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Agricultural Carbon Markets: A Case Study of Alberta

Sarah Sellars, Krista Swanson, Gary Schnitkey, and Nick Paulson

Department of Agricultural and Consumer Economics
University of Illinois

Carl Zulauf

Department of Agricultural, Environmental and Development Economics
Ohio State University

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As carbon markets develop in the United States, review of established carbon markets in other countries can help address challenges. We provide a case study of the carbon offset market in Alberta Province, Canada. We specifically examine how their system has dealt with practical issues due to the need for occasional tillage, and development of procedures for when farmland is rented.

Background

Alberta has a different policy environment than the United States due to their cap-and-trade policy and carbon pricing scheme. Still, evaluating the functioning of their carbon offset market in Alberta provides background for how markets may function in the United States. On July 1, 2007, Alberta introduced legislation to regulate emitters of greenhouse gases (GHG) whose emissions exceed 100,000 metric tons of GHG per year. These large emitters were given four options by the government:

1. Increase efficiency,
2. Pay a carbon price set by the province,
3. Purchase offsets from other facilities who emit less GHG than their limit,
4. Pay for emissions reductions in other segments of Alberta's economy, including agriculture.

The last 3 options in effect substitute a payment rather than invest in production technology to reduce GHG. This creates markets which place values on carbon credits or offsets.

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In regard to Option 2, the Alberta provincial government set the price of carbon for 2021 at \$40 CAN (\$32 USD)¹ per credit. The price has increased in 2022 to \$50 CAN (\$40 USD) per credit. The government-set price of carbon becomes an opportunity cost in regard to evaluating Option 4. Purchasing carbon offsets becomes an economically rationale strategy if the offsets can be purchased for less than the government-set carbon price plus other transaction costs.

Carbon offsets can only be created in Alberta by following specific government-approved protocols. There are four protocols that can be used for agriculture: conservation cropping, reducing GHG emissions from fed cattle, distributing generated renewable energy, and anaerobic decomposition of agricultural materials.

Initially, approximately 10 companies aggregated agricultural carbon credits in Alberta. Today three remain, suggesting intense competitive pressures. The three are: Trimble, Farmers Edge, and Radicle (“Agricultural Carbon Offsets – Overview” 2022). According to discussions with one of these aggregators, the aggregator approaches large emitters offering agricultural carbon credits for a price slightly below the government set price for carbon. This is a profit enhancing deal for both parties, as the emitter’s cost is lower than the government set carbon price and the aggregator benefits from increased demand for agricultural carbon offsets.

Conservation Cropping Proposal

Given this institution background, we summarize the most popular protocol, the Conservation Cropping Protocol, and examine three of the questions U.S farmers have regarding carbon markets: farmer payments, land ownership, and tillage (see *farmdoc daily* [April 13, 2021](#)) from the perspective of how Alberta has chosen to address them.

The most popular protocol in Alberta, particularly during the beginning stage of agricultural carbon markets, is the no-till annual cropping protocol, which was later renamed the Conservation Cropping Protocol (Goddard 2021). From 2007 through 2021, the conservation cropping protocol provided an estimated 14 million metric tons of offsets valued at over \$164 million USD² (Goddard 2021). The protocol ended on December 31, 2021 because the adoption threshold was reached (“Agricultural Carbon Offsets – Overview” 2022). Once the practices reached 10 – 40% adoption, the policy suggests that the practice has overcome barriers to adoption so incentives for adoption are no longer required (Goddard 2021).

The Conservation Cropping Protocol quantified greenhouse gas emissions reductions from new carbon stored annually in soil, lower nitrous oxide emissions from soils under no-till, and emissions reductions from using fewer passes per farm field. The protocol used a performance standard baseline methodology where sector level census data from 2006 were used to establish a baseline based on best practices for the sector and known levels of reduced and no-till adoption. By establishing a baseline to quantify annual emissions reductions based on annual, incremental increases in soil carbon adjusted for the 2006 adoption, the Conservation Cropping Protocol allowed all farmers who practiced conservation tillage to enroll, regardless of when the adopted conservation tillage (“Quantification Protocol for Conservation Cropping” 2012). In the U.S., early adopters of practices may or may not be eligible for agricultural carbon market programs. In the U.S, the adoption threshold varies from company to company, with some companies requiring the practice to have been adopted in the last two years and others allowing farmers to enroll if they adopted the practice up to 10 years ago.

Farmer Payment

The money a farmer receives depends on the price the aggregator and emitter negotiate, the subsequent split between the aggregator and the farmer, and the amount of additional carbon the farmer generates. Values on the Alberta government website suggest the typical split between an aggregator and a farmer for a Conservation Cropping protocol is 2/3 for the farmer and 1/3 for the aggregator.

