
How to Grow and Sell Carbon Credits in US Agriculture

This report compares the requirements to grow and sell carbon credits across 17 private voluntary agricultural initiatives in the United States.

Why agriculture credits?

A growing number of private initiatives are offering producers compensation for the generation of agriculture carbon credits as well as other ecosystem services such as improvements in water quality. Credits and ecosystem services are purchased by large corporations and other entities pursuing a reduction in their environmental footprints. Some private and public entities are already purchasing carbon credits generated outside agriculture to comply with environmental regulations and to improve their appeal to environmentally-conscious stakeholders.

According to a 2019 report by the National Academy of Sciences, agricultural practices to enhance soil carbon storage can sequester 250 million tons of carbon dioxide annually in the US, equivalent to around 4% of the country's emissions. An economic assessment conducted by IHS Markit in 2018 concludes that the potential demand for agriculture carbon credits in the US is 190 million tons per year, falling short from the supply potential of 326 million tons per year. That report estimated the size of the US market for carbon credits at \$5.2 billion, and the market for other ecosystem services related to nitrogen and phosphorous management at \$8.7 billion annually.

In an attempt to jump start the incipient voluntary agriculture credits market, a few large companies have announced their intentions to purchase credits in the near future: Microsoft announced an agreement with Truterra, while IBM, JP Morgan Chase, Boston Consulting Group, Dogfish Head Craft Brewing, Shopify, Anheuser-Busch, and Barclays announced agreements with Indigo Ag. However, little is known about the exact details of those transactions. On the supply side, Peoples Company announced the enrollment of 20,000 managed acres with CIBO in January 2021.

A number of federal programs – including the Inflation Reduction Act of 2022 and the USDA Partnership for Climate-Smart Commodities – were designed to support the development of voluntary markets for carbon credits to help reduce carbon emissions by 40% by 2030. Agriculture, in particular, will receive \$19.5 billion through existing USDA programs over the next five years to expand the adoption of conservation practices, plus \$1 billion in technical assistance by NRCS, \$2.8 billion in grants to spur the development of climate-smart commodities, and \$1 billion for climate-smart commodities market expansion.

The complexities involved in the comparison of agriculture carbon initiatives might discourage agricultural producers from properly evaluating relevant alternatives, resulting in a protracted adoption process, and even an accelerated dis-adoption process if initiatives fail to satisfy producers' expectations. In an attempt to help producers navigate the complexities associated with carbon and ecosystem services initiatives, the present report compares 17 private voluntary initiatives across 23 variables. Seven initiatives offer per-output carbon payments (Carbon by Indigo, CIBO Carbon Credits, Corteva, Eco-Harvest, Nori, RegenConnect, and Soil and Water Outcomes Fund), seven initiatives provide per-practice carbon payment (ADM re:generations, Bayer Carbon, CarbonNow, Indigo Ag: Market+ Source, PepsiCo-PCM, Truterra's 2023 Nitrogen Management Incentive, and Truterra's 2023 Supply Shed Benefits), and three initiatives offer both types of payments. (Agoro Carbon, CIBO Carbon Bridge, Nutrien's Sustainable Nitrogen Outcomes).

How was the data collected?

We reviewed online reports (including Sellars and colleagues (2021), Illinois Sustainable Ag Partnership (2023), and earlier versions of this File A1-76), as well as carbon initiatives' web pages, and interviewed representatives from some of the carbon initiatives. A list of sources is available in the last section of this report.

What are the main findings?

The emerging agriculture credits market can be currently characterized as an unarticulated patch of coexisting initiatives with different rules, incentives, and penalties, rather than as a cohesive and transparent market where the same activity has the same implication across initiatives. In its formative stage, the incipient agriculture credits market is very dynamic, focused on testing protocols through small-scale pilot programs, and lacks standardization and liquidity. The side-by-side comparison of the 17 initiatives is organized into three groups, corresponding to Tables 1-3: payments per output, payments per practice, and mixed payments.

While all initiatives require **additionality** to generate a credit, not all initiatives require that producers change their production practices. **Additionality** means that producers must do something **different** to reduce carbon and increase ecosystem services. However, initiatives use a wide array of benchmarks to determine what is **different**. Some initiatives require a change of practices with respect to past practices on the same field, while some others require that practices in the field be different from common practices in the area (even if the same practices have been implemented for many years in the field under consideration). See "qualifying practices (additionality)" in Tables 1-3.

