

Energy Savings and Environmental Benefits from Agricultural Production of Biogas

Online Survey (to be sent to biogas producers with dairy operations)

[EMAIL INVITATION]

SUBJECT LINE: Survey Invitation – Energy Production and Environmental Impacts from Agricultural Production of Biogas

On behalf of a national group of Canadian researchers, [insert name of company implementing survey] are conducting a survey with farm-based biogas producers across Canada to learn about current animal feeding practices, biogas production methods, and animal manure storage practices which affect biogas production and emissions that contribute to air pollution and climate change.

The survey will help to:

- Quantify greenhouse gas and air pollution emissions reductions from farms with biogas systems, compared to farms with no biogas systems
- Identify best management practices that could reduce emissions
- Identify related policies that may be implemented to reduce emissions
- Determine if there may be links between emissions reductions and increases in energy production

Your farm was selected at random for this survey from a list of biogas producers. If you qualify for this study (see Section 1) and agree to participate, **you will receive \$xxx.**

The results from this survey will be used for statistical purposes and published in aggregate form only. **Your identity and the information you provide will be kept confidential and anonymous.** A full privacy and confidentiality statement can be found online at [URL LINK](#).

Survey participants will be provided the opportunity to obtain a summary of the survey findings as well as more detailed information on the study than will be available to non-respondents.

We ask that you complete the survey as soon as possible, but no later than [insert date]. The person completing the survey should be the one most knowledgeable about the biogas system operation and manure management on the farm during 2013.

If you have any problems accessing the site or completing the survey, please email us at [\[INSERT HELP EMAIL ADDRESS\]](#).

While participation in this survey is voluntary, your participation is very important to us! Thanks again for your time and input. It is much appreciated.

Best regards,

The survey has been approved by **xx**. If you have concerns pertaining to the ethics of this survey, please contact **yy**.

[INTRODUCTION]

On behalf of a national group of Canadian researchers, thank you for your participation in this survey. **[insert name of company for implementation]** is contacting biogas producers across Canada to learn about current animal feeding practices, biogas production methods, and animal manure storage practices which affect biogas production and emissions that contribute to air pollution and climate change.

The results from this survey will be used for statistical purposes and published in aggregate form only. **Your identity and the information you provide will be kept confidential and anonymous.** A full privacy and confidentiality statement can be found online at **URL LINK**.

Survey participants will be provided the opportunity to obtain a summary of survey findings as well as more detailed information on the study than will be available to non-respondents .

If you have any questions regarding this study, please do not hesitate to contact us at **[INSERT HELP EMAIL]**.

Thanks again for your time and input. It is much appreciated.

Section 1: Survey Qualifiers

1.1 **Were** you the person solely or jointly responsible for the management of your dairy farm and/or biogas operation in 2013?

<input type="checkbox"/>	Yes	(Move to Section 2)
<input type="checkbox"/>	No	(Survey suspended)

Comment [MSOffice1]: SURVEY
NOTES: Force one response (Q is required + radio button response options)

1.2 **Which** of the following best describes your farm in regards to biogas operations? *Select one.*

- Currently operating a biogas system
- Planning to operate a biogas system within the next **X** years
- Operated a biogas system in the past, which is currently not operational
- Not operating a biogas system and no plans to do so
- Not operating a biogas system but considering doing so

Comment [MSOffice2]: SURVEY
NOTES: Force one response (Q is required + radio button response options)

For all questions about your dairy operation,

- **INCLUDE** all milking cows, dry cows, and heifers on your operation, regardless of ownership, including those that are boarded, fed and milked for others.

- **EXCLUDE** all calves, heifers, milk or dry cows owned by you but kept on a farm operated by someone else.

Section 2: About Your Farm Operation

The questions in Section 2 are designed to give a general description of your farm operation including information about livestock, animal productivity and nutrition. Data is requested on animal productivity and nutrition to help determine how much energy (in the form of food) is fed to animals, how much of that energy is converted to growth and sustenance, and how much is excreted. This, in turn, will help determine greenhouse gas and air pollution emissions and, where biogas systems are in place, how much manure is collected and converted to useable energy.

