

Base Protocol Plan for Non Incineration Thermal Waste Conversion

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.

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Part I: Identification of the Protocol Developer

1.1 Title of the Base Protocol:

Quantification Protocol for Non Incineration Thermal Waste Conversion

1.2 Lead Protocol Developer

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Initiating Entity

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

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 applies to projects that divert waste material from a landfill and convert that waste, through methods other than incineration, to Biofuel.

This protocol quantifies the emission reductions from the avoidance of fossil fuel consumption, replaced by municipal solid waste on an equivalent energy potential basis. It also specifically includes reductions in GHG emissions due to any heat/power production and electricity generation related to the process, and from the avoidance of landfilling any organic materials which may be diverted for conversion to Biofuel.

In the context of this protocol, Biofuel is defined as the synthetic fuel gas (syngas) created from the conversion of waste. BioEnergy is defined to include electricity, and heat / power produced from the Biofuel. Slag is a useful by-product of the production of Biofuel. There is also a negligible amount of residue material left over from the Biofuel production process.

Projects that involve incineration of waste are not covered under this protocol for quantifying the emission reductions from Biofuel production and use. The resulting products (energy, emissions, etc.) from incineration are sufficiently different as to warrant the requirement for a separate protocol. Incineration does not produce a Biofuel; this is a key distinction between incineration and the non-incineration thermal process covered by this protocol.

To meet the requirements under this protocol, the project developer must supply sufficient evidence to demonstrate that:

- The material being sent to the BioEnergy facility that is claimed as diverted from landfill, would otherwise be landfilled, as confirmed by disposal records or other means; and
- The BioEnergy facility must be in compliance with all required permits, including regulations regarding storage of waste on site.

As there are multiple opportunities for generating emission reductions from non incineration thermal waste conversion 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 fossil fuel combustion sources as addressed in section 3.2.4 “Fuel Combustion (CRF Category 1.A.1)”; and
- The reduction of emissions from municipal solid waste landfills as addressed in section 8.2 “Solid Waste Disposal on Land (CRF Category 6.A)”

2.2 Description of Project-specific Technology (if applicable)

Non incineration thermal waste conversion is a process by which materials with high reclamation value are removed from the waste stream and used to generate energy. An example of this technology is Plasco Energy Group's Conversion System¹.

In this system municipal solid waste is input into a conversion chamber, where recycled heat is used to convert it to a crude Syngas. This crude Syngas then flows to a refinement chamber where it is refined using plasma torches. The refined gas is then processed to recover contaminants such as sulphur, acid gas and heavy metals that were contained in the original MSW waste stream. The final product is a clean Syngas that may be used to fuel internal combustion engines, to generate electricity, with waste heat recovered from the engines and the conversion process being used to generate steam. This steam may then be used to either generate electricity or heat and power.

Solid residue may be produced in the conversion chamber. This residue is processed at high temperatures to stabilize the solids and convert any remaining volatile compounds and fixed carbon into crude Syngas for further processing. Residues are processed into inert and non-toxic slag solids and sold for use as construction aggregate².

2.3 GHG(s) that will be reduced:

The following GHGs will be reduced from non incineration thermal waste projects:

- CO₂ through reduced combustion emissions;
- CH₄ through reduced combustion emissions and reduced landfill emissions; and
- N₂O through reduced combustion emissions.

2.4 Description of how real reductions will be achieved:

The opportunity for generating carbon offsets with this protocol arises mainly from the indirect reductions of greenhouse gas (GHG) emissions from displacing a portion of fossil fuels with municipal solid waste in electricity and heat / power production. Reductions in GHG emissions due to any heat/power production and electricity generation related to the process, and from the avoidance of landfilling any organic materials which may be diverted for conversion to Biofuel are also included.

The baseline condition for the Non-Incineration Thermal Waste Conversion Protocol is that the municipal solid waste is being collected, handled and disposed of in a landfill (controlled or uncontrolled) such that anaerobic decomposition of the organic fraction would typically occur. The baseline also includes the use of fossil fuels by downstream users (calculated on an equivalent energy potential basis), the production of heat/power using fossil fuels at facilities that rely on heat/power from the BioEnergy facility, and the

¹ http://www.plascoenergygroup.com/?Technology_Overview

² http://www.plascoenergygroup.com/?Technology_Overview

generation of electricity by other facilities to cover the net generation capacity of the BioEnergy 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 six ways:

1. The heat and power production component of the process may be dealt with outside the scope of the protocol as part of a *Waste Heat Recovery* protocol. However, the project developer must justify the separation of this component of the project to ensure that the emission reductions are properly quantified between the two projects and that double counting does not occur;
2. The heat and power production component of the project may provide some or all of the heat and power requirements for the facility. Flexibility is provided in terms of allowing the broadening of the project scope to include existing, new, or retrofitted supplementary heating both on and off site to meet the project energy load;
3. In cases where the project developer wishes to quantify the emission reduction from reduced transportation requirements, then the GHG sources for the corresponding transportation related element(s) in project and baseline must be quantified (e.g. B4 and P4);
4. Site specific emission factors or other project specific factors (i.e. landfill characteristics) may be substituted for the generic emission factors indicated in this protocol document. The methodology for generation of these emission factors must ensure accuracy;
5. In particular site specific emissions factors for non-biogenic waste may be calculated from a mass balance and substituted for those indicated in this protocol document;
6. In cases where the diversion of feedstocks from landfill cannot be verified, the diversion of feedstocks from landfill components of the project may be ignored in both the baseline and project conditions; and
7. For projects with a dedicated end-user of some or all of the electricity generation, where the non-incineration thermal waste conversion facility is connected by a dedicated line to that facility, site specific electricity generation emission factors may be substituted for the generic grid emission factors indicated in this protocol document. The methodology for generation of these emission factors must be sufficiently robust as to ensure reasonable accuracy.

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:

Primarily, the 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; 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.

No other relevant regulations have been identified.

2.6.2 List of potentially relevant climate change incentives:

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 brownfields, energy, transportation, waste, and water up to 80 percent of the capital cost.

No other climate change incentives have been identified for the development of non incineration thermal waste conversion projects in Canada.

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

Registered name of protocol:	Quantification Protocol for Non Incineration Thermal Waste Conversion
System for which protocol was developed:	Alberta Offset System
Date protocol was completed and approved:	September 2008
Developer of the protocol	
Name:	Keith Driver

Organization:	Blue Source Canada ULC
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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 Non Incineration Thermal Waste Conversion Projects to adapt it for national applicability.

These may include the following:

- Normalized / Site-specific Baseline; and
- The SSR's for fuel extraction and processing (P10 and B9) may be excluded and the SSR for electricity usage at the site (P24) 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