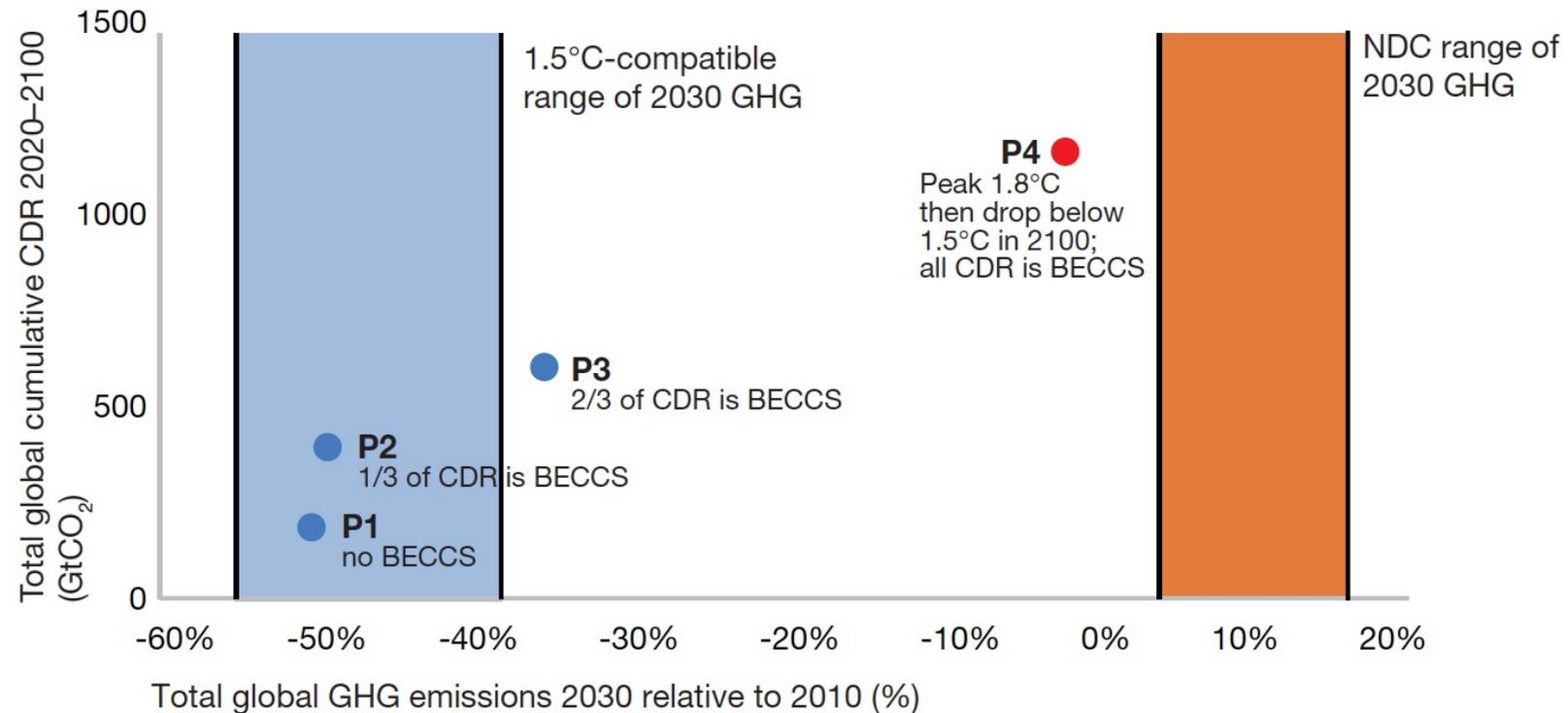

Governance challenges for large-scale carbon dioxide removal

Claire Fyson
Co-head Climate Policy, Climate Analytics
6th November 2021

Strong emissions reductions in next decade lower need for CO₂ removal in 1.5°C mitigation pathways

In 1.5°C compatible pathways CDR is needed to:

- compensate for **insufficient action to date**
- compensate for **residual emissions** that cannot readily be phased out
- But scale depends on near-term emissions cuts



