ARE ARTIFICIAL TREES THE ANSWER FOR CARBON CAPTURE?

Within six or seven years, could we be seeing ‘artificial trees’ in use to combat climate change directly, soaking up carbon dioxide from the ambient air? That’s the hope held out by Klaus Lackner, whose brainchild invention was the star of the recent Air Capture Week at the Institution of Mechanical Engineers (ImechE) in London.

Lackner’s ‘trees’ are actually towers designed to hold out arrays of sorbent chemicals, which, he says, can capture a thousand times more CO2 than real trees of comparable size. And he refutes the recent calculation by the American Physical Society (APS) that the costs would be exorbitant.

Lackner, a Columbia University professor of geophysics who also heads the Lenfest Center for Renewable Technology, suggests that it could be brought as low as $30 per ton of CO2. That's a mere fraction of the APS estimate of $430, and comparable with low-end estimates for carbon capture at source in power plants and industrial processes. If achievable, this would make air capture from so-called 'distributed emissions', including cars and planes, a plausible carbon control strategy. The cost of capture would also provide a rational ceiling price for the carbon emitted by such polluters in the first place.

Lackner points out that storage of the CO2 after capture need not be an additional cost, if it can be put to positive use in agriculture or other industrial processes. This kind of 'closed-loop' approach also typifies the work of two other Columbia professors, Graciela Chichilnisky and Peter Eisenberger, whose Global Thermostat start-up company is among those vying with Lackner for leadership in the air capture field.

Their process, using sieve-like structures and sorbent chemicals, is, however, designed for use alongside industrial processes where CO2 is emitted in greater concentration, such as power stations.

It tackles the thorny problem of satisfying its own operational energy needs by utilising the low-grade heat which those industrial processes would otherwise just disperse though their cooling systems. And it looks to put the captured CO2 to good use, too.

One possible route is combining CO2 with hydrogen to make synthetic hydrocarbon fuels [see ‘CO2: the new green fuel?‘]. Another, which Global Thermostat is exploring with a start-up called Algae Systems, is to feed it to the algae engaged in producing algal biofuels.

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