

ALBERTA: NORTH AMERICA'S FIRST COMPLIANCE OFFSET CARBON MARKET.

Tom Goddard¹
Karen Haugen-Kozyra²
Andy Ridge³

¹Alberta Agriculture and Rural Development, #300, 7000-113 St, Edmonton, Alberta, Canada
T6H 5T6 Tom.Goddard@gov.ab.ca

²Climate Change Central, Edmonton

³Alberta Environment, Edmonton

INTRODUCTION

World interest in reducing greenhouse gas emissions is increasing. The World Bank estimated the 2007 global carbon market at \$64 B USD, double the value from a year earlier and a six fold increase from 2005 (Capoor and Ambrosi 2008). Most of that value is from the European market. Where companies desire to reduce emissions but cannot, they may purchase offset credits from someone else who is able to reduce their emissions or sequester carbon. Alberta has created the first compliance carbon offset system in North America (Alberta Environment 2007a).

ALBERTA'S EMISSIONS

Alberta has the highest greenhouse gas (GHG) emissions of any province in Canada (235 Mt CO₂e in 2006) and it is projected to increase to 305 CO₂e Mt by 2020 (Alberta Environment 2007b). Alberta has 10% of the national population but a vibrant resource extraction industry and coal combustion electrical generation result in the province comprising 33% of the total national inventory of GHGs (Environment Canada, 200x).

On a national basis, agriculture produces 7% of Canada's greenhouse gas emissions (Environment Canada, 2008). Agriculture in Alberta produces 31% of the national agriculture emissions due to the size of the agriculture industry. Alberta has nearly one third of the agriculture land in Canada and more than half the national beef cow herd.

The 2002 Alberta Climate Change Emissions Management Act (CCEMA) required companies of a certain size (100 kt of total GHGs) to record and file statements of annual GHG emissions. Alberta had a total of 115 Mt of 2006 greenhouse gas emissions recorded under the auspices of the Specified Gas Reporting Regulation (Alberta Environment 2007b). These are emissions from industries that fall above the threshold 100kt whereas the previous national numbers include all sources of emissions. Nearly half of the total industrial emissions are from power companies and one third are from oil and gas. Fourteen percent of the total emissions are classed as "other" which includes refining, cement, forest products and fertilizer industries. The combined total emissions of fertilizer plants were 4.5 Mt of CO₂e but they were responsible for nearly half of the total N₂O emissions. The top 30 companies are responsible for 87% of the total 2006 emissions.

ENABLING LEGISLATION AND POLICY

Alberta was the first province in Canada with a climate change action plan in 2002. As part of that legislation, regulations were introduced that required industries with emissions (CO₂e) greater than 100kt per year to report their emissions on an annual basis starting in 2003.

Alberta chose an emission intensity basis for reporting emissions and their required reductions. Emission intensity is a more economically friendly way of reducing emissions than absolute caps. Companies are motivated to become more energy efficient in their production as well as cutting GHG emissions. Absolute caps tend to limit or reduce economic activity (companies fold or move). Alberta believes that implementation of new technologies will reduce emissions in the long term. In the meantime, market based instruments such as offset credit trading has a role to play as we move toward the longer-term goal.

In early 2007 the Climate Change Emissions Management Act was amended to require companies with an emission intensity of more than 100 kt CO₂e per year to reduce their emissions by 12% from their baseline (an average of 2003-2005 emissions). Newly constructed facilities (past 2000) have a three year grace period due to the fact that they will have installed the newest technology and in order to create a baseline (Alberta Environment 2007).

Just over 100 companies qualify in the “over 100,000 tonne club”. Under the Act they have three options to handle emissions that exceed their reduction target (eg. they did not achieve their 12% reduction in a particular year).

1. Emission Performance Credits. Obtain performance credits (buy, trade, etc) from other regulated companies that have reduced their emissions more than needed.
2. Technology Fund Credits. Pay into the Climate Change and Emissions Management Fund at a set price of C\$15/tonne CO₂e. Funds collected are to be used to develop or invest in Alberta based technologies, programs, and other priority areas.
3. Emission Offsets. Companies may offset their emissions by purchasing emission reduction offsets. It is voluntary (eg. they could choose options 1 or 2 above) however, the offsets must be from Alberta and must be approved offsets (approved quantification protocols by Alberta Environment).