2.1 Animal Type(s), Growth and Production

In 2013, what types of animals were housed the majority of time in barns on your farm? For each type of animal housed in barns, please indicate the average number as well as the average growth and production data as requested.

2.1.1 Milking Cows

2.1.1.1 Milking Cows were housed in barns in 2013.

<input type="checkbox"/>	Yes (Move to Section 2.1.1.1)
<input type="checkbox"/>	No (Move to Section 2.1.2)

2.1.1.2 Average number of milking cows housed in barns in 2013? *Enter number.*

Average Number of Milking Cows
<input style="width: 90%;" type="text"/>

2.1.1.3 Average weight of milking cows housed in barns in 2013? *Enter number and select pounds (lb) or kilograms (kg).*

Average Weight of Milking Cows	
<input style="width: 95%;" type="text"/>	<input type="checkbox"/> Pounds (lb) <input type="checkbox"/> Kilograms (kg)

2.1.1.4 Average daily weight of milk production in 2013? *Enter number and select pounds per day or kilograms per day.*

Average Weight of Milk Production	
<input type="checkbox"/>	<input type="checkbox"/> Pounds (lb)/day
	<input type="checkbox"/> Kilograms (kg)/day

2.1.1.5 Average number of days in milk production in 2013? *Enter number.*

Average Number of Milking Cows
<input type="checkbox"/>

2.1.2 Dry Cows

2.1.2.1 Dry Cows were housed in barns in 2013.

<input type="checkbox"/> Yes	(Move to Section 2.1.2.1)
<input type="checkbox"/> No	(Move to Section 2.1.3)

2.1.2.2 Average number of dry cows housed in barns in 2013? *Enter number.*

Average Number of Dry Cows
<input type="checkbox"/>

2.1.2.3 Average weight of dry cows housed in barns in 2013? *Enter number and select pounds (lb) or kilograms (kg).*

Average Weight of Dry Cows	
<input type="checkbox"/>	<input type="checkbox"/> Pounds (lb)
	<input type="checkbox"/> Kilograms (kg)

2.1.3 Heifers

2.1.3.1 Heifers (over one year) were housed in barns in 2013.

<input type="checkbox"/> Yes	(Move to Section 2.1.3.1)
<input type="checkbox"/> No	(Move to Section 2.1.4)

2.1.3.2 Average number of heifers housed in barns in 2013? *Enter number.*

Average Number of Heifers
<input type="checkbox"/>

2.1.3.3 Average weight of heifers housed in barns in 2013. *Enter number and select pounds (lb) or kilograms (kg).*

Average Weight of Heifers	
<input type="checkbox"/>	<input type="checkbox"/> Pounds (lb)
	<input type="checkbox"/> Kilograms (kg)

2.1.4 Calves

2.1.4.1 Calves (up to one year) were housed in barns in 2013.

<input type="checkbox"/>	Yes	(Move to Section 2.1.4.1)
<input type="checkbox"/>	No	(Move to Section 2.2)

2.1.4.2 Average number of calves housed in barns in 2013? *Enter number.*

Average Number of Calves	
<input type="text"/>	

2.1.4.3 Average weight of calves housed in barns in 2013? *Enter number and select pounds (lb) or kilograms (kg).*

Average Weight of Calves	
<input type="text"/>	<input type="checkbox"/> Pounds (lb) <input type="checkbox"/> Kilograms (kg)

2.2 Animal Nutrition

For each type of animal housed in barns in 2013, please complete the nutrition charts below.

2.2.1 Milking Cows

2.2.1.1 What types of feed did you provide your milking cows in 2013? *Select all that apply and indicate average amount of feed per day (by weight) and percentage of each feed type on a dry matter basis? Total percentage must add to 100%*

Types of Feed Provided to Milking Cows	Average Amount of Feed Type Per Day (By Weight)	Percentage of Feed Type in Total Feed (Dry Matter Basis)
<input type="checkbox"/> hay	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> hay silage	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> corn silage	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> corn	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> total mixed ration	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> supplements (protein/energy)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> other (please specify)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
Total (must equal 100%)		100 %

