

Base Protocol Plan – Landfill Gas Capture and Destruction Base Protocol

PART I: IDENTIFICATION OF THE PROTOCOL DEVELOPER

1.1 Title of Base Protocol

Landfill Gas Capture and Destruction Base Protocol (adapted from the Quantification Protocol for Landfill Gas Capture and Combustion, September 2007, Version 1. Alberta Environment; Specified Gas Emitters Regulation)

1.2 Lead Protocol Developer

1.3 Initiating Entity

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PART II: BASE PROTOCOL APPLICABILITY AND DEVELOPMENT APPROACH

2.1 Description of the Project Type

The opportunity for generating carbon offsets with this protocol arises from direct GHG emission reductions through the destruction of methane captured from the landfill. Further offsets may be generated if the destruction of the landfill gas generates electricity and/or thermal energy that displace the combustion of fossil fuels. Emissions from landfills as well as electricity and heat production are included in Canada's inventory of GHG emissions.^{1,2}

Potential users of this protocol include any closed or operating landfills where landfill gas is being emitted as a result of the anaerobic conditions. Those facilities that began operation prior to January 1, 2000 would not be eligible under this protocol.³ Credits will only be granted for processing that occurs after January 1, 2008.⁴

2.2 Description of any project-specific technology (if applicable)

There are a range of technology options available for the capture, destruction and use of landfill gas. There are no project-specific technologies associated with this protocol.

2.3 Greenhouse gases that will be reduced

- Carbon dioxide (CO₂)
- Methane (CH₄)

2.4 Description of how real reductions will be achieved

Landfill gas (LFG) is passively emitted due to the anaerobic decomposition of the organic components within the landfill. The baseline condition represents those emissions that would have been released to the atmosphere in the absence of the project condition. The baseline condition is thus dependent upon the volume of LFG captured and destroyed. Projects may achieve real reductions in two ways.

First, landfill gas collection and destruction reduces the quantity of methane emissions released to the atmosphere from the landfill. The destruction of the methane component of the landfill gas results in emissions of biogenic carbon dioxide, thus achieving a reduction in man-made GHG emissions.⁵

Second, the project may capture and use the energy released by the destruction of the methane component of the LFG to distribute heat and/or electrical power. This heat and/or power may displace the use of other on-site or off-site fossil fuel consumption. The use of these fossil fuels would therefore be reduced, achieving a reduction in anthropogenic GHG emissions.

2.5 Base Protocol Flexibility

Similar to the Clean Development Mechanism ACM0001 Version 9.1 *Consolidated baseline and monitoring methodology for landfill gas project activities*, a flexibility provision will be provided for a capture and/or destruction system upgrading scenario. In an upgrading scenario, the effectiveness or

¹ Section 8.2 Solid Waste Disposal on Land (CRF Category 6.A) National Inventory Report, 1990-2005: Greenhouse Gas Sources and Sinks in Canada. Environment Canada, April 2007.

² Section 8.2.1 Public Electricity and Heat Production (CRF Category 1.A.1) National Inventory Report, 1990-2005: Greenhouse Gas Sources and Sinks in Canada. Environment Canada, April 2007.

³ A flexibility provision will be included in the protocol that will allow project developers to seek credit for upgrades to systems that were installed prior to January 1, 2000. The onus would rest on the project developer to provide sufficient justification in the project documentation to satisfy the registry and Environment Canada.

⁴ Section III. Registration of Offset Projects. Turning the Corner: Canada's Offset System for Greenhouse Gases.

⁵ The carbon dioxide component of the LFG is already considered to be biogenic, and is therefore not quantified under this protocol.

efficiency of the system increases over the baseline. Under these circumstances, the project developer must present sufficient evidence to prove that such projects are justified and should be considered additional.

With respect to upgrading, Part 4 under “Protocol Flexibility” in the *Quantification Protocol for Landfill Gas Capture and Combustion*, provides flexibility to project developers when upgrading flares from open to enclosed. When converting a flare from an open to enclosed type under an upgrading scenario, this provision sets the destruction efficiency of open flares at zero. This will not be an eligible approach under this protocol.⁶

Note: In the case of a project-specific baseline, the protocol may provide project developers with the flexibility to differentiate between eligible and ineligible flows, in a manner similar to the GE/AES Greenhouse Gas Services *Methodology for Landfill Gas Methane Capture and Destruction Projects, Version 1.1*. The onus will be on the project developer to justify such an approach, and will require that the eligible capture system be distinct and monitored separately from the ineligible system. This approach is similar to that used by the California Climate Action Registry.⁷

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

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 encapsulated in 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

⁶ Note: The protocols referenced by the Draft Guide for Protocol Developers as eligible under the fast-track process cite a range of default flare destruction efficiencies. These are:

California Climate Action Registry Version 2

Open: 96.0%

Enclosed: 99.5%

GE/AES Version 1.1

Open: 50% to 96%

Enclosed: 98%

Engine: 98%

Alberta Environment Version 1

Open: 25%

Enclosed: 99.92%⁶

CDM Executive Board Annex 13

Open: 50%

Enclosed: 90%

Each of the above methodologies allows for the application of a destruction efficiency derived from direct metering.

⁷ California Climate Action Registry. Landfill Project Reporting Protocol: Collecting and destroying methane from landfills. Version 2.0 Draft, September 2008.

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; and
- 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.
- 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. 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.
- FCM’s Green Municipal Fund (GMF) - provides loans and loans with grants for projects related to brownsfields, energy, transportation, waste, and water up to 80 percent of the capital cost.

2.7 Building on existing protocols or proprietary information

Registered name of protocol:	<i>Quantification Protocol for Landfill Gas Capture and Combustion</i>
System for which protocol was developed:	Specified Gas Emitters Regulation, Alberta Environment
Date protocol was completed and approved:	September 2007, Version 1
Developer of the protocol:	Alberta Environment ⁸

Explanation of how the existing protocol will be adapted

The *Quantification Protocol for Landfill Gas Capture and Combustion* ('Alberta Protocol') will be adapted through a collaborative process involving members of the Industry Provincial Offset Group (IPOG) and best-practice guidance based on the Methane Management protocols listed in Annex J of the *Draft Guide for Protocol Developers*.

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

The protocol is based upon the *Quantification Protocol for Landfill Gas Capture and Combustion*, Specified Gas Emitters Regulation, Alberta Environment.

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⁸ The *Quantification Protocol for Landfill Gas Capture and Combustion*, Version 1, represents an abridged, re-formatted and amended version of the *Draft Quantification Protocol for Landfill Gas Capture and Combustion*, April 11, 2006. That document was prepared by Enviro-Access Inc. for submission to Environment Canada.

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.

Signature:

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

Name

By: _____
(print name)

Title: _____

Signature: _____

Signed this ____ day of _____, 2008