Companies account for their emissions on a calendar year and have until the end of the following March to reconcile their account. Since the Act was amended in the spring, the 2007 year started on July 1st so companies only have half a year to account for currently. Alberta Environment estimates that if all companies paid their current emission intensity liability into the Tech Fund it would amount to about \$177 M on an annual basis. At \$15 per tonne that works out to about 12 Mt of liability. Therefore, there will not be enough offset credits to satisfy the demand.

KEY ENABLERS

The science of coefficients and measures or the generation of policy are by themselves, not enough. Two key entities have helped in protocol development, setting up market standards and infrastructure and, enabled the market to function. They are Climate Change Central, a non-

government organization (NGO) created in 2000 to enable climate change programming across all sectors in Alberta. The second is the various aggregator companies that deliver the offsets to market.

Climate Change Central (C3) is a partnering with the Alberta Government to develop the needed tools and infrastructure to help Albertans generate offsets. C3 provides a meeting ground for market regulators, protocol developers and aggregators. The private sector is encouraged to develop draft protocols in Alberta and C3 coordinates an open, transparent technical and stakeholder review process on behalf of the Alberta government. Further, C3 runs the project-based registry where project developers can register their projects, post their reports and verification statements and serialize their tonnes of carbon offsets. This ensures transparency, no double accounting and confidence to buyers that the proper oversight on the creation of the offsets has occurred.

Aggregators are companies that create offset magnitudes of a size that interest the buyers. Individual farms do not have sufficient volumes of carbon offsets to interest the larger industrial buyers. Enabling characteristics of aggregators include:

- May have staff that can review protocols in the final stages of development.
- Create interest amongst the offset suppliers (farmers)
- Explain protocols and requirements to clients.
- Provide data support to clients.
- Create a quality aggregation that withstands third party verifications.
- Allows farms with small amounts of offsets to participate in the market.
- Provide entrepreneurial skills and innovations for offset market to work smoothly.
- Provide feedback to protocol developers and market regulator.

These two important partners in the carbon offset market facilitate the development and operation of a market without a heavy burden upon government of additional staff and infrastructure. C3 has facilitated a carbon offset suppliers association where aggregators can share information, develop common contract terms and ensure each other's activities are adhering to collective business standards. These key enablers help identify and fill in the holes on the carbon market highway and make the market "real" for suppliers and buyers.

OFFSET PROTOCOLS

Protocol development has been a long and involved task. There has been little experience and even lesser expertise in the area. We have relied on learning our way into protocol development and application. Early work in protocol development started in 2003 with a federal-provincial effort for a pork protocol. National support and cooperation continued with other protocols up until 2006. Many federal, provincial and academic scientists collaborated on these protocols. The last protocol to be worked on by a federal-provincial initiative was the soil tillage protocol. A change in federal government stalled further development until 2008. Alberta continued protocol development unilaterally during the two-year stall in federal interest as protocols were needed for the 2007 amendment to the Alberta Climate Change and Emissions Management Act which created the compliance market. Engagement of federal, university and other specialists from across Alberta and other provinces continue with all protocol development. The Alberta

development process is currently a 10-step process that can take 8 to 12 months (Figure 1). An August 2008 call for protocol proposals by the federal environment agency has rekindled interest. Over half of the protocols on the federally approved “fast track” list are Alberta government protocols. They will be adapted into the national offset system.

Some key points in the Alberta protocols are:

- Alberta Government approved quantification protocols are developed on an ISO 14064 Part 2 framework. Third party verification follows an ISO 14064 Part 3 framework.
- Scientific/technical data and standards are all considered. The value of coefficients may depend upon the level of scientific data available, uncertainty, expected variability of application (soils, landscape, livestock classes, climate, etc).
- Protocols account for all GHGs (CO₂, N₂O, CH₄ and consideration of the 21 gases listed in the Act).
- Verification and harmonization or linkage factors are considered. It will be more valuable if it is compatible with future national or other provincial protocols.
- Verification is completed after the credits have been created (*ex poste*). There is no project approval or validation step.
- The more rigor in producing offset quantification protocols should yield more of a blue-chip protocol that produces a higher value offset.