A handful of initiatives have a specific plan to promote the **permanence** of carbon sequestration. For example, a portion of the carbon credits are kept in a reserve pool to be used in the case of carbon reversal, while some initiatives require a 10-year commitment of the practices.

Further Considerations

An advantage of the emerging agriculture credits market over the failed carbon credit exchange from the late 2000s is that the expected farm size to participate in the carbon market is much smaller than before (Ribera and McCarl, 2009).

As protocols to generate agriculture credits become more encompassing and transparent, a price discovery process for agriculture credits becomes functional, and credit buyers build trust in the integrity of the system and the permanence of carbon reductions, the agriculture credits market should

consolidate and possibly grow. As long as buyers of agriculture credits perceive differences in the quality of credits generated through alternative protocols, it can also be expected that initiatives generating high-quality credits will gain market share while other initiatives will exit the market (via bankruptcies or mergers and acquisitions).

The dynamism of this incipient market can be illustrated by the discontinuation of the Farmers Business Network's Gradable Carbon initiative in 2022, after one year in the market, and the dissolution of the partnership between Corteva and ESMC; and the newly developed partnerships between Nori and Bayer, and between Corteva and Indigo Ag.

While carbon credits are the major focus of the present article, other ecosystem markets from agricultural production could develop in the future to foster water quality and quantity, wetlands, pollinators, and biodiversity. The performance of the voluntary agriculture credits market will set a precedent for those other markets.

More Information

[Agoro Carbon Alliance](https://www.agorocarbonalliance.com) [agorocarbonalliance.com](https://www.agorocarbonalliance.com)

[Bayer Carbon](https://www.bayercarbon.com) [bayercarbon.com](https://www.bayercarbon.com)

Bruner, E. and J. Brokish. 2021. [Ecosystem Market Information: Background and Comparison Table 1](#) [Fact sheet]. Illinois Sustainable Ag Partnership. <https://bit.ly/3y0IXlZ>

Bruner, E. and J. Brokish. 2021 [Ecosystem Market Information: Background and Comparison Table 2](#) [Fact sheet]. Illinois Sustainable Ag Partnership. <https://bit.ly/2T0cCwN>

Bruner, E. and J. Brokish. 2021. [Ecosystem Market Information: Background and Comparison Table 3](#) [Fact sheet]. Illinois Sustainable Ag Partnership. <https://bit.ly/3w1MFtY>

[CIBO Impact](https://www.cibotechnologies.com/cibo-impact/) www.cibotechnologies.com/cibo-impact/

[Corteva Carbon Initiative](https://www.corteva.us/products-and-solutions/digital-solutions/carbon.html) www.corteva.us/products-and-solutions/digital-solutions/carbon.html

[Ecosystem Services Market Consortium \(ESMC\)](https://www.ecosystems-services-market.org) [ecosystems-services-market.org](https://www.ecosystems-services-market.org)

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Giles, J. 2021. “[Digging into the complex, confusing and contentious world of soil carbon offsets.](#)”

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[Indigo Carbon](#) www.indigoag.com

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National Academies of Sciences, Engineering, and Medicine. 2019. [Negative Emissions Technologies and Reliable Sequestration: A Research Agenda](#). Washington, DC: The National Academies Press. <https://doi.org/10.17226/25259>

[Nori Carbon Removal Marketplace](#) nori.com

[Nutrien Carbon Program](#) <https://bit.ly/2U0cJZg>

Peoples Company. 2021. “CIBO and Peoples Company Join Forces to Generate Carbon Credits for Regenerative Practices on More Than 20,000 Acres of Managed Land.” Jan 19.

Plastina, A. 2022. “[How Do Data and Payments Flow Through Ag Carbon Programs?](#)” Iowa State University Extension and Outreach, Ag Decision Maker File A1-77. <https://go.iastate.edu/AGDMA177>

Ribera, L. A., and B. A. McCarl. 2009. “Carbon Markets: A Potential Source of Income for Farmers and Ranchers.” AgriLife Extension, Texas A&M University System.

Sellers, S., G. Schnitkey, C. Zulauf, K. Swanson and N. Paulson. 2021. “What Questions Should Farmers Ask about Selling Carbon Credits?” *farmdoc daily* (11):59, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, April 13.

