

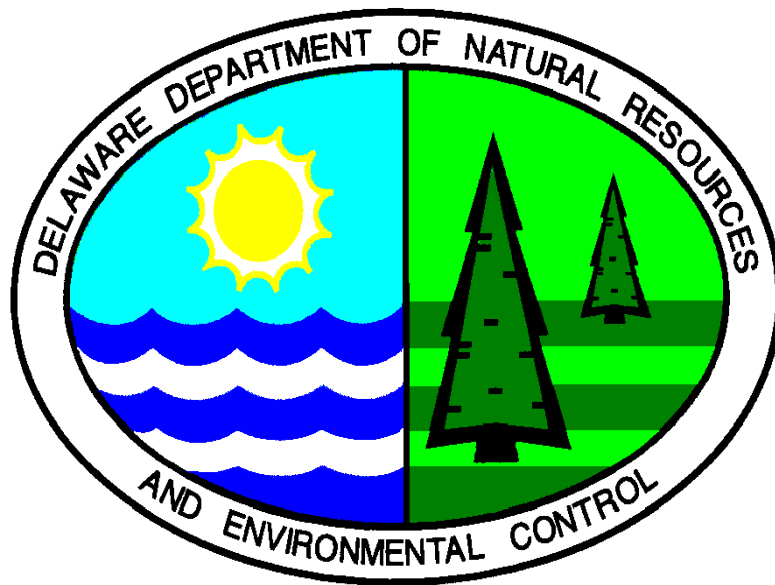
**DEPARTMENT OF NATURAL RESOURCES AND
ENVIRONMENTAL CONTROL**

DIVISION OF AIR QUALITY

CO₂ Budget Trading Program Offset Project:

Avoided Methane Emissions from Agricultural Manure Management Operations

Consistency Application Instructions



OCTOBER 2010



**DNREC – Division Air Quality Form
CO₂ Budget Trading Program
Consistency Application Instructions – Avoided Methane
Emissions from Agricultural Manure Management**

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1. Overview

To demonstrate that an agricultural manure management offset project qualifies for the award of CO₂ offset allowances, a Project Sponsor must submit to the Department, a fully completed *Offset Project Consistency Application – Avoided Methane Emissions from Agricultural Manure Management* (“*Consistency Application*”), including the coversheet and all forms and related attachments. An incomplete *Consistency Application* will not be reviewed to determine consistency. Following these instructions will ensure that the *Consistency Application* contains all necessary information and is submitted properly.

Each Project Sponsor should review 7 DE Reg. 1147 addressing offset projects and the award of CO₂ allowances. All offset application materials and other documents are available at

<http://www.awm.delaware.gov/AQM/Pages/Offsets.aspx>

Before the *Consistency Application* can be completed, the Project Sponsor must establish a general account and obtain an offset project ID code through the RGGI CO₂ Allowance Tracking System (RGGI COATS). The Project Sponsor identified in the *Consistency Application* must be the same as the Authorized Account Representative for the RGGI COATS general account identified in the *Consistency Application*. For information about establishing a RGGI COATS general account and offset project ID code, consult the RGGI COATS User’s Guide, available at <http://www.rggi-coats.org>.

Key eligibility dates and application submittal requirements for offset projects are as follows:

- For offset projects commenced on or after January 1, 2009, the *Consistency Application* must be submitted within six months after the project is commenced.
- For an offset project located in one participating state, the *Consistency Application* must be filed with the appropriate regulatory agency in that state.
- For an offset project located in more than one participating state, the *Consistency Application* must be filed in the participating state where the majority of the CO₂-equivalent emissions reduction or carbon sequestration due to the offset project is expected to occur.

2. Submission Instruction

Submit one (1) complete hardcopy original *Consistency Application* as well as an electronic copy in the form of a CD disk to the Department at the location specified below. Submit hardcopies of forms requiring signatures as originally-signed copies and scan such signed forms for electronic submission. Facsimiles of the *Consistency Application* are not acceptable under any circumstances.

***CO₂ Budget Trading Program
DNREC Air Quality Management
156 South State Street
Dover, Delaware 19901***



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3. Consistency Application

The *Consistency Application* has three parts, as described below. Each part comprises specified forms and required documentation. The *Consistency Application* has been created as a Microsoft Word document with editable fields. Enter information directly into the fields provided or submit information or documentation as an attachment, as directed.

The Project Sponsor should save an electronic copy for his or her file to serve as a reference for any necessary remediation.

The *Consistency Application* includes eight (8) forms divided into three parts, as follows:

Part 1. General Information Forms

- Form 1.1 – General Information
- Form 1.2 – Project Sponsor Attestations
- Form 1.3 – Project Sponsor Agreement
- Form 1.4– Disclosure of Greenhouse Gas Emissions Data Reporting

Part 2. Category-Specific Information and Documentation Forms

- Form 2.1 – Project Description
- Form 2.2 – Demonstration of Eligibility
- Form 2.3 – Monitoring and Verification Plan

Part 3. Independent Verification Form

- Form 3.1 – Independent Verifier Certification Statement and Report

The following instructions address each of the forms in numerical order. Note that the forms themselves include many embedded instructions.



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COVERSHEET

Check the boxes to indicate which forms are being submitted.

Part 1. Preliminary Information Forms

Form 1.1. General Information

Enter the requested information in the editable text fields in the Form. If a text field is not applicable or is unanswerable, enter “NA.” Note the following:

Project Sponsor: The Project Sponsor is the person who is the Authorized Account Representative for the RGGI COATS general account identified in the *Consistency Application*.

RGGI COATS General Account Name and Number: The RGGI COATS general account identified in the *Consistency Application* is the RGGI COATS account into which any awarded CO₂ offset allowances related to the offset project will be transferred.

