Climate Change Central

The Anaerobic Decomposition of Agriculture Materials – Alberta Protocol

Overview:

Carbon Offsets from Anaerobic Decomposition in Alberta
This bulletin provides background and summarizes details of the Quantification Protocol for The Anaerobic Decomposition of Agriculture Materials in Alberta. An overview of Alberta's Regulatory Framework and Offset requirements are given in the Overview document in this series.

The Anaerobic Decomposition protocol considers reductions in greenhouse gas (GHG) emissions from utilizing biogas, produced in a digester, to create renewable energy – electricity, thermal energy or straight use of biogas in natural gas transmission systems. The anaerobic digestion of organic material produces biogas which typically ranges from 40 to 60% methane depending on the feedstocks used, and the type of digestion process.

Typically anaerobic digestion of agricultural material involves the establishment of an integrated materials management system for single (on-farm) or multiple agricultural facilities. Anaerobic digesters, generators, thermal energy recovery systems, biogas processing, fertilizer production, and/or water treatment systems may all be built on a site to handle any number of agricultural materials. The kinds of agricultural materials can include but is not limited to manure, silage, dead animal stocks, byproducts of biofuel production, processing wastes, and biosolids.

Emission Reductions – What Counts?:
The substitution of fossil fuel-based energy with the renewable energy from the produced biogas results in GHG reductions when the energy is consumed. Direct emission reductions from improved manure handling/storage before and after the digester is built, is not included in the protocol[1]. The baseline condition for projects applying this protocol is defined as the operating conditions at the project farm/facility prior to the change to building the digester. Further, project developers must prove that the agricultural material and other wastes have been treated in an anaerobic digestion facility.

More specifically, a project must demonstrate:

- The agricultural material diverted to the anaerobic digestion facility would have been managed differently - either land spread, sent to landfill or incinerated - as confirmed by an affirmation from the biomass supplier;
- For projects where methane production processes are enhanced (e.g. mesophilic, thermophilic, etc.) the anaerobic digestion facility manages the risk of fugitive emissions in keeping with the guidance provided in the protocol as evidenced by an affirmation from the project developer and applicable records;
- The digestate does not undergo active windrow composting as indicated by an affirmation from the project developer (this can lead to large N20 emissions –a potent GHG) ;

[1] Note – the Pork protocol could be used in conjunction with this Protocol to calculate the baseline emissions from manure handling/storage at Pork operations to calculate any direct emission reductions from the improved manure processing procedures.

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- The quantification of reductions achieved by the project is based on actual measurement and monitoring (except where indicated in the protocol) as indicated by the proper application of this protocol;
- The project must have received its first batch of feedstock, excluding feedstock for testing phase, after January 1, 2002 as indicated by facility records;

Under the Alberta Offset System rules, Projects can claim credit back to 2002 onwards, if they meet the requirements of the system and protocols. There is no deadline for which to access these past tonnes. If a project developer wanted to wait a year to see how things evolve in the market, they could get involved a year from now and still gain credit back to 2002 if all requirements are met.

To claim offsets back to 2002, the above would need to be demonstrated in the Project documentation.

Coefficients of GHG emissions:
GHG reduction rates are also called factors, or, coefficients. Default coefficients for anaerobic digestion in Alberta account for a baseline and project conditions for emission reduction.
The baseline is calculated by the emissions from the disposal of an equivalent quantity of agriculture material being either land applied, sent to landfill or incinerated. This approach accounts for market forces, weather and energy demand and operational parameters without adding multiple streams of management strategies.

The protocol allows for some flexibility in how it's applied, allowing the project developer to group the GHG sources and /or sinks where one metric or measurement covers off the collective fuel supply to multiple sources or sinks (simplifies the calculation); substitute site specific factors for the generic emission factors; and or modify measurement and data management procedures to account for the available equipment..
The protocol uses generic emission factors for equipment as developed and reported in Canada's methodology for the National GHG Inventory Report, prepared on an annual basis. If the Project Developer wants to calculate specific emission factors from the energy efficiency rating for their equipment, this is allowed. Guidance on this is in the Protocol.

In all cases of applied protocol flexibility the specified minimum standards for data quality, frequency, accuracy and quality must still be met.

Definitions:

Anaerobic Digestion
An active and naturally occurring biological process where organic matter is degraded by methanogenic bacteria to yield methane gad and mineralized organic nutrients.

Functional Equivalences
The Project and the Baseline should provide the same function and quality of the products and services. This type of comparison requires a common metric or unit of measurement for comparison between Project and Baseline activity. In the direct application of this protocol as is, the amount of fossil fuels displaced in the baseline is effectively zero. If bringing in elements like improved feedstock handling, functional equivalence needs to be addressed.

References:
Alberta Quantification Protocol for Anaerobic Decomposition of Agricultural Materials at: http://www.carbonoffsetsolutions.ca;
Environment Canada, 2006, National Inventory Report 1990 – 2004. Greenhouse Gas Sources and Sinks in Canada. Submission to the United Nations Framework Convention on Climate Change. 608 pp. at:
http://www.ec.gc.ca/pdb/ghg/inventory_report/2004_report/toc_e.cfm