



According to the US Environmental Protection Agency (EPA), ecosystem services markets allow companies, communities and other beneficiaries to pay landowners and managers to *protect, restore or mitigate* for impacts to ecosystems. While many of the practices that offer the greatest ecosystem benefits are typically encouraged via traditional state and federal financial assistance programs, market payments are generated via outcomes verified at the field level and are not necessarily practice-specific. Current active and pilot markets exist for several ecosystem services including carbon sequestration and greenhouse gas (GHG) reductions, water quality and quantity improvements, as well as wetland and habitat creation, among others. This resource focuses on agricultural opportunities for carbon and water quality markets.

What is a carbon offset – According to the [US Government Accountability Office](#), a carbon offset is defined as a measurable reduction of GHG emissions from an activity or project in one location that is used to compensate for emissions occurring elsewhere. Carbon offsets are typically measured in metric tonnes (2,205 pounds) of carbon dioxide equivalent (CO₂e).

What is a water quality credit – The [EPA defines a water quality credit](#) as a unit of pollutant reduction usually measured in pounds equivalent. Credits can be generated by industrial and municipal point sources implementing new treatment technologies or via implementation of management practices that improve water quality above an established baseline. General water quality market information can be found on EPA's [Water Quality Trading Basics and Policy Resources Page](#).

Planning Resources to Assist in Moving from Practices to Outcomes

[COMET-Planner](#) provides general estimates of the GHG impacts of certain NRCS conservation practices. Estimates can be supplied in tonnes of CO₂e reduction potential per acre per year.

American Farmland Trust's (AFT) [CaRPE Tool](#) expands the utility of the data reported by COMET-Planner by integrating cropland and grazing land acreages and data from the 2017 Census of Agriculture. AFT's recent [Combating Climate Change on US Cropland](#) Report highlights an application of this tool along with a summary of the technical capacity of cover cropping and no-till to sequester carbon and reduce GHG emissions.

Additionally, AFT's [Guide to Water Quality, Climate, Social and Economic Outcomes Estimation Tools](#) features 14 outcome estimation tools and two methods.

Note – While this resource list is not intended to be exhaustive or comprehensive, the above referenced project pages and reports provide extensive reference lists that can serve as a great starting point for anyone interested in digging deeper into these topics.

Background on Featured Entities

Bayer Crop Science – Bayer's US Carbon Program pays \$3 per acre for reduced tillage (strip-till or no-till), \$6 per acre for cover crop adoption, and \$9 per acre for adopting both practices, per year, subject to verification and validation. **Bayer's US Carbon Program** is currently available in 17 states including: IN, IL, IA, KS, WI, ND, SD, NE, MN, MO, MI, OH, AR, MS, LA, MD, and DE and looking to expand eligible geographies, crops and practices.

Corteva Agriscience – Corteva leverages Granular Insights to assist farmers in earning an estimated \$5-20 per acre by introducing cover crops and/or reduced tillage. **Corteva's Carbon Initiative** is currently available in Illinois, Indiana, and Iowa with plans to expand to additional states later in 2021 and into 2022.

Nutrien – Nutrien's [Carbon Program](#) is designed to provide incentive payments for climate smart practice implementation or carbon and water outcomes, depending on the pilot. **Nutrien** is currently testing pilot projects across 15 US states and 3 Canadian provinces.

	Bayer	Corteva	Nutrien
Acreage Min/Max	10 acre per field minimum	None	None
Contract Length	10 yr enrollment (minus yrs farmer was paid for historical practices) + additional 10 yr retention of practices; no penalty for leaving the program if written notice is provided 30 days prior to end of current program yr.	10 yr contract, option to opt-out at the end of yr 2. Opt-out option at the end of each year for years 3 – 10.	1 to 3 years, depending on pilot project
New Practice Requirement	New practices adopted within 10 yrs are eligible for payback for up to 5 yrs.	Yes, no look-back period	Yes, no look-back period
Payment Schedule	Payments are made upon practice verification. For practices used in Fall 2021/Spring 2022, payments should be expected in Q4 of 2022.	Payments are made after practices are verified. For practice changes made in Fall 2021/Spring 2022, payments would be made in Spring 2023.	Pilot dependent, but most often at the end of the crop year after practice implementation is verified.
Ability to Enroll Same Fields in Gov't Programs/ Other Markets	Growers can participate in state and federal programs if they do not generate greenhouse gas reduction assets.	Farmers can participate in federal and state conservation programs.	Pilot project dependent – some can overlap, some restrict the acres from participating in other programs at the same time
Outcome Estimation	Soil sampling every 5 years, with carbon sequestration modeled on a yearly basis via external peer-reviewed models	Practice changes are logged in the Granular Insights platform. This data is shared with ESMC, who will quantify farmers' soil carbon storage and certify their credits.	Pilot project dependent – but generally through a combination of modeling and sampling of both water and soil
Practice Verification	Utilizes various methods, including the Climate FieldView platform and Operational Tillage Information System (OpTIS) technologies, plus soil sampling every 5 yrs.	Soil sampling by Corteva, with additional quantification and verification conducted by ESMC.*	Verification of all data is done for all projects by the grower and where needed by Nutrien staff or other partners.
Data Collected on Enrollment	During enrollment, growers share their fields via Climate FieldView and select which practices are used and when they were adopted.	Current crop year + 3 yrs of historical field data, including crop type, nitrogen applications, tillage data, harvest data, and cover cropping data (if applicable).	Field level practice data, soil samples, and field shape files
Penalty for Temporary Break in Practice Implementation	Situations in which one or both selected practices are not implemented due to environmental conditions will be evaluated on a case-by-case basis.	If the weather prevents the use of practice change, a grower will see reduced crediting and thus reduced payments.	Pilot-project dependent
Enrollment Assistance	Customer Success team available to answer questions via carbonprogram@bayer.com or 833-877-7934.	Assistance in navigating program participation (onboarding to payment) provided by Corteva Carbon Sales and Support. Visit Corteva.com/carbon.	Pilot-project dependent
Technical / Agronomic Assistance	Free agronomic support from Bayer agronomists. Cover crop discount and selection available through LaCrosse Seed.	Free agronomic recommendations on practice changes and implementation provided by local Pioneer Seed Agents or other Corteva Advisors.	Free technical assistance from a variety of Nutrien staff.

*ESMC program information is included in Bruner, E. and Brokish, J. (2021) Ecosystem Market Information: Background and Comparison Table [Fact sheet]. Illinois Sustainable Ag Partnership. (Table 1)



Matrix information was provided and vetted by company representatives. Questions regarding this document can be sent to ebruner@farmland.org or jbrokish@farmland.org.

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