Agricultural Carbon Markets, Payments, and Data:
Big Ag's Latest Power Grab

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Introduction

Farmers could become a big part of the solution to climate change by adopting certain farming practices that can take carbon from the air and store it in the ground. Unfortunately, politicians on both sides of the aisle are embracing policies that, while purporting to enlist agriculture in reducing greenhouse gas emissions, are actually serving to entrench corporate power, increase the use of harmful chemicals, worsen social and racial inequities, and forestall meaningful reforms.

These policies involve the buying and selling of so-called "carbon-offset" credits. In its simplest form, the idea begins with granting credits to farmers who adopt certain practices, such as planting more trees and cover crops, that are supposed to remove carbon from the atmosphere. Farmers then receive compensation for their efforts by selling these credits to other entities, typically large corporations. These corporations, in turn, use their purchases of such credits to justify claims of environmental responsibility. Though they may still be emitting carbon dioxide and other greenhouse gasses into the atmosphere, they claim to have "offset" these emissions by paying others to pollute less or actively sequester carbon, often to the point of asserting that they now have a "net-zero" climate impact. Demand for these offsets is growing. A fifth of the world's largest corporations have publicly promised to reach a "net-zero" goal.[1]

Carbon-offset programs have become a leading U.S. policy approach for mitigating agriculture's climate impact. Politicians, agribusinesses, and environmental groups alike backed the Growing Climate Solutions Act, which was included in the Fiscal Year 2023 Omnibus Appropriations Bill as the "Greenhouse Gas Technical Assistance Provider and Third-Party Verifier Program". The provision would direct USDA to list private carbon market facilitators on its website and broadly list protocols for measuring carbon sequestration. Paying farmers for sequestering carbon got an indirect nod in President Biden's signature climate legislation, the Inflation Reduction Act. Most recently, the U.S. Department of Agriculture announced that it will give over half a billion dollars in grants to projects advancing private carbon markets as a part of its larger climate-smart commodities initiative.[2] But behind this appealing market-based narrative lies a deeply concerning trail of uncertainties, fraud, and corporate exploitation.

First, unlike regulatory "cap-and-trade" markets designed to control other forms of pollution, such as sulphur dioxide emissions, these voluntary carbon-offset schemes do not put a cap on the total amount of pollution allowed. They are cap-and-trade programs without the cap. Without any mandated climate pollution limits, carbon-offset trading is unlikely to result in any actual net reduction in the amount of carbon in the atmosphere. Moreover, because polluters can, as we will see, buy credits from projects that overestimate carbon sequestration or fail to store carbon in the long term, these carbon-trading schemes run the risk of actually increasing carbon emissions.[3]

Even if these schemes did impose a cap on carbon emissions, applying a market-trading system to soil carbon would still be unworkable. Reliably and consistently measuring or modeling soil carbon is still very challenging, especially when it comes to quantifying changes in soil carbon year over year. Soil carbon samples taken from the same field can lead to very different results. Offset programs seek to pay farmers annually, but meaningfully increasing soil carbon

can take over a decade to succeed.[4] What's more, soil carbon storage is very fickle. Carbon sequestered in the soil can be released with a change in land management practices or through severe weather events, therefore failing to sequester carbon long-term.[5]

Third-party certifiers aim to ease these concerns about soil carbon impermanence or measurability by claiming to provide verification of carbon sequestration. However, there are dozens of different certifiers using dozens of varied, unregulated standards. Most of these certifiers rely on theoretical modeling of carbon sequestration as opposed to actual soil measurements. Such fundamental uncertainties will lead to wildly variable carbon-offset prices. Without basic market fundamentals of information exchange and consistent commodities, selling and buying offsets is little more than speculation.

Thus, these carbon-offset schemes rest on yet developing science and are plagued with measurement problems that prevent them from being anything like a true market that limits climate change by putting a real price on carbon. Far from making polluters pay the price for the harm they cause to others, these schemes allow them to buy paper certificates, based on uncertain science, that they use as marketing tools to deceive the public and policymakers. The schemes allow corporations to make bold and misleading marketing claims about their contributions to reducing climate change, effectively giving polluters a way to "greenwash" their carbon footprints.

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To make matters worse, big agribusiness corporations are using the system to deepen their own monopolistic power. Programs run by corporations such as Cargill, Bayer, Nutrien, and Corteva pay farmers for adopting specific farming practices that either depend on the companies' proprietary technologies or require farmers to use their digital agriculture platforms. For example, Bayer promotes using its glyphosate-based herbicides like Roundup to control weeds in lieu of tillage and to "knock down" cover crops.[6] Bayer also requires farmers to upload data through its digital agriculture program, FieldView, to certify their credits, driving more farmers and their valuable information to the platform. Under these private carbon-offset programs, agribusiness giants define climate-smart agriculture and promote large-scale, monoculture, chemical-dependent farming methods that can harm the environment in the long run and further entrench their market power. By controlling the same private, unregulated carbon-offset markets in which they trade on their own account and set their own prices, they are also subject to massive conflicts of interest.