[Soil and Water Outcomes Fund](#)
theoutcomesfund.com

[Truterra](#) truterraag.com/Carbon

All links accessed November 2023.

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Table 1. Carbon initiatives offering payments per output.

Initiative	Carbon by Indigo	CIBO Carbon Credits	Corteva	ESMC's Eco-Harvest	Nori	Cargill's RegenConnect	Soil and Water Outcomes Fund
Carbon farming practices allowed	Cover crops, reducing tillage, diversifying crop rotation, and nitrogen management.	Cover crops; no-till; reduced till; nitrogen management.	Cover crops; reduce tillage; nitrogen management; and increasing biodiversity.	Agricultural practices referenced in NRCS Conservation Practice Standards, e.g., Cover crop, reduced tillage, and nutrient management.	Crop rotations; cover crops; shifting from annuals to perennials; reduced tillage intensity; residue management; substituting synthetic fertilizers with organic matter additions.	Sustainable practices such as cover crops, reduce tillage, and no-till.	List not prescriptive, but includes no-till, cover crops, and extended crop rotations.
Qualifying practices (additionality)	New practices, except for cover crops (new and enhancement).	New practices.	New practices and enhancements.	New practices.	Adopted within the last 10 years.	New or expanded practices (continue use for re-enrollment).	New practices.
Eligible crops	Field crops: barley, canola (fall & spring planted), corn, cotton, dry edible beans, dry field peas, flax, oats, peanuts, rye, sorghum, soybeans, sugar beets, sunflowers, wheat (winter & spring).	Corn, soybeans, wheat.	15 crop types: barley, canola, corn, cotton, dry edible beans, dry field peas, flax, oats, peanuts, rye, sorghum, soybeans, sugar beets, sunflowers, dry wheat.	Corn, soybeans, wheat, alfalfa, and oats.	Row crop/hay/ grass: alfalfa, barley, broccoli, carrots, cauliflower, clover, corn (grain or silage), cotton, dry field beans, dry field pea, fallow, grass, grass-legume mix, lettuce, millet, oats, peanuts, potato, rye, sorghum, soybeans, strawberries, sugar beets, sunflowers, switchgrass, tomato, wheat (spring or winter). Orchard/vineyard: almond, avocado, cherry, English walnut, grapefruit, grape, lemon/ lime, olive, orange, peach/nectarine, pistachio, tangerine/ mandarin.	Corn, soybeans, wheat.	All crops in selected areas.
Regional coverage	30 states: AL, AR, CO, DE, GA, IL, IN, IA, KS, KY, LA, MD, MI, MN, MS, MO, NE, NY, NC, ND, OH, OK, PA, SC, SD, TN, TX, VT, VA, WI.	13 states: IL, IN, IA, KS, KY, MI, MN, MO, NE, ND, OH, SD, WI.	30 states in 2022: AL, AR, CO, DE, GA, IL, IN, IA, KS, KY, LA, MD, MI, MN, MS, MO, NE, NY, NC, ND, OH, OK, PA, SC, SD, TN, TX, VT, VA, WI.	Portions of the Corn and Soybean Belt, Southern and Northern Great Plains, and Great Lakes.	All US Croplands.	24 states: AL, AR, CO, GA, IL, IN, IA, KS, KY, LA, MI, MN, MS, MO, NE, NC, ND, OH, OK, SC, SD, TN, TX, WI.	The field must be HEL and Wetlands compliant on selected areas in 19 States: AL, GA, IL, IN, IA, KS, MI, MN, MO, NC, ND, NE, NY, OH, SC, SD, TN, VA, WI.

The information reported in Tables 1-3 was gathered through Fall 2023, interested producers should carefully research initiatives before signing a contract as initiatives continue to evolve.

Table 1. Carbon initiatives offering payments per output.