Offset Project ID Code: The offset project ID code is the alphanumeric code generated when the Project Sponsor creates a record of the offset project in RGGI COATS. The project location entered should be the primary location of the project if the project consists of actions at multiple locations. The brief description of the offset project should indicate all locations where project actions occur or will occur. See the RGGI COATS User’s Guide for more information about creating an offset project record in RGGI COATS, available at: <https://rggi-coats.org/eats/rggi/>

Project Sponsor Organization: Provide the full legal name of the organization the Project Sponsor represents, including any alternative names under which the organization also may be doing business (e.g., John Doe Enterprises, Inc., d/b/a JDE). If the Project Sponsor is representing himself or herself as an individual, enter “NA”.



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Form 1.2 Project Sponsor Attestations

Check the boxes that apply, sign and date the form. Submit the originally signed form as part of the paper hardcopy *Consistency Application*. Scan the signed and dated form for submission as part of the electronic version of the *Consistency Application*.

Form 1.3 Project Sponsor Agreement

Sign and date the form. Submit the originally signed form as part of the paper hardcopy *Consistency Application*. Scan the signed and dated form for submission as part of the electronic version of the *Consistency Application*.

Form 1.4 Disclosures of Greenhouse Gas Emissions Data Reporting

Check the appropriate box in the form to indicate whether greenhouse gas emissions data related to the offset project have been or will be reported to any voluntary or mandatory programs other than the CO₂ Budget Trading Program. For each program for which data have been or will be reported, provide the program name, the program type (voluntary or mandatory), program contact information (website or street address), the categories of data reported, the frequency of reporting, when the reporting began or will begin, and reporting status (prior, current, future). The Project Sponsor must disclose future reporting related to current commitments made to voluntary programs as well as future reporting mandated by current statutes, regulations, or judicial or administrative orders.

Part 2. Category-Specific Information and Documentation Forms

The three (3) forms in Part 2 of the *Consistency Application* address category-specific requirements and documentation for agricultural manure management offset projects. Instructions for the Part 2 forms are provided below.

Form 2.1 Project Description

Attach a detailed narrative of the actions to be taken by the offset project. The attached narrative must include a header that indicates it is an attachment to Form 2.1 and identifies the offset project name and offset project ID code. The narrative must include the following information:

1. Offset Project Owner and Operator Information. Provide organization legal name(s), point(s) of contact information, and physical address for the offset project owner and offset project operator. The owner of the offset project is the party that holds the legal rights to the offset project. The operator of the offset project is the legal entity responsible for operating, controlling, or supervising the offset project under a written agreement with the owner of the offset project.



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Provide organization legal name(s), point(s) of contact information, and physical address for the parent company if the owner or operator is a subsidiary.

2. Offset Project Facility Location and Specifications. Provide the following information about the facility where the offset project occurs or will occur: Unique ID number (e.g., 1,2,3) for each building included in the offset project
 - Name of the facility
 - Physical address (including city, state, zip code) of the facility
 - Organization legal name(s), address, and point(s) of contact information for the owner and operator of the facility; provide organization legal name(s), point(s) of contact information, and physical address for the parent company if the owner or operator of the facility is a subsidiary
 - Specifications of the facility where the offset project is or will be located, if not one of the listed facilities at number 3 below; if one of the facilities listed at number 3 below, identify the facility

3. Influent Facility Location and Specifications. Provide the following information in narrative or table form for each facility that will provide influent (manure and/or organic food waste) to the anaerobic digester (If the information requested is included in a state or local permit, the information provided in the *Consistency Application* must be consistent with that included in the permit.):
 - Name of the facility
 - Physical address (including city, state, zip code) of the facility
 - Type(s) of manure and/or organic food waste influent from the facility to be added to the digester (for manure: dairy cow, swine, specify other; for food waste: dairy, vegetable, fruit, meat-processing, oil-based, or specify other)
 - Type(s) of manure and/or organic food waste storage practices used prior to offset project commencement (liquid/slurry, pit below animal confinements, uncovered anaerobic lagoons, or specify other), total capacity of such storage (volume in cubic feet or gallons), and length of storage time (days)
 - Type of manure collection employed at the facility (mechanical scrape or flush)
 - Estimated manure production in pounds per day for the facility, and the water used to clean milking parlors, barns, or other installations, in gallons per day
 - Volume of manure and/or organic food waste influent, which includes water content, produced by the facility (gallons per day); specify whether the estimate is based on water meter measurements or derived from the daily volume change in manure storage and/or organic food waste storage at the facility, in gallons per day or cubic feet per day
 - Volume of manure and/or organic food waste influent from the facility to be added to the anaerobic digester (gallons per day)



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4. Equipment Specifications and Project Schematic. Provide the following information in narrative or table form (information should be identical to that from a state or local permit, if applicable):
- a. Identify the type(s) of anaerobic digester installed or to be installed as part of the offset project:
 - Complete mix digester
 - Plug flow digester
 - Covered lagoon digester
 - Other digester type (specify)
 - b. For each anaerobic digester installed or to be installed as part of the offset project, provide the following information:
 - Name of manufacturer
 - Date of installation
 - Design capacity (in cubic feet or gallons)
 - Hydraulic retention time (HRT) in days ($HRT = \text{Volume of digester} / \text{average volume of manure added per day}$)
 - Digester biogas collection, flow, and composition monitoring equipment specifications including:
 - i. type(s) of equipment and manufacturer(s);
 - ii. dates of installation;
 - iii. dates of initial calibration;
 - iv. design digester biogas flow capacity (standard cubic feet per minute);
 - v. installed digester biogas flow meter accuracy;
 - vi. methane concentration instrument thresholds (percent by volume) and precision and accuracy levels as specified by the manufacturer; and
 - vii. whether methane concentration instrument provides for continuous or periodic monitoring of digester biogas.
 - c. For each anaerobic digester installed or to be installed as part of the offset project, provide the following information about how methane from the digester is utilized or will be utilized, as applicable:
 - Electricity Generation:



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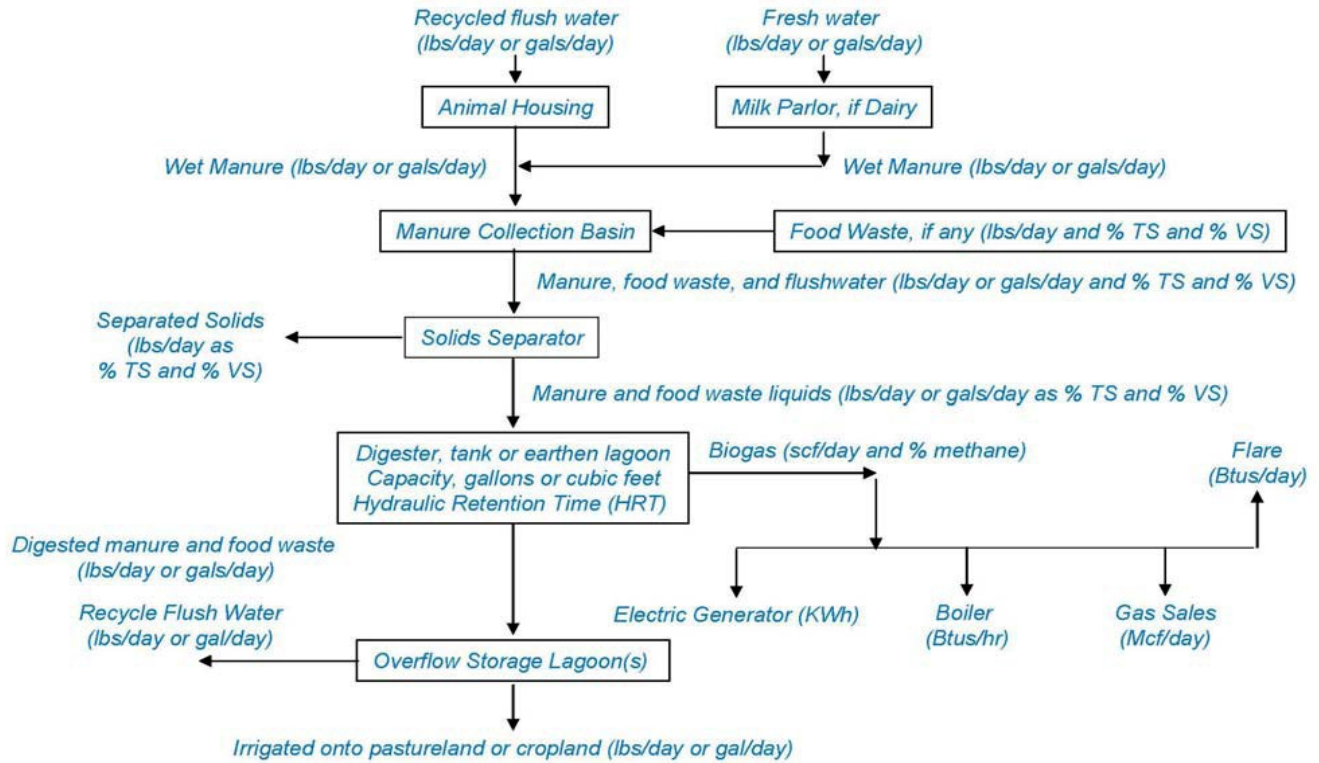
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- i. Type of electric generation unit (internal combustion engine, microturbine, fuel cell, or specify other type);
 - ii. Make or model, manufacturer, and date of installation of electric generation unit;
 - iii. Design electricity generation capacity in MWe, as specified by the manufacturer; and
 - iv. Heat rate (Btu/kWh), as specified by the manufacturer.
- On-Site Direct Combustion:
 - i. Type of combustion unit (flare, boiler, water heater, space heater, or specify other); and
 - ii. Make or model, manufacturer, and date of installation of combustion unit.
- d. Attach a technical schematic of the anaerobic digestion system that illustrates the manure flow from animal pens, food waste added (if any), collection system (whether scrape or flush), digester, gas handling system (generator, flare, boiler, or other gas utilization device), effluent storage for the digested manure, and ultimate disposal. Include mass flow of the manure, food waste, and water quantities on a daily basis. Include all mass and energy flows. Include manure and food waste flow for all facilities that will provide influent to the anaerobic digester. Figures 1 and 2 below provide illustrative examples.



