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Cancel Culture: Corporations Flock to Carbon Offsets to Solve their Climate Problem, but do Offsets Truly Reduce Emissions?

The most basic problem with carbon offsets is that you're trading a known amount of emissions with an uncertain amount of emissions reductions. But there's also the whole trading approach of companies being able to buy their way out of the responsibility to reduce their own emissions.

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Demand for carbon removal [offsets] outweighs supply by so much that the sector's capacity is sold out years into the future. That has forced companies to commit to paying for removals that haven't happened yet using technologies that haven't been invented yet.

—WALL STREET JOURNAL, JUNE 8, 2022²

The first market established specifically for purchasing carbon offsets was called the Clean Development Mechanism (CDM) and was established in 1997 under the Kyoto Protocol. That agreement, signed by more than 150 countries, was intended to reduce the amount of Greenhouse gases being released into the atmosphere.³ Under the CDM, a company could offset its greenhouse

¹ <https://www.nytimes.com/2022/05/18/climate/offset-carbon-footprint-air-travel.html>

² <https://www.wsj.com/articles/carbon-removal-industry-draws-billions-to-fight-climate-change-11654640329>

³ <https://education.nationalgeographic.org/resource/kyoto-protocol-signed>

Professor Andrew M. Isaacs prepared this case study with Natàlia Costa i Coromina (UC Berkeley, Master of Development Practice 2023) with assistance from Case Writer Ramon Delgado, as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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gas (GHG) emissions by, for example, funding construction of a wind or solar power plant in place of a planned fossil fuel plant. The concept was straight-forward: even though the company providing the funds had not reduced its *own* emissions, it was paying for another company to reduce *their* emissions, so the company providing the funds would consider some of its own emissions as having been “offset.” Since then, companies worldwide have dramatically increased their purchases of carbon offsets, providing funds for many projects that were thought to be beneficial in addressing climate change. By 2021, global carbon markets had surged, with the value of traded carbon dioxide (CO₂) offsets growing to a record \$851 billion. The market was expected to continue to grow in 2022 and beyond, boosted by companies worldwide announcing carbon neutrality goals and other climate commitments that required purchasing carbon offsets.⁴

Companies’ climate goals have been spurred on by public pressure as well as dire climate change projections. In 2022, the Intergovernmental Panel on Climate Change (IPCC) explained that greenhouse gas emissions must peak before 2025 to keep global warming within the goals of the Paris climate agreement. The IPCC called for rapid and deep emissions reductions globally across all sectors of the economy in order to stay at safe levels of GHGs in the atmosphere. Further, humanity must reach “net zero” GHG emissions by 2050 to avoid the disastrous effects of warming the planet beyond 1.5 degrees Celsius above preindustrial levels.⁵

Some corporate leaders consider the use of carbon offsets as an essential part of a short-term solution until the world has fully transitioned to a non-fossil carbon economy and reaches net-zero greenhouse gas emissions. Others believe that purchasing carbon offsets—while enabling companies to *claim* that they are helping combat climate change—are actually a dangerous distraction, because offsets allow companies to continue business as usual rather than making fundamental changes to their operations.⁶

How Carbon Offsets Are Supposed to Work

Companies purchase carbon offsets either because they choose to, using voluntary markets, or are required to by a governmental agency.⁷ Offsets are intended to serve as a way for a company (or an individual) to compensate for its GHG emissions. If a company goes so far as to buy carbon offsets equal to its entire carbon footprint, it can even declare itself to be carbon-neutral, at least in theory.