Initiative	Carbon by Indigo	CIBO Carbon Credits	Corteva	ESMC's Eco-Harvest	Nori	Cargill's RegenConnect	Soil and Water Outcomes Fund
Farm area limitations	Minimum 150 acres	None	None	None	None	None	None
Contract length	5 years, twice renewable.	10 years with an option to opt out starting in year 4.	5 years.	5 years, renewable three times.	10 years of the practice changed.	1 year, renewable for unspecified number of times.	1 year, renewable for unspecified number of times.
Type of payment	Cash.	Cash.	Cash.	Cash.	USDC (stablecoin) with the option to convert to cash.	Cash.	Cash.
Target environmental service	Carbon offsets.	Carbon offsets and insets.	Carbon offsets.	Carbon insets, environmental improvements.	Carbon offsets.	Carbon insets (soil carbon sequestration), environmental improvements.	Carbon insets (soil carbon sequestration and nitrous oxide reductions) and water quality (nitrogen and phosphorous usage).
Payment structure	Producers receive 75% of the carbon offset sale revenue with a guaranteed minimum payment of \$15 per metric ton of carbon offsets for the 2022 carbon crop. 50% of payment is paid in year 1, 20% in year 2, 10% in years 3-5.	Once credits sold, producers receive 80% of sale revenue.	Producers receive 75% of the average carbon offset price sold in Indigo Ag with a floor of \$20 per credit. Payments are made after carbon credits are sold, and are vested over a 5-year period.	Producers receive a minimum of \$15 per metric ton of carbon insets.	Once carbon offsets sold, producers receive 100% of the selling price, and additional 25% is charged to the buyer.	Producers receive up to \$35 per metric ton of carbon sequestered. A minimum guaranteed payment is issued in Feb. of the year following the enrollment, and the balance is paid after the verification in next Jan.	Producers received an average payment of \$34 per acre for all environmental services in 2022. 50% paid within 30 days of signing agreement (spring), and 50% paid after annual verification (Nov./Dec.).
Look-back payment for past practices	Up to 2 growing seasons prior to the current crop year.	None.	None.	None.	Allowed the adoption of regenerative ag practices within the last 10 years.	None.	None.
Stacking	Allowed for all types of cost share from public programs, and for private ecosystem payments other than carbon.	Allowed for all types of cost share from public programs, and for private ecosystem payments other than carbon.	Allowed for cost-share from public programs only.	Allowed for cost-share from public programs only.	Allowed for all types of cost share from public programs, and for private ecosystem payments other than carbon.	Allowed for cost-share from public programs only.	Allowed for cost-share from public programs in some areas.
Agronomic assistance	Free.	Free.	Free.	Free.	None.	Free.	Free.
Historical data to be shared with Initiative	3-5 years of historical field management data.	Historical data of farm practices are collected using remote sensing. Producers only need to review and edit/confirm them.	3-5 years of historical field management data.	3 years of historical operational data. If producers are not aware of prior land practices, remote sensing can be used to ensure cover crops or reduced tillage have not been used in the past 10 years.	10 years of historical operating data and at least 3 years of pre-switch operating data.	4 years of historical field management data.	2-3 years of historical field management data, and 2-3 years of proposed practice change.

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Table 1. Carbon initiatives offering payments per output.

Initiative	Carbon by Indigo	CIBO Carbon Credits	Corteva	ESMC's Eco-Harvest	Nori	Cargill's RegenConnect	Soil and Water Outcomes Fund
Measuring carbon outcomes	Using DayCent model.	Using the Verra's VM0042 Methodology for Improved Agricultural Land Management, v1.0.	Using Indigo's carbon quantification model and soil testing data.	Using Regrow's soil carbon DeNitrification-DeComposition (DNDC) model.	Using COMET-Farm model (GGIT) by Soil Metrics. Soil testing is optional at extra cost.	By Regrow using data from remote sensing and the DNDC (DeNitrification-DeComposition) model.	Using COMET-Farm model, Nutrient Tracking Tool and soil and water testing.
Monitoring, Verifying, and Reporting	Third-party verification: random site visits and evidence checks, registry-approved methodology.	Verification by Verra.	Verification by Climate Action Reserve.	Annual data reported by producer and/ or Advisor and/ or imported from other third party data collection systems by the end of the year. Third-party verification: remote sensing and site visits to small subset of randomly selected producers.	Third-party verification with extra cost at least every 3 years and in year 10.	Monitoring and Verifying by Regrow using field data and OpTIS remote sensing.	Verification by Soil and Water Outcomes Fund: yearly field visits, remote sensing.
Carbon registry	Carbon credits are independently issued by Verra and Climate Action Reserve.	Carbon credits are independently issued by Verra.	Carbon credits are issued by the Climate Action Reserve.	Own registry.	Own registry.	Not specified.	Own registry.
Assurance of carbon sequestration permanence	Credit buffer pool with the registry.	Not specified.	Not specified.	Not specified.	The practices are committed for 10 years. Nori will use tokens held in reserve to purchase new Nori Carbon Removal Tonnes (NRTs) on behalf of the buyer in the amount of any over-reported NRT numbers or leakage from changed practices.	Not specified.	Not specified.