¹ Using the April 8, 2022 conversion rate of 0.80 USD to 1 CAD

² 143 million Euros at the conversion rate of 1.15 USD to 1 Euro taken on February 10, 2022

The typical amount of carbon that is sequestered when using the Conservation Cropping protocol in effect for 2021 is suggested to be between 0.10 and 0.20 metric tons per acre. In an example on the government website, the carbon offset is sold for \$18.17 USD (\$23 CAN) per metric ton. Swallow and Goddard (2013) suggest that as of 2011, at least 5,000 Alberta farmers had carbon offset contracts with aggregator companies. These farmers are 8% of the 62,050 farmers in Alberta counted in the 2011 Canadian Census of Agriculture (Leitch 2018). Swallow and Goddard also estimate that most farm participants earned between CAN\$1000 and CAN\$5000 (\$796 – \$3978 USD),¹ representing around 1% of average gross income of Alberta farms. The Swallow and Goddard study is from 2013, so it is likely this figure could have changed over the last 9 years.

Land Ownership

In the Alberta program, the landowner owns the carbon offset. A land title certificate must be filed for each enrolled field. A farmer is required to obtain the landowner's signature in order to claim the offset and to submit proof of this approval. It is typical for the farmer to claim the offset according to a government website ("Agricultural Carbon Offsets – Overview" 2022). In the U.S., there has been a lot of discussion about who owns the carbon credit and how to prove ownership. Proof of land ownership and landlord's permission requirements may vary from company to company. For example, some companies may require an attestation of right to sell carbon from the landlord while other companies may not require any physical proof.

Tillage

One concern many U.S. farmers have about carbon markets is whether they can till part of their field to address specific issues as they arise. The Conservation Cropping Protocol allows for discretionary tillage operations of up to 10 percent of the project area of a single agricultural field. The area tilled is allowed to change from year-to-year within the field. The discretionary tillage must be documented and the size of the disturbance must be estimated. If the area tilled is found to be greater than or equal to 10 percent of the field area, the field will be disqualified for that year and the payment will be lost ("Quantification Protocol for Conservation Cropping" 2012). A key takeaway is that Alberta is an example of a functioning program that recognizes and permits for special circumstance tillage needs.

Conclusion

As the U.S. carbon market develops, many questions arise about how the market should be regulated and potential problems with the market. Although institutional and policy differences exist between the U.S. and Alberta, Canada, Alberta's functioning carbon market can be useful when thinking about the future of the U.S. agricultural carbon market and addressing challenges. The purpose of this article is to provide a very specific look at an agricultural carbon markets from an informative and comparative standpoint. The article is not suggesting that the U.S. should handle agricultural carbon markets in the same way as Alberta, but is simply bringing attention to Alberta's agricultural carbon markets. Also, this article is not mean to serve as an endorsement of agricultural carbon markets and does not provide perspective or discussion on some of the broader topics and issues related to agricultural carbon markets.

References

"Agricultural Carbon Offsets – Overview." 2022. Government of Alberta, <https://www.alberta.ca/agricultural-carbon-offsets-overview.aspx>

Goddard, T. 2021. "Climate-Change Policy for Agriculture Offsets in Alberta, Canada." In D. Dent and B. Boincean, *Regenerative Agriculture: What's Missing? What Do We Still Need to Know?* Switzerland: Springer, pp. 95–104. https://link.springer.com/chapter/10.1007/978-3-030-72224-1_8

Leitch, A. 2018. "Census of Agriculture Provincial Profiles." Government of Alberta, <https://open.alberta.ca/dataset/ff36cf63-9526-469b-acec-553c57ca6579/resource/ac8cdb5f-94c9-4c80-9623-0410f41eca5a/download/alberta-farm-and-farm-operator-report.pdf>

¹ Using the April 8, 2022 conversion rate of 0.80 USD to 1 CAD

"Quantification Protocol for Conservation Cropping." 2012. Government of Alberta,
<https://open.alberta.ca/dataset/b99725e1-5d2a-4427-baa8-14b9ec6c6a24/resource/db11dd55-ce34-4472-9b8b-cb3b30214803/download/6744004-2012-quantification-protocol-conservation-cropping-april-2012-version-1.0-2012-04-02.pdf>

Sellars, S., G. Schnitkey, C. Zulauf, K. Swanson and N. Paulson. "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, 2021.

Swallow, B.M. and T.W. Goddard. 2013. "Value Chains for Bio-Carbon Sequestration Services: Lessons from Contrasting Cases in Canada, Kenya, and Mozambique." *Land Use Policy* 31:81–89.
<https://www.sciencedirect.com/science/article/abs/pii/S0264837712000154>