Removal activities under the Article 6.4 mechanism

Inversion Point Technologies Ltd. response to community suggestions regarding consideration of methane for inclusion or exclusion in removal activities

Firstly, we at Inversion Point wish to express our gratitude to the UNFCCC for consideration of prior comments submitted to the supervisory body team on June 20th, 2023. The draft in consideration for classification of removals and reductions under section 6.4 seems poised to open GHG markets around the world to thousands of GHG removal and reduction entrepreneurs.

It has been suggested to Inversion Point Technologies Ltd. (Inversion Point) that there is discussion of excluding methane from the removals category of the UN's proposed article 6.4 mechanism. As a company actively working to develop atmospheric methane removal technology, we are joined by several other companies actively engaged in development of similar technologies with varied deployment mechanisms, all of whom would similarly benefit from the inclusion of GHG removal credits for methane. This note seeks to make two recommendations to facilitate this:

1. A means of differentiating removal credits from offset credits based on emergent need in a net zero world , and;
2. An approach allowing growth of removal technologies for each GHG independent of technological price differences between gases and proportional to emergent need

The note then closes with a list of catalytic benefits to society which might be offered by methane removal, along with a short cost calculation for our own technology for consideration.

What is the role of removals in a net zero world?

The UNFCCC has acknowledged that significant volumes of carbon removal will be required to limit global warming to a 1.5 degree C rise. This necessity stems from society's forecasted necessary and unavoided GHG emissions, and removal credits ought to grow technologies which will fill this demand today and in a net zero world.

How can we distinguish between removals and offsets?

To understand this demand, consider a simplified net zero future where:

1. All GHG emissions are accounted for and attributed to a responsible party.
2. All necessary and unavoided emissions are balanced through rapid removal of a similar GHG from circulation.

Removal credits ought to therefore be granted separately from any emissions which will be attributed to a responsible party in a net zero world. Otherwise, removal credits may support technologies unable to fill future removal needs, which are better characterized as reductions. To be fairly compensated for work done, and to support optimal placement to maximize climate benefits, it is recommended that projects be eligible for both removal and reduction credits as applicable.

What projects might qualify for both removal and offset credits?

1. Atmospheric oxidation projects collocated near methane emissions sources, such as rice fields, cattle, coal mines, or a ship's smokestacks.
2. Ocean alkalinity projects collocated near carbonated, acidic effluent from various facilities.
3. Enhanced mineralization processes near heightened CO_2 sources such as power plants or cities.
4. Biomass sequestration, where biomass emissions may be fully or partially attributable to a responsible party such as a landfill or sawmill wastes.

It may be beneficial to allow proponents to choose whether or not to consider their projects for both removal and offset credits where applicable, while including some allowance for inaccuracies in the accounting of removals and offsets for project which generally qualify for one category.

How can we support removals, offsets, and solutions for different GHGs simultaneously?

The proposed draft supports the differentiation of removals from offsets, and does not prescribe specific requirements to purchasers of credits. This supports nations and buyers prioritizing different solutions in service of their own needs, and sellers in allowing for different technologies to fetch different credit prices.

Similarly, it is proposed that offset and removal credits be ascribed a percentage weighting by GHG removed when granted. Enhanced atmospheric oxidation removals, for example, would be weighted 100% to methane, while carbon capture and sequestration removals would be weighted 100% to CO_2, and biomass sequestration may have a mixed attribution. This supports nations and companies as buyers prioritizing different solutions in service of their own unavoided emissions, and sellers in allowing for different technologies to fetch different credit prices as different solutions are developed with different fundamental costs.

Conclusion

By considering a simplified net zero world and the role which removals will play in this, we can accurately assign removal and reduction status to different solutions. Removals occur independent of any emissions which can be attributed directly to a responsible emitter, while reductions occur to reduce these attributable emissions. This will support pricing differentiation and growth for both categories of technology. By extension, identification of credits by percentage of GHG removal will support pricing differentiation and growth for necessary technologies.

It will be necessary for markets to continue to evolve to reach a net zero world. Interplay between human knowledge, perception, action, and technology will be hard to predict. Differentiation and identification are important steps which will support targeted buyer behaviour, enabling present growth for necessary technologies and future market and policy mechanisms.