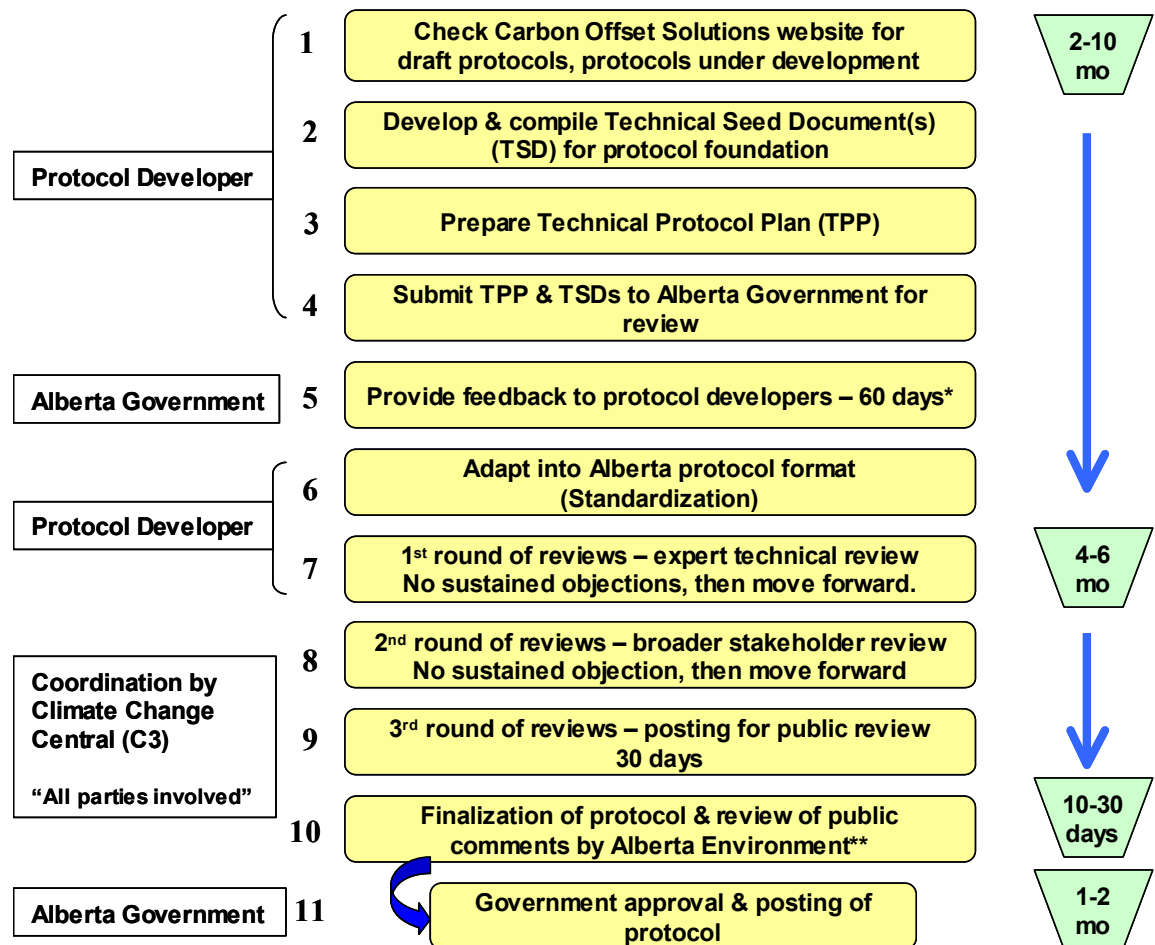
Currently 9 of 23 approved protocols are of interest to agriculture:

Afforestation	Biofuel	Energy efficiency
Beef feeding edible oils	Biogas	Pork
Beef days on feed	Biomass	Tillage management
Beef life cycle		

There are rules around how projects and the offsets qualify in the Alberta Registry system:

1. They result from actions taken on or after Jan 1, 2002 (where applicable due to the nature of the protocol). This acknowledges the signals sent in 2002 with the Climate Change and Emissions Management Act and gives credit for early actions.
2. They are real, demonstrable, quantifiable, and measurable. Suppliers, buyers and the public must be confident in what is being created and sold.
3. They occur at a place other than a regulated facility and from actions not otherwise required by law.
4. Ownership is established and clear.
5. They are only counted once for compliance purposes (they are unique).
6. They are verified by a qualified third party.
7. Credits occur from Alberta projects.

