Center for Carbon Removal http://www.centerforcarbonremoval.org

Comments by the Director Noah Diech

Things I believe about carbon removal: Post-COP21

Before the Center for Carbon Removal officially launched in June, I wrote a blog post titled, "12 things I believe about carbon removal." In the six months since that post, a lot has happened in the world of climate change. Here's how my thoughts have evolved (with a red-line version between the two posts at the end):

12(+) Things I Believe about Carbon Removal:

1 Preventing catastrophic climate change is a moral, economic and national security imperative.

2 We should completely stop emissions as quickly as we can convince people to do so, as limiting warming to 1.5C is likely required to prevent catastrophic climate change

3 It is technically possible to prevent 1.5C or 2C of warming without carbon removal, but it is much, much harder to do than if we had large-scale carbon removal solutions to complement traditional GHG abatement solutions.

4 In the future, the portfolio of large-scale (e.g. billion ton/year) carbon removal solutions will potentially include: re/afforestation, ecosystem restoration, carbon sequestering agriculture, biochar, bioenergy with carbon capture and sequestration, direct air/seawater capture and sequestration, mineral weatherization, “blue carbon” strategies, and likely other techniques not yet proposed/published.

5 Most albedo modification geoengineering is worth avoiding as is ocean iron fertilization, as risks outweigh potential benefits. Research is likely beneficial as long as strong governance and public transparency/participation is included.

6 a) Developing sustainable and economically-viable carbon removal solutions will require significant investments in research and development.

   a. b) All of the potential variations on bioenergy+CCS systems need to be demonstrated with commercial scale pilots ASAP, and detailed lifecycle carbon emissions analysis done by an independent third party need to accompany these pilots.
   b. c) Algae and CO2 capture technology innovation can provide an important pathways for viable bioenergy+CCS in the future; policy for fossil CCS is also an important enabler of negative emissions energy systems
   c. d) DAC systems will find applications primarily as mitigation solutions in the near- to mid-term--DAC-to-fuels innovation will likely motivate R&D in this area.
   d. e) Terrestrial carbon sequestration approaches urgently need accounting and M&V workto ensure their reliability and that they can

participate in carbon markets.

7 Once developed, commercializing promising carbon removal solutions will require the development of markets that demand carbon removal — carbon removal as a co-benefit alone will not be enough to reach gigatonne-scale removal levels, with landscape restoration as the potential exception to this rule.

8 In order to catalyze development of carbon removal technologies and markets, leaders from industry, policy, NGOs, philanthropies and the general public need to engage in dialogues about the best ways to develop carbon removal solutions — information and discussion is needed alongside deployment.

9 Armed with information about the opportunities and challenges of carbon removal, a broad coalition of business and environmental interests will not object to the development of carbon removal solutions — no entrenched interest gains from keeping carbon in the air, so no entrenched interests have an economic incentive to fight the development of carbon removal solutions. The key challenge will be convincing this coalition to actively support the development of carbon removal solutions.

10 Opponents to carbon removal will mostly object to the specifics of how carbon removal is accomplished/implemented, not to the overall need for carbon removal to fight climate change, in particular *which* solutions are worthwhile and *when* the right time is to support the development and deployment of these solutions.

11 The few opponents that do object to carbon removal writ large will do so on grounds that A) carbon removal will lead to a moral hazard that delays action to reduce emissions and/or B) carbon removal solutions are too expensive and slow working to implement at scale.

12 Carbon removal solutions will not lead to moral hazard around reducing emissions, as carbon removal proponents will work to build carbon removal as a complement to GHG abatement solutions for mitigating climate change.