

Matt Koller
ESM 202 Environmental Biogeochemistry
Assignment 2
Solutions for Carbon Emissions

I. Summary. Protect Our Winters (POW) is a non-profit climate advocacy organization whose mission is to help people protect the places and lifestyles they love from climate change. POW aims to engage its members in the political process by advocating for climate-friendly leaders and policies. As such, POW must critically assess the efficacy of solutions that deal with carbon emissions. This brief recommends that POW support cap-and-trade systems of carbon and its equivalents to reduce overall greenhouse gas emissions.

II. How cap and trade works. Cap and trade systems provide a market-based incentive for polluting entities to reduce emissions by setting an overall limit on greenhouse gas emissions. Also known as emissions trading, these markets are typically overseen by a governmental entity that sets the limit and issues a set number of annual permits, which correspond to the overall emissions limit. Companies are free to buy and sell these permits—which allow them to emit a certain amount of carbon, by the ton—either from the state or on the open market.

Carbon (and its equivalents) is currently priced at approximately \$17/ton¹ in the California market and \$45/ton in the European Union market,² though estimates about the “true” price of carbon vary. William D. Nordhaus, an economist at Yale University, estimates the social cost of carbon (SCC), which represents the “economic cost caused by an additional ton of carbon dioxide emissions or its equivalent,” to be approximately \$31 per ton in 2010.³ However, some estimates peg the true SCC at up to \$400 per ton⁴.

III. Challenges of cap and trade systems. The primary challenge for cap and trade systems is setting an overall emissions limit that is low enough to force the largest polluters to reduce their emissions. If the overall limit is too high, this will create a glut of under-polluters who can then sell their excess credits to over-polluters, delaying overall emissions reductions. Additionally, this system is designed to reduce emissions by making them financially costly for polluters. However, if polluters are able and willing to pay the carbon tax or trade for emissions permits, they will not effectively reduce overall carbon emissions.

IV. Biogeochemical implications. Whether the cap and trade system establishes a state market (such as California), a national market (such as Canada), or an international market (such as the European Union), it is only focused on reducing overall emissions into the atmosphere. Cap-and-trade schemes do not provide a technological solution for emitters to reduce their emissions; they only make it more costly, over time, for these emitters to pollute the atmosphere. Unless the system has an extremely low overall limit that all emitters within its jurisdiction must adhere to, cap-and-trade schemes do not meaningfully affect the biogeochemical carbon cycle.

V. Case Study: California. California offers some important lessons for cap-and-trade markets. The first is that any cap-and-trade system must have a market large enough to reasonably accommodate all of the emitters, i.e. there must be a sufficient number of entities who have excess permits that can be traded to entities that have high emissions. The second is that incentives—such as free permits—must be provided to businesses that would otherwise move their operations to a different market. A federal cap-and-trade scheme would greatly reduce this problem (i.e. a company operating in Southern California would be much less likely to relocate

to Nevada in order to avoid paying a carbon tax if they'd have to pay a similar tax in Nevada). The third is that the overall limit on emissions must be low enough to provide emitters with an enforceable incentive to decarbonize their operations.

VI. Environmental justice implications. Cap-and-trade schemes are complicated. On the one hand, they will eventually reduce overall carbon emissions, which would slow the rate of global warming. Since global warming disproportionately affects disadvantaged communities, cap-and-trade schemes could contribute to solving an environmental injustice.

However, cap-and-trade schemes are focused on reducing *overall* emissions—not localized emissions. Many of the largest polluters are already located in disadvantaged communities, and research has shown that without a sufficiently low overall emissions cap, these largest polluters will continue to buy excess permits from other industries and continue to pollute at the same rate as before. According to a 2018 study by Cushing et al., certain neighborhoods actually saw increases in emissions following the implementation of cap-and-trade schemes—neighborhoods that were typically disadvantaged.⁵ As such, cap-and-trade schemes could result in environmental justice issues, since they focus on solving the overall problem and are not concerned whether disadvantaged communities will shoulder an unfair portion of the burden.

VII. Policy barriers & incentives. Cap-and-trade schemes require a large market in order to work effectively. A patchwork system comprised of various states, such as the linked markets between California and Quebec⁶, is feasible, however, a cap-and-trade system would be most effective at the federal level. This would create a large market for polluters to buy and sell

permits, and would mean that all companies operating under U.S. federal jurisdiction would be required to participate. However, Republican opposition to cap-and-trade schemes presents a significant barrier to implementing this at the federal level⁷.

VIII. Recommendation. In order to be effective, cap-and-trade systems must have a low overall emissions limit that steadily decreases each year. This overall limit must be clearly stated at least ten years ahead of time to allow companies to plan for the increased costs of emitting carbon and be sufficiently low enough to force companies to reduce their carbon emissions by transitioning away from fossil fuels and toward renewable energy, reducing the carbon that is emitted into the atmosphere and slowing the rate that the natural biogeochemical carbon cycle is disturbed. The U.S. current emits approximately 5,000 million metric tons of CO₂ equivalents, therefore, Protect Our Winters should advocate for an ambitious federal cap-and-trade scheme that will allow for 3,000 million metric tons of CO₂ equivalents by the year 203.

Works Cited

1. December 2020 Calif. carbon allowance price extends gains into year's end.
<https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/december-2020-calif-carbon-allowance-price-extends-gains-into-year-s-end-61975760>.
2. Carbon Price Viewer. *Ember* <https://ember-climate.org/data/carbon-price-viewer/>.
3. Nordhaus, W. D. Revisiting the social cost of carbon. *Proc. Natl. Acad. Sci.* **114**, 1518–1523 (2017).
4. Nuccitelli, D. Climate change could impact the poor much more than previously thought | Dana Nuccitelli. *The Guardian* (2015).
5. Cushing, L. *et al.* Carbon trading, co-pollutants, and environmental equity: Evidence from California's cap-and-trade program (2011-2015). *PLoS Med.* **15**, e1002604 (2018).
6. Program Linkage | California Air Resources Board. <https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/program-linkage>.
7. Galbraith, K. Republican Senator Takes Heat for Cooperating on Cap-and-Trade. *Green Blog* <https://green.blogs.nytimes.com/2009/10/16/sen-graham-takes-heat-for-climate-stance/> (2009).
8. Song, L. Cap and Trade Is Supposed to Solve Climate Change, but Oil and Gas Company Emissions Are Up. *ProPublica* https://www.propublica.org/article/cap-and-trade-is-supposed-to-solve-climate-change-but-oil-and-gas-company-emissions-are-up?token=2Ilelg2m8CV-f7Qt_hrqLo689h0hXZ1n.

9. Checking the math on cap and trade, some experts say it's not adding up. *CalMatters*
<https://calmatters.org/environment/2018/05/checking-the-math-on-cap-and-trade-some-experts-say-its-not-adding-up/> (2018).
10. Song, L. The Word Nobody Wanted to Say at the UN Climate Action Summit.
ProPublica <https://www.propublica.org/article/offsets-un-climate-action-summit-the-word-nobody-wanted-to-say?token=9WLmsuYtAV9xfiOMxs8XxIDtYNohEqSV>.