Details of not only protocols but also calculators and guidance documents are available on the C3, Carbon Offset Solutions website specially set up for the Alberta offset market (www.carbonoffsetsolutions.ca). In addition the website contains many items such as, a listing of aggregator companies, verifiers and brokers operating in Alberta and their contact information.



* Timing may vary depending on the volume of protocol proposals received.
 ** Additional time may be required depending upon the public comments received.

Figure 1. The Alberta protocol development process.

TILLAGE SYSTEM PROTOCOL

The Soil Tillage System Management Protocol was the most sought after project type and so far, has constituted the most offsets sold in the market.

Farmers are allowed to sell their soil carbon accumulations back to 2002 provided that conditions adhere to the protocol. This was the start of the Climate Change and Emissions Management Act and gave signals that a compliance market with offsets was pending. It also gives some credit for early actions.

Eligible actions for offsets must be new and additional to business as usual. Since no-tillage is being adopted in western Canada, the moving baseline was accounted for. The sequestration

coefficient was discounted for the slope of the increase of no-till adoption as accounted for by the national agriculture census.

The tillage system protocol uses unique approaches to meet additionality and permanence criteria. To satisfy additionality, the quantification science used a discounted or ‘adjusted baseline’ to subtract out carbon accrued to date (2002 start year) from current adoption rates of zero or reduced tillage from a region. In this manner, only the additional or incremental carbon going forward from 2002 onwards, counts as an offset credit. The adjusted baseline, is only applied to activities that sequester carbon on a go-forward basis. The coefficients in some regions are nearly zero due to high rates of adoption, or discounted by 40 to 60% in others. The federal government’s cross-ministry Working Group on Offsets in December 2006 adopted this approach as a fair and equitable approach for activity based projects where practices that create sinks could be reversed quite easily. It was recognized that maintenance of the sink is as important as the creation of a larger sink by farmers from their tillage practices on the prairies.

Permanence is addressed in Alberta with the application of an “Assurance Factor” to biological sink projects to assure permanence of the stored carbon. This approach relies on a risk-based approach where discounting coefficients or credits for a region is used to account for the probability of a reversal occurring over a set period of time, based on historical evidence/expert opinion. The Alberta prairies have over 20 years of experience with reduced tillage management and experts who do not have a market interest (government and not for profit extension staff), were consulted to derive the assurance factor.

In essence, each coefficient is discounted by the risk percentage attributed to a certain region (e.g., 10% discount on every verified tonne creates a set aside, resulting in 0.1 t CO₂e collected by the government) and set aside. This pool of carbon is used to cover the risk of a reversal. This reserve essentially belongs to the ‘atmosphere’ and assures against carbon lost to the atmosphere via reversals in the future – it functions as a reserve holdback that is operationalized through government policy. Project developers need to disclose when a sink practice is reversed, and they do not create credits for that year. Alberta has found that this approach allows for more flexibility in management and contracting; with a discounted approach to address liability, annual contracts can be used.

Alberta recognizes that soil carbon sequestration occurs at different rates according to agro-climatic zones (following the development work of a national protocol). Two zones were delineated for the dry and moister prairie zones. A minor adjustment of the boundary line between the two zones was made in Alberta to be more consistent to soil property zone boundaries. Aggregator companies underlined the need for a simple application of the boundary. Was it to be a transition zone of an intermediate value reflecting the natural fuzziness or gradation of soil carbon? Should it be a hard line that can be envisioned on the ground? Discussions soon determined the best was a line that is one fence post wide, a distinct line across the province. A listing of the land parcels (“quarter sections”) which contained the boundary line was released to aggregators and a clarification document produced.

The definition of No-Tillage surfaced early on in the application of the protocol. The working definition was not specific enough and would vary depending up individual soil and equipment

circumstances. A maximum disturbance percentage was adopted based upon the ratio of seed row opener width to shank spacing. A clarification document was produced. Interestingly, farmers considering new equipment purchases made certain the equipment configuration would meet the definition and purchased equipment that perhaps provided even less soil disturbance than originally intended.