2.2.1.2 What proportion of your milking cow feed came from commercial suppliers in 2013?

Proportion of Commercial Feed for Milking Cows	
<input type="checkbox"/>	more than 75%
<input type="checkbox"/>	25 - 75%
<input type="checkbox"/>	less than 25%
<input type="checkbox"/>	None

Comment [MSOffice3]: SURVEY NOTES: include only those questions that are relevant according to Q2.1 responses

2.2.1.2.1 Which types of commercial feed products/supplements were fed to your milking cows in 2013? *Select all that apply and indicate amount per day (by weight) and percentage on a dry matter basis. Total percentage must add up to 100%.*

Types of Feed Supplements for Milking Cows	Average Amount of Feed Supplements Per Day (by weight)	Percentage of Feed Type in Total Feed Supplements (Dry Matter Basis)
<input type="checkbox"/> complete grain mix	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> protein	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> amino acids	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> vitamin/mineral premixes	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> other (please specify)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
Total (must equal 100%)		100 %

2.2.1.3 How did you decide the amount of protein to feed your milking cows in 2013?

Method of Determining Protein Fed to Milking Cows
<input type="checkbox"/> fed the same protein amount regardless of production or age
<input type="checkbox"/> divided into two or more groups according to milk production (e.g. high and low)
<input type="checkbox"/> divided into two or more groups according to lactation (e.g. first lactation cows fed differently than multi-lactation cows)
<input type="checkbox"/> each cow fed individualized portions of protein supplement (e.g. topdressing or computerized feeding systems)
<input type="checkbox"/> other (please specify)

2.2.1.4 How were supplements fed to your milking cows in 2013? *Select all that apply.*

Method of Supplements Fed to Milking Cows
<input type="checkbox"/> added to total mix ration
<input type="checkbox"/> top dress (i.e. tie stall barns)
<input type="checkbox"/> fed in milking parlour
<input type="checkbox"/> fed in standing yards or pasture
<input type="checkbox"/> other (please specify)

2.2.1.5 Was crude protein used as a commercial protein supplement for your milking cows in 2013?

<input type="checkbox"/> Yes	(Move to Section 2.2.1.5.1)
<input type="checkbox"/> No	(Move to 2.2.1)

2.2.1.5.1 What was the average percentage of crude protein content in the supplement? *Enter number or select 'don't know'.*

<input type="checkbox"/>
<input type="checkbox"/> Don't know

2.2.1.5.2 What was the target crude protein feeding rate in the total diet for your milking cows? Enter number and indicate pounds/cow/day or kilograms/cow/day using drop down menu OR check 'don't know option'.

2.2.2 Dry Cows

2.2.2.1 What types of feed did you provide your dry cows in 2013? Select all that apply and indicate average amount of feed per day (by weight) and percentage of each feed type on a dry matter basis? Total percentage must add up to 100%.

Types of Feed Provided to Dry Cows	Average Amount of Feed Type Per Day (By Weight)	Percentage of Feed Type in Total Feed (Dry Matter Basis)
<input type="checkbox"/> hay	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> hay silage	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> corn silage	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> corn	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> supplements (protein/energy)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> total mixed ration	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> other (please specify)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
Total (must equal 100%)		100 %

2.2.2.2 What proportion of your dry cow feed came from commercial suppliers in 2013?

Proportion of Commercial Feed for Dry Cows
<input type="checkbox"/> more than 75%
<input type="checkbox"/> 25 - 75%
<input type="checkbox"/> less than 25%
<input type="checkbox"/> None

2.2.2.2.1 Which types of commercial feed products/supplements were fed to your dry cows in 2013? Select all that apply and indicate amount per day (by weight) and percentage on a dry matter basis. Total percentage must add up to 100%.