Finally, carbon-offset programs aggravate ongoing social injustices. Generally, only larger, mechanized farms will be able to earn enough from carbon offsets to cover the costs of implementing the required farm practices. Meanwhile, to the extent that the availability of carbon offsets inflate the price of farmland, this will make it still harder for people of modest means to become farmers.[7] Moreover, these offsetting schemes fail to clean up the environment and may intensify pollution hotspots in low-wealth communities and communities of color in the U.S. and the Global South.[8]

There's no doubt that farmers should be supported in shifting to ecologically regenerative methods. But the evidence shows that using carbon offsets to do so is a counter-productive and inequitable approach that will let big polluters off the hook and fail the needs of family farmers. Congress and the USDA should not waste time and resources promoting this questionable and harmful approach. Policymakers have far more effective and proven tools already at their disposal to promote climate-friendly farming methods that do not exacerbate the liabilities and harms of private carbon-trading schemes.

Agriculture, Climate Change, and Soil Carbon

Agriculture and forestry account for some 22% of global greenhouse gas emissions.[9] The most direct way that the agricultural sector can help fight climate change is by lowering its carbon footprint via practices such as raising fewer livestock in factory farm conditions, reducing use of synthetic fertilizers and pesticides, and preventing the conversion of existing biodiverse, carbon-rich ecosystems, such as forests, into farmland to begin with. But the focus of most agriculture carbon-credit programs, and thus the focus of this report, is on farmers' ability to sequester carbon in soil.

How farmers treat their soil has significant climate implications given that farmers and ranchers manage more than half of the U.S. land base.[10] Investments in supporting farmers to transition to more biodiverse, agroecological, and perennial farming methods could help sequester more carbon in the soil, reduce reliance on synthetic fertilizers and pesticides, and make farms more resilient in the face of climate change. However, most carbon-offset programs focus on promoting cover-cropping and reduced tillage along with otherwise chemical-dependent and monoculture farming practices. These methods are not as effective for sequestering carbon and introduce other environmental harms.

SOIL AS A LIVING SYSTEM

Earth's soils contain more carbon than all its biomass and atmosphere, combined.[11] The life of soil is at the heart of its ability to capture and store carbon. Plants take in carbon from the air and use it as the basis for plant matter. This carbon is released through roots into the soil thanks to a teeming ecosystem of microorganisms. Invertebrates such as earthworms and springtails also feed on fallen plants, breaking them down and excreting carbon-rich casts and feces, mixing organic matter into the soil as they go.[12]

Thus, one key component of truly regenerative farming systems is that they protect and enhance soil biodiversity. Research shows that the pesticides commonly used in U.S. agriculture pose a serious threat to soil organisms.[13] A recent meta-review found that pesticides kill or harm soil invertebrates in 71% of cases studied.[14] This makes it very concerning that some of the largest players in the establishment of soil carbon markets are pesticide companies like Bayer and Corteva.

Additionally, soil carbon is just one indicator of the health of agricultural ecosystems and is difficult to accurately measure compared to others. Other measures such as soil biodiversity and water filtration can give a more holistic picture of soil health. Focusing only on carbon could incentivize a reductionist approach to carbon farming, further entrenching unsustainable, chemical-intensive industrial agriculture practices.

REGENERATIVE FARMING APPROACHES

Practices such as cover-cropping, crop diversification, agroforestry, and applying compost can be part of holistic regenerative farming systems. Data on organic farming — which depends on ecological methods to build soil health and control pests, and which prohibits the use of over 900 agricultural pesticides — demonstrates that these methods can improve soil carbon sequestration. Organic farms have been found to sequester up to 25 percent more carbon in the soil[15] and achieve deeper and more persistent carbon storage[16] than farms using agrichemical approaches.

Biodiverse farming and ranching systems that incorporate trees, shrubs, and perennial plants also have greater potential to sequester carbon than annual cropping systems. One study estimated that adopting agroforestry on just 10% of U.S. crop and grazing lands could sequester enough carbon to offset up to 30% of all U.S. annual carbon emissions.[17] Another study found that, even by conservative estimates, agroforestry can sequester 10 to 20 times more carbon per acre than practices such as no-till or cover-cropping.[18]

A REDUCTIONIST APPROACH TO CARBON FARMING

Despite the available data demonstrating that diverse and agroecological farming systems have the greatest potential to sequester carbon, most agricultural carbon-credit programs promote practices that are compatible with monoculture annual crop production, including no-till farming and cover-cropping.