Verification costs are another area of complexity. There is very limited experience in the world of verifying carbon projects. It often merges several disciplines together such as accountants working with agronomists and/or engineers and/or livestock specialists. Physical inspection of facilities needs to be kept to a minimum in order to reduce verification costs down. Verification costs should reduce as prototypes and templates are developed and confidence, testing and learning increases.

The tillage system management protocol now has five accompanying documents on the carbon offset solutions website to provide further guidance and clarification.

INITIAL TRANSACTIONS

The first commitment period of the compliance regulation (6 months) ended December 31, 2007. Over that half year period industry in Alberta chose to settle two-thirds of their liability by payments into the technology fund, one-quarter of their liability settled by purchasing offsets and the remainder by trading emission performance credits. Of the offsets purchased, just over half of them came from agriculture sources – all from the soil tillage protocol. Sale prices ranged from C\$6 to C\$12 per tonne CO₂e. Transaction costs were in the 30-40% range.

A number of submitted tillage offsets did not pass verification in the first commitment period because ownership could not be proven to the satisfaction of the verifier (land tenure rates are 50% or higher in the Prairies). Some landowners are not resident in the province and it takes extra time and effort to obtain a release of ownership of the sequestered carbon. Some landowners also need explanations on what ownership is being verified and what it all means. The offsets can be resubmitted for the current compliance period once the paperwork is in order.

Extension meetings were held across the province in the fall of 2007 to inform farmers and industry of the rules of the market, available protocols, roles of aggregators and economic opportunities. The mornings were presentations and discussions. The afternoons were mock trading sessions. Feedback was very positive and plans are to do the same again this year as interest continues to be high.

What did we learn from our first experience? A survey of market participants was conducted along with a review meeting held in July 2008 with all parties to document our learnings. Key learnings include:

- Alberta's offset system proved the aggregator model works.
- Intense interest in biosequestration projects – the model works.
- The market is now competing on reduced transaction costs.
- More project documentation templates are required.
- Verification standards are needed for more complex projects (e.g. tillage).

- Ownership issues – barred up to 40% of tillage offsets presented in the first period.
- Less red tape should provide more market uncertainty.
- Accreditation of verifiers may be warranted.
- Unanticipated costs found on the project developer side will lead to more diversification of projects (\$15 safety valve a challenge).

CONCLUSIONS

Our experience in developing and supplying tillage system offset protocols to the Alberta compliance offset market has illustrated to us the need for a comprehensive systems approach integrating science+policy+theory+reality. The best learning occurs when we work with all parties that have an interest in the market. Considerable effort and resources are needed and distribution of efforts across government departments and NGOs negates the need for a large administration in any one institution. In addition to protocol development, guidance documents are required, an information centre and extension of the system and technologies required for both sellers and buyers. Aggregators help bring sellers to the market and can alert the regulator to adjustments that are needed. We have found buyers and sellers willing to participate in tillage carbon offsets. The system works.

REFERENCES

- Alberta Environment. 2002. Climate change and emissions management act. Alberta Queen's Printer, Edmonton, Alberta.
http://www.qp.gov.ab.ca/documents/Acts/C16P7.cfm?fm_isbn=077974697X
- Alberta Environment 2007a. Climate Change: Alberta's Credit Trading System – facts at your fingertips. Factsheet 1p.
http://environment.alberta.ca/documents/Credit_Trading_System.pdf
- Alberta Environment 2007b. Alberta Environment Report on 2006 Greenhouse Gas Emissions. 81p. http://www3.gov.ab.ca/env/air/documents/2006_GHG_Report.pdf
- Alberta Environment. 2007c. Specified gas emitters reduction regulations.
<http://environment.alberta.ca/631.html>
- Capoor, K and Ambrosi, P. 2008. State and Trends of the Carbon Market 2008. World Bank, Washington D.C. 71p.
<http://siteresources.worldbank.org/NEWS/Resources/State&Trendsformatted06May10pm.pdf>
- Climate Change Central. 2008. (various listings, protocol documents in pdf format)
<http://www.climatechangecentral.com>, <http://www.carbonoffsetsolutions.ca>
- Environment Canada. 2008. National Inventory Report 1990-2006 greenhouse gas sources and sinks in Canada. Environment Canada, Ottawa. 615 p.