

Base Protocol Plan for Aerobic Composting Projects

Fast Track Protocol Development Process

Submitted: February 2009

This document has been prepared by Blue Source Canada ULC on behalf of the Industry
Provincial Offset Group Working Group 7: Landfill.

Contents

Part I: Identification of the Protocol Developer.....	3
1.1 Title of the Base Protocol:.....	3
1.2 Lead Protocol Developer.....	3
1.3 Initiating Entity	3
1.4 Rationale for initiating the development of the protocol (optional):	3
Part II: Base Protocol Applicability and Development Approach.....	5
2.1 Description of the Project Type:	5
2.2 Description of Project-specific Technology (if applicable)	6
2.3 GHG(s) that will be reduced:	7
2.4 Description of how real reductions will be achieved:	7
2.5 Base Protocol Flexibility (optional):	7
2.6 Federal, Provincial/Territorial Legal Requirements & Climate Change Incentives	8
2.6.1 List of potentially relevant requirements:	8
2.6.2 List of potentially relevant climate change incentives:.....	10
2.7 Building on existing protocols or proprietary information (if applicable).....	11
2.8 Explanation of how the existing protocol will be adapted:	11
2.9 Explanation of the nature of the proprietary information and how it might be used in the Base Protocol:.....	13
Part III: Declaration / Consent / Signature	14

Part I: Identification of the Protocol Developer

1.1 Title of the Base Protocol:

Quantification Protocol for Aerobic Composting Projects

1.2 Lead Protocol Developer

Organization:	Blue Source Canada ULC
Address:	Suite 2210, 777 – 8th Ave SW
Name:	Keith Driver
City:	Calgary
Title:	Vice-President, Operations
Province:	Alberta
Postal Code:	T2P 3R5
Email:	keithd@bluesourceCAN.com
Website:	http://www.bluesourceCAN.com
Telephone:	(403)262-3026
Fax:	(403)269-3024

Initiating Entity

Organization:	Industry Provincial Offsets Group (IPOG)
Name:	
Title:	
Address:	
City:	
Province:	
Postal Code:	
Email:	
Website:	http://www.offsetsgroup.ca
Telephone:	
Fax:	

1.4 Rationale for initiating the development of the protocol (optional):

There is industry support behind the development of this protocol and a recognized opportunity to generate greenhouse gas offset credits.

There is industry support behind the development of this protocol and a recognized opportunity to generate greenhouse gas offset credits.

Through the Industry Provincial Offset Group, members strive to ensure that protocols are:

- Based on a complete life-cycle analysis with consideration of all relevant GHG sources and sinks;
- Consistent in their treatment of cross-cutting issues;
- Based on accurate and unbiased best science and best practice guidance;
- Fully transparent; and
- Conservative so as to ensure that environmental integrity is maintained.

Part II: Base Protocol Applicability and Development Approach

2.1 Description of the Project Type:

This protocol is applicable to the quantification of direct and indirect greenhouse gas (GHG) emission reductions arising from the implementation of an aerobic composting project that diverts organic wastes from landfill. A properly functioning aerobic composting project maintains the conditions necessary to support aerobic decomposition of the waste processed at the composting facility. This prevents the decomposition of this waste under anaerobic conditions in landfill, which would result in methane generation.

The decomposition of organic waste in landfills under anaerobic conditions results in the generation of methane, carbon dioxide and various trace gases. The CO₂ emissions produced from the decay of waste are considered to be biogenic in nature, as the release of CO₂ during decay represents the re-release of CO₂ originally absorbed from the atmosphere during the growth of the plant matter. The methane emissions from anaerobic waste decomposition however are anthropogenic and result in an increase in GHG emissions.

The anaerobic decay of waste in landfill is a slow process and can continue to generate methane emissions for 100 years or more. One option for preventing the release of methane emissions from landfill sites is to implement alternative aerobic or anaerobic technologies that avoid the disposal of organic waste in landfill. The implementation of an aerobic composting project can therefore prevent the generation of methane emissions from waste decay that would have been released over many decades in the future.

