



Methane to Markets

Development of an International Protocol for
Evaluating the Performance of Anaerobic
Digestion

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Overview

- Background
- Current Status
 - Draft International Protocol
 - Suggested Reviewers
- Next Steps

Background

- The Agriculture Subcommittee discussed the development of an international protocol for evaluating the performance of anaerobic digestion
 - First discussed in Beijing in November 2007
 - Then in Mexico in April 2008.
- As a result the U.S. Environmental Protection Agency agreed to draft an international protocol, which would be reviewed by a group of international experts.

Protocol Objective

- A protocol for quantifying and reporting the performance of anaerobic digestion systems would:
 - Provide a consistent and standard method for the international community to review and assess technologies
 - Provide project developers and potential users with credible and comparable information

- In 2006, the U.S. developed a similar national protocol

- This protocol is available online at:
<http://www.epa.gov/agstar/resources.html>

Draft International Protocol

- The U.S. EPA drafted an international protocol for the Methane to Markets Partnership which:
 - Contains elements similar to the U.S. protocol
 - Allows more flexibility than the U.S. protocol to allow for varying levels of reported information

Draft International Protocol Components

- The draft international protocol includes these components:
 - Prerequisites for performance evaluations
 - Background information
 - Estimation of methane emissions reductions
 - Biogas production and utilization
 - Economic analysis
 - Process performance characterization
 - Suggested report format

Draft International Protocol Evaluation Prerequisites

- Prerequisites for performance evaluations
 - Full-scale systems located on commercial livestock operations
 - A minimum of 12-months in duration
 - Steady-state conditions after completion of start-up (minimum requirements)
 - Plug-flow & mixed digesters: 5 HRTs
 - Covered lagoons: one year
 - Attached film digesters: 3 months of warm weather operation

Draft International Protocol Background Information

- Required Background Information
 - Name, location, and type of operation
 - Type, age and number of animals
 - Type of manure handling system
 - Type of digester and design details
 - Type of biogas utilization system with design details
 - Source(s) of revenue from biogas production

Draft International Protocol Carbon Accounting

- Methane Emissions Reductions
 - Baseline emissions are functions of manure management methods and climate

 - Methodology Guidance
 - Intergovernmental Panel on Climate Change (IPCC) 2006 Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10.
 - http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf
 - California Climate Action Registry (CCAR) livestock protocol.
 - <http://www.climateregistry.org/tools/protocols/project-protocols/livestock.html>

Draft International Protocol Biogas Production and Use

- Measuring production: total and utilized
- Biogas composition: CH₄, CO₂, H₂S, and NH₃
- Utilization:
 - Generating electricity: kWh generated, thermal conversion efficiency, and waste heat recovered and utilized or potentially available
 - Boiler fuel: Conventional fuel Btu replaced
- Reporting standards

Draft International Protocol Economic Analysis

- **Costs**
 - General approach: an independent enterprise
 - Boundary conditions: exclusions and inclusions
 - Annual capital cost
 - Annual operating and maintenance costs
- **Revenue**
 - Valuing on-farm energy use: rate structure differences and demand charge impacts
 - Revenue from by-products: what is valid and what is not

Draft International Protocol Process Performance

- Parameters:
 - Minimum: TS, TVS, COD, and pH
 - Optional: TVA, TKN, ON, NH₄-N, TP, indicator organisms, and pathogens

- Sample collection: representative composites of 24-hour flows
 - Frequency of sample collection
 - Sample preservation and analytical methods

Draft International Protocol Suggested Reviewers

- The Administrative Support Group (ASG) requested the Agriculture Subcommittee to suggest expert reviewers for the draft international protocol.
 - The U.S. EPA has compiled a list of reviewers based on the suggested experts.

Proposed Next Steps

- The draft protocol will be distributed to the group of international experts for review.
- The group will submit written comments to the U.S. EPA.
- If necessary, the group will convene one or more teleconference to discuss the comments.
- Based on the comments, the U.S. EPA will develop a revised international protocol which will be distributed to the Agriculture Subcommittee.