Table 1. Carbon initiatives offering payments per output.

Initiative	Carbon by Indigo	CIBO Carbon Credits	Corteva	ESMC's Eco-Harvest	Nori	Cargill's RegenConnect	Soil and Water Outcomes Fund
Breach of contract	Payment paused until soil carbon returns to previous level.	Farmers stop generating credits in the interrupted farm for the year.	Temporary breach: reduced carbon crediting resulting in lower payments. Permanent breach: farmers will not receive any unvested payments.	Soil carbon gains must be realized before additional credit issuance or payment.	Temporary breach: farmer commits to make best effort to retain carbon stocks, not liable for <i>force majeure</i> carbon losses. Sustained breach: the contract is invalidated, subject to dispute resolution by arbitration.	Temporary breach: risk management strategy employed to account for the limited number of such instances. Details disclosed in program agreements.	Farmer would not receive payment.
Other information	Fields must have been used in agricultural production for at least the past 10 years.	CIBO Technologies partnered with Bushel.	None.	None.	Implementation of conservation practices at least 10 years is required to generate carbon credits.	Participant must be a current or future Cargill grain customer and have a Cargill account number. Cargill's RegenConnect is a partnership with Regrow platform.	Soil and Water Outcomes Fund is a partnership of AgOutcomes (a subsidiary of the Iowa Soybean Association) and ReHarvest Partners (a subsidiary of Quantified Ventures).
Enrollment period	Before May 1 for spring/summer crop.	Anytime.	Anytime.	Anytime.	Anytime.	March - September 15.	Around the start of the calendar year until all acre limits have been reached.
Market launch date	June 2019.	2022.	2021.	May 2022.	September 2019.	2022.	2020.
Website	carbon.indigoag.com/ www.indigoag.com/carbon	www.cibotechnologies.com/getcarbon/	www.corteva.us/products-and-solutions/digital-solutions/carbon.html	ecosystemservicesmarket.org/eco-harvest/	nori.com/	www.cargillag.com/grow-with-cargill/RegenConnect	theoutcomesfund.com/

The information reported in Tables 1-3 was gathered through Fall 2023, interested producers should carefully research initiatives before signing a contract as initiatives continue to evolve.

Table 2. Carbon initiatives offering payments per practice.

Initiative	ADM's re:generations	Bayer Carbon	CarbonNow	Indigo Ag: Market+ Source	PepsiCo-PCM	Truterra's 2023 Nitrogen Management Incentive	Truterra's 2023 Supply Shed Benefits
Carbon farming practices allowed	Varies by states and programs. Generally: cover crops; no-till; strip-till; nitrogen management; and living roots.	No-till, strip-till, and cover crops.	The use of Locus AG's soil probiotics, with at least reduced tillage.	Sustainable farming practices, such as cover crops, minimal or no-till, fertilizer management, and other crop-specific management practices.	Cover crops; no-till or strip-till; and MRTN/10% nitrogen reduction.	The reduction of applied nitrogen by 20 lbs. per acre and/or the addition of an eligible enhanced efficiency fertilizer including (i) nitrification inhibitors (nitrapyrin, pronitridne, DCD); (ii) Urease inhibitors (NBPT, NPPT, Duromide); (iii) Combination nitrification + urease inhibitors; and (iv) Polymers and/or sulfur-coated urea.	Tillage reduction and/or cover crops.
Qualifying practices (additionality)	New or existing practices.	New or recent adoption.	New adoption.	Varies by programs.	New practices.	New practices.	New or existing practices.
Eligible crops	Corn, soybeans, wheat, canola, and peanuts.	Corn and soybeans (intermittent rotation with wheat).	Corn, wheat/cereals, cotton, soybeans, and alfalfa.	Corn, soybeans, wheat, cotton, and rice.	Corn and soybeans.	Corn.	Corn.
Regional coverage	18 states: AL, FL, GA, IL, IN, IA, KS, MI, MN, MO, MS, NE, NC, ND, OH, OK, SC, WA.	16 states: AL, AR, IL, IN, IA, KS, KY, LA, MI, MN, MS, MO, NE, OH, TN, WI.	US cropland.	19 states: AL, AR, GA, IL, IN, IA, KS, KY, LA, MN, MS, NC, ND, NE, OH, OK, SC, TN, TX.	IL, KY, and NE.	IL.	IN.
Farm area limitations	None.	Minimum 10 acres per field.	Minimum 500 acres.	Not specified.	Not specified.	Not specified.	Not specified.
Contract length	1 year.	10 initial years (minus any years for which the farmer receives payment for historical practices), plus an additional 10-year retention period.	4 years, with the option to increase compensation by extending to 10 years or more.	Single-season contract.	1 year.	1 year.	1 year.
Type of payment	Cash.	Cash.	Cash.	Cash.	Cash.	Cash.	Cash.
Target environmental service	Carbon Insets.	Carbon offsets.	Carbon offsets.	Carbon insets.	Carbon insets.	Carbon offsets and insets.	Carbon offsets and insets.

