



Pricing Carbon in Oregon:

Agricultural Offset Protocols

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AGRICULTURAL OFFSET PROTOCOLS

HIGHLIGHTS

- Several jurisdictions have developed farming and ranching protocols that are potentially applicable within Oregon.
- Eligible protocol activities include cattle herd management, anaerobic digestion of manure, reduced application of nitrogen fertilizer, reduced tillage practices and avoided conversions of grassland.
- Alberta and other jurisdictions have developed the concept of ‘proportional additionality’ to reward early adopters of practices such as no-till.
- Grants and other financial assistance opportunities exist to help ranchers and farmers transition to offset generating practices.

INTRODUCTION

A total of 24 U.S. states and Canadian provinces have participated in the development or implementation of cap and trade programs to reduce greenhouse gas (GHG) emissions and mitigate the impacts of climate change.^{1,2,3} Oregon’s state legislature has considered ‘cap and invest’ bills for the past several sessions, most recently with the Clean Energy Jobs Bill in 2018. Although the bill did not pass, important questions emerged about how a cap and invest program might affect farming practices, costs, and income streams.

Oregon’s working landscape could be described as a mosaic of agricultural and forestry operations. The state is comprised of eight distinct agricultural regions.⁴ The state’s top seven agricultural commodities (in terms of dollar value) are greenhouse and nursery products, cattle and calves, hay, milk, grass seed, potatoes, and wheat;⁵ however, the state Oregon produces more than 220 different commodities.

Within traditional cap and invest style programs, agricultural activities are not regulated under emission caps, but is eligible to generate carbon offsets.

Offsets are generated by activities that reduce emissions or increase carbon sequestration to compensate for the emissions of other entities, generating tradable credits.⁶ A variety of offset programs exist globally and within the U.S. Offset markets can be split into **voluntary** (those which entities can voluntarily enter to offset their emissions) and **compliance** (entities must participate to comply with a regulation, e.g. a pollution cap). The programs and policies may be restricted to specific states, regions, or countries, or can be applied internationally. Offset protocols generally include the following components:

- Activities eligible to generate carbon credits;
- Methods for quantifying GHG sequestration in terms of actual carbon dioxide equivalents (CO₂e);

- How to demonstrate that the activity would not have occurred in the absence of an offset project (additionality); and
- Project monitoring and time commitments.

This issue brief will provide information on agricultural offset protocols being implemented by other governments and programs. Programs and protocols potentially applicable within Oregon agriculture have been highlighted in hopes of broadening the opportunities for farmers and ranchers within any potential carbon pricing legislation in the state.

METHODS

An assessment of Oregon agriculture was conducted using statistics from the Oregon Department of Agriculture, internet-based research, and local knowledge. A survey of literature on existing agricultural carbon offset and incentive programs was then conducted to glean protocols that could be most applicable within Oregon. Assessments of protocol relevance were based on their alignment and applicability to key Oregon agricultural commodities. The literature synthesized was mainly comprised of protocol quantification methods and guidance documents. In addition to this, a survey was conducted to identify potential incentives for actors to adopt offset protocols. Such incentives included additional grants for which offset credit-generating activities would be eligible.

A total of seven different carbon offset programs were included in the survey.

- The Offset Credit System of Alberta, Canada;
- The Compliance Offset Program of California;
- The National Carbon Offset Standard of Australia;
- The American Carbon Registry;
- The United Nations Clean Development Mechanism (followed by European Union markets);
- The Climate Action Reserve; and
- The Verified Carbon Standard

RESULTS

Approximately 44 protocols from the seven above-mentioned offset programs were identified as potentially applicable to Oregon. These protocols are roughly applicable to ranching or farming.

Ranching

Cattle ranching is the second highest grossing agricultural activity in Oregon⁶ and occupies more land area than any other commodity.⁷ Therefore, well-designed protocols that provide opportunities for cattle and livestock operations to generate credits have the potential to be widely adopted across the state. In other offset programs, protocols pertinent to ranching come under three main categories: 1) *the anaerobic digestion of manure for energy*; 2) *adjusting feeding methods to reduce enteric emissions*; and 3) *adopting low-carbon grazing and pasture management practices*. The following is a breakdown of ranching protocols by program:

California has developed a *Livestock Protocol*, which requires projects to install a biogas control system (i.e. an anaerobic digester) to generate offset credits. The digester must capture and convert methane that would otherwise be emitted in its absence.⁸

