Rightsizing expectations for carbon dioxide removal towards ambitious climate goals

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Carbon Budget

Start of Industrial Era

Our carbon budget for 2°C

By 2011, we had already emitted around 2/3 our allowance

Now

Carbon budget we have left

Carbon budget we have spent
Rightsizing Expectations for Carbon Dioxide Removal

Rightsizing Carbon Dioxide Removal Expectations

### A sampling of CDR technologies

Comparative features of three widely discussed, potentially large-scale strategies for carbon dioxide removal (2, 7).

<table>
<thead>
<tr>
<th></th>
<th>Forest and Soil Stewardship</th>
<th>BECCS</th>
<th>Direct Air Capture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of engineering complexity</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Environmental cobenefits</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Land area required for large-scale deployment</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Risk of later carbon dioxide release</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Energy status</td>
<td>~Neutral</td>
<td>Production</td>
<td>Consumption</td>
</tr>
</tbody>
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Rightsizing Carbon Dioxide Removal Expectations

- Feasible at scale? Game changing?
- Limits to deployment? (Land, water, reservoirs, energy)
- Does overshoot limit impacts? Why 2100?
- Can-kicking ethics?
  - shifting responsibility vs preserving flexibility
- What problem are we trying to solve?
Understanding Rates of Land-Use Transformation
Understanding Rates of Land-Use Transformation

Global Overlap of Bioenergy and Carbon Sequestration Potential

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Carbon-Negative Bioenergy Potential with “Low Transport”

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CCS at US Ethanol Biorefineries

Rightsizing Stewardship Opportunities

Anderson et al. (in review).
Forest Offsets Partner Mitigation & Conservation
(Then: Environmental Justice & Air Quality Implications)

Anderson et al. (in review).
Thanks to the team

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