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ASSESSING IMPACTS OF DAC TO ENABLE RESPONSIBLE SCALING

EESI Briefing on Direct Air Capture

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WHY FOCUS ON RESPONSIBLE SCALING?

- We will likely need DAC at a large scale
- DAC is a new industry, unfamiliar to most
- Like all infrastructure, need to consider local impacts beyond DAC's needed carbon removal
- To not repeat historical inequities related to infrastructure development

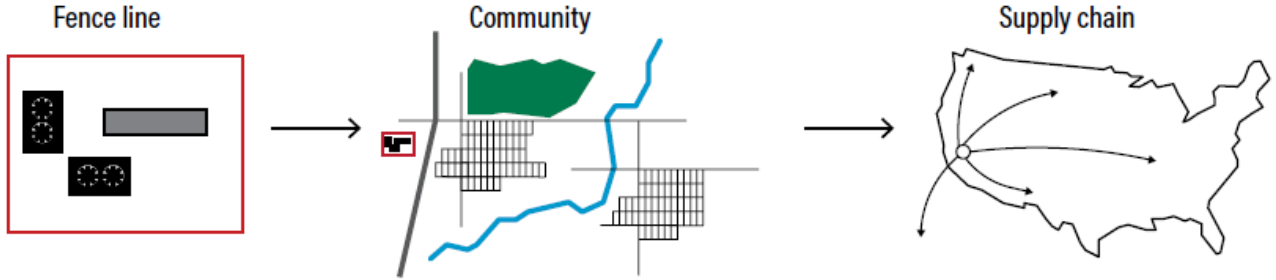
Explore further at: wri.org/research/direct-air-capture-impacts

Photo by Climeworks

KEY TAKEAWAY

WRI research finds that overall, DAC plants are expected to produce zero or almost zero onsite emissions that could negatively impact human health or the environment

CATEGORIZING IMPACTS



	Local	Distributed
One time: Pre-plant	Construction of plant (one time), construction material production, transport, labor	Production of capture media, production of select construction materials, production of energy infrastructure
Ongoing	Energy usage (fossil), chemical leakage or drift, transport of materials to/from plant, energy production, CO_2 use-related activities,* management of captured CO_2,* end-treatment of plant materials	Distant supply chain stresses; production of capture media; production of electricity, transport, and management of captured CO_2,* end-treatment of materials*
One time: Post-plant	Decommissioning, destruction, post-site maintenance and remediation, destruction and disposal transport, economic loss, discontinuation of CO_2 use-related activities,* end-treatment of materials, residual infrastructure, post-management site care	Economic loss, end-treatment of plant materials, residual infrastructure, post-management site care

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IMPACTS ARE PROJECT SPECIFIC

DAC system and energy source	DAC plant (km^2)	Energy source (km^2)	Total for 1 $MtCO_2$/yr scale plant (km^2)
Sorbent: geothermal	0.5	7.0	7.5
Sorbent: solar PV	0.5	34.2	34.7
Sorbent: wind	0.5	65.6	66.0
Sorbent: NG with CCS	0.5	-	0.5
Solvent: NG with CCS + geothermal	0.4	1.5	1.9
Solvent: NG with CCS + solar PV	0.4	7.1	7.5
Solvent: NG with CCS + wind	0.4	13.6	14.0
Solvent: NG with CCS	0.4	-	0.4

Note: Numbers may not add up due to rounding

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EXPECTED IMPACTS AT SCALE

DAC at a half-billion tonne scale would be expected to use:

Resource/ material	Share of	U.S. or global total
Energy	4.4%	U.S. primary energy supply
	3.8%	U.S. projected 2050 energy supply (EIA reference case)
Construction materials	Up to 3%	U.S. annual cement production (for concrete)
	Up to 4%	U.S. annual steel production
	Up to 8%	U.S. annual PVC production
Chemicals	19%	Global annual solvent (KOH) production
	37%	Global annual production of chemicals used in sorbents

