



Carbon Capture

Technology Overview

Thirty-two percent of U.S. energy is supplied by natural gas, contributing to 34% of annual CO₂ emissions.¹ To mitigate these emissions, this carbon capture technology collects CO₂ from the flue of natural gas-fueled boilers and turns it into potassium carbonate (pearl ash), which can then be used to make soap, detergents, and other upcycled products. The CO₂ is captured before it enters the atmosphere, using heat recovery/reuse and carbon mineralization. The technology runs the captured CO₂ through a one-step, zero-waste reaction with potassium hydroxide to form the non-toxic pearl ash byproduct. The device is roughly the size of two refrigerators and attaches directly to the gas heating unit. It requires electrical connectivity, vent integration, and connection to a municipal water supply line. Installation takes approximately two days and requires the same work and technical expertise as installing a domestic hot water heater. The technology reclaims more energy from the waste heat than it requires to operate.

Why is GSA Interested?

This technology provides an opportunity to reduce greenhouse gas emissions and sequester carbon that would otherwise be released into the atmosphere. Each unit can sequester up to 8 tons of CO₂ per year (equivalent to the impact of 300 trees).

The manufacturer performs ongoing maintenance and collects the pearl ash from the facility every 10 to 14 days. Because the revenues from the upcycled product sales are shared with the building owners, the manufacturer claims a return on investment in approximately 4 to 6 years (depending upon the volume of CO₂ production from the boilers) and ongoing revenue generation after that.

How Will Success Be Measured?

The technology demonstration will assess two manufacturer claims: a 25% reduction in CO₂ emissions and payback in less than 6 years.

Deployment Potential

This technology is applicable to any commercial building that uses natural gas boilers for space and water heating. It is currently best suited to buildings with mid-sized non-condensing boilers (minimum BTU rating of 250,000) that are used year-round.

¹Energy and the environment explained: Where greenhouse gases come from, <https://www.eia.gov/energyexplained/energy-and-the-environment/where-greenhouse-gases-come-from.php>, accessed 06-2022.

In collaboration with the National Renewable Energy Laboratory, this regional Green Proving Ground (rGPG) evaluation will assess the real-world performance of carbon capture technology in a federally-owned facility. The technology will be provided by CleanO2.