The information reported in Tables 1-3 was gathered through Fall 2023, interested producers should carefully research initiatives before signing a contract as initiatives continue to evolve.

Table 2. Carbon initiatives offering payments per practice.

Initiative	ADM's re:generations	Bayer Carbon	CarbonNow	Indigo Ag: Market+ Source	PepsiCo-PCM	Truterra's 2023 Nitrogen Management Incentive	Truterra's 2023 Supply Shed Benefits
Payment structure	Payment rates vary by programs, practices, and states (1) Climate-Smart Commodities Payment: \$25 per acre per year for new cover crops in fields not enrolled in any federally funded programs (producers must provide FSA documents to share with USDA) (2) Standard Practice Payment: \$10 per acre per year for new cover crops in fields enrolled in federally funded programs (3) Additional Wheat Payment: \$2 per acre per year for no-till or strip-till and \$5 per acre for nitrogen balance in wheat fields. Producers receive payments upon verification in May.	Producers receive up to \$6 per acre per year for no-till/strip-till, or cover crops, and up to \$12 per acre per year both. Payment is paid annually upon practice verification in fall.	Guaranteed payments of \$9 per acre per year and \$3 per acre per year after soil sampling and at year-end after data collection, respectively. Performance bonus paid based on carbon sequestration data from soil testing after validation.	A price premium is paid after crop delivery.	Producers receive payment after the verification in spring. Payment rates are as follows: <i>Cover crops</i> - \$15 per acre per year (years 1 & 2: one before corn and one before soybeans), \$10 per acre per year (year 3+); <i>No-till/Strip-till</i> - \$10 per acre (years 1 & 2), \$5 per acre (year 3+); <i>Nitrogen reduction</i> - \$10 per acre per year (year 1 only); <i>Cover crops + no-till/strip-till</i> - \$20 per acre per year (years 1 & 2), \$15 per acre per year (year 3+); <i>No-till/strip-till + nitrogen reduction</i> - \$15 per acre per year (years 1 & 2); <i>All 3 eligible practices</i> - \$25 per acre per year (years 1 & 2), \$15 per acre per year (year 3+).	Producers receive \$10 per acre per year upon verification of field management data.	Producers receive \$5 per acre per year upon verification of field management data.
Look-back payment for past practices	One-time payment of \$15 per acre for cover crop implemented in 2018-2022 that did not receive payments from EQIP/CSP/RCP (producers must provide USDA FSA documents).	One-time payment of up to \$6 per acre per year per practice for continuously adopted eligible practices on or after October 2020.	None.	Varies by programs.	None.	None.	None.
Stacking	Allowed for cost-share from public programs only, but will receive a lower rate.	Allowed for all types of cost-share from public programs, and for private ecosystem payments other than carbon.	Allowed for cost-share from public programs only.	Not allowed.	Allowed for cost-share from public programs only.	Not allowed.	Not allowed.

The information reported in Tables 1-3 was gathered through Fall 2023, interested producers should carefully research initiatives before signing a contract as initiatives continue to evolve.

Table 2. Carbon initiatives offering payments per practice.

