Science & Technology

Saving the Forest by the Trees

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Efforts to control global warming have focused largely on protecting forests and limiting the use of fossil fuels, which produce greenhouse gases such as carbon dioxide. Klaus Lackner is on the forefront of a complementary approach, commonly called carbon sequestration. It involves capturing and storing CO2 by technological means.

Lackner, the Maurice Ewing and J. Lamar Worzel Professor of Geophysics, is helping to develop a synthetic tree that he says could absorb nearly 90,000 tons of carbon dioxide a year — roughly the amount emitted annually by 15,000 cars. It would stand more than 300 feet tall and 180 feet wide and look like a huge football goalpost with venetian blinds between its uprights.

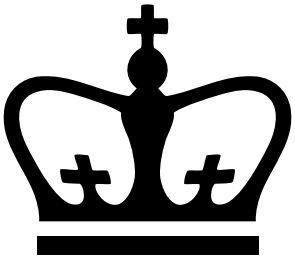
The apparatus would extract carbon dioxide from the air using liquid sodium hydroxide, which is converted to sodium carbonate as wind rushes over it. A series of further chemical reactions, Lackner says, would draw the carbon out of the sodium carbonate and turn it into a concentrated form of carbon dioxide that could be buried.

Lackner began developing the technology at Los Alamos National Laboratory in the 1990s with chemist Patrick Grimes and physicist Hans J. Ziock. The colleagues together founded Global Research Technologies in 2004 to build a prototype. The company is backed financially by Land’s End founder and Columbia benefactor Gary Comer and run by Allen Wright, the former director of research operations at Biosphere 2, the three-acre enclosed mini-environment previously used for ecological experiments in Oracle, Arizona. With Lackner serving as technical adviser, Global Research Technologies is on schedule to build a working model by 2007.

Whereas most methods of carbon sequestration involve capturing carbon dioxide before it enters the atmosphere, such as at power plants, Lackner’s synthetic tree promises the advantage of catching carbon dioxide that is generated by any source. “For distributed, mobile sources like cars, on-board capture at affordable cost would

not be feasible,” he wrote in a 2003 paper.“Yet, in order to stabilize atmospheric levels of CO2, these emissions, too, will need to be curtailed.” Lackner is developing technology to absorb carbon dioxide at power plants, as well.

In addition, Lackner is working with Wally Broecker, the Newberry Professor of Earth and Environmental Sciences, and Jürg Matter, the Doherty Associate Research Scientist at the Lamont-Doherty Earth Observatory, to devise a method for storing carbon dioxide safely underground. By 2007, they hope to pump some into the calcium-rich basalts beneath Iceland, where it should turn into solid magnesium carbonate in the pores of the rock and remain locked away indefinitely in that stable form.



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