no no, you can't do this,’ ” said Daniel Schrag, a Harvard geochemist whose work inspired the proposal.

The plan may get an attentive hearing in Washington, where President Obama has installed a team at the Energy Department and other agencies that is determined to put new clean-energy plans into effect.



Norway is the only country to have undertaken a large project to bury greenhouse gas emissions under the sea floor, at the Sleipner gas field 155 miles off the coast in the North Sea. Credit... Daniel Sannum Lauten/Agence France-Presse — Getty Images

The Linden proposal builds on the work of Mr. Schrag and one of his graduate students, Kurt Zenz House. In a paper in 2006, they argued that layers of rock beneath the ocean floor might be the best place to bury the huge amounts of carbon dioxide that industrial societies emit into the atmosphere.

SCS Energy, which hired Mr. Schrag as a consultant after learning of that work, has specialized in tricky projects. Despite intense opposition, it succeeded in building a power plant fired by natural gas that began operating in Astoria, Queens, in 2006.

The company has struck a deal to pay \$95 million for an old DuPont chemical factory site at Grasselli Point in Linden. The site is near rail lines and barges that

can deliver coal. More than a dozen permits are needed from state and federal agencies, and those are likely to take years.

In an unusual twist, SCS says it intends to bolt a fertilizer plant onto the power plant to improve the economics. When power prices are high, the plant would concentrate on making electricity, but when they are low, it would also make nitrogen fertilizer.

Richard J. Gerbounka, the mayor of Linden, said he was “very excited about the project,” which would help redevelop a desolate industrial area.

A buried steel pipe, two feet in diameter, would transport liquid carbon dioxide from the power plant to a site 70 miles offshore, beneath half a mile of water. A well would inject the carbon dioxide to a depth of about a mile below the sea floor, into a layer of ancient sandstone. Mr. Schrag said the carbon dioxide would stay there for millions of years, kept down by a thick layer of mud and the weight of the sea. Not even earthquakes or underwater landslides would be likely to dislodge it, he said.

“The worst thing that could happen is a little bit of CO₂ escaping into the atmosphere,” said Dean Malouta, the manager of technology for exploration and production for Shell’s Americas region, which has financed some related research.

A well would be drilled to reduce the pressure and release the seawater displaced by the carbon dioxide, providing a better way to manage pressure than is possible on land, Mr. Schrag said.

Already, some oil companies pump carbon dioxide into their drilling fields in places like Texas, to help squeeze out more oil. The carbon dioxide put underground has mostly remained there, preventing it from re-entering the atmosphere.

But capturing carbon dioxide from power plants is expected to be costly, adding 25 percent or more to operating expenses, in addition to higher construction costs. In this country, utilities are planning only modest demonstration projects. One larger project in Illinois, FutureGen, was abandoned by the Bush administration as costs escalated.

Worldwide, more than a dozen projects are under way to store power plant emissions. Norway is the only country to have undertaken a large project to bury greenhouse gas emissions under the sea floor, at the Sleipner gas field 155 miles

off the coast in the North Sea. That project has been going safely for 13 years, but it buries less than a quarter of the amount of carbon dioxide as proposed in New Jersey.

Environmental groups have been divided over whether this approach is a good idea. “The burden of proof is clearly going to be on the project developers” to prove the geological suitability of undersea storage, said Mark Brownstein of the Environmental Defense Fund.

Partly because of tight regulations and environmental opposition, no coal-fired plants have been built in New Jersey since the mid-1990s, and even renewable energy projects can be hard to site along the East Coast because of the difficulty of obtaining permits.

“It’s an exciting project, but it’s an unproven technology at the scale proposed,” said Elaine Makatura, a spokeswoman for the Department of Environmental Protection in New Jersey, which has had preliminary meetings with the developers.

The company sees the main hurdle as financing. SCS has begun informally talking with banks, and hopes to sidestep the credit crisis because it will not need large sums until about 2011. “As a business investment in the electricity industry, it’s an attractive investment,” said Frank Smith, a founder of SCS.

The company hopes to tap close to \$100 million a year in federal tax credits for its technology and says it believes it can turn a profit without additional grants. The plan features not only the fertilizer plant, but also other aspects that would improve the finances.

For instance, the carbon dioxide disposal pipe would be large enough to carry emissions not only from the power plant but also from factories nearby, a potentially valuable service if the government cracked down on emissions.