Types of Feed Supplements for Dry Cows	Average Amount of Feed Supplements Per Day (by weight)	Percentage of Feed Type in Total Feed Supplements (Dry Matter Basis)
<input type="checkbox"/> complete grain mix	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> protein	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> amino acids	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> vitamin/mineral premixes	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> other (please specify)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
Total (must equal 100%)		100 %

2.2.2.3 How were supplements fed to your dry cows in 2013? Select all that apply.

Method of Supplements Fed to Dry Cows
<input type="checkbox"/> added to total mix ration
<input type="checkbox"/> close up or pregnant cows
<input type="checkbox"/> other (please specify)

2.2.3 Heifers

2.2.3.1 What types of feed did you provide your heifers in 2013? *Select all that apply and indicate average amount of feed per day (by weight) and percentage of each feed type on a dry matter basis? Total percentage must add up to 100%.*

Types of Feed Provided to Heifers	Average Amount of Feed Type Per Day (by weight)	Percentage of Feed Type in Total Feed (Dry Matter Basis)
<input type="checkbox"/> hay	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> hay silage	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> corn silage	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> corn	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> supplements (protein/energy)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> total mixed ration	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> other (please specify)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
Total (must equal 100%)		100 %

2.2.3.2 What proportion of your heifer feed came from commercial suppliers in 2013?

Proportion of Commercial Feed for Heifers
<input type="checkbox"/> more than 75%
<input type="checkbox"/> 25 - 75%
<input type="checkbox"/> less than 25%
<input type="checkbox"/> None

2.2.3.2.1 Which types of commercial feed products/supplements were fed to your heifers in 2013? *Select all that apply and indicate amount per day (by weight) and percentage on a dry matter basis. Total percentage must add up to 100%.*

Types of Feed Supplements for Heifers	Average Amount of Feed Supplements Per Day (by weight)	Percentage of Feed Type in Total Feed Supplements (Dry Matter Basis)
<input type="checkbox"/> complete grain mix	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> protein	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> vitamin/mineral premixes	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
<input type="checkbox"/> other (please specify)	<input type="checkbox"/> lbs or <input type="checkbox"/> kg	%
Total		100 %

2.2.3.3 How were supplements fed to your heifers in 2013? *Select all that apply.*

Method of Supplements Fed to Heifers
<input type="checkbox"/> added to total mix ration
<input type="checkbox"/> calf starter
<input type="checkbox"/> close up or pregnant cows
<input type="checkbox"/> other (please specify)

Section 3: About Your Manure Management Practices

The questions in Section 3 are designed to obtain information regarding the manure management practices you employ that may change greenhouse gas emissions (such as methane) and air quality emissions (such as ammonia). To help understand greenhouse gas and air pollution emissions from untreated manure, please answer the following questions.

3.1 Structures

3.1.1 What type of barn houses the majority of your milking cows, dry cows, and heifers in 2013? *Select one response per column.*

	Type of Barn	Milking Cows	Dry Cows	Heifers
a.	Free stall with solid floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	Free stall with slatted floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	Tie stall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	Bedded Pack	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	Pack Scrape	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.1.2 What type of ventilation system was used within the barn(s) in 2013? *Select one response per column.*

	Ventilation Type	Milking Cow Barn(s)	Dry Cow Barn(s)	Heifer Barn(s)
a.	<input type="checkbox"/> Natural (curtain windows and/or chimneys)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/> Fans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/> Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.1.3 What type of bedding materials were used in the barn(s), in 2013?

	Bedding Type	Milking Cow Barn(s)	Dry Cow Barn(s)	Heifer Barn(s)
a.	<input type="checkbox"/> Straw or other crop residue			
b.	<input type="checkbox"/> Sawdust, wood chips, shavings			
c.	<input type="checkbox"/> Sand			
d.	<input type="checkbox"/> Separated solids			

3.1.4 How much of each bedding type was used per week in 2013? *Enter number and select unit of measurement.*

	Bedding Type	Amount used in Milking Cow Barn(s) per week	Amount used in Dry Cow Barn(s) per week	Amount used in Heifer Barn(s) per week
a.	<input type="checkbox"/> Straw or other crop residue		<input type="checkbox"/> bales or <input type="checkbox"/> lbs / week	
b.	<input type="checkbox"/> Sawdust, wood chips, shavings		<input type="checkbox"/> bales or <input type="checkbox"/> lbs / week	
c.	<input type="checkbox"/> Sand		<input type="checkbox"/> tonnes / week	
d.	<input type="checkbox"/> Separated solids		<input type="checkbox"/> tonnes / week	

3.2 Manure Generation, Collection and Transfer

3.2.1 What percentage of your farm’s manure was solid versus liquid in 2013? Solid manure is equal to or greater than 18% dry matter. Liquid manure is less than 18% dry matter. Total percentage must add up to 100%.