Initiative	ADM's re:generations	Bayer Carbon	CarbonNow	Indigo Ag: Market+ Source	PepsiCo-PCM	Truterra's 2023 Nitrogen Management Incentive	Truterra's 2023 Supply Shed Benefits
Agronomic assistance	Free.	Free.	Free.	Free.	Not specified.	Not specified.	Not specified.
Historical data to be shared with Initiative	8 years of satellite imagery used to build history of practices.	3 years of historical agronomic data.	3-5 years of historical field management data.	None.	3 years of historical field management data.	3 years of historical field management data.	Full rotation baseline data may be required.
Measuring carbon outcomes	Not applicable.	Not applicable.	Soil organic carbon (SOC) and Bulk Density (BD) tests are taken every year.	Not applicable.	Not applicable.	Not applicable..	Not applicable.
Monitoring, Verifying, and Reporting	Verification through remote sensing and other tools. FBN will assist producers in the process of gathering field-level data.	Verification by OpTIS and soil samples every 5 years.	Third-party verification.	Not specified.	Not specified.	Not specified.	Not specified.
Carbon registry	Not applicable.	Carbon offsets issued by Nori, but farmers do not own the offsets or the Nori Carbon Removal Tonnes (NRTs).	Carbon credits will be issued by Verra, but farmers do not own credits.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Assurance of carbon sequestration permanence	Not specified.	10-year retention period.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.
Breach of contract	Producers will not receive payment if the practice is not done.	Temporary breach evaluated on a case-by-case basis. No penalty for leaving the program, but farmer can lose end-of-contract bonus.	Not specified.	Producers will not receive agreed premium.	Not specified.	Not specified.	Not specified.

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Table 2. Carbon initiatives offering payments per practice.

Initiative	ADM's re:generations	Bayer Carbon	CarbonNow	Indigo Ag: Market+ Source	PepsiCo-PCM	Truterra's 2023 Nitrogen Management Incentive	Truterra's 2023 Supply Shed Benefits
Other information	ADM's re:generations is a partner with FBN, and is a part of the Commodities for Climate-Smart Partnerships. USDA also funds some of these practices through ADM. Re:generations currently offers three types of payments for crop producers: (i) Climate-Smart Commodities; (ii) Standard Practice; and (iii) Additional Wheat. Not all payments are available in each state. A small subset of farmers will be randomly selected and compensated \$1,000 for on site verification of practices.	Bayer partnered with Nori to sell carbon offsets generated from the program.	Locus AG partnered with Anew Climate, LLC ("Anew", formerly Bluesource). Carbon credits generated will be sold via Anew's network of global buyers. Funding for the upfront payments was provided by Green Star Royalties Ltd.	This initiative consists of multiple programs. Producers must contact Indigo to learn about the locally available programs.	Carbon insets generated in this program are claimed by PepsiCo.	None.	None.
Enrollment period	Until November 17, 2023.	By the end of the calendar year.	Spring deadline is February 15. Fall deadline is August 15.	Anytime.	Summer.	August 1 - November 1, 2023.	August 8 - November 1, 2023.
Market launch date	2022.	2020.	2021.	2021.	2022.	2023.	2023.
Website	admadvantage.com/regen/	bayerforground.com/farmers/carbon-initiative	locusag.com/carbonnow/	www.indigoag.com/marketplus/for-agribusinesses	www.precisionconservation.org/new-pepsico-incentive-payment-program/	www.truterraag.com/enroll	www.truterraag.com/enroll

The information reported in Tables 1-3 was gathered through Fall 2023, interested producers should carefully research initiatives before signing a contract as initiatives continue to evolve.

Table 3. Carbon initiatives offering mixed payments.