Companies are increasingly buying voluntary carbon offsets indirectly, rather than funding a carbon-reducing project themselves. Such indirect purchasing of carbon offsets is done through brokers or other secondary marketplaces, and the transaction is recorded in a publicly-accessible registry. Carbon offset registries establish their own protocols and track the issuance and retirement of carbon credits. Registries also maintain public databases to guard against the double counting of an offset.⁸ Revenue from the purchase of a carbon offset covers the cost of operating the registry, plus other costs associated with operating the market, including the substantial cost of assessing the validity of the underlying carbon-reducing project. The balance of funds is subsequently spent

⁴ <https://www.reuters.com/business/energy/global-carbon-markets-value-surged-record-851-bln-last-year-refinitiv-2022-01-31/>

⁵ <https://www.argusmedia.com/en/news/2318547-emissions-must-peak-by-2025-for-15c-ipcc>

⁶ <https://www.nytimes.com/2022/05/18/climate/offset-carbon-footprint-air-travel.html>

⁷ <https://carbon-direct.com/2022/05/assessing-the-state-of-the-voluntary-carbon-market-in-2022/>

⁸ <https://carbonplan.org/research/offset-disclosure-needs>

on the project itself, which is intended to either (a) permanently remove CO₂ from the atmosphere, or (b) guarantee that emissions that would have otherwise happened are avoided.⁹

There are four main types of offset projects. The most common type are forestry projects where a new forest is planted on previously de-forested land or an existing forest is protected from being cut down. Companies often choose forestry projects for benefits beyond climate change since such projects may also have a broader ecosystem benefit. A second project type builds or maintains new power plants that produce solar or wind energy in locations where a fossil-carbon power plant had been planned for construction. A third type are waste-to-energy projects that capture methane and convert it into electricity. Finally, there are projects typically located in economically disadvantaged areas that promote the use of non-fossil fuel-based technologies.¹⁰

Companies Face Pressure to Reduce their GHG Emissions

Companies are increasingly being pressured by consumers, employees and investors to reduce their GHG emissions. Amazon, Microsoft, Google, Starbucks, Lyft, and FedEx and others have announced CO₂-reduction plans to achieve carbon neutrality by 2050 or earlier. Coca-Cola is part of a group that has promised to work towards its [net-zero target](#) specifically by investing in projects that remove carbon from the atmosphere through carbon offset projects.¹¹

However, critics warn that companies that purchase carbon offsets are in fact primarily engaging in a marketing exercise, and should be focusing on reducing their emissions, not spending money on projects of dubious impact. Greenpeace has likened carbon offsets to PR plans that intended to make fossil fuel use, and the associated emissions, more palatable to consumers.¹²

In the Absence of Standards—the Wild West?

For a carbon-reduction project to generate offsets that can be purchased, managers of that project need to demonstrate that the emission reductions or carbon dioxide removals being claimed are (a) real, (b) measurable, (c) permanent, (d) additional, (e) independently verified, and (f) unique.¹³ These requirements are often not met, and in some cases are infeasible. Further, even the offset purchasers themselves may be unaware that the project they funded is not actually happening as anticipated. For example, many offset projects are aimed at reducing the emissions associated with deforestation in the Amazon. Yet land development pressure in the region can overwhelm the obligations not to deforest that are funded by offsets. The effectiveness of carbon offsets can be reduced when a project does not work as intended or is reversed. Ultimately, in the case of forestry projects, the result may be that the forest preservation that was supposed to happen either never occurred or didn't last, but the corporation purchasing the offset continued its emissions while also claiming to have offset those emissions.¹⁴

⁹ <https://www.techtarget.com/whatis/definition/carbon-offset>

¹⁰ <https://www.eic.co.uk/4-types-of-carbon-offset-projects/>

¹¹ <https://terrapass.com/blog/why-are-so-many-companies-embracing-carbon-offsetting>

¹² <https://www.greenpeace.org.uk/news/the-biggest-problem-with-carbon-offsetting-is-that-it-doesnt-really-work/>

¹³ <https://www.mckinsey.com/business-functions/sustainability/our-insights/how-the-voluntary-carbon-market-can-help-address-climate-change>

¹⁴ <https://www.vox.com/2020/2/27/20994118/carbon-offset-climate-change-net-zero-neutral-emissions>

Critics of carbon offsets also argue that they are a way for the wealthy to pay their way out of the climate problem without altering their practices, leaving people in the developing countries where most offsetting projects occur to deal with the difficult task of enacting change. In addition, without a government regulator, the market is left to sort out its own verification activities, which leads to a lot of uncertainty.¹⁵