In practice, there is considerable potential to divert streams of organic residues from landfill towards higher value and less greenhouse gas emission intensive end uses. As such, this protocol covers the diversion of organic residues from landfill for biological decomposition to a condition sufficiently stable for nuisance-free storage and for safe use in land application. This protocol is applicable to a broad variety of organic residues including agricultural and agri-food residues, the organic portion of municipal solid waste, food wastes, forestry and landscaping wastes, etc.

Composting of manure is specifically excluded from quantification under this protocol due to a lack of scientific understanding of the nitrous oxide emissions. Upon further research, these may be included such that the emissions of nitrous oxide during composting are better understood to prevent overestimation of the emission reductions for projects composting manure. Mixed streams, which include manures, may still be contemplated, however, the manure portion of the stream must be excluded from calculations.

To demonstrate that a project meets the requirements to apply this protocol, the project proponent must supply sufficient evidence to demonstrate that:

- The materials being diverted to the aerobic composting operation would otherwise have been landfilled as confirmed by materiality, disposal records or other means; and
- The organic residue must be treated to the point of being mature as per the requirements of Canadian Council of Ministers of the Environment (CCME) for maturity and destruction of pathogenic organisms as per facility operating permits or other third party analysis;
 - The CCME Guidelines for Compost Maturity are available at http://www.ccme.ca/assets/pdf/compostgdlns_1340_e.pdf

In addition, the proponent is responsible for identifying all established practices, requirements and regulations that affect their site. The proponent would identify / confirm / explain and demonstrate if provincial / municipal regulations or requirements require (or will require) the diversion of certain streams of waste from landfill during the registration period. Any waste streams whose diversion is required would not be eligible for offset generation.

Given the opportunity for generating emission reductions from aerobic composting projects, such projects will positively impact Canada's National GHG Inventory. The following impacts will be realized under the associated sectors, as outlined in the National Inventory Report 1990 – 2005: Greenhouse Gas Sources and Sinks in Canada:

- The reduction of emissions from waste decomposition as addressed in section 8.2 under “Solid Waste Disposal on Land (CRF Category 6A)”.

2.2 Description of Project-specific Technology (if applicable)

Aerobic composting project may implement a range of technologies and methods including the use of bins, passive windrows, turned windrows, aerated static piles and in-vessel channels. Selection of the most appropriate technology will depend on the type and quantity of feedstock, desired timelines, availability of space and other resources and the desired quality of the finished product¹.

A brief description of each technology is provided below²:

- Bin Composting: In this process a medium quality compost product is produced in a bin, using natural aeration and turning compost using a front-end loader.
- Passive Windrow Composting: In this process product quality will depend on the characteristics of the initial mix and the degree of mixing, and compost is produced in piles or windrows. This approach is slow with compost being produced by natural aeration over extended time periods.
- Turned Windrow Composting: In this process a uniform compost is produced using a mechanical aeration process.

¹ Agriculture and Agri-Food Canada. Composting Factsheet Series: <http://www.agf.gov.bc.ca/resmgmt/publist/300series/382500-5.pdf>

² *ibid*

- **Aerated Static Pile Composting:** In this process compost may be produced in either piles or windrows with mechanical aeration being provided by blowing air through the mix.
- **In-vessel Composting:** In this process a uniform compost is produced using a drum, silo or channel coupled with a controlled aeration system.

In Canada, the most common type of aerobic composting project and operating method is windrow composting. Other methods in order of decreasing relevance include the use of aerated static piles, in-vessel composting and indoor windrow operations³.

2.3 GHG(s) that will be reduced:

The following GHGs will be reduced from aerobic composting projects:

- CH₄ through reduced emissions from anaerobic decomposition of waste in landfill.

The following GHGs will be impacted by aerobic composting projects (and will also be quantified by this protocol):

- CO₂ through combustion emissions and electricity usage;
- CH₄ through combustion emissions and aerobic treatment of waste; and
- N₂O through combustion emissions and aerobic treatment of waste.

2.4 Description of how real reductions will be achieved:

An aerobic composting project will achieve GHG reductions/removals primarily through the diversion of organic residues from landfill thus avoiding methane production from anaerobic decomposition. The emissions from operating the project are anticipated to be small in relation to the methane emissions generated in the baseline condition, but these emissions will be conducted against the total emission reduction from avoided landfilling.