Alberta also offers credits for the anaerobic decomposition of agricultural materials but interestingly, in addition to methane, the protocol also regulates nitrous oxide and carbon dioxide.⁹ This differs from most offset protocols applying to anaerobic decomposition which generally only regulate methane. This protocol accounts for the fact that biogas use reduces the consumption and extraction of other fuels, such as natural gas. Thus, the protocol considers the indirect reduction in nitrous oxide and carbon dioxide emissions associated with the reduction in fossil fuel use in its calculations.¹⁰ Alberta also has four other protocols relevant to ranching, dairy farms, beef cattle, feeding practices, and selective breeding. Eligible activities under these protocols include:

- Modifying livestock diets to reduce enteric methane emissions; timing manure applications to reduce storage time (stored manure generates methane and nitrous oxide emissions); retaining fewer heifers; and increasing annual milk production per cow (to reduce emissions per unit of milk);¹¹.
- Reducing the harvest age of beef cattle;¹²
- Using feed technologies to improve efficiency;¹³
- Selectively breeding cattle that have a low residual feed intake or have greater feed conversion efficiencies.¹³

Australia has protocols for beef cattle herd management, destroying methane from piggeries and dairy manure using biodigesters or anaerobic ponds, reducing cattle emissions through adding feed supplements, and sequestering soil carbon on grazing land. Eligible activities include:

- Controlling herd movements;
- Providing feed supplements that reduce enteric emissions;
- Culling inefficient cows;
- Installing biodigesters;
- Changing the timing, intensity, stocking rate and duration of grazing to maximize pasture land quality; and
- Converting from agricultural cropping to grazed pasture.¹⁴

Similarly, the American Carbon Registry (ACR) has protocols for recovering methane from animal manure (through anaerobic biodigesters), as well as livestock management and grazing land.^{15,16} Eligible activities for the latter include those that reduce fossil fuel usage, enteric methane emissions, nitrogen fertilizer use, and manure methane emissions, and that increase sequestration in soils associated with grazing land management.¹⁶ In addition, the ACR allows credits to be generated from adding compost to grazing lands. This accounts for the avoided emissions from organic waste ending up in landfills (where it is naturally decomposed by anaerobic microorganisms, releasing methane into the atmosphere).¹⁷ The ACR also provides credits for the avoided conversion of grassland to cropland, for which grazing is allowed (albeit accounting for the added enteric and manure emissions).¹⁸

The Clean Development Mechanism (CDM) has protocols for the installation or modification of anaerobic digestion systems, directing livestock manure from multiple operations to a single treatment plant, and the strategic use of animal feed.¹⁹

The Climate Action Reserve has protocols for the installation and diversion of organic waste to biodigester systems.^{20, 21} Similarly to ACR, the Climate Action Reserve has a protocol for the avoided conversion of grassland to cropland, which can still generate credits while being grazed.²²

The Verified Carbon Standard has a protocol for reductions in emissions through adjusted grazing densities on uncultivated land.²³

Farming

Oregon produces more than 220 agricultural commodities, making it one of the most diverse agricultural landscapes in the country. As of 2016, the most prevalent crops in terms of acres planted were hay, wheat, corn, potatoes, and barley.²⁴ Other major crops include grass for seed, various fruit and nut trees, nursery stock, and grapes. While general protocols related to nutrient management may be applied to these varied systems, new, Oregon-specific protocols may need to be developed to optimize carbon storage and embrace the diversity of Oregon agricultural production. From the seven offset programs surveyed, it was observed that protocols related to farming fell into the categories of reducing nitrous oxide emissions, preserving and increasing soil carbon (mostly through reduced tillage), and avoiding the conversion of natural lands to cropping systems. Protocols related to nitrous oxide emissions appeared to be most common.

Alberta has protocols for low- or no-tillage practices, acknowledging the reduction in emissions from decreased passes with heavy machinery, increased carbon sequestration, and lower nitrous oxide emissions.²⁵ Interestingly, for this protocol producers are not required to provide evidence of ‘before and after’ practices. This is to allow farmers who adopted no-tillage practices prior to carbon pricing to benefit.²⁵ Alberta also has a protocol for reducing nitrous oxide emissions through increasing the efficiency of nitrogen fertilizer application, and for minimizing conditions for nitrogen to persist in soils.²⁶ The protocol encourages the use of a *4R* system (Right source at the Right rate, the Right time, and the Right place) in applying synthetic or organic nitrogen fertilizers.²⁶