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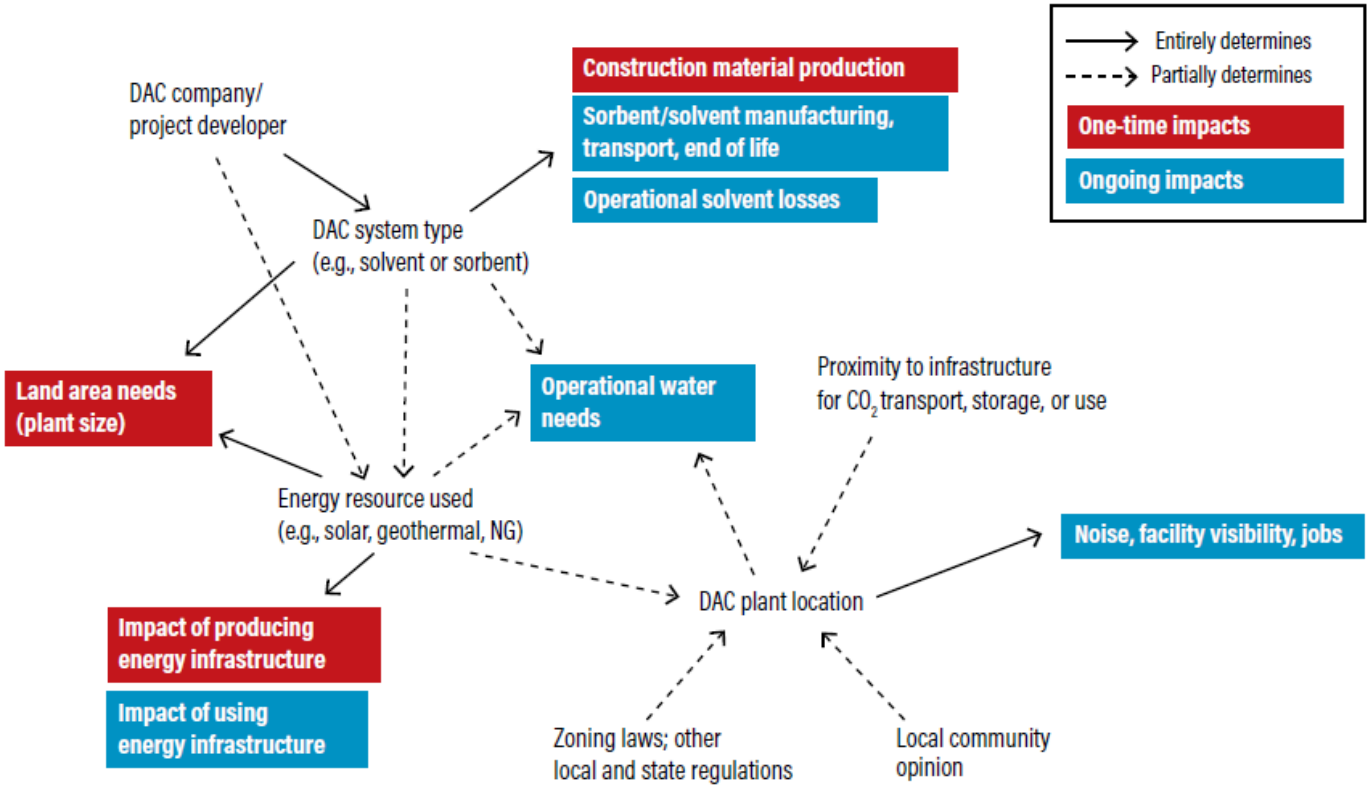
IMPACTS ARE INTERCONNECTED