Many parties have expressed concern about the integrity of using carbon offsets as a commodity – that they have become a cheap but opaque way for corporations to claim emission reductions. The voluntary carbon market has been called the ‘wild west’ because it is mostly self-regulated with poor transparency. Skepticism has prompted growing scrutiny by investors, regulators and even consumers to ensure claims are appropriate and not just greenwashing.¹⁶ With increasing demand for effective carbon removal solutions, carbon offset projects on the voluntary market may need to refocus on higher quality categories of projects than those related to forestry, specifically CO₂ removal from the atmospheres with long-duration underground storage.¹⁷

Intrinsic Challenges with Carbon Offsets

Carbon dioxide is a very stable gas that does not break down over time. Once emitted, CO₂ remains in the atmosphere for centuries to millennia, never losing its potency as a planet-warming Greenhouse gas.¹⁸

As a result, offset projects need to endure and cannot be reversed for centuries in order to be considered permanent. Ensuring that a project lasts for centuries and longer—far beyond a human life span—is difficult to achieve. Although planting forests that absorb carbon dioxide is a popular type of offset, forests need to grow to maturity and never be cut down for the benefit to be real. If the forest is lost, its carbon will be released back into the atmosphere.¹⁹ Climate change is making it harder to ensure the durability of any forest project. The combination of [droughts, heat waves, pest invasions, and wildfires](#) amplified by global warming, experts say, is making it hard to count on any particular patch of forest being alive and reliably storing carbon indefinitely.²⁰

Another challenge is called additionality. This is the concept that a particular carbon offset funded a carbon reduction that wouldn’t have happened had the offset not been purchased. Additionality is an example of a “counterfactual,” which by definition is unprovable. A corporation that, for example, pays for a forest to not be cut down, and claims that benefit to offset its own emissions, can never prove that the forest definitely *would have been* cut down if not for them.²¹

Yet another concept, known as leakage, is also a challenge in proving that an offset project worked as intended. An example of leakage is where a company pays for a 20-hectare forest to not be cut down, but the region where the forest is being preserved still needs wood and other forest products, so a *different* 20-hectare forest is cut down instead. The result is that the same deforestation that was going to happen happens anyway, except that the company purchasing the offset fully believes that it has offset its emissions by preserving 20 hectares of forest. Leakage is almost always present in any offset project and can make determining a project’s actual impact nearly impossible.²²

¹⁵ <https://carboncredits.com/who-verifies-carbon-credits/>

¹⁶ <https://www.ft.com/content/9b02fcf7-9e04-4b71-ad14-251552d5a78e>

¹⁷ <https://carbon-direct.com/wp-content/uploads/2022/05/Commentary-on-the-Voluntary-Registry-Offsets-Database-VROD-2022.pdf>

¹⁸ <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

¹⁹ <https://clearloop.us/2021/06/16/carbon-offset-permanence-corporate-sustainability/>

²⁰ <https://www.nationalgeographic.com/environment/article/forests-as-carbon-offsets-climate-change-has-other-plans>

²¹ http://www.offsetguide.org/wp-content/uploads/2020/03/Carbon-Offset-Guide_3122020.pdf

²² https://pdf.usaid.gov/pdf_docs/PNACY489.pdf

So... What's the Future of Carbon Offsets?

To reduce or reverse the accumulation of GHG in the atmosphere, and therefore reduce or reverse global warming, the choices have been clear since the 1980s: (a) reduce or eliminate your emissions of fossil carbon, or (b) remove carbon from the atmosphere and store it permanently in the ground. By 2022 however, nearly all carbon offsets purchased by industry with the intent of “b,” that is, removing carbon from the atmosphere and storing it permanently in the ground, did not actually do that, due to enormous and in some cases unsolvable challenges, such as proving that a forest planted today still exists hundreds of years in the future.²³

As business leaders and investors became aware of this problem, they began investing in start-ups that actually *did* “b”: remove carbon from the atmosphere and store it permanently in the ground, while at the same time avoiding projects of dubious value such as paying for a promise to not cut down a forest (so-called “avoided emissions”).