The baseline condition for projects applying this protocol is that the organic residues are being collected, handled and disposed of in a landfill (controlled or uncontrolled) such that anaerobic decomposition would typically occur. In the project condition these emissions are avoided through the diversion of these wastes to the aerobic composting facility.

A testing period for this activity will not be required prior to full implementation.

2.5 Base Protocol Flexibility (optional):

Flexibility in applying the quantification protocol is provided to project developers in four ways.

³ Statistical information released by the Composting Council of Canada from their annual survey:
<http://www.compost.org/compostinggrowsstronger.html>

1. There will be some sequestration of carbon within the compost. There may also be emissions of methane and nitrous oxide from its use. The net emissions of greenhouse gases are difficult to quantify and likely negligible for most end-uses of compost. However, the project developer may wish to include these elements in the analysis. The analysis must include all elements and must trace the compost through to its end use;
2. Organic materials that are being land applied on agricultural lands may be excluded from the requirement to meet CCME guidelines for maturity. However, it must be demonstrated by the proponent that this material will not be stored in conditions that would allow for anaerobic conditions to develop;
3. Site specific emission factors and other project specific factors (i.e. relevant landfill characteristics) may be substituted for the generic emission factors indicated in this protocol document. The methodology for generation of these emission factors must be sufficiently robust as to ensure reasonable accuracy; and
4. The project proponent may provide other evidence to demonstrate that the compost is mature. Or, alternatively, they may demonstrate that the compost is of such a quality that the underlying principles of the protocol remain assured and that there is no risk of over-estimating the emission reductions.

If applicable, the proponent must indicate and justify why flexibility provisions have been used.

2.6 Federal, Provincial/Territorial Legal Requirements & Climate Change Incentives

2.6.1 List of potentially relevant requirements:

Aerobic composting projects will be impacted by provincial / municipal regulations for diversion of certain waste streams from landfill. These regulations will vary by province / municipality. Currently the following provinces have regulations requiring the diversion of organic waste from landfill:

- Ontario: Ontario Regulation 101/94⁴ of the Environmental Protection Act mandates the collection of leaf and yard waste in municipalities with a population of 5,000 or more;
- Nova Scotia: Section 102 of the province's Solid Waste Resource Management Regulations includes a province-wide ban on the disposal of compostable organic material⁵;
- PEI: The province's Waste Resource Management Regulations (PEI Reg. EC691/00) prohibits the disposal of organic material in landfill⁶; and

⁴ <http://www.canlii.org/on/laws/regu/1994r.101/20080318/whole.html#BK3>

⁵ <http://www.gov.ns.ca/nse/waste/banned.asp>

⁶ <http://www.canlii.org/pe/laws/regu/2000r.691/20041117/whole.html>

- British Columbia: B.C.'s Recycling Regulation requires industry to collect and recycle any regulated products it manufactures or sells. There is no further regulation on the diversion of organic waste from landfill.

Other legal requirements and climate change incentives impacting the projects included within the scope of this protocol relate to landfill gas (LFG) generation at landfills from which waste is diverted.

There are currently no federal legal requirements pertaining to LFG or GHG generation from landfills, and regulation is typically not undertaken at the municipal level. In Canada, landfill gas regulations are generally enacted at the provincial level, and to varying degrees according to general goals and requirements. The regulatory considerations are incorporated into site operating certificates or certificates of approval and generally do not specify an amount of landfill gas that must be combusted at the sites; provisions are made for combustion of landfill gas in flares (generally enclosed), reciprocating engines or other combustion devices. There are only three Provinces with legal requirements applicable to LFG projects including:

- British Columbia currently has proposed LFG regulation on GHG generation from landfills which is anticipated to come into effect January 1, 2009. The specific requirements and threshold values for implementing LFG control systems is currently under consideration;
- Alberta Reg. 139/2007 - Specified Gas Emitters Regulation: Regulation applies to facilities with total direct GHG emissions equal to or over 100,000 tonnes CO₂e per calendar year. Must submit a baseline emission intensity application, and annual compliance reports. These regulations are not specific to LFG;
- Ontario has specific legislation regarding LFG emissions and previously required all operating landfills above 3.0 million cubic meters in airspace to implement LFG control systems. Recently, Ontario Regulation (O. Reg.) 216/08 amended O.Reg.232/98 to lower the threshold landfill size to 1.5 million cubic meters for mandatory air emissions control;
- Also in Ontario, O. Reg. 217/08 amends O.Reg.347 to ensure operating landfills which are not being expanded report on the design of LFG controls and have LFG controls in place; and
- Quebec Règlement Sur Lafrisement et Incineration des Materials Residuals - landfills having a maximum capacity greater than 1.5 million cubic meters, or as soon as a landfill receives 50,000 tonnes or more of residual materials per year, the biogas collection system must have a gas pumping device. In addition, the biogas collected must be removed by means of thermal destruction equipment capable of destroying at least 98 percent.

The remaining western provinces, eastern provinces, and territories do not have provincial or municipal legal requirements governing LFG or GHGs generated from landfills.

No other relevant regulations have been identified.

2.6.2 List of potentially relevant climate change incentives:

Climate change incentives that may impact on the eligibility of aerobic composting projects include the following:

- Manitoba's Waste Reduction and Pollution Prevention (WRAPP) fund provides grants to help organizations, businesses and government to develop local waste reduction and pollution prevention projects⁷; and
- New Brunswick's Climate Change Action Fund may provide funding for infrastructure to improve the performance of composting operations and to further encourage waste diversion⁸.

Further, climate change incentives related to implementing LFG systems will serve to reduce the quantity of emission reductions generated from the avoided decomposition of organic material in landfill. The following federal and provincial climate change incentives have been identified for implementing LFG systems:

- Climate Fund – federal institution for the purchase of domestic and/or international emissions reductions and removal credits, which will be one of Canada's approaches to climate change;
- Pilot Emissions, Removals, Reductions and Learning (PERRL) Initiative – federal initiative designed to provide Canadian companies, and organizations with an economic incentive to take immediate action to reduce GHG emissions. There were six Canadian landfills that successfully applied to this initiative and that received revenue for emissions reductions achieved;
- Renewable Power Production Incentive (RPPI) - 1 cent/kWh Incentive- is a federal funded program aimed at small hydro, biomass, and LFG utilization projects announced by the previous Liberal government. The status of this program is currently uncertain;
- New Brunswick Climate Change Action Plan – provincial initiative that includes financial incentive to install methane management systems at two of the six engineered provincial landfills;
- Standard Offer (through the Ontario Power Authority (OPA)) - provincial incentive provided by the Ontario government that encourages project developers to set up renewable energy systems by letting them sell "clean" power to the grid at a fixed premium. Several Ontario landfills are engaged in this program for the development of LFG to energy power plants; and
- FCM's Green Municipal Fund (GMF) - provides loans and loans with grants for projects related to brownfields, energy, transportation, waste, and water up to 80 percent of the capital cost.

⁷ <http://www.gov.mb.ca/conservation/pollutionprevention/wrapp/wrappfund.html>

⁸ <http://www.gnb.ca/0009/0369/0015/0001-e.pdf>

No other climate change incentives have been identified for the development of aerobic composting projects in Canada.

2.7 Building on existing protocols or proprietary information (if applicable)

Registered name of protocol:	Quantification Protocol for Aerobic Composting Projects
System for which protocol was developed:	Alberta Offset System
Date protocol was completed and approved:	September 2007
Developer of the protocol	
Name:	Keith Driver
Organization:	Blue Source Canada ULC

2.8 Explanation of how the existing protocol will be adapted:

The existing seed protocol will be adapted through an inclusive, transparent and consistent process coordinated through the Industry Provincial Offset Group's (IPOG) broad membership. In particular, work will be conducted by a protocol technical working group formed specifically to address adaptation of the protocol in question and potentially other related protocols. Cross-cutting issues groups will also be formed to address issues affecting a range of protocols, and to ensure consistency in approach.