Large-scale CDR governance gaps

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Large-Scale Carbon Dioxide Removal to Meet the 1.5°C Limit: Key Governance Gaps, Challenges and Priority Responses

M.J. Mace, Claire L. Fyson, Michiel Schaeffer and William L. Hare
Climate Analytics

Special Issue Article

Abstract

Parties to the UNFCCC and Paris Agreement have agreed to pursue efforts to limit the global average temperature increase to 1.5°C. To meet this goal, the international community will have to aggressively reduce emissions and also remove CO₂ from the atmosphere on an unprecedented scale, through an array of biological and technical Carbon Dioxide Removal (CDR) options. This paper considers governance challenges that arise from the need to rely on CDR to meet the Paris Agreement's long-term temperature goal. It looks at how heavy this reliance may have to be, over what timeframe, involving what options and, crucially, how best to ensure that CDR does not, while trying to address one problem, create many other challenges for sustainable development. After identifying the potential scale and pace of CO₂ removal needed to meet the 1.5°C goal, we identify key governance gaps and challenges that arise from large-scale CDR implementation and propose a series of policy responses to be addressed by policy makers as a matter of priority, to enable CDR to contribute to 1.5°C-consistent pathways at the scale and pace required.

Policy implications

- Only if Parties bring forward new and updated nationally-determined contributions (NDCs) that are substantially more ambitious in the reductions they deliver for 2030, will reliance on CDR be reduced to a scale that may be economically feasible and avoid jeopardizing sustainable development.
- More work is needed to develop portfolios of CDR approaches that can maximize synergies with sustainable development and minimize trade-offs in various country contexts.
- Improvements to information and accounting systems are needed to enable an ongoing assessment of progress toward net-zero emissions and to help fashion equitable incentives for deployment.
- Issues of equity need to be considered in the design of incentives for CDR uptake: a range of tools, including direct financial support, will be needed at both ends of the spectrum – to address barriers to inexpensive no regrets CDR options and to support the commercialization of more expensive CDR options at the scale and pace required.



Political governance challenges

How can we ensure that CDR scale-up does not come at the cost of rapid emissions reductions?

- NDCs and net zero targets – few rules, flexibility
 - Land sector often treated ambiguously or omitted altogether
- Market mechanisms pose environmental integrity and double counting risks
 - No agreement yet on rules for accounting transfers or environmental integrity protections,
 - Will these systems be fit for large-scale CDR transfers?
 - How to deal with issues of permanence, leakage etc.?



Many net zero targets lack clarity and credibility

- National net zero targets rely on CDR, but often with **little clarity / transparency**
- Few have **separate targets** for emissions and removals
- Credibility** of net zero called into question by weak 2030 NDCs

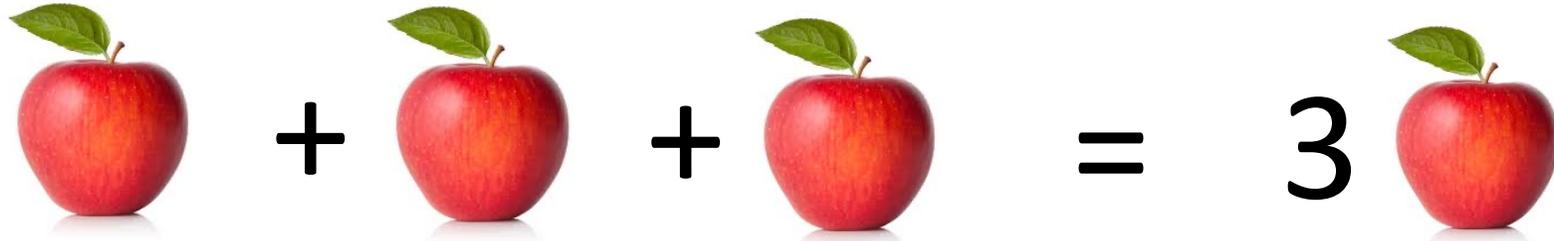
Rating the comprehensiveness of national net zero target design		Net zero target design elements									
Country	Rating	1 Target year	2	3	4	5	6	7	8	9	10
			Emissions coverage	International aviation and shipping	Reductions or removals outside of own border	Legal status	Separate reduction & removal targets	Review process	Carbon dioxide removal	Comprehensive planning	Clarity on fairness of target
EU	ACCEPTABLE	2050	✓	⊖	✓	✓	✗	✓	✓	✓	✗
Chile	ACCEPTABLE	2050	✓	✗	✓	⊖	✓	⊖	✓	✓	✗
Costa Rica	ACCEPTABLE	2050	✓	✗	✓	⊖	✓	⊖	✓	✓	✗
Germany	AVERAGE	2045	✓	✗	✗	✓	✓	✓	✗	⊖	⊖
UK	AVERAGE	2050	✓	✓	✗	✓	✗	✓	✗	⊖	⊖
Canada	AVERAGE	2050	✓	✗	✓	✓	✗	✓	✗	⊖	✗
Japan	POOR	2050	✓	✗	✗	✓	✗	✓	✗	⊖	✗
New Zealand	POOR	2050	✗	✗	✗	✓	✗	✓	✗	⊖	✗
South Korea	POOR	2050	✗	✗	✗	✓	✗	⊖	✗	⊖	✗

