AG ECOSYSTEM CREDIT MARKETS

What Growers Should Know

Note: Information provided in this presentation may not cover everything on the development of agriculture ecosystem credit markets. These are still in development, changing regularly and are often proprietary.

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BACKGROUND

• These are voluntary, incentive-based national markets designed to sell agriculture ecosystem asset credits.
• Farmers who want to earn money selling credits on these new markets opt into data monitoring and measurement.
• Payments are typically based on outcomes such as increases in soil carbon or improved water quality or practice.
• Need to certify, quantify, and verify these outcomes into credits.
SOME CONSERVATION PRACTICES

- Conservation Cover
- Cover Crops
- Crop Rotation
- Livestock Rotation
- No-till/ Strip-till

- Anaerobic Digesters
- Nutrient Management
- Buffer Strips
- Tree/Shrub Establishment
SUSTAINABILITY MARKETS’ REVENUE POTENTIAL

Changes to Crop Systems Could Generate Additional Revenue

- Producer Enrollment
- NRCS practices
- Data monitoring/measurement
- Long-term contract

Quantified, Verified Assets:
- Soil Carbon
- Water Quality
- Nutrients
- Net GHGs
- Water Quantity
- Etc.

Growers Paid for Credits

Credit Buyers:
- Meeting sustainability commitments
- Compliance standards

Source: Farm Bureau Compilation
WHAT

• Agricultural Asset Credits Generated:
  • Carbon(CO2) – the most common greenhouse gas & most common market platform
  • Greenhouse Gases
  • Water Quality
  • Water Quantity
  • Nutrients
  • Etc.

• Credits purchased by:
  • Corporations
  • Agribusinesses
  • Governments

• Credits applied in the form of:
  • Input discounts
  • Cash payment
WHO AND WHEN

• Public
  • Growing Climate Solutions Act
  • Food & Ag Climate Alliance has proposed Carbon Bank run through USDA Commodity Credit Corporation - November 2020

• “Programs”
  • Nutrien – 2021
  • Land O’Lakes (Truterra)
  • Corteva (Granular)
  • GROWMARK
  • Soil and Water Outcomes Fund
  • Others – AFT, EDF, TNC, WWF

• “Market- Operators”/ Providers
  • Non-Profit
    • Ecosystem Services Market Consortium (ESMC) – 2022

• Private
  • Indigo – June 2019
  • Nori – Sept. 2019
  • Farmers Business Network (Gradable) – Sept. 2020
  • Bayer Crop Science – Mid 2020
## How Some Leading Carbon Markets Compare

<table>
<thead>
<tr>
<th>Market Launch Date</th>
<th>Acreage Enrollment Minimum</th>
<th>Per-Acre Cash Payment to Farmers</th>
<th>What Do Your Contracts Require Farmers to Do?</th>
<th>What Are the Terms?</th>
</tr>
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<tbody>
<tr>
<td>BAYER</td>
<td>2020</td>
<td>10 acres</td>
<td>The contract period is 10 years and includes cropland or rangeland.</td>
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<td>There is no contractual volume for producers; the producers’ outcomes are calculated annually over the course of a 10-year crediting period, which can be renewed to a maximum of 20 years.</td>
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<td>Producers are required to plant corn or soybeans, have an active FieldView Plus account and agree to share the data needed for the program.</td>
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<tr>
<td>ESMC</td>
<td>Fall of 2022</td>
<td>No minimum</td>
<td>Producers share information with Gradable on their crop production practices (including planting, fertilizer applications, tillage and harvest), which is processed with artificial intelligence that leverages 2.6 million acre-years of farm data from FNIS. Gradelable validates and certifies the practices into a single farm-level score, which allows farms to be rewarded for practices without having to share detailed practice information with buyers.</td>
<td>Producers dictate their own participation in Indigo Carbon and may choose to pilot on a handful or all of their fields in the first year. Growers can continue to enroll more eligible fields in subsequent years if they qualify.</td>
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<td>Producers must register and enter required information for asset or credit generation, and certify information entered is accurate.</td>
<td>To be eligible for the program, a grower must contract at least one eligible crop field, hold exclusive operating rights to their land, have not cleared the land in the past 10 years and not receive payments for the land through another carbon credit program.</td>
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<td>Producers must show ownership of the assets to be generated to sell them into the market.</td>
<td>Producers must commit to making at least one practice change on each enrolled field. There is no cap on the number of acres growers can enroll.</td>
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<td>No enrollment fee or requirement to purchase ag products.</td>
<td>Producers must submit three to five years of historical data depending on crop rotation as well as current season details about planting and harvest dates, tillage and fertilizer applications. When applicable, farmers must provide information on cover crops, organic amendments, irrigation and grazing.</td>
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<td>Implementing conservation could have associated costs. Producers might be responsible for practice implementation costs and expenses such as soil carbon testing.</td>
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</tbody>
</table>

**More Information**

- Bayer: BayerCarbon.com
- EcosystemServiceMarket.org
- Gradable.com
- IndigoAg.com/for-growers
- Nori.com
- Nutrien.com

To learn more about the tools, incentives and points of differentiation among these carbon markets, visit: AgWeb.com/carbon-markets
WHERE

• Nori
  • Pilot farms being used to gather cropping data and engaging with them to improve the Nori cropping soil carbon methodology to generate credits.