Manure Type	Percentage
Solid	%

Liquid	%
Total (must equal 100%)	100%

3.2.2 In what form(s) did you manage the manure on your farm in 2013? *Select one response for each animal type.*

Comment [MSOffice4]: responses indicate whether or not Sections 4.1 and/or 4.2 need to be answered

Animal Type	Manure Type
Milking cows	<input type="checkbox"/> solid or <input type="checkbox"/> liquid
Dry cows	<input type="checkbox"/> solid or <input type="checkbox"/> liquid
Heifers	<input type="checkbox"/> solid or <input type="checkbox"/> liquid

3.2.3 What type of manure collection system do you use within ... *Select one response for each animal type.*

	Manure Collection System	Milking Barn(s)	Dry Cow Barn(s)	Heifer Barn(s)
a.	<input type="checkbox"/> Automatic alley scrapers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/> Slatted floors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/> Manual scraping (i.e. skid steer)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	<input type="checkbox"/> Flush system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	<input type="checkbox"/> Other (please specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.2.4 What percentage of your liquid manure was transferred to an anaerobic digester in 2013? *Select one response.*

Percentage of Liquid Manure Transferred to Anaerobic Digester	
<input type="checkbox"/> less than 25%	(Move to Section 3.3)
<input type="checkbox"/> more than 25%	(Move to Section 3.4)

3.3 Liquid Manure Storage and Management

3.3.1 For liquid manure that did not transfer directly to an anaerobic digester, what type of liquid manure storage system was on your farm in 2013? Exclude storages that connect with barns (i.e. slatted floor with storage beneath). *Select liquid manure storage type and indicate depth of manure storage.*

	Liquid Manure Storage Type	Dimensions (indicate depth of manure storage)		
a.	<input type="checkbox"/> Tanks (above ground)	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
b.	<input type="checkbox"/> Tanks (mostly below ground)	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
c.	<input type="checkbox"/> Earthen (single cell)	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
d.	<input type="checkbox"/> Earthen (multiple cells)			
	Cell #1	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
	Cell #2	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
	Cell #3	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m

3.3.2 In 2013, when did you agitate the liquid manure storage? *Select all months that apply.*

Months that Liquid Manure Storage was Agitated in 2013	
<input type="checkbox"/>	January
<input type="checkbox"/>	February
<input type="checkbox"/>	March

<input type="checkbox"/>	April
<input type="checkbox"/>	May
<input type="checkbox"/>	June
<input type="checkbox"/>	July
<input type="checkbox"/>	August
<input type="checkbox"/>	September
<input type="checkbox"/>	October
<input type="checkbox"/>	November
<input type="checkbox"/>	December
<input type="checkbox"/>	Did not agitate manure storage in 2013

3.3.3 What was your annual energy consumption for manure agitation in 2013? *Indicate approximate number of tractor hours in 2013.*

Number of Tractor Hours for Manure Agitation in 2013	
a.	<input type="checkbox"/> less than 5 hours
b.	<input type="checkbox"/> between 5 and 10 hours
c.	<input type="checkbox"/> over 10 hours

3.3.4 How much diesel fuel was consumed in 2013 specifically for manure agitation? *Enter litres of diesel fuel per year.*

L Diesel/Year
<input type="text"/>

3.3.5 In 2013, when was the liquid manure storage emptied completely to within one foot of the bottom? *Select all months that apply.*

Months Liquid Manure Storage is Completely Emptied in 2013	
<input type="checkbox"/>	January
<input type="checkbox"/>	February
<input type="checkbox"/>	March
<input type="checkbox"/>	April
<input type="checkbox"/>	May
<input type="checkbox"/>	June
<input type="checkbox"/>	July
<input type="checkbox"/>	August
<input type="checkbox"/>	September
<input type="checkbox"/>	October
<input type="checkbox"/>	November
<input type="checkbox"/>	December
<input type="checkbox"/>	Did not completely empty manure storage in 2013

3.3.6 Was liquid manure land applied on your farm in 2013?

Liquid Manure Land Application on Your Farm	
<input type="checkbox"/>	Yes (Move to Section 3.3.6.1)
<input type="checkbox"/>	No (Move to Section 3.3.7)

3.3.6.1 At what time of year was the liquid manure land applied and in what percentage?

Timing of Land Application of Liquid Manure		Percentage
a.	<input type="checkbox"/> spring	%

b.	<input type="checkbox"/> summer	%
c.	<input type="checkbox"/> fall	%

3.3.7 In 2013, approximately what percentage of liquid manure from your farm operation was...
Total percentage must add up to 100%.