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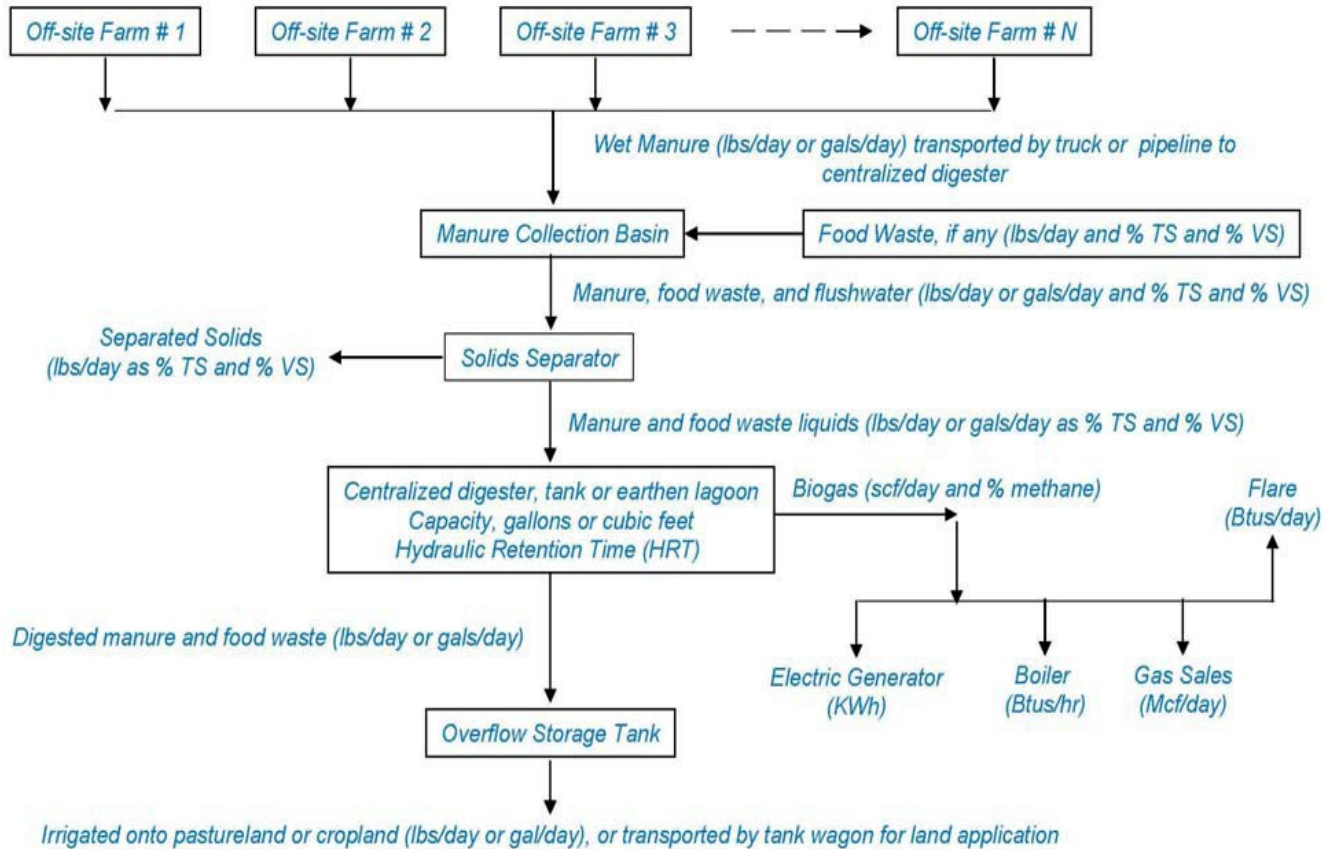
Figure 1. Technical Schematic of Manure Digester System





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Figure 2. Technical Schematic of Centralized Digester System





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Form 2.2 Demonstration of Eligibility

Attach documentation to Form 2.2 to demonstrate offset project eligibility. The attachment must include a header that indicates it is an attachment to Form 2.2 and includes the offset project name and offset project ID code. Attached documentation must include the following:

1. Demonstration of Uncontrolled Anaerobic Storage. Provide documentation for each facility that will provide influent to the anaerobic digester that the manure and/or organic food waste that is input into the anaerobic digester would have been stored through uncontrolled anaerobic storage in the absence of the offset project. Provide the following documentation for each facility, as follows:
 - a. For a facility providing manure, provide a diagrammatic representation (system schematic) of the previous waste management system at the project site prior to offset project implementation.
 - b. For a facility providing organic food waste, provide the following:
 - A diagrammatic representation (system schematic) of the previous waste management system at the project site prior to offset project implementation
 - Documentation that the food waste was stored for at least 30 days and that the storage tank was not stirred for at least 30 days, using the following equation and historic data:

$$\text{Storage time, days} = \frac{\text{Volume of the storage tank (gallons or cubic feet)}}{\text{Average daily volume of food waste (gallons or cubic feet)}}$$

2. Documentation of Digester System Feedstock. Provide documentation that at least 50-percent of the total annual mass input into the anaerobic digester(s) that comprises the offset project consists of livestock manure. List the annual mass of manure and organic food waste influent (in pounds) that will be provided to the digester from each facility documented in Form 2.1.
3. Demonstration of Conditional Eligibility for Projects that Receive Certain Incentives or Retain Attribute Credits. If the offset project meets certain criteria outlined in this section, it may be eligible for the award of CO₂ offset allowances even if the following conditions apply:
 - The offset project received or will receive funding or other incentives from [any program or fund made up of revenue collected directly from retail electricity or natural gas ratepayers through retail energy bills, or any program or fund funded through revenue from the auction or sale of CO₂ allowances.
 - The offset project contains an electric generation component and the Project Sponsor retains the legal rights to any and all attribute credits generated by the offset project that may be used for compliance with a renewable portfolio standard (RPS) or other regulatory requirement.



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If either or both of the above conditions apply, attach documentation to Form 2.2 that demonstrates the offset project meets at least one of the following criteria:

- The market penetration rate for anaerobic digester systems in Delaware is five (5) percent or less;
- The offset project is located at a farm with 4,000 or less head of dairy cows or equivalent animal units; or
- The offset project is a regional-type digester designed for annual manure input equivalent to that which would be produced by a farm with 4,000 or less head of dairy cows or equivalent animal units.