Inversion Point is grateful for the continued opportunity to provide feedback on the Article 6.4 Supervisory Article 6.4 mechanism.

We trust that our response can be of use to the Supervisory Body as it moves forward with its work.

Yours sincerely,

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Catalytic Effects of Affordable Removal Technology

As a non-revenue generating activity for existing businesses, expenditures have historically been minimized on emissions reduction and carbon offsetting activities. Reasons provided for this have included shareholder dividend / fiscal responsibility, non-competitiveness for exports against less stringent nations' industries, knowledge/technological barriers, and simple lack of will.

It is proposed that affordable removal technology for any GHG will provide benefits to the global public interest via several mechanisms:

1. Removal of knowledge/technical barriers and provide one potential backstop solution for all emitters
2. Method of regulating GHG costs for complicated stakeholders like agriculture
3. A means for governments to act with carbon and fuel tax revenues

Affordable removal baseline technologies can provide clarity to large public corporations and government services which are relied on chiefly for predictable profits and affordable services. Concerned stakeholders will also have no reason to develop 'undeveloped/tech not ready for deployment' arguments. Corporations will also have clear means to act on net zero goals – helping to bring timelines and accountability into focus and minimizing future shareholder risk.

By providing affordable source agnostic GHG removal, groups of farmers and agricultural product traders can reliably backstop net zero claims without imposing myriad new technologies on thousands of diverse farming situations. This also provides a mechanism for consumers to experience a uniform price while enterprising farmers can engage with carbon markets and continue to profit from local removal and reduction credit generations.

Many governments currently collect carbon taxes or fuel taxes on hydrocarbon-based fuel sources sold to consumers, which are not always deployed to reduce emissions. Affordable removal technology provides a simple option for use of these funds to generate employment and GHG reductions.

Estimated economics for Atmospheric Methane Removal with Hydrogen Peroxide
As one company working to develop one cost effective removal technology, it is our pleasure to share an early cost estimate with you. We hope that this serves not as a promise, but as a point of hope for a future which removals might bring, through our company and through others.

GHG Reduction (tCO2e/tH2O2)				
		OH Regeneration Efficiency[2]		
		0.6	**0.7**	**0.8**
Methane Reactivity[1]	**0.15**	5.38	8.07	13.46
	0.2	7.73	11.20	18.15
	0.25	9.96	14.18	22.62

H2O2 Breakeven price @ $100/tCO2e				
		OH Regeneration Efficiency[2]		
		0.6	**0.7**	**0.8**
Methane Reactivity[1]	**0.15**	$ 538	$ 807	$ 1,346
	0.2	$ 773	$ 1,120	$ 1,815
	0.25	$ 996	$ 1,418	$ 2,262

As a reactive bulk product, the transportation, containerizing and stabilization of the chemical also add significant costs. Public manufacturers of H_2O_2 also report operating margins of 20-30%.

Inversion Point has commissioned a report from IMARC with a bottoms-up approach that arrives at a cost of production at C$600-C$700/T. The largest components of the cost structure are purified water (35%), electricity (13%), labor (11%) and hydrogen (9%).

Concurrently, Inversion Point has received quotes for delivered hydrogen peroxide within the province of Alberta at C$2,100/T. We expect the price of the hydrogen peroxide quote can be reasonably reduced by forgoing the following costs, when operating an in-house peroxide facility with directly piped delivery to dispersion equipment:

1. Producer margins (20-30% reduction)
2. Transportation of H_2O_2 in diluted form (10% reduction)
3. Packaging requirements (9% reduction)
4. Stabilization chemicals (7% reduction)

This suggests the cost of self-producing hydrogen peroxide may exist between C$600/T (IMARC low estimate) to C$1,029/T (quote less conservative expected savings). At a net removal effectiveness of 13.6 TCO2e per tonne of H_2O_2, this is equivalent to a C$44-76/TCO2e (US$33-56/TCO2e) cost of credits.

References:

1. *OH Methane Reactivity in North America (Permar et. Al. (2023), source: https://doi.org/10.1039/D2EA00063F)*
2. *OH Regeneration Efficiency Worldwide (Novelli et. Al. (2020), source: https://doi.org/10.5194/acp-20-3333-2020)*