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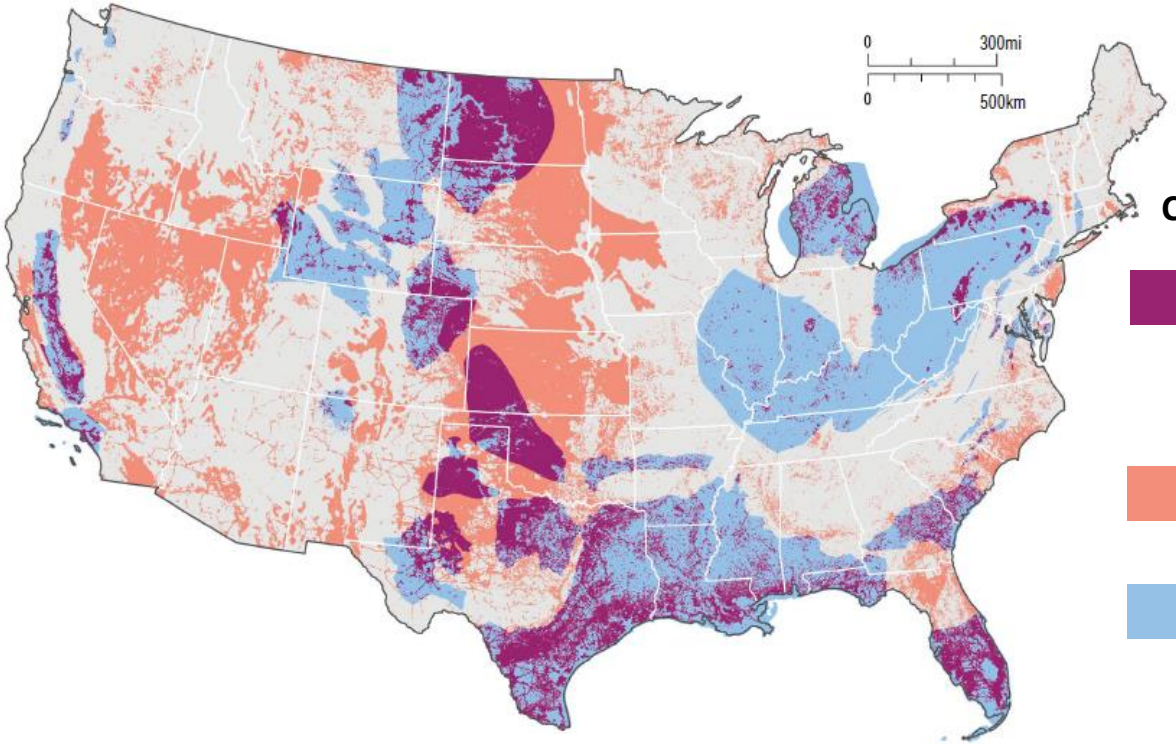
DAC IMPACTS & SITING PROCESSES



Carbon dioxide removal (CDR) systems

- Complete CDR system: potential for deployment of energy (solar, wind, geothermal) and geologic sequestration co-located
- Incomplete CDR system: potential for deployment of energy only
- Incomplete CDR system: potential for deployment of geologic sequestration only

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EQUITABLY DISTRIBUTING BENEFITS

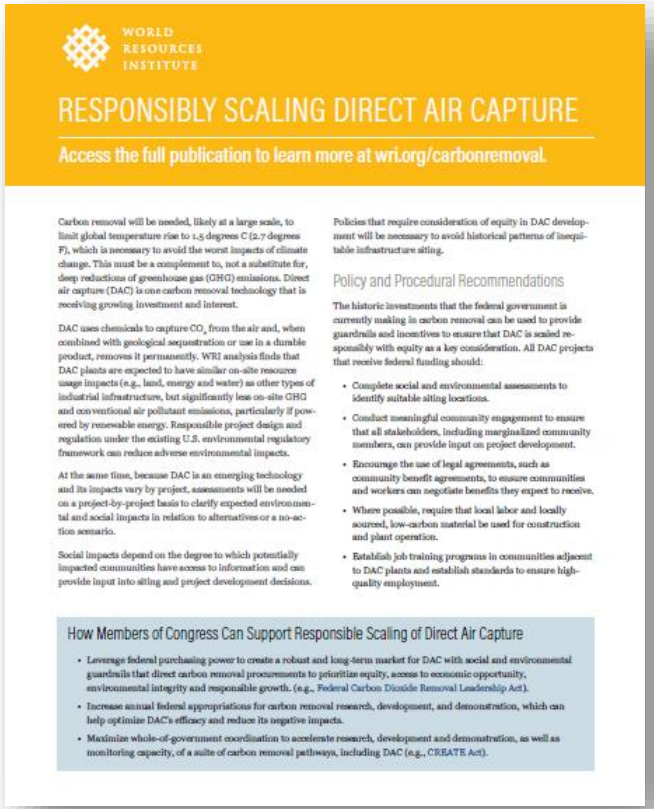
- Global benefit: CO_2 removal
- Potential local benefits:
  - High-quality employment opportunities
  - Job training and apprenticeship programs
  - Other local investment tailored to community needs