While some data show the potential for no-till agriculture to improve soil carbon sequestration,[19] the latest data show that no-till may actually redistribute soil carbon from the deeper layers into the top layers of soil rather than increase soil carbon stocks.[20] This effect could cause more carbon release from soil rather than storing it deep in the ground where it is more stable — particularly as intermittent tillage may be important in no-till systems in some regions.[21]

One meta-study looking at 69 experiments around the globe found no significant difference in soil carbon levels between conventionally tilled and no-till fields when studies measured the deeper layers of soil.[22] Some studies examining carbon at deeper soil depths also cast doubt on the ability of cover crops alone to sequester carbon. Using multiple practices together may improve outcomes; for example, one study found that cover-cropping combined with no-till may sequester more soil carbon than released in the long term.[23]

THE CHALLENGE OF MEASURING SOIL CARBON

While it is evident that some farming practices have more carbon-sequestering potential than others, the science of agricultural soil carbon sequestration is complex and developing. There isn't a clear consensus on how long carbon remains in the soil or under what conditions.[24] Disturbing soil and changing weather can release years of stored soil carbon into the atmosphere.[25] There are major uncertainties around measuring year-to-year changes in soil carbon, the very type of measurements needed to make annual payments to farmers for implementing practices such as cover-cropping or no-till farming.[26] Other studies suggest that soil may reach a carbon saturation point past which no more carbon can be stored.[27]

Soil carbon sequestration also varies considerably by soil type and climate and can even vary significantly within a single field.[28] One study found that soil carbon concentrations can vary fivefold in a seemingly uniform field.[29] The tools required to measure soil carbon to the degree of accuracy needed to ensure integrity in a carbon market do not exist.[30] Without adequate measurement tools, farmers and carbon-offset sellers can't actually determine how many tons of carbon their credits represent.

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With so much uncertainty and variability in measuring and modeling soil carbon sequestration, programs that aim to quantify and commoditize farmers' total tons of sequestered carbon are largely based on assumptions and projections rather than actual measurements.
In addition, new understandings of how microorganisms

break down soil carbon suggest that many computer carbon models, including those used to estimate carbon sequestration for carbon credits, overestimate how much carbon will stay in the soil.[31]

All of these challenges create fundamental issues when carbon payment programs try to turn farmers' sequestered carbon projections into sellable offset credits in carbon markets. If buyers can't trust that any given carbon credit represents the tons of offset carbon that it claims to, how can they assign it a value and price?

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What Are "Carbon Markets?" And Do They Work?

The logic behind carbon payments seems simple at first – pay farmers to adopt practices that sequester carbon by generating and selling credits representing that carbon to corporate buyers. But the reality is much more complicated when it's not clear if credits represent the pollution reductions that they claim to and corporations are able to corner credit sales.

Many major corporations have made pledges to reduce their net climate footprint. Where businesses cannot (or do not want to) change their practices to reduce their pollution, they can pay to reduce pollution elsewhere by buying carbon-offset credits. This "market-based" pollution-trading concept shares ideological roots with the regulatory cap-and-trade scheme, in which governments set a pollution limit (the cap) and issue pollution allowances that entities can use, sell, or buy (trade). The theory goes, trading in pollution credits can allocate scarce resources for more efficient environmental clean-up – it may cost less for a big polluter to pay someone else to reduce pollution elsewhere.

But unlike cap-and-trade and other regulatory carbon markets, which require corporations to comply with a shrinking pollution limit, so-called "voluntary" or private carbon-offset sales are not made to comply with regulation. Nor do offsets represent a scarce pollution allowance. Offsets can be generated from new projects claiming to reduce or remove pollution. There is no central commodities exchange for trading carbon offsets. Corporations voluntarily buy these offsets through a variety of exchanges and certification programs to make green marketing claims and meet internal climate goals of their choosing.

For now, most U.S. agricultural carbon offsets are sold through private exchanges and programs to corporate buyers. In some cases, agribusiness corporations recruit and pay farmers directly for adopting carbon-sequestering practices without going through any sort of exchange.

The generally regulation-averse agriculture industry has rallied behind the idea of paying farmers to help the planet by generating carbon offsets for corporate buyers. More than 175 organizations and companies endorsed legislation aimed at directing farmers toward the carbon-offset "green rush," called the Growing Climate Solutions Act. Legislators included a watered-down version of the bill in the 2023 Fiscal Year Omnibus Appropriations Bill. USDA has also invested in growing agriculture carbon-offset programs through its Climate Smart Commodities grants.

Proponents of agricultural carbon offsets extol the notion that they're harnessing the power of markets to match demand for pollution reduction with farmers that can be incentivized to sequester carbon for the right price. But upon closer inspection, these transactions lack many basic market mechanisms and can be cornered by corporate buyers.