Attached documentation must include at least one of the following:

- a. Market Penetration Rate. Provide documentation that the market penetration rate for anaerobic digesters in Delaware is five (5) percent or less. The market penetration rate determination must utilize the most recent market data available at the time of submission of the *Consistency Application*. The documentation must use the following formula:

$$MP (\%) = (MG_{AD}/MG_{STATE}) \times 100$$

Where:

MG_{AD} = average annual manure generation from dairy cows and swine serving all anaerobic digester projects in Delaware (in lbs of manure per year) when the *Consistency Application* is submitted

MG_{STATE} = average annual manure generation of all dairy cows and swine in Delaware (in lbs of manure per year) when the *Consistency Application* is submitted

To determine the average annual manure generation, MG_{AD} , serving anaerobic digesters in Delaware, contact the Department of Agriculture for information on the population of dairy cows and swine that currently serve anaerobic digester projects in Delaware. If such information is unavailable, obtain state and/or local digester project permits, which may provide information on the manure supply and/or dairy cow and swine population serving anaerobic digesters.

If the above resources do not provide information for manure generation serving anaerobic digester projects in Delaware, use data of operational anaerobic digester projects available from the U.S. EPA AgStar Program to derive manure generation estimates for anaerobic digesters in Delaware (see <http://www.epa.gov/agstar/operational.html>).

If the U.S. EPA AgStar data indicate Delaware has no operational anaerobic digesters, MG_{AD} equals zero and the market penetration criterion is met.



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If the U.S. EPA AgStar data indicate operational anaerobic digesters in Delaware that serve a flare or other non-electric generation use, derive an estimate of manure generated annually by the animals providing influent to the anaerobic digester using Table 1 below and U.S. EPA AgStar data of the number of animals and animal type serving the anaerobic digester.

If the U.S. EPA AgStar data indicate operational anaerobic digesters in Delaware that serve an electric generator, estimate the quantity of manure influent associated with anaerobic digester projects in Delaware using the following equation:

$$MG_{AD} \text{ (lbs of manure per year)} = [\text{Electricity production (kWh/yr)} \times \text{Generator heat rate (Btu/kWh)} / \text{Methane heat content (Btu/scf methane)}] / \text{methane potential from manure (scf methane/lb manure)}$$

Where:

Generator heat rate = 14,000 Btu/kWh, used by AgStar for typical digester gas fueled engine-generators

Methane heat content = 1012 Btu/scf methane

Methane potential from manure = 0.5 scf of methane per lb wet manure, a typical value for digester conversion of manure to methane according to AgStar (see U.S. EPA, *AgStar Handbook, Appendix C, FarmWare User's Manual Version 3.0*, available at <http://www.epa.gov/agstar/pdf/handbook/appendixc.pdf>.)

To determine the average annual population of dairy cows and swine in Delaware, use the most current National Agricultural Statistics Service USDA Census of Agriculture (<http://www.nass.usda.gov/census>) or other USDA resources, such as “Quick Stats”

(http://www.nass.usda.gov/Data_and_Statistics/Quick_Stats). Calculate the average annual manure generation of all dairy cows and swine in Delaware, MG_{STATE} , using Table 1 below and the following equation:

$$MG_{STATE} = \text{Population of dairy cows and swine} \times \text{Pounds of manure per day per animal} \times 365 \text{ days/yr}$$



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Table 1. Default Manure Excretion Rate

Type of Animal	Weight ^a (lbs)	Manure ^b
		Lbs/d/1000 lb weight
<u>Dairy</u>		
Lactating Cow	1,332	80
Dry Cow	1,332	82
Heifer	1,049	85
Calf	260	65.8
<u>Swine</u>		
Sow: Lactating	436	60
Sow: Gestating	436	27.2
Nursing Pigs	35	106
Weaned Pigs	90	106
Feeder Pigs	201	63.4
Boars	400	20.5

^a Average estimated weights from U.S. EPA, U.S. Manure Management Inventory, 2004.

^b USDA National Resource Conservation Service, Manure Production Nutrient Content Data (as excreted).

Source: U.S. EPA, *AgStar Handbook, Appendix C, FarmWare Users Manual Version 3.0*, 2007, <http://www.epa.gov/agstar/resources/handbook.html>.

Calculate the market penetration rate (MP) in percent as described in the equation above. Demonstrate that the market penetration rate is no more than five (5) percent.

- b. Size of Farm. Provide documentation that the offset project is located at a farm with 4,000 or less head of dairy cows or equivalent animal units. Use the following procedures:
 - i. For an offset project located on a farm that includes only dairy cows, tabulate the number of dairy cows on the farm to determine the head of dairy cows.
 - ii. For an offset project located on a farm that includes dairy cows and/or other animal types, tabulate the number of dairy cows on the farm to determine the number of cow animal units, and determine the number of equivalent animal units of the other animal types as follows:



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- A. Tabulate the total weight for each animal type other than dairy cows on the farm (in pounds).
- B. Divide the total weight for each animal type (lbs) by 1,400 lbs to derive the number of equivalent animal units for that animal type.
- C. Sum the number of animal units for each animal type.

The result must demonstrate that 4,000 or less animal units are present on the farm.

- c. Input Capacity of Regional-Type Digester. If the offset project is a regional-type digester, document that the total annual manure input supplied to the digester is designed to be less than the average annual manure produced by a farm with 4,000 or less head of dairy cows, or a farm with equivalent animal units. Provide the following:
 - i. Document the annual input capacity of the anaerobic digester in pounds of manure per year.
 - ii. Document the type of manure influent that will be provided to the anaerobic digester from each of the facilities supplying manure to the digester and the mass of such manure (lbs). (This information should be consistent with that provided in Form 2.1.)
 - iii. Document the number of dairy cows or equivalent animal units required to produce the annual mass of manure that meets the annual influent capacity of the anaerobic digester. For animals other than dairy cows, divide the average animal weight (lbs) by 1,400 lbs to determine equivalent animal units (1,400 lbs is the assumed default weight for a full-sized dairy cow). Document the data source used to estimate animal manure generation by animal type. (U.S. EPA, *AgStar Handbook, Appendix C, FarmWare User's Manual Version 3.0*, 2007, is one source of such data.)