Scientific governance challenges

- Access to information needed to monitor progress towards the goal of balancing emissions and removals
 - GHG inventory gaps and uncertainties
 - Monitoring across supply chains (e.g. for BECCS),
 - Monitoring biophysical effects and sustainability implications
 - Issues of storage, e.g. permanence and leakage
- Safeguards for sustainable development
 - What CDR portfolios could maximise co-benefits for sustainable development and prevents adverse impacts?



Challenges for tracking progress



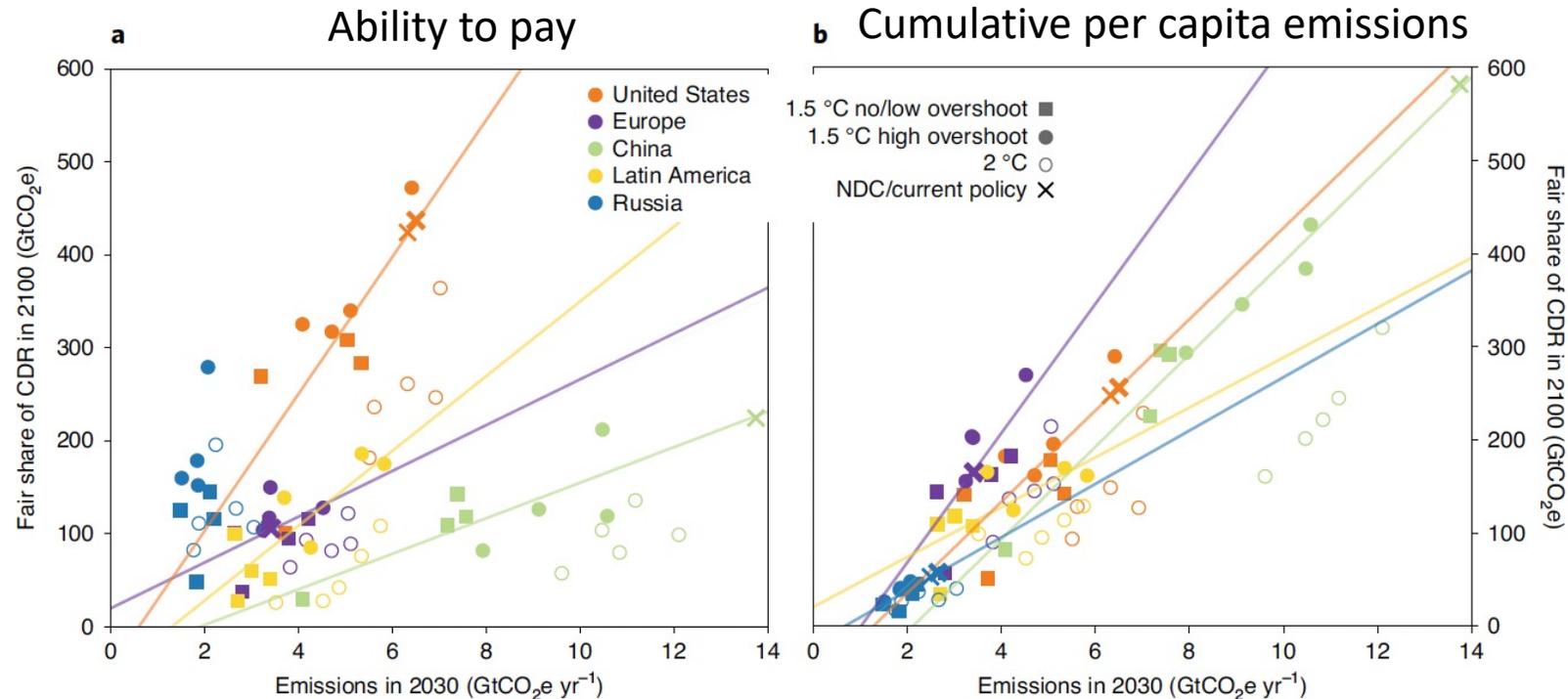
Reliable information is needed to track progress towards net zero and assess consistency with 1.5°C limit and sustainable development