For one, some of the carbon-offset programs run by the largest agribusiness corporations exist outside any kind of carbon-offset exchange where buyers bid for credits. Bayer and Cargill both unilaterally set the price they'll pay farmers for adopting no-till or cover crops and claim any generated credits, which they can then sell to other buyers or keep to meet their corporate emissions reduction goals. This gives Bayer and Cargill power to determine how much they want to pay for greenwashing marketing claims and denies farmers any semblance of a fair price for their offsets determined through supply and demand.

But even when farmers do sell their offsets on more competitive and open exchanges, the product that they're selling doesn't meet the standards for a tradable commodity. Carbon offsets are anything but standard and fungible like a bushel of corn or barrel of oil. Their value and price rely entirely on the offset's perceived (not actual) integrity: does the buyer believe that this credit *actually* represents the total tons of carbon that it claims to? Offset integrity is challenging to ascertain and depends on the measurement and verification standards of the project and certification that generated the credit.

The sheer number of certifiers and lack of strict standards amid scientific uncertainty allows for many phony or imprecise credits to enter the market. A University of California Berkeley research fellow, Barbara Haya, told *Grist* that it is "mind-bogglingly difficult to find high-quality offsets."[32] An independent review of more than 100 projects globally found that 90 percent of the projects failed to offset as much as they claimed, were not permanent, or came with damaging side effects for local communities or ecosystems.[33] A 2017 report by the European Commission estimated that 75% of the carbon credits in the EU's carbon trading system had a low likelihood of reducing emissions.[34] In California, exploitable carbon-credit protocols have actually led to an increase in carbon emissions.[35]

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Because of these validity concerns, U.S. agriculture carbon-offset sales have struggled to take off in the past. Most notably, in 2012 the U.S.'s predominant voluntary carbon-credit exchange, the Chicago Climate Exchange (CCX), collapsed due to insufficient demand for credits and credibility concerns. Without standardized measurement or verification methods, traders on the CCX were able to claim bogus carbon credits. The value of carbon credits became unclear, the intangible commodity became meaningless, and the price plummeted.

Today, there is much more demand for carbon credits. McKinsey estimates that demand for carbon offsets will increase fifteenfold over the next decade and the market for carbon credits could reach more than $50 billion.[36] However, while proponents argue that standards are much stronger than in 2012 or when the European Commission studied offsets in 2017, significant credibility issues remain. A 2021 study by the Environmental Defense Fund and Woodwell Climate Research Center of 12 protocols for measuring

and evaluating soil organic carbon found such wide variation between protocols that it "run[s] the risk of creating credits that are not equivalent or even comparable."[37] Without basic market mechanisms for price discovery and transparent, agreed-upon value, carbon offsets remain rife for speculation and volatility.

The Growing Climate Solutions Act, or "Greenhouse Gas Technical Assistance Provider and Third-Party Verifier Program," will attempt to increase confidence in companies working to facilitate farmer participation in carbon markets by listing protocols for measuring carbon sequestration and companies with whom farmers or forest owners can work to generate and sell carbon credits on USDA's website. This might sound like a regulation, but it's not. To be listed on USDA's website, businesses need to share some basic information about how they measure and certify credits and "maintain expertise" in carbon-verification protocols. But they do not need to comply with any set measurement techniques or carbon modeling.

At the same time, Congress also included the SUSTAINS Act in the 2023 Fiscal Year Omnibus Appropriations Bill. This bill will allow USDA to accept "contributions of private funds for the purpose of addressing the changing climate, sequestering carbon, improving wildlife habitat, protecting sources of drinking water, and addressing other natural resource priorities identified by the secretary."[38] Most relevant to soil carbon markets, the bill also specifies that a corporation contributing to USDA may specify which practices to fund and prescribe the terms for ownership of the corporation's share of environmental service credits resulting from practices the corporation paid for. In other words, corporate sponsors get a cut of any carbon credits generated with the help of their donations.

The bill opens the door for private carbon market schemes to rope farmers and foresters into restrictive contracts under the banner of NRCS Conservation programs. USDA will even be tasked with advertising such opportunities. While the version of the Growing Climate Solutions Act included in the Omnibus may have removed explicit USDA-certification of private carbon schemes, the SUSTAINS Act goes a step in the opposite direction. Private carbon schemes will essentially, through a grant to USDA, be considered government programs themselves.

Lending such legitimacy to fledgling soil carbon-offset schemes could influence their value in voluntary exchanges and potentially prime agricultural offsets for use in regulatory compliance markets, like California's cap-and-trade exchange, where the stakes are higher. All told, legislative provisions that will boost agricultural carbon markets do not police existing markets and transactions and would fan the flames of a speculative industry that stands to divert resources from effective pollution reduction and regulation.

Ultimately, carbon market evangelists claim they've found a win-win solution to allocate scarce resources towards the most cost-effective pollution reductions. In reality, voluntary carbon trading diverts resources into speculative offsets with no standard value that, on the whole, overpromise and under-deliver. Absent regulations, polluters can buy cheap cover to keep polluting while emissions may not decrease at all.