Emerging technologies that pulled carbon dioxide from the atmosphere and permanently stored it underground were small in scale but had promising results. In fact, in early 2022, investors committed more than \$2 billion in just two months to support such technologies - making “carbon capture and storage” the fastest-growing area in climate finance.²⁴

The most advanced of such companies was Climeworks AG, a Swiss company specializing in what was known as “Direct Air Capture” of CO₂ from the atmosphere. Climeworks was founded in 2009 by two engineering students as a university spin-out, and introduced its first working modules in 2014. A series of large government, corporate, and venture capital investments followed, and by 2021 the world’s first at-scale Direct Air Capture plant was up and operating in Iceland, powered by carbon-free geothermal energy, and storing the captured CO₂ underground. Although it was the largest Direct Air Capture plant at the time, its impact was still just a drop in the bucket in terms of scale: at just 4,000 tons per year, the Climeworks plant was capturing only 0.00001% of global CO₂ emissions. Still, in spring 2022, the company landed \$650 million in new venture investment, and broke ground on a new plant ten times the size of the 2021 operation.²⁵

Another innovator in carbon capture and storage was San Francisco startup Charm Industrial that converts agricultural waste into a carbon-rich liquid which is then [pumped underground](#). As with Climeworks, companies including Microsoft bought carbon offsets from Charm in order to offset their emissions.²⁶ Compared to Climeworks, Charm used a simpler approach to carbon capture: plants do the work of capturing CO₂ from the air, though that also makes Charm dependent on a steady supply of inexpensive agricultural waste as a feedstock.

By 2022 there were these and other options for purchasing carbon offsets that would pay for removing carbon from the atmosphere and storing it permanently in the ground. Unfortunately, those “high quality” technology-based offsets could cost upwards of \$1,000 per ton of carbon removed, about 100 times more than “lower quality” offsets associated with nature-based solutions like reforestation projects.²⁷

²³ <https://www.nytimes.com/interactive/2018/08/01/magazine/climate-change-losing-earth.html>

²⁴ <https://www.wsj.com/articles/carbon-removal-industry-draws-billions-to-fight-climate-change-11654640329>

²⁵ <https://climeworks.com/>

²⁶ <https://www.technologyreview.com/2022/02/15/1045317/fuel-plant-agricultural-beccs-waste-climate-change/>

²⁷ <https://trove-research.com/wp-content/uploads/2021/06/Trove-Research-Carbon-Credit-Demand-Supply-and-Prices-1-June-2021.pdf>

Some corporations believed that yet-to-be-discovered technologies could prove to be winners in the business of carbon capture and storage. As a result, a number of competitions, business incubators and corporate funding initiatives were launched. Prominent among these initiatives were Microsoft's commitment to invest \$1 billion into carbon reduction and removal technologies.²⁸ Also, the \$100 million Gigaton-scale Carbon Removal XPRIZE funded by Elon Musk and the Musk Foundation was launched with a goal to: "Inspire and help scale efficient solutions to achieve 10 gigaton per year carbon removal by 2050 to help fight climate change and restore the Earth's carbon balance."²⁹

As the XPRIZE CEO said, "It's not too late to use human creativity, innovation, and competition to rewrite our history and create a better future for all of us on this planet we call home."

²⁸ <https://blogs.microsoft.com/blog/2022/03/10/an-update-on-microsofts-sustainability-commitments-building-a-foundation-for-2030/#:~:text=Collaboration%20and%20investment&text=Additionally%2C%20we%20have%20allocated%20%24471,to%20reduce%20water%20and%20waste.>

²⁹ <https://www.xprize.org/prizes/elonmusk>

Case Discussion Questions

1. What are the circumstances under which a corporation should use carbon offsets as a way of reducing its emissions?
2. What might motivate a company to consider permanent carbon capture and storage solutions, even though they are significantly more expensive?
3. Does it make sense for a company to anticipate increased regulation in the carbon offset market? What form might that regulation take?