Explore further at: wri.org/research/direct-air-capture-impacts

Photo by Climeworks

RECOMMENDATIONS

- Procedural
  - Social impact assessment (SIA)
  - Legal benefit and workforce agreements
- Policy
  - Meaningful community engagement
  - Local labor, local low-carbon materials
  - Encourage use of SIAs and legal agreements with communities



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RESPONSIBLY SCALING DIRECT AIR CAPTURE

Access the full publication to learn more at wri.org/carbonremoval.

Carbon removal will be needed, likely at a large scale, to limit global temperature rise to 1.5 degrees C (2.7 degrees F), which is necessary to avoid the worst impacts of climate change. This must be a complement to, not a substitute for, deep reductions of greenhouse gas (GHG) emissions. Direct air capture (DAC) is one carbon removal technology that is receiving growing investment and interest.

DAC uses chemicals to capture CO_2 from the air and, when combined with geological sequestration or use in a durable product, removes it permanently. WRI analysis finds that DAC plants are expected to have similar on-site resource usage impacts (e.g., land, energy and water) as other types of industrial infrastructure, but significantly less on-site GHG and conventional air pollutant emissions, particularly if powered by renewable energy. Responsible project design and regulation under the existing U.S. environmental regulatory framework can reduce adverse environmental impacts.

At the same time, because DAC is an emerging technology and its impacts vary by project, assessments will be needed on a project-by-project basis to clarify expected environmental and social impacts in relation to alternatives or a no-action scenario.

Social impacts depend on the degree to which potentially impacted communities have access to information and can provide input into siting and project development decisions.

Policies that require consideration of equity in DAC development will be necessary to avoid historical patterns of inequitable infrastructure siting.

Policy and Procedural Recommendations

The historic investments that the federal government is currently making in carbon removal can be used to provide guardrails and incentives to ensure that DAC is scaled responsibly with equity as a key consideration. All DAC projects that receive federal funding should:

- Complete social and environmental assessments to identify suitable siting locations.
- Conduct meaningful community engagement to ensure that all stakeholders, including marginalized community members, can provide input on project development.
- Encourage the use of legal agreements, such as community benefit agreements, to ensure communities and workers can negotiate benefits they expect to receive.
- Where possible, require that local labor and locally sourced, low-carbon material be used for construction and plant operation.
- Establish job training programs in communities adjacent to DAC plants and establish standards to ensure high-quality employment.

How Members of Congress Can Support Responsible Scaling of Direct Air Capture

- Leverage federal purchasing power to create a robust and long-term market for DAC with social and environmental guardrails that direct carbon removal procurements to prioritize equity, access to economic opportunity, environmental integrity and responsible growth. (e.g., Federal Carbon Dioxide Removal Leadership Act).
- Increase annual federal appropriations for carbon removal research, development, and demonstration, which can help optimize DAC's efficacy and reduce its negative impacts.
- Maximize whole-of-government coordination to accelerate research, development and demonstration, as well as monitoring capacity, of a suite of carbon removal pathways, including DAC (e.g., CREATE Act).

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THANK YOU!

Links to: Paper, article, 2-pager

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