• Bayer
  • Indiana, Illinois, Iowa, Kansas, Wisconsin, North Dakota, South Dakota, Nebraska, Minnesota, Missouri, Michigan, Ohio, Arkansas, Mississippi, Louisiana, Maryland, and Delaware

• Indigo
  • Arkansas, Colorado, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, and Texas

• Nutrien
  • Pilot projects targeted in Illinois, Chesapeake Bay and Ohio

• ESMC
  • Protocol Adaptations Based on USDA Land Resource Regions and Crop Management Zones
  • Pilot Projects:
    • Pacific Northwest- Oregon
    • Great Lakes – Minnesota
    • Soy and Corn Belt – Missouri, Illinois, Iowa, Ohio, Kansas (still planning)
    • Southern Great Plains – Nebraska, Kansas, Texas
    • California/Western Region- in need of projects
    • Corteva - Illinois, Indiana and Iowa
WHY

• Promote healthy soils
• Maintain ecosystem functions
• Efforts in managing GHG emissions
  • Reduce new emissions
  • Remove past emissions
• Create impacts that benefit society
  • Improved water quality
  • Water use conservation
  • Biodiversity
  • Pollinator and wildlife habitat
• Diversified revenue streams
HOW

• Developing protocols for enrolled working agricultural lands that are reviewed and certified

• Developing processes to quantify and verify assets being generated

• Conducting pilot projects in major agricultural production systems to test and refine protocols and tools
QUESTIONS FROM GROWERS:

• How do we overcome barriers of entry?
  • Verification
  • Additionality
  • Early-adopters
  • Financial barriers
  • Technical support
  • Education
• How will farmers be paid?
• How will farmer data be protected?

• Who will regulate these?
• How long is a contract?
• What do contract terms actually mean?
• What is my liability/access?
• What’s realistic to expect?
• Who can I trust?
• What about x, y, z?
Sustainability Markets, Part 1: Agricultural Ecosystem Credit Markets – The Primer

Sustainability Markets, Part 2: Common Land-Use Practices Under Consideration for Conservation Adoption

Sustainability Markets, Part 3: Barriers to Participation in Ag Ecosystem Credit Markets

Sustainability Markets, Part 4: Is Carbon a Commodity?

Sustainability Markets, Part 5: Good Business Practices for Farmers Participating in Agriculture Ecosystem Credit Markets
Carbon Markets for US Row Crop Producers: Opportunities and Challenges

Nathan Thompson
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Farmer awareness, engagement, and participation in carbon markets

Are you aware of any opportunities to receive payments for capturing carbon on your farm? 736

Have you actively engaged in discussions regarding receiving payments for capturing carbon on your farm? 465

Have you signed a contract to capture carbon on your farm? 380

Number of Respondents

Source: Purdue University-CME Group Ag Economy Barometer, February, March, and April 2021 Surveys
Why are farmers choosing not to participate in carbon markets?

- Payment Level Offered: 64%
- Legal Liability of Contract Noncompliance: 38%
- Other: 31%
- Skepticism of Carbon Sequestration Viability: 29%
- Previous use of Eligible Practices: 22%
- Receipt of State or Federal Conservation Funding: 0%

Source: Purdue University-CME Group Ag Economy Barometer, March and April 2021 Surveys
### How much will I get paid?

- Price is determined by supply and demand
  - Supply is lagging demand
  - Price and demand may vary with quality of offsets

- Current prices seem to be in the range of $10-$20/MT of carbon
  - In per acre terms, that is probably $5-$10/acres (at 0.5 MT/acre sequestered)
  - $40/acre est’d. cost to switch from conv. till to no-till (Gramig and Widmar, 2018)

Source: Purdue University-CME Group Ag Economy Barometer, March and April 2021 Surveys
What are my contractual obligations to continue the practice?

- Soil carbon sequestration is reversible (impermanent)
  - Example – tillage to eliminate field ruts, weeds, etc.
  - How would carbon contracts handle these situations?

- How long are contracts?
  - 1-20 years
  - Australia's Emissions Reduction Fund – 100-year contracts
    - 25-year contracts available, but at reduced price
Do I qualify if I am already using eligible production practices?

- Generally, no.
  - They are not “additional.”
  - Some opportunities for short “lookback” payments from some firms
  - Typically, less than 5-year “lookback”
Other important questions

- Who pays for verification?
- Can I get paid for carbon stored on leased acres?
- What is government’s role?
Thank you!

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Visit www.purdue.edu/commercialag for a white paper and webinar on carbon markets.