Through this process the format and content of the existing protocol will be updated to meet the requirements of Environment Canada. Apart from the additional elements required, other noteworthy changes may be made to the Alberta Quantification Protocol for Aerobic Landfill Bioreactor Projects to adapt it for national applicability.

These may include the following:

- Normalized / Site-specific Baseline;
- Emission sources and sinks (SSRs) related to development of the site may be included throughout to ensure the protocol follows the ISO 14064-2 standard and is based on a full life-cycle analysis; and
- The SSRs for fuel extraction and processing (P16 and B8) may be excluded and the SSR for electricity usage at the site (P15) included.

Adaptation of the existing protocol will follow the multi-step process outlined below:

- Collection of technical and background information related to development, review and approval of the protocol to ensure transparency through the adaptation process;

- Review of the protocol to ensure consistency with Canada's "Turning the Corner" action plan and the requirements of the federal offset system. Any areas of inconsistency with the protocol documentation will be identified in this step;
- Review of existing provincial and federal regulations that could impact the surplus nature of the emission reductions from the project activity. This phase will serve to address the surplus requirement relative to applicable federal and provincial legislation;
- Review of the seed protocol's baseline condition to address the incremental nature of the project activity in the Canadian context. This review will include an assessment of the baseline's compatibility with Canadian best practices and potential alternative baseline approaches;
- Review of the protocol to ensure the quantification methodology is consistent with best practice guidance, and applicable to the range of Canadian geographical and climatic conditions;
- Review of the protocol's measurement and monitoring requirements to ensure they are reflective and reasonable in the Canadian context. This will include a review of data collection requirements and frequency of measurement and monitoring;
- Consideration of other environmental impacts and criteria air contaminants, as required by the "Turning the Corner" action plan;
- Additional analysis to address any outstanding issues identified to date that may present a significant challenge to protocol adaptation. This step will include assembly of the technical working group to drive further analysis;
- Redrafting of protocol to address technical issues identified in the previous steps and to ensure it meets the technical and format requirements of the Canadian offset system;
- Review of any material changes made to the quantification approach using project data to ensure the revised methodology is generally consistent with the original documentation;
- Cross-protocol review of the adapted protocol with other protocols adapted by IPOG, to ensure consistency in scope and approach to quantification; and
- Compilation of documents required for submission of the final draft protocol to Environment Canada for approval. The results of all stages of the review and adaptation process will be summarized and compiled to support Environment Canada's review.

Given the volume of work required under short timelines, multiple agencies will be required to provide a range of technical inputs, perspectives and capacity. To accomplish required tasks and meet timelines, technical resources within IPOG will be mobilized to provide input; drawing on group member's significant experience in protocol and project development.

This IPOG Working Group will draw on the experience of Climate Change Central to manage the adaptation process and to ensure broad stakeholder involvement by parties that may not be comfortable working directly with IPOG.

2.9 Explanation of the nature of the proprietary information and how it might be used in the Base Protocol:

We are anticipating full disclosure and transparency, therefore, there are no perceived issues regarding proprietary information associated with this protocol.

Part III: Declaration / Consent / Signature

The undersigned acknowledges that the undersigned has read, understood and that the undersigned agrees to abide by all the terms, conditions, instructions, and notices set out in the Guide for Protocol Development.

The undersigned acknowledges that the review of, and comments regarding, this base protocol plan or portions thereof does not ensure that the base protocol plan or portions thereof will be used in an Offset System Quantification Protocol by Canada's Offset System for Greenhouse Gases.

The undersigned is legally authorized to use any and all proprietary (or protected) information found in and submitted with the base protocol plan.

The undersigned is duly authorized to sign this application.

The undersigned declares that the base protocol plan submitted for Canada's Offset System for Greenhouse Gases and the information provided on, with or pursuant to this application is true, accurate and complete.

The undersigned consents to the public disclosure, in any manner including, without limitation, posting on Offset System website, of all the information in the base protocol plan and the information submitted with the base protocol plan.

By protocol developer (individual, or an organization's or a corporation's duly authorized representative, date, name, title)

By: **KEITH DRIVER**

Title: **VICE-PRESIDENT, OPERATIONS
BLUE SOURCE CANADA ULC**

Signature: _____

Signed this ____ day of _____, 2008