

# Moniz unveils \$10B plan for 'large-scale' CO<sub>2</sub> removal

By Peter Behr

With the U.S. and other nations losing ground on carbon emission reductions, the U.S. government needs to fund a concerted 10-year federal research and development program to demonstrate commercial technologies at the "gigaton-scale" for removing carbon from the atmosphere, a new analysis by former Energy Secretary Ernest Moniz's think tank argues.

Capturing carbon from emitters and the air at levels needed to keep temperatures under control "would require the creation of new industries comparable in size to the steel, concrete, and petroleum industries of today," the report released today by the Energy Futures Initiative says.

The think tank urges creation of a \$10.7 billion coordinated research program across a dozen federal agencies, led by the Energy Department, national laboratories, the Department of Agriculture and NOAA. Under the proposal, the research funding would be front-loaded with \$325 million committed in the first year. It follows announcements by large oil companies to fund or support technologies that remove CO<sub>2</sub> from industrial facilities or directly from the air (Energywire, Sept. 23).

The research agenda should center on energy and industrial strategies and technology-boostered natural processes to strip CO<sub>2</sub> from the atmosphere, according to the report.

"The evolving climate science indicates the need to move toward a more stringent temperature limit" of holding the global increase in temperature this century below 1.5 degrees Celsius compared with preindustrial

levels, rather than the 2 C target originally set by the Paris climate agreement in 2015, the authors said. As of 2018, two-thirds of the major carbon-emitting countries "were not on track" to meet the initial goal, the report said, noting a preliminary estimate for 2018 showing an escalating rate of CO<sub>2</sub> emissions.

Achieving net-zero carbon emission levels across global economies by midcentury is not possible without unprecedented programs to lower CO<sub>2</sub> emission levels where possible to balance continuing emissions, the report said.

"What the scientific community is telling us is that we need even greater ambition" on carbon emissions reductions, said Joseph Hezir, an EFI principal.

The report will be released in New York City by Moniz in conjunction with United Nations secretary-general's Climate Action Summit.

## What's the cost?

The authors say to be effective, technological carbon direct removal with machines "ultimately needs to be deployed at very large scale." It cited a 2018 report by the National Academies of Sciences, Engineering and Medicine, "Negative Emissions Technologies and Reliable Sequestration: A Research Agenda," advocating removing 10 billion metric tons of CO<sub>2</sub> per year globally by midcentury. EPA estimated that in 2014, the U.S. share of global CO<sub>2</sub> emissions from fossil fuel combustion and major industrial processes was 15%.

CO<sub>2</sub> removal can compensate for emissions from sectors like aviation that may be too

difficult or expensive to eliminate, as well as catching up to past failures to hit carbon reduction targets, the report said. The report distinguishes its recommendations from proposals for geoengineering, such as plans to seed the atmosphere chemically to manage solar radiation.

Removing 1 gigaton of CO<sub>2</sub> by liquefying it and storing it underground requires an operation equivalent to twice the annual production of crude oil in the U.S., the authors said.

One process requiring heat treatment, called low-temperature solid sorbent, would require energy equivalent to one-third of all the U.S. electricity output to remove 1 billion metric tons.

Estimates of the costs of large-scale direct carbon capture vary greatly, but some estimates are clustered between \$300 and \$600 per metric ton removed.

The report notes a study by the Rhodium Group this year estimating that achieving net-zero emissions by 2045 would require construction of 689 to 2,258 direct carbon capture plants at a 1-megaton scale each.

A half-dozen bills have been submitted in the Senate and House to increase funding for direct carbon capture technologies, including a measure co-sponsored by Sen. Lisa Murkowski (R-Alaska), who chairs the Senate Energy and Natural Resources Committee, and Sen. Joe Manchin (D-W.Va.), the committee's ranking member.

The report did not tackle how the costs of large-scale carbon extraction would be met, given opposition to climate policy proposals by the Senate's Republican leadership. But it noted that funding from several carbon taxation proposals in Congress could lead to a major removal program, if enacted.

The researchers also said that natural

absorption of CO<sub>2</sub> by trees, plants and soil can be strengthened by expanding forestland and restraining deforestation, and by preserving and expanding wetlands.

The report notes research by the Salk Institute for Biological Studies to create genetically modified plants with deeper, bigger root systems that would store more carbon and resist decomposition, slowing CO<sub>2</sub> release.

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