The total must be 4,000 or less dairy cows or equivalent animal units.

Form 2.3 Monitoring and Verification Plan

Provide the Monitoring and Verification Plan (M&V Plan) as an attachment to Form 2.3. The attachment must include a header that indicates it is an attachment to Form 2.3 and includes the offset project name and offset project ID code. The attached M&V Plan must include the following information:

1. Documentation of Methane Generation Calculation Procedures. Attach a spreadsheet documenting the equations and project-specific data sources for each influent-generating facility that will be used to calculate the monthly baseline methane emissions from the degradation of volatile solids during the annual reporting period, including the following:
 - Baseline emissions (short tons CO₂-equivalent)
 - Volatile solids degraded
 - Calculation of Van't Hoff-Arrhenius factor ("f factor")
 - Calculation of volatile solids available for degradation



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- Calculation of mass of volatile solids available at the start of each reporting month
- Calculation of mass of volatile solids available at the end of each reporting month
- Calculation of mass of volatile solids removed from storage during each reporting month
- Calculation of volume of methane produced

The equations used must be consistent with those specified at 7 DE Reg. 1147-10.6 (See also, Monitoring and Verification Report, Form 2.3). The documentation of data sources must account for how facility-specific data obtained through the influent monitoring procedures specified under item number 2 below will be applied in the methane generation equations.

2. Influent Monitoring Procedures. Document the monitoring procedures to be used at each facility providing manure and/or organic food waste influent to the anaerobic digester, including the following:
 - Monthly influent flow (in kg, wet weight) from the facility into the digester based on either recorded weight or derived from digester influent pump flow. Provide specified quantification procedures.
 - Monthly influent total solids concentration as a percent of a sample, using U.S. EPA Method Number 160.3, Methods for the Chemical Analysis of Water and Wastes (MCAWW) (EPA/600/4-79/020). Provide specified sampling procedures and method and the testing facility to be used.
 - Monthly influent volatile solids concentration as a percent of total solids in a sample, using U.S. EPA Method Number 160.4, Methods for the Chemical Analysis of Water and Wastes (MCAWW) (EPA/600/4-79/020). Provide specified sampling procedures and method and the testing facility to be used.
 - Monthly average ambient temperature (degrees Celsius) based on reading from the nearest National Weather Service certified weather station. Provide the procedures for collecting temperature data, the location of the closest certified weather station, and the distance from the influent-generating facility.
3. Documentation of Methane Captured and Destroyed. Attach a spreadsheet documenting the calculations and project-specific data sources that will be used to quantify the annual volume of methane (in standard cubic feet) captured and destroyed by the anaerobic digester during the reporting period, including the following:
 - a. If a direct continuous monitoring system is measuring methane concentration of digester biogas:
 - Daily methane recovery as measured in standard cubic feet of methane per day from the continuous monitoring system
 - Sum of daily methane recovery on a monthly basis



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- Sum of monthly methane recovery to obtain total annual methane recovery from the digester
- b. If a direct continuous monitoring system is monitoring digester biogas flow only:
 - Daily digester biogas flow as measured in standard cubic feet of digester biogas from the continuous monitoring system
 - Sum of daily digester biogas flow on a weekly basis
 - Weekly methane concentration measurements (in percent by volume) using calibrated digester biogas analyzer
 - Weekly methane recovery as measured in standard cubic feet, derived by multiplying weekly digester biogas flow by the respective week's methane concentration measurement (in percent by volume)
 - Sum of weekly methane recovery on a monthly basis
 - Sum of monthly methane recovery to obtain total annual methane recovery from the digester in standard cubic feet of methane
- 4. Documentation of Transport CO₂ Emissions (applicable only to regional-type digesters). If the offset project is a regional-type digester, attach a spreadsheet documenting the procedures to be used to quantify CO₂ emissions due to transportation of manure and organic food waste from the facilities where the manure and organic food waste were generated to the anaerobic digester during the reporting period. Specify data sources and calculations for one of the following two methods:
 - a. Method 1: Emission factors for type and quantity of fuel used
Identify data sources and calculations for fuel use for all shipments of manure and organic food waste from off-site facilities to the anaerobic digester during each reporting year. Specify how transport miles and quantity of fuel used for each shipment will be determined and recorded. Specify the emission factors to be used, which may include:
 - Diesel fuel: 22.912 lbs CO₂/gallon
 - Gasoline: 19.878 lbs CO₂/gallon
 - Other fuel: emission factor approved by the Department
 - b. Method 2: Emission factors for type of fuel by ton-mile
Identify data sources and calculations to determine total tons of manure and organic food waste transported from off-site facilities for input into the anaerobic digester during each reporting period. Specify how transport tons, transport miles, and fuel type used for each



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shipment will be determined and recorded. Specify the emission factors to be used, which may include:

5. Quality Assurance/Quality Control (QA/QC) Procedures. Document the QA/QC procedures for equipment used to measure biogas volumetric flow and methane concentration, including the following:

- Procedures for recording names and contact information for the personnel responsible for project monitoring and documentation, including manure and organic food waste influent monitoring, recording of digester biogas flow and methane concentration, and identification of third-party analytical laboratories used to verify biogas methane composition
- Procedures for recording names and contact information for the personnel responsible for QA/QC of project monitoring data and documentation
- Procedures, if applicable, for annual comparison of methane generated by the anaerobic digester, as measured by monitoring equipment, against estimated methane used to generate electricity, as derived from electric generation records. The recommended procedure for the estimation of methane used to generate electricity is as follows:

$$\text{Annual methane recovered (scf)} = [(\text{annual kWh of electricity produced from digester biogas methane}) \times (\text{heat rate in Btu/kWh of electric generation unit})] / 1012 \text{ Btu/scf}$$

- Procedures, if applicable, for documenting annual electricity generation and electric generation unit heat rate
- Procedures for documenting installation and retirement of equipment for monitoring biogas volumetric flow and methane concentration
- Procedures and calculations for standardization of digester biogas flow that correct for documented site-specific temperature and pressure measurements. (This procedure is not necessary when using flow meters that automatically measure temperature and pressure, and express digester biogas flow in standard cubic feet.)
- Procedures for QA/QC of methane concentration measurements. If using gas analyzer instruments inside the digester or in the biogas collection pipe for continuous methane concentration measurement, procedures for maintenance of the following data:
 - i. Accuracy and precision of analyzer, in accordance with manufacturer specifications;
 - ii. Proof of initial calibration (documentation provided by manufacturer);
 - iii. Records of periodic instrument calibration in accordance with manufacturer instructions;



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- iv. Records of methane concentration in at least 15 minute intervals; and
 - v. Records of calibration procedure followed at least once per year against a gas sample with a known methane concentration in the range of 60 to 70 percent by volume.
- Procedures for quarterly third-party laboratory analysis of methane concentration of sampled biogas using U.S. EPA-approved laboratory testing methods, including specification of the testing method to be used
 - Procedures for ensuring that biogas samples will be taken at the location of the digester biogas flow meter
 - Procedures for QA/QC of influent monitoring data for each facility supplying manure and/or organic food waste to the anaerobic digester
 - For regional-type digesters, procedures for the compilation of monthly receipts and records of manure and/or organic food waste (in kg) received for input into the anaerobic digester from each facility supplying manure and/or organic food waste influent
 - For regional-type digesters, for each facility supplying organic food waste influent, procedures for ensuring that the daily food waste input to the on-site storage tank prior to shipment to the anaerobic digester is greater than 1/30 of the total storage tank capacity
 - For regional-type digesters, for each facility supplying manure influent, procedures for ensuring that the daily manure input to the on-site storage tank or pond prior to shipment to the anaerobic digester is greater than 1/30 of the total storage tank or pond capacity
 - Procedures for the compilation of an annual QA/QC report summarizing findings of QA/QC activities conducted and any remedial actions taken
6. Documentation of Measuring and Monitoring Equipment Maintenance, Operation, and Calibration. Document the record keeping protocol that will be used to ensure that the following required actions are performed and documented for each reporting period:
- a. Maintenance of Measuring and Monitoring Equipment.
 - Monthly records of digester biogas flow rate performance tests to ensure: (1) flow readings are being recorded at least every 15 minutes; (2) the accuracy of digester biogas flow meter readings is within +/- 5 percent of manufacturer specifications; and (3) methane concentration instrument manufacturer specifications for precision and accuracy are met
 - Records of the type of biogas flow meter installed (differential pressure or hot wire anemometer)



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- Records of the date and location of flow meter installation
 - Records of performance of maintenance schedules for digester biogas flow meter and methane concentration instrument in accordance with manufacturer recommendations and specifications
- b. Operation of Measuring and Monitoring Equipment.
- Daily records of collected digester biogas flow rates in at least 15-minute intervals
 - Weekly records of methane concentration (if methane concentration is not continuously monitored) or daily records of methane concentration (if onsite continuous methane concentration analyzer is used)
 - Monthly records of calculation of digester biogas flow rate standardization (in standard cubic feet per day) to correct for site-specific pressure and temperature measurements. (Note, this procedure is not necessary when using flow meters that automatically measure temperature and pressure, and express digester biogas gas flow in standard cubic feet.)
 - Daily records of field data used for flow measurement standardization, including barometric pressure and biogas temperature and pressure measurements. (Note, this is not applicable when using flow meters that automatically measure temperature and pressure, and express digester biogas gas flow in standard cubic feet.)
 - Monthly records of the number of hours the digester biogas flow meter device was inoperable
 - Monthly records of the amount of methane combusted (in standard cubic feet) in the combustion device
 - Monthly records of electricity generation and measured heat rate, based on source tests or derived from heat input (MMBtu) and electricity generation (KWh) (applicable to offset projects with an electric generation component)
- c. Calibration of Measuring and Monitoring Equipment.
- Records of the calibration procedures conducted for the digester biogas flow meter in accordance with manufacturer specifications, but conducted not less than annually
 - Records of the dates and results of digester biogas flow meter calibration, and the portable instrument and procedures used to check installed flow meter accuracy, including field measurements and flow calculations
 - Records of the calibration procedures conducted for the methane concentration monitoring instrument. (Daily records if applicable to continuous methane concentration monitoring instrument; monthly records if applicable to portable methane concentration monitoring instrument.)
 - Records of the dates and results of methane concentration monitoring instrument calibration, including field measurement data. (Applicable to both continuous methane



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concentration monitoring instrument and portable methane concentration monitoring instrument.)

7. Record Keeping and Records Retention Protocol. Document the record keeping and records retention protocol that will be used to maintain documentation throughout the duration of the offset project, including maintenance of an electronic index or hardcopy of information.

a. Influent Monitoring.