In reality, voluntary carbon trading diverts resources into speculative offsets with no standard value that, on the whole, overpromise and under-deliver.

Promoting voluntary carbon markets also lets private entities define what qualifies as "climate-smart" agriculture. As more dominant seed and agrichemical companies get into the business of paying farmers for carbon sequestration these harmful actors will devise carbon payment programs that put their profits above the public interest. The extensive surveillance and data collection required to verify carbon credits paired with long-term contracts also introduce new avenues for corporations to entrench power and corner markets.

How Voluntary Carbon Payment Programs Entrench Big Ag

With so much interest and growth in carbon-offset credits, start-up and legacy businesses alike are finding different ways to get in on the green rush. In addition to carbon-credit certifiers and exchanges, brokers of all sorts are stepping in to help farmers turn their agricultural practices into sellable carbon offsets. Navigating carbon-offset measurement and certification can be incredibly complex and costly for farmers to take on independently. Most farmers generate carbon-offset credits with or on behalf of a third-party business, such as Indigo Ag, that estimates farmers' tons of carbon sequestration, works with a certifier to turn those estimates into sellable carbon offsets, and typically markets those credits for farmers as well.

High-profile carbon-farming start-ups, including Indigo Ag and Nori, have garnered most of the media attention for recruiting and paying farmers to generate carbon offsets. But dominant agribusiness corporations such as Bayer, Corteva, Nutrien, Land o' Lakes, and Cargill have all launched different types of carbon payment programs, too. **[See sidebars, pages 9-11, for more details on these programs.]** These companies can leverage their large customer base and dominance in key agricultural markets to quickly gain a leading position in the new carbon- payment market (or pick winners and losers by partnering with start-ups, as Corteva has with Indigo).

Corporations say that they're launching these programs to do their part to fight climate change, but cornering the position between farmers and carbon-offset marketing holds significant benefits for their larger enterprise. Carbon-sequestration verification programs allow agribusinesses to collect more detailed agronomic data and drive new users to their digital agriculture platforms and products. New volumes of farm-level data also help corporations target farmers

BAYER'S CARBON PROGRAM

Bayer is one of the most influential agrichemical and seed companies in the world following its 2016 acquisition of Monsanto. As just one example, Bayer acquired Monsanto's patented genetically engineered traits found in more than 65% of all U.S. soybean seeds and 80% of all U.S. cotton seed.[58] In addition to selling seeds, seed traits, and agrichemicals, Bayer has made big investments in the nascent digital agriculture industry,[59] in part to acquire more information about farmers and levy greater influence over their management decisions. In Monsanto's 2013 annual report, the company pointed to a lack of farm-level data as holding back profits.[60] That same year, Monsanto announced its $930 million acquisition of the Climate Corporation, one of the most advanced data analytics companies in agriculture.[61] One of Climate Corporation's central products is Climate FieldView.

Climate FieldView is a digital agriculture platform that farmers use to acquire various digital agriculture software programs that can monitor and record climatic data, soil conditions, and management practices to make farming recommendations. Data are collected from farm equipment synced to the platform and from the information uploaded by farmers.[62] Over 180 million acres of farmland globally are enrolled in Climate FieldView, and Bayer's new carbon program could bring in even more.[63]

In 2020, Bayer launched a carbon market program through FieldView, now called ForGround.[64] Farmers in ForGround are paid for every acre on which they adopt a carbon sequestering practice, rather than per ton of carbon sequestered.[65] In the program's latest iteration, prices vary by state but generally farmers earn $5-$6 per acre annually for no-till or strip-till agriculture, and $6 per acre per year for cover cropping.[66] In the program's pilot, farmers could also earn credits to buy Bayer products instead of cash.[67] As of 2023 farmers that enroll receive a free subscription to FieldView Plus.[68] Farmers sign contracts to adopt these practices, at Bayer's specifications, for 10 years with an additional 10-year retention period after the contract ends.[69] The program is currently available in 17 states.[70]

When Bayer promotes its program there is an unspoken assumption that the revenue to pay farmers for adopting these practices comes from Bayer's sale of the carbon credits that farmers generate. But at a House agriculture committee hearing in September, 2021 a Bayer representative, Leo Bastos, couldn't give a straight answer to this basic question about where the money to pay for its carbon program will come from. Rather than sell credits immediately, Bayer may choose to hold onto carbon credits to make corporate sustainability claims or sell them later if credit prices rise. This raises questions about whether farmers are receiving a fair value for their work to generate credits, since Bayer's payment plan is not directly tied to credit sales (Indigo, by comparison, pays farmers in a portion of their carbon credit sales). At the 2021 hearing, Bastos also stated that their contracts allow for farmers to receive a larger payout if carbon credit values rise. "As prices increase, we actually share more of that value back to the farmer," Bastos said. Nonetheless, this arrangement still gives Bayer the power to set payment prices to farmers, especially when there is scant price transparency or price discovery in carbon offset transactions to begin with.

with advertising or get an informational advantage in commodity trading. Carbon-credit contracts also lock farmers into a discrete set of agricultural practices, often dictated by the carbon-payment program, allowing seed and agrichemical corporations to define climate-smart farming and preference their products in the process.

