IGS Policy Brief

Renewable Energy is More Beneficial for Climate and Health than Direct Air Capture of Carbon Dioxide

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Comparing climate and health outcomes of atmospheric carbon dioxide removal (direct air capture) and renewable energy helps guide investment choices.

Both choices can reduce atmospheric greenhouse gas concentrations, but resources for climate mitigation resources are limited. Decisionmakers should count public health outcomes alongside emissions reductions and costs when weighing options.

KEY TAKEAWAYS

- **Renewable energy remains more cost-effective than direct air capture across the country though 2050.** Direct air capture is only effective when used to "clean up" legacy greenhouse gas emissions after fossil fuels are replaced by deploying renewable energy.
- **The effectiveness of direct air capture is variable across the United States.** In the Upper Midwest, wind and solar remain the most cost-effective option through 2050, even if direct air capture uses 85% less energy and is 90% cheaper than today's technologies. By contrast, in California, direct air capture investments become cost-effective if technology uses 73% less energy and is 50% cheaper.
- **Avoiding carbon emissions represented 93% of climate and health benefits of investments on average across all scenarios.** When monetized, climate represents the majority of benefits. However, health is not trivial, especially for communities near power plants.
- **Renewable energy deployment reliably produces positive climate and public health benefits.** In contrast, connecting direct air capture to the electric grid increases energy demands and worsens local air quality and health.
- **This new framework provides a practical tool for decisionmakers to allocate limited funds.** By holding costs constant, the analysis highlights differences in public health outcomes and climate benefits. This can help prioritize spending in other sectors, such as building heating and transportation, that are challenging to decarbonize.

RESEARCH METHODS OVERVIEW

This study was the first to compare the health and climate benefits of greenhouse gas reductions due to cost-equivalent investments in direct air capture compared to solar and wind deployment at a regional scale. Researchers modeled estimated benefits for 22 regions in the United States from 2020-2050 under eight future grid scenarios, along with four scenarios for the cost and energy efficiency of future direct air capture technology.

Read the journal article

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