For each facility providing manure and/or organic food waste influent to the digester:

- Records of monthly influent flow (in kg, wet weight) into the digester and quantification procedures used
- Records of monthly influent total solids concentration as a percent of total solids in sample, and sampling procedures, method, and testing facility used
- Records of monthly influent volatile solids concentration as percent of total solids in sample, and sampling procedures, method, and testing facility used
- Records of average monthly ambient temperature, and data collection method used

b. Methane Captured and Destroyed.

If a direct continuous monitoring system is measuring methane concentration of recovered digester biogas:

- Records of daily methane recovery as measured in standard cubic feet from the continuous monitoring system

If a direct continuous monitoring system is measuring the flow of digester biogas only:

- Records of daily digester biogas flow as measured in standard cubic feet of digester biogas from the continuous monitoring system
- Records of weekly methane concentration measurements (in percent by volume) using a calibrated digester biogas analyzer

c. Transport CO₂ Emissions.

If Method 1 (see item 4.a. above) is used to document transport CO₂ emissions:

- Records of transport miles and quantity of fuel used for each shipment of manure or organic food waste from an off-site facility for input into the digester

If Method 2 (see item 4.b. above) is used to document transport CO₂ emissions:

- Records of tons of manure or organic food waste transported, transport miles, and fuel type used for each shipment of manure or organic food waste from an off-site facility for input into the digester



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d. Quality Assurance/Quality Control (QA/QC) Program.

- Names and contact information for the personnel responsible for project monitoring and documentation
- Names and contact information for personnel responsible for QA/QC of project monitoring and documentation
- Annual QA/QC report and the associated findings and remedial actions taken
- Annual comparison of methane generated by the anaerobic digester, as measured by monitoring equipment, with estimated methane used to generate electricity, as derived from electric generation records (applicable to offset projects with an electric generation component)
- Annual electricity generation and electric generation heat rate (applicable to offset projects with an electric generation component)
- Records of installation and retirement of equipment for monitoring biogas volumetric flow and methane concentration
- Records of monthly calculation results for standardizing digester biogas flow that correct for documented site-specific temperature and pressure measurements. (Note, not applicable when using flow meters that automatically measure temperature and pressure, and express digester biogas flow in standard cubic feet.) Includes daily records of field data collected for flow measurement standardization, including barometric pressure and biogas temperature and pressure measurements
- Results of quarterly third-party laboratory analysis of methane concentration of sampled biogas using U.S. EPA-approved laboratory testing methods
- Documentation that biogas samples were taken at the location of the digester biogas flow meter
- For regional-type digesters, monthly receipts and records of manure and organic food waste (in kg, wet weight) received for input into the anaerobic digester from each off-site facility supplying manure and/or organic food waste influent
- For regional-type digesters, monitoring records of daily organic food waste input to storage at each off-site facility supplying manure and/or organic food waste influent (in mass or volume, and as a fraction of total tank storage capacity)

e. Maintenance of Measuring and Monitoring Equipment.

- Records of digester biogas flow meter performance test results for each month
- Records of the type of biogas flow meter installed during the reporting period (differential pressure or hot wire anemometer)
- Records of the date and location of flow meter installation



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- Records of maintenance performed on digester biogas flow meter and methane concentration instrument
- f. Operation of Measuring and Monitoring Equipment.
- Records of daily digester biogas flow rates (with flow rate recorded at least every 15 minutes)
 - Records of weekly methane concentration (if methane concentration not continuously monitored) or records of daily methane concentration (if direct continuous methane concentration analyzer is used)
 - Records of number of hours digester biogas flow meter device was inoperable each month
 - Records of combustion device operation hours for each month
 - Records of the daily amount of biogas combusted in at least 15 minute intervals
- g. Calibration of Measuring and Monitoring Equipment.
- Records of digester biogas flow meter calibration results, and the portable instrument and procedures used to check installed flow meter accuracy, including field measurements and flow calculations



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Part 3. Independent Verification Form

The form in Part 3 of the *Consistency Application* addresses requirements and documentation related to the independent verifier certification statement and report. Instructions for the form in Part 3 are provided below.

Form 3.1 Independent Verifier Certification Statement and Report

An accredited verifier must sign and date the form. Submit the originally signed form as part of the paper hardcopy of the *Consistency Application*. Scan the signed and dated form for submission as part of the electronic version of the *Consistency Application*.

Provide the independent verifier report as an attachment to Form 3.1. The verifier report must include a header that indicates it is an attachment to Form 3.1 and includes the offset project name and offset project ID code.

The verifier report must document the following:

1. The verifier has reviewed the entire *Consistency Application* and evaluated the contents of the application in relation to the applicable requirements of 7 DE Reg. 1147-10.6.
2. The verifier has evaluated the adequacy and validity of information supplied by the Project Sponsor to demonstrate that the offset project meets the applicable eligibility requirements of 7 DE Reg. 1147-10.3 and 7 DE Reg. 1147-10.6.
3. The verifier has evaluated the adequacy and validity of information supplied by the Project Sponsor to demonstrate baseline emissions, pursuant to the applicable requirements of 7 DE Reg. 1147-10.6.
4. The verifier has evaluated the adequacy of the Monitoring and Verification Plan submitted pursuant to 7 DE Reg. 1147-10.6.

The verifier report must include the following contents, in the order listed below:

- Cover page with report title and date
- Table of contents
- List of acronyms and abbreviations
- Executive summary
- Description of objective of report
- Identification of the client, including name, address, and other contact information
- Identification of the offset project
- Description of evaluation criteria (applicable regulatory provisions and documentation required in the *Consistency Application*)



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- Description of the review and evaluation process, including any site visits and interviews
- Identification of individuals performing the verification work, including the verification team leader and key personnel, and contact information for the team leader
- Description of the materials provided to the verifier by the Project Sponsor
- Evaluation conclusions and findings, including level of assurance provided