LETTING BIG AG DEFINE CARBON-SMART FARMING

Proponents of the voluntary, carbon-payment-and-credit-trading programs argue that pushing conventional farmers to adopt more environmentally sustainable practices is in the public interest, whether the directive comes from an agribusiness or a public body. However, the corporate entity is not designed to act in the public interest.[39] Unlike public officials, who are accountable to the public, corporations have a fiduciary duty to maximize shareholder profits.[40]

Studies show that agroecological management and agroforestry have far greater climate benefits than implementing isolated practices like cover-cropping or no-till agriculture on conventional, mono-crop farms.[41] Despite this, carbon-market platforms across the board prescribe isolated practices, predominantly reduced tillage, reduced nitrogen fertilizer use, cover-cropping, and in the case of livestock, installing methane digesters on industrial livestock operations.

One explanation for this approach is simplicity: requiring discrete practices is simpler than asking farmers to take a whole-ecosystem approach to agricultural management. These practices are also minimally disruptive to, and in many cases further, the industrial agricultural systems that are core to the business models of corporations such as Bayer and Cargill. Genetically engineered seed and agrichemical manufacturers have every incentive to recommend carbon-sequestering methods that push their product sales over more holistic agroecological management.

CARGILL'S CARBON PROGRAM

Cargill is the one of the largest private companies in the world, ranked second in the United States after Koch Industries.[71] Cargill trades commodities ranging from soy to steel and runs slaughterhouses around the world. Cargill rose to dominance, in part, by developing extensive information gathering and sharing systems for superior market intelligence and commodity trading.[72] Today, Cargill says data analytics is still an essential part of how it does business, the corporation even makes revenue selling proprietary datasets and intelligence. Carbon payment programs present another way for Cargill to gather farm-level information and trade in carbon offsets as a new commodity.

Cargill's carbon program, called "RegenConnect" operates through a partnership with Regrow, a data analytics and soil modeling company. Farmers must have a Cargill customer number to participate.[73] Farmers upload four years of historical agronomic data to Regrow's FluroSense platform.[74] Farmers then agree to implement a practice prescribed by Regrow: cover cropping, reducing fertilizer use, or no-till. Farm-level data are uploaded throughout the program and supplemented by data collected through a satellite system.

Regrow calculates total carbon sequestration with a computer model called a DeNitrification- DeComposition Model (DNDC). The DNDC's algorithm simulates soil microbial processes to "digitally recreate the effects of farming practices on soil health."[75] DNDC requires data on soil pH; soil carbon; bulk density; soil texture; cropping areas and rotations; daily weather; and management practices including fertilizer use, planting and harvest dates, tillage, and watering.[76]

Regrow's platform also collects run-of-mill personal data on farmers, including site traffic data and credit card information.[77] Regrow's privacy policy also includes a catch-all provision: Regrow can collect "Any other personal information that may be required in order to facilitate [a participant's] dealings with [Regrow]."[78] The privacy policy allows Regrow to acquire these data directly or through third parties. However, a representative from Regrow said that their privacy policy only allows for information collected from farmers to be used for improving their product and verifying carbon sequestration and other environmental outcomes. Regrow also said that they only share anonymized farmer data with Cargill that is pertinent to the RegenConnect partnership.

While Climate FieldView allows participants to remove data,[79] other platforms require that the data are permanently relinquished. Regrow's privacy policy grants the FluroSense platform "a royalty-free, worldwide, irrevocable and perpetual license to use, reproduce, copy, de-identify and categorize [participant's] Data."[80]

Cargill's program is currently available to farmers in fifteen states.[81] For the last two growing seasons Cargill offered one year contracts for generating carbon offsets, though Cargill's website suggests that they are looking for long-term partnerships.[82] For the 2022-2023 crop season, Cargill is offering farmers $25 per ton of sequestered carbon per acre.[83] The company plans to use these carbon credits to meet internal corporate greenhouse gas reduction goals and sell them to "downstream customers," such as grain and beef buyers.[84]

For example, Bayer is a strong proponent of implementing no-till agriculture and using cover crops. These two practices form the foundation of its Carbon Initiative. Perhaps most concerning about this model from an environmental perspective is the heavy use of glyphosate, the main ingredient in Roundup,™ to make these practices work for industrial monocultures.[42]

While organic operations can deploy no-till and cover crops without relying on synthetic herbicides, conventional monoculture operations cannot. At a large scale, herbicides are the most efficient way to "knock down" cover crops when it's time to plant the cash crop, and companies like Bayer are happy to provide the necessary glyphosate-based herbicides.