Who is responsible?

- Current NDCs would leave a huge CDR burden for future generations
- Every 1 Gt of emissions in 2030 could generate **~20-70 Gt** “fair share” CDR responsibility this century for China, the EU and USA
- Who should pay? Where should CDR be deployed?
- Climate justice dimension (across time and geography)

Sources:

Lee et al. 2021, Environmental Research Letters
Fyson et al. 2020, Nature Climate Change



Large-scale CDR governance gaps

- Need for more **ambitious NDCs** to reduce reliance on CDR
- Work needed to develop portfolios of CDR approaches that can benefit **sustainable development**
- Improvements in **information and accounting systems** need to track progress towards net zero and help fashion equitable incentives
- Issues of **equity** need to be considered when designing incentives for CDR uptake, including **direct financial support**.



Thank you!

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nature climate change ARTICLES
<https://doi.org/10.1038/s41558-020-0857-2>
 Check for updates

Fair-share carbon dioxide removal increases major emitter responsibility

Claire L. Fyson^{1,2,5}, Susanne Baur³, Matthew Gidden^{1,2} and Carl-Friedrich Schleussner^{1,3}

The Paris Agreement long-term temperature goal is to be achieved on the basis of equity. Accomplishing this goal will require carbon dioxide removal (CDR), yet existing plans for CDR deployment are insufficient to meet potential global needs, and equitable approaches for distributing CDR responsibilities between nations are lacking. Here we apply two common burden-sharing principles to show how CDR responsibility could be shared between regions in 1.5°C and 2°C mitigation pathways. We find that fair-share outcomes for the United States, the European Union and China could imply 2–3 times larger CDR responsibilities this century compared with a global least-cost approach. We illustrate how delaying near-term mitigation affects the CDR responsibilities of major emitters: raising emission levels in 2030 by one gigatonne generates about 20–70 additional gigatonnes of CDR responsibility over this century. An informed debate about equitable CDR contributions will be essential to achieve much-needed progress in this area.

Governing large-scale carbon dioxide removal: are we ready? - an update

February 2021

C2G Carnegie Climate Governance Initiative
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ENVIRONMENTAL RESEARCH LETTERS

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Fair distributions of carbon dioxide removal obligations and implications for effective national net-zero targets

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View the [article online](#) for updates and enhancements.

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Policy implications

- Only if Parties bring forward new and updated nationally-determined contributions (NDCs) that are substantially more ambitious in the reductions they deliver for 2030, will reliance on CDR be reduced to a scale that may be economically feasible and avoid jeopardizing sustainable development.
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- Improvements to information and accounting systems are needed to enable an ongoing assessment of progress toward net-zero emissions and to help fashion equitable incentives for deployment.
- Issues of equity need to be considered in the design of incentives for CDR uptake: a range of tools, including direct financial support, will be needed at both ends of the spectrum – to address barriers to inexpensive to progress CDR options and to support the commercialization of more expensive CDR options at the scale and pace required.

Special Issue Article