Initiative	Agoro Carbon	CIBO Carbon Bridge	Nutrien's Sustainable Nitrogen Outcomes
Carbon farming practices allowed	Row crops: tillage management; cover crops; and nitrogen management. Pasture and range: grazing management; biodiversity; and nitrogen management.	Cover crop; no-till; reduced till.	At least 5% nitrogen application reduction and/or use of a nitrogen inhibitor.
Qualifying practices (additionality)	New practices and enhancement.	New practices.	New practices.
Eligible crops	Row crop, range, and pasture.	Corn and soybeans.	Corn, cotton, wheat, tomatoes, sorghum, and barley.
Regional coverage	Continental states of the US.	All US cropland.	Selected counties in the US.
Farm area limitations	Minimum 500 acres.	None.	None.
Contract length	10 years.	10 years with an option to opt out starting in Year 4.	1 year, with annual re-enrollment for up to 10 years.
Type of payment	Cash.	Cash.	Cash.
Target environmental service	Carbon offsets.	Carbon offsets and insets.	Carbon offsets.
Payment structure	Producers receive up to 80% of carbon offset value from soil carbon sequestration with two options of payment schedules: Option A: Two payments after verification/issuance in years 5 and 11 with floor prices of \$18 per metric ton of carbon dioxide equivalent (mtCO ₂ e) in year 5 and \$20 per mtCO ₂ e in year 11. Option B: Annual pre-payments in early years netted against issued offsets paid in years 5 and 11 with floor prices of \$16.50 per mtCO ₂ e in year 5 and \$20 per mtCO ₂ e in year 11. Producers receive \$0.05 per lbs per acre per year of Nitrogen reduced and \$2.50 per acre per year for utilizing one of the 4Rs of nutrient stewardship.	Producers receive up to \$35 per acre in year 1 for cover crops and no-till, up to \$25 per acre in year 2, up to \$15 per acre in year 3, and up to \$10 per acre in year 4. Starting year 5, producers receive 80% of carbon offset value sold in the CIBO Impact marketplace. For carbon insets, no information is specified.	Producers receive \$1.50 per acre per year for reducing nitrogen application by at least 5% with an additional \$25 per metric ton of carbon dioxide equivalent (mtCO ₂ e). Additional incentives are available by using qualifying Loveland Products in selected areas.
Look-back payment for past practices	None.	None, but early adopters may be eligible for one-time payment via CIBO Certified Regenerative Grain program.	None.
Stacking	Not allowed.	Stacking across private and government programs is allowed, but the same field cannot be enrolled in other programs that pay for carbon removal and retention.	Not specified.
Agronomic assistance	Free.	Free.	Free.
Historical data to be shared with Initiative	3 years of historical field management data.	Historical data of farm practices are collected using remote sensing. Producers only need to review and edit/confirm them.	3 years of historical field management data.
Measuring carbon outcomes	Using Verra's VM0042 (Methodology for Improved Agricultural Land Management) and soil sampling data.	Using remote sensing, soil sampling, advanced algorithm, neural networks and AI based on field management data.	Using undisclosed model and data from water and soil samplings.

Table 3. Carbon initiatives offering mixed payments.

Initiative	Agoro Carbon	CIBO Carbon Bridge	Nutrien's Sustainable Nitrogen Outcomes
Monitoring, Verifying, and Reporting	Verification by Verra.	Verification by satellite data and Verra.	Third-party verification, likely by the Climate Action Reserve.
Carbon registry	Carbon offsets issued by Verra.	Not specified, likely Verra.	Carbon offsets likely issued by the Climate Action Reserve, but assigned to Nutrien.
Assurance of carbon sequestration permanence	20% non-tradable offsets kept by the Registry in buffer pool as insurance.	Not specified.	Not specified.
Breach of contract	Temporary breach due to weather factors results in delay in annual payment. Permanent breach triggers repayment obligation of cumulative carbon payments by producers.	No payment for ungrown cover crops for the year.	None.
Other information	Enrolled fields must have been in crop production for at least 3 years. Agoro is an initiative of Yara International.	CIBO Technologies partnered with Bushel.	None.
Enrollment period	Anytime.	Anytime.	Until May 31.
Market launch date	2021.	2022.	2022.
Website	www.agorocarbonalliance.com/	www.cibotechnologies.com/getcarbon/	info.nutrienagsolutions.com/sno

The information reported in Tables 1-3 was gathered through Fall 2023, interested producers should carefully research initiatives before signing a contract as initiatives continue to evolve.

For flowcharts showing the direction data, payments, methods, and carbon credits move within select carbon programs, see AgDM File A1-77, [How do Data and Payments Flow through Ag Carbon Programs?](https://go.iastate.edu/AGDMA177), <https://go.iastate.edu/AGDMA177>.

To evaluate the net returns to a carbon farming contract, for various states, see AgDM File A1-78, [Net Returns to Carbon Farming](https://go.iastate.edu/AGDMA178), <https://go.iastate.edu/AGDMA178>.

Additional resources on Carbon Markets can be found on the [Ag Decision Maker webpage](https://go.iastate.edu/AGDMCARBON), <https://go.iastate.edu/AGDMCARBON>.

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