Multiple studies have found that using glyphosate harms important fungi, earthworms, and other invertebrates that are essential to a healthy soil ecosystem.[43] Focusing entirely on practices like no-till at industrial scales in order to generate carbon credits will not only increase sales of chemicals tied to biodiversity collapse and human health concerns, but it may also come at the cost of building healthy soils that can sequester carbon and provide a number of other ecosystem benefits in the long term.[44]

These types of carbon payments also further marginalize truly sustainable farms. Gearing carbon-payment programs towards larger, monoculture, and chemical-intensive farms give them another revenue stream and advantage over smaller and diversified farms with proven environmental benefits. As currently designed, carbon payments act as another low-value commodity for which economies of scale are necessary to capture the benefits. Only farms operating hundreds or thousands of acres can generate enough credits to offset the current costs of implementation and verification.[45] For example, in 2020, the average farm selling carbon credits to Indigo operated 1,300 acres and grew commodity grains or cotton.[46]

CORTEVA'S CARBON INITIATIVE WITH INDIGO AG

Corteva is the seeds and agrichemical spinoff of DowDupont, a chemical conglomerate that split itself into three corporations in 2019. Corteva competes with Bayer as one of the two largest crop input corporations globally. Corteva also operates a digital agriculture platform called Granular Insights. In August 2021 Corteva announced an expansion of its Carbon Initiative program including a partnership with Indigo Ag, a leading carbon trading start up.

Indigo is a growing corporation that began selling microbial seed treatments and branched out into digital agriculture products and data-driven grain marketing. The corporation now runs one of the top platforms for measuring agricultural carbon sequestration and marketing carbon offsets to corporate buyers.

Just as Cargill partners with ReGrow to measure and verify carbon sequestration, Corteva partners with Indigo. One key difference is that Corteva collects farmers' carbon quantifying information through the corporation's Granular Insights platform, which then shares the data with Indigo for certification and credit generation. Indigo quantifies tons of sequestered carbon using a combination of modeling, based on farmer-provided data, and select soil sampling. Indigo will then sell these credits through their "buyer network." More than a dozen corporations including The North Face, Barclays, Shopify, and Fat Tire brewing have signed up to purchase Indigo's agricultural carbon credits.

Corteva guarantees farmers that generate credits for Indigo through Granular Insights a minimum of $20 per credit or 75% of their carbon credits' sales value.[85] Corteva projects that credits will sell for $30 per credit in the 2022 crop year and $60 per credit by 2030.[86] Participating farmers sign a five-year contract and share three to five years of historical farm data to enroll.[87] The program is available in 28 states.

COMPOUNDING MONOPOLY POWER THROUGH DATA ACQUISITION AND BUNDLING

As agriculture becomes increasingly mechanized and technology-dependent, the tools that digitally collect, store, and analyze farm data are an integral aspect of large-scale agriculture.[47] Leading agribusinesses, especially seed and chemical manufacturers, are clamoring to develop a dominant digital platform through which farmers access agriculture software and data-driven farm management insights.

Capturing large volumes of farm-level data has become an increasingly important competitive advantage in this

arena. Once captured and analyzed, data can bring tailored agronomic insights to every level of decision-making on the farm. These insights run on machine learning, whose predictions improve with larger and more diverse datasets.[48] Because verifying carbon sequestration requires copious amounts of detailed information from farmers, carbon-payment programs introduce a new way for dominant corporations to expand their data advantage and draw new users onto their digital agriculture platforms. As Bayer, Corteva, and Cargill expand their data advantage by collecting more information on more farm acres through carbon-offset programs, their market dominance will only deepen.

When seed and chemical companies control the software that advises farmers on planting decisions, they also have new opportunities to engage in predatory business practices. In a 2017 letter, the American Antitrust Institute and Food & Water Watch warned that the Bayer-Monsanto merger would allow the newly formed company to combine not just their seed and chemical products, but digital agriculture products and farmer data sets. They said the merger would allow the company to "leverage[] critical information. . . to bundle traits, seeds and chemicals into exclusive, proprietary packages,"[49] much as these corporations have already done with patented herbicide and herbicide-resistant seed pairs. For instance, an early version of Monsanto's digital agriculture platform, FieldScripts, *only* offered Monsanto brand seeds on the platform.[50] Today, Bayer offers a free year of premium Climate FieldView when bundled with its seeds and chemical through a rewards program, "Bayer PLUS Rewards."[51] Carbon program participants receive premium FieldView for free.[52]

Bayer has found that FieldView users buy more Bayer products. According to a 2022 presentation, Bayer generated more than 5% higher sales from its corn seed customers who had FieldView Plus compared to non-FieldView Plus users. Bayer also found that FieldView users planted Bayer corn seeds at a 2.5% higher seeding rate than the national average.[53] These advantages shut out seed and agrichemical competitors and keep farmers using a narrow set of expensive products.