California interestingly has not yet developed protocols that would be directly applicable to crop farming in Oregon. The closest protocol pertains to rice cultivation, a crop that is not grown or suited to Oregon’s climate.²⁷ However, California’s cap and trade program does incentivize soil carbon sequestration activities through their *Healthy Soils Program*. This program specifically provides grants for practices that increase soil organic carbon; for converting cropland to herbaceous cover (sequestering carbon in herbaceous perennials); and for establishing woody cover plants.²⁸

Australia has protocols for activities that increase the sequestration of soil carbon.²⁹ Activities eligible to generate credits include optimizing synthetic or organic fertilizer use to increase yields, keeping crop residues on fields, remediating or improving soils, and reducing tillage.²⁹

The ACR also has protocols for reducing nitrous oxide emissions by using best practices related to nitrogen fertilizer similar to those of Australia.³⁰ Such practices refer to both the methods of application as well as the composition of the fertilizer.³⁰

The CDM also has a protocol for reducing nitrous oxide emissions.¹⁹ In this instance, offset activities include the application of ‘soil inoculants’ (a treatment containing beneficial soil microorganisms) to

enhance the nitrogen fixation of legumes (in legume-grass rotation cropping) on acidic cropland soils.¹⁹ This reduces or replaces the need for synthetic nitrogen fertilizer. The use of seeds that are ‘nitrogen-use efficient’ can also generate offsets.¹⁹

The Climate Action Reserve and the Verified Carbon Standard both have similar nitrous oxide emissions protocols to those described above.^{31,23} However, the Verified Carbon Standard also issues credits for practices that increase soil carbon sequestration, reduce soil erosion, and protect soil carbon stocks.²³

Additionality

A crucial element of all offset programs is the concept of *additionality*. This concept refers to carbon stored by activities that would not have happened without some intervention, are additional to business as usual, and are not legally required.³² Table 1 summarizes how different offset programs have developed criteria to demonstrate additionality for eligible practices

Tests for Additionality

(AB = Alberta, CA = California, AUS = Australia, ACR = American Carbon Registry, CDM = Clean Development Mechanism, CAR = Climate Action Reserve, VCS = Verified Carbon Standard)^{33 34 35 36 37}

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TABLE 1. Tests of Additionality.

An activity may not be eligible if...	Offset Programs
The activity is required by law or regulation	AB, CA, AUS, ACR, CAR
Viable alternative activities are required by law	CDM
The activity is supported by other government incentives	AUS
There are alternative technologies that would achieve the same result	AB
The project is a financially attractive investment	AB, CDM, CAR
Adoption of the activity is not affected by public perceptions	AB
Activity does not face institutional or social barriers	ACR
Activity is adopted by more than 40% of the sector	AB
The activity is deemed as common practice in the area / has a high degree of market penetration	CA, ACR, CDM, CAR, VCS
The technology is economically feasible / there are no cost barriers	AB, CA, ACR, VCS
Activity had begun before being registered for offsets	AUS
The activity does not face technological barriers such as lack of trained personnel, R&D deployment risk, or market failure	ACR
The resultant reduction in emissions would have occurred in the absence of the activity	CDM
Activity does not face ‘significant’ barriers to adoption	CDM
It does not result in emission rates that are lower than a determined industry threshold / predetermined baseline performance metric	CAR, VCS

There are two important things to note from the above table. First, within each program, meeting one or more of the criteria does not automatically mean that an activity is additional. A project’s additionality is assessed in terms of satisfying a minimum number of criteria, or a hierarchy of criteria (similar to a decision

tree). Second, most protocols have additionality criteria specific to the type of project in question. For example, Alberta has a unique system for assessing additionality under their no-tillage protocol. Farmers who adopted such practices on or after 2002 may have their projects be considered additional, but may only be credited for incremental emissions reductions made after 2012. In other programs, farmers adopting additional practices prior to the creation of an offsets program are not eligible to generate credits. This is known as “*proportional additionality*” and helps early adopters participate in carbon markets.³⁹

Financial Assistance and Incentives

For many farmers and ranchers, initial costs and delayed benefits may be a significant barrier to transitioning to climate smart practices that have the potential to generate offset credits. In addition, developing and registering offset projects can be expensive and time consuming. Farmers and ranchers in Oregon have access to a number of state and federal financial assistance programs, mostly in the form of grants and cost-share programs, that have the potential to defray the up-front costs of employing carbon sequestering practices. It should be noted that farmers would only be able to yield benefits from both financial assistance and offset credits if an activity would still be considered additional despite receiving funding from such programs. Australia’s offset program specifically prohibits this. Table 2 depicts a sample of incentives found within Oregon.

