



PGE pilot project demonstrates algae's potential to reduce carbon emissions

Portland General Electric is committed to meeting Oregon's growing energy needs in a reliable, cost-effective and increasingly sustainable way. As part of that focus, PGE is actively investigating ways to reduce carbon dioxide (CO₂) emissions from electricity generation. This is an important step in addressing greenhouse gases that contribute to global climate change.

PGE recently concluded a successful small-scale pilot project using algae to capture and consume CO₂ emissions from our coal-fired plant in Boardman, Oregon. PGE is among the first utilities to undertake a dedicated investigation into using algae to reduce CO₂ emissions.

Algae require sun, water, nutrients and CO₂ to grow. The Boardman site is an ideal site for conducting algae research, due to its relatively large amount of sunlight, water, CO₂ emissions and land mass.

Research findings

In this study, PGE and its partners demonstrated that algae did consume carbon dioxide from the Boardman plant. Algae that were fed CO₂ emissions grew significantly faster than algae that were exposed only to air.

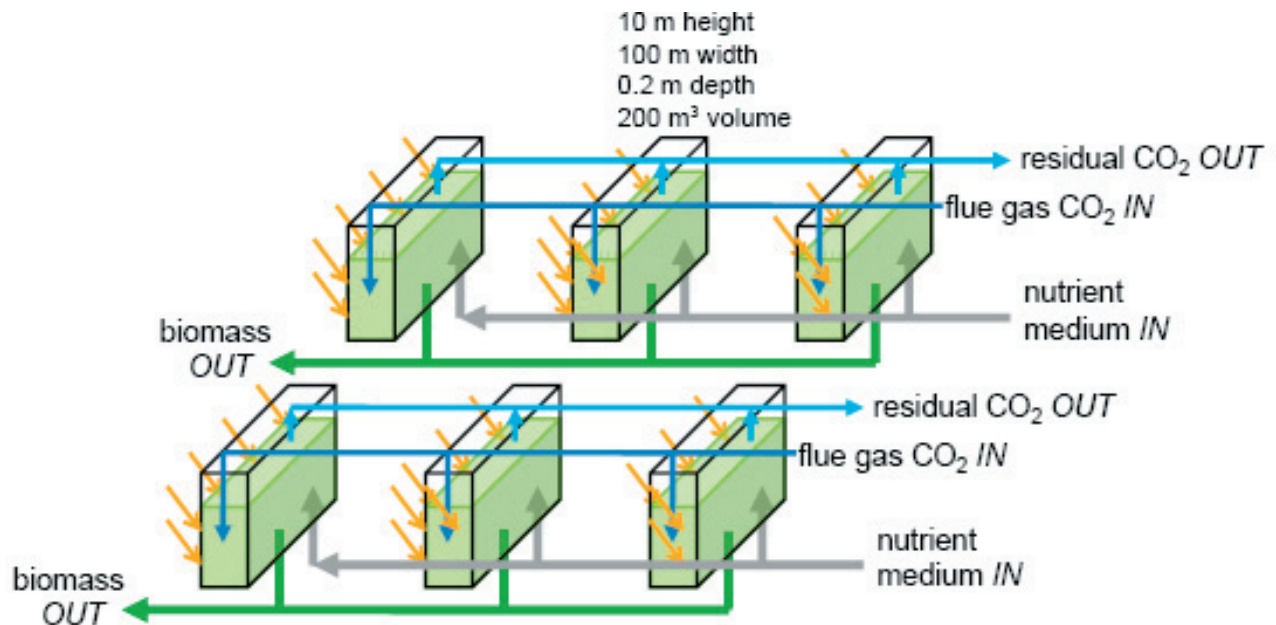


For the study, PGE diverted gas produced during power generation, including CO₂, to an outgoing pipe in the side of the exhaust stack. After traveling through a cooling bath, an above-ground piping system delivered the gas to three of six large tubs, where the CO₂ was absorbed by the algae. The other three tubs were exposed only to air. Algae also were skimmed from the water for harvesting into biomass.

What's next?

The PGE pilot project demonstrated that algae will consume carbon dioxide emissions in horizontal, open-air tubs. It would take vast amounts of land, however, to produce enough algae to consume substantial emissions from the plant. Our scientists and engineers suspect that a closed-air, vertical system fed by carbon dioxide would grow even more algae, using less land mass.

That's why PGE, in partnership with Oregon State University, proposes to conduct further research using closed-system, vertical bioreactors. In the process, we also hope to find a method for measuring the amount of nitrous oxide consumed by algae. In addition, PGE proposes to study which of the available naturally occurring algae strains are best suited to the CO₂ capture process. Currently, PGE is helping fund research at Oregon State University to investigate different strains of algae that could be used as part of this project.



Conceptual design of proposed photo bioreactor at PGE's Boardman Plant.

Why algae?

Harvesting algae holds significant promise for addressing the nation's energy and agriculture needs. In addition to consuming carbon dioxide that contributes to global warming, algae produce two important byproducts: biofuel and biomass. Biofuel made from algae oil can be used to power automobiles and jets, thereby reducing our dependence on foreign oil. Biomass can be used as fertilizer and livestock feed, freeing up other crops for human consumption.

Unlike other biofuel sources like corn, wheat and sugar beets, algae can be grown almost anywhere — in fresh water, saltwater, even wastewater — and in areas that don't support agriculture. And because algae grow very quickly, it delivers a yield of biofuel per acre unmatched by other alternatives — 1,000 times greater, in some cases.

About the Boardman plant

PGE owns 65 percent of the 585-megawatt coal-fired Boardman Power Plant in northeastern Oregon. It is the workhorse of PGE's generating resources, dependably and cost effectively providing about 15 percent of our total generating capacity. It assures our customers a diverse power generation mix and enables PGE to avoid dependence on any one type of fuel.

In addition to conducting research into carbon capture, PGE is developing an aggressive action plan to cut permitted haze-causing emissions and mercury emissions from the plant. The effort is part of our shared, regional and statewide commitment to improve visibility in wilderness areas and national parks.