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LONG-TERM CONTRACTS LIMIT FARMER AUTONOMY AND TIE THEM TO A NEW, VOLATILE "COMMODITY"

Just one year of tilling can release much of the carbon stored in soil. Due to these concerns around soil carbon permanence, many carbon-payment programs require that farmers make a long-term commitment to change their practices. But such agreements introduce considerable power imbalances, especially when made with monopolistic corporations. Farmers agree to adopt new fixed costs for five or 10 years at a time when the promised benefit of a carbon payment is wildly uncertain. For example, the contracts in Bayer's Carbon Program last for 10 years, plus an additional 10-year "retention period" during which farmers must maintain their new practices to ensure long-term carbon sequestration.[54] This effectively commits farmers to 20 years of new fixed costs (which can be as much as $35 per acre in the case of cover crop) but only 10 years of guaranteed pay[31] Although Bayer claims that farmers can leave the contracts at any time "with no penalty," their exact terms of termination are not public and they emphasize that farmers cannot remove a portion of their fields and add them back in.[55]

While most analysts predict that the value of agriculture carbon offsets will increase, some remember the promise and crash of the Chicago Climate Exchange, through which some farmers signed five-year carbon credit contracts only for the price of carbon to drop from $7 per ton to 3¢ per ton. Farmers narrowly avoided years of money-losing contracts because the Exchange

itself evaporated. While Bayer, Cargill, and Corteva all offer minimum price payments, there's no telling how terms could change should prices collapse.

As previously discussed, a major issue with valuing carbon credits is the lack of standardization and credibility. Even though carbon-measurement technology has somewhat improved since 2012, standardization and credit trustworthiness have not. Carbon offsets are still incredibly volatile with questionable underlying value and little in the way of transparent price discovery. Credit values vary dramatically depending on their perceived credibility. Financial instruments based on commodities with potentially no value nor true price discovery introduce systemic financial risks that only benefit financial speculators.[56]

Carbon offsets are still incredibly volatile with questionable underlying value and little in the way of transparent price discovery.

Conclusion & Recommendations

Far from mitigating the climate emergency, carbon-offset schemes threaten to further entrench environmentally destructive farm practices and chemical use, worsen social and racial equity issues, foster corporate self-dealing and monopoly, and threaten to exacerbate the economic marginalization of small to medium-scale farmers – all while forestalling meaningful reform by enabling corporate "greenwashing." Fortunately, there are many other ways that Congress and the Administration could reduce agriculture's carbon footprint and promote adoption of ecologically regenerative farming methods, even voluntarily.

CONGRESS AND THE ADMINISTRATION SHOULD:

- Ensure that USDA programs do not promote private carbon payment programs and reject corporate contributions to conservation programs that require farmers to share ownership of carbon credits with corporate donors.
- Invest in popular existing programs to fund environmental improvements in agriculture, such as the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP). A study by the Institute for Agriculture and Trade Policy found that USDA denied more than half of all EQIP and CSP applications, in part due to lack of funds. Funding should be greatly expanded, with resources set aside to promote proven carbon-sequestering practices, primarily agroforestry.

- Close these programs' existing loopholes, which allow large polluting farms, especially animal factory farms, to win large grants to subsidize the environmental cleanup necessitated by their inherently polluting business model.
- Support farmers who transition to ecologically regenerative practices, such as those encompassed within organic agriculture, that enhance soil health, protect biodiversity, and help make our food system more resilient to climate change.
- Promote agroforestry through existing USDA programs, such as encouraging tree plantings as a part of the Conservation Reserve Program (CRP) or expanding farm safety net programs, such as crop insurance, to better include agroforestry.
- Improve federal food procurement to invest in genuinely climate-smart farms and community-based food systems and disinvest from environmentally harmful businesses.
- Regulate air and water pollution from the largest, most polluting farms, including working with the EPA to set limits on agricultural greenhouse gas emissions.
- Hold dominant agribusinesses liable for the environmental violations of the farms they contract with, given their control over farmers' practices.
- Better enforce existing antitrust laws to combat the monopoly power of the largest agribusinesses.
- Protect farmer data:
    - Ensure data portability for farmers to easily transfer their information between platforms.
    - Allow farmers to remove their data from a platform, so that corporations cannot continue to profit off their information after a farmer has stopped using their service.
    - Prohibit the use of farmer data gathered to verify carbon sequestration or provide planting recommendations to be used to speculate in futures markets.
    - Ensure corporations obtain a farmer's explicit consent before sharing or selling their data to third parties.

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