TABLE 2. Agriculture Conservation Incentives.

Incentive/ Assistance	Description
Environmental Quality Incentives Program (EQIP)	<ul style="list-style-type: none"> ● Administered by the Natural Resources Conservation Service (NRCS). ● Provides financial assistance for farmers to implement practices improving animal, plant, water, soil and other natural resources on agricultural or private forested land. ● Contracts are up to 10 years in duration, and payments are made after EQIP activities are implemented.⁴⁰
Conservation Stewardship Program	<ul style="list-style-type: none"> ● Administered by NRCS. ● Makes minimum payments of \$1,500 per year. ● Includes support for crop growers and forest managers. Supported activities may improve natural resources, biodiversity and buffers, pest management, soil, water, and wildlife.⁴¹
The Energy Trust of Oregon	<ul style="list-style-type: none"> ● A nonprofit organization. ● Supports clean energy projects, specifically dairies and farms converting manure to biogas.

	<ul style="list-style-type: none"> • The project development assistance provided by the trust includes feasibility studies, design, permitting, grant writing assistance, construction management, and utility interconnection. • Also can cover up to 50% of costs related to hiring external consultants for professional assistance, the upper limit being \$200,000. • The level of incentive provided is calculated based on the comparison of the project's cost to the produced energy's market value. It is possible that such market values may be enhanced by credits. • In return for funding, the trust will retain a proportion of the project's generated Renewable Energy Certificates.⁴²
<p>Rural Energy for America Program (REAP) Renewable Energy Systems and Energy Efficiency Improvement Loans and Grants in Oregon</p>	<ul style="list-style-type: none"> • Offers grant funds and loans to farmers for renewable energy systems and improvements in energy efficiency. • Funds may be used for the installation of renewable energy systems on site, specifically including biomass systems such as anaerobic digesters, solid fuels, ethanol, and biodiesel. • Grants fund up to 25% of project costs, loans can fund up to 75% of project costs. • Loans can be between \$5,000 and \$25 million.⁴³
<p>Conservation Innovation Grants</p>	<ul style="list-style-type: none"> • Administered by NRCS. • To be eligible, projects must use technologies or conservation approaches that are supported by a sufficient number of studies to indicate a probability of success. However, pilot projects and field demonstrations for innovative conservation projects are also supported. • Participants receive more diversified options for compliance with local, state, and federal policies, as well as environmental enhancement. • State CIG grants have a maximum of \$75,000.⁴⁴
<p>Yamhill Soil and Water Conservation District</p>	<ul style="list-style-type: none"> • Provides the free use of no-till drills and mulching services.⁴⁷

Agriculture Capital	<ul style="list-style-type: none"> ● Private entity investing mainly in permanent crops, such as tree nuts, citrus, and blueberries. ● Focus mainly on organics. ● Activities that may be supported include those that improve soil organic matter, cover crops, composting, microbial health, integrated pest management, riparian zones, pollinator habitats, and general preservation of ecosystem functions.⁴⁸
Oregon Agricultural Heritage Program	<ul style="list-style-type: none"> ● Provides matching grants for conservation management plan drafting and implementation, permanent working land conservation easements, and 20-50 year working land conservation covenants.⁴⁹

CONCLUSIONS

There is a wide range of protocols implemented around the world from which to model a program for Oregon agricultural offsets. The majority of protocols appear to be applicable to ranching, for which there is wide variety of eligible credit-generating activities, such as: modifying feeding practices, adjusting harvest age, and using anaerobic digesters. On the farming side, most protocols apply to soil conservation (mainly through no-till practices), avoided conversion, and reducing nitrous oxide emissions as well as sequestering nitrogen in the soil.

While activities must be those that would not have occurred in the absence of an offset program (additionality), early adopters of certain practices need not be excluded. Alberta uses the principle of ‘proportional additionality’ to allow early adopters to earn offset credits from the year of introduction of the protocol. Finally, there are a wide range of grants and financial assistance programs available in Oregon that could help overcome some of the financial and technical barriers to developing agricultural offset projects.

POLICY RECOMMENDATIONS

- Adapt ranching protocols from other programs to Oregon.
- Develop offset protocols specifically geared to Oregon’s unique assemblage of cropping systems. Developing protocols for each individual cropping system may not be practical. Policymakers and protocol developers should focus on high impact mitigation protocols that provide easily measurable carbon gains at minimal cost.
- Back date common practice baselines to allow early adopters to benefit from carbon markets.

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