		Percentage of Liquid Manure From Your Farm Operation in 2013
a.	Spread on your land used for feed	%
b.	Used on other crop land on your farm not used for feed	%
c.	Spread on neighbours' land	%
d.	Removed by a contractor (don't know how it was used)	%
e.	Sold off the farm	%
f.	Or, other (please specify)	%
	Total (must equal 100%)	100%

3.3.8 In 2013, on what crops did you apply liquid manure from your farm operation and approximate volume applied?

Comment [MSOffice5]: Question only prompted if land application selected in previous question.

	Type of Crop Receiving Liquid Manure	Amount of Liquid Manure	Number of Acres	Percentage
a.	<input type="checkbox"/> hay	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
b.	<input type="checkbox"/> corn	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
c.	<input type="checkbox"/> soybeans	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
d.	<input type="checkbox"/> small grains (barley, wheat, oats)	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
e.	<input type="checkbox"/> Other (please specify)	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
	Total			100 %

3.3.9 Did you routinely analyze your liquid manure at a certified laboratory for N, P and K in 2013?

Liquid Manure Analysis	
<input type="checkbox"/> Yes	(Move to Section 3.3.9.1)
<input type="checkbox"/> No	(Move to Section 3.3.10)

3.3.9.1 What were the lab results of the most recent lab analysis of liquid manure (before anaerobic digestion) from your farm operation? If more than one sample analyzed choose the most typical.

	Liquid Manure Lab Result	Unit of Measure
a.	Moisture Content	<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage
b.	Dry Matter Content	<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage

c.	Total Nitrogen (N)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
d.	Ammonium (NH ₄)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
e.	Phosphorus (P)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
f.	pH		

3.3.10 Did you separate solids from your liquid manure for use as bedding in 2013?

Separated Solids From Liquid Manure	
<input type="checkbox"/> Yes	(Move to Section 3.3.10.1)
<input type="checkbox"/> No	(Move to Section 3.4)

3.3.10.1 What percentage of your digestate was separated in 2013?

Percentage of Separated Solids	
<input type="checkbox"/> 0 - 25%	
<input type="checkbox"/> 26 - 50%	
<input type="checkbox"/> 51 - 75%	
<input type="checkbox"/> 75 - 100%	

3.3.10.2 How did you store the separated solids in 2013?

Separated Solid Storage	
<input type="checkbox"/> Enclosed building	
<input type="checkbox"/> Freely ventilated building	

3.4 Solid Manure Storage and Management

3.4.1 Did you store solid manure on your farm operation in 2013?

Solid Manure Storage on Your Farm	
<input type="checkbox"/> Yes	(Move to Section 3.4.2)
<input type="checkbox"/> No	(Move to Section 4)

3.4.2 What type of solid manure storage system was on your farm in 2013? *Select solid manure storage type and indicate depth of manure storage.*

	Solid Manure Storage Type	Dimensions (indicate depth of manure storage)		
a.	<input type="checkbox"/> Uncovered piles	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
b.	<input type="checkbox"/> Covered piles	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
c.	<input type="checkbox"/> Other (please specify)	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m

3.4.3 In 2013, when was the solid manure storage emptied completely from storage? Select all months that apply.

Months Solid Manure Storage was Completely Emptied in 2013

<input type="checkbox"/>	January
<input type="checkbox"/>	February
<input type="checkbox"/>	March
<input type="checkbox"/>	April
<input type="checkbox"/>	May
<input type="checkbox"/>	June
<input type="checkbox"/>	July
<input type="checkbox"/>	August
<input type="checkbox"/>	September
<input type="checkbox"/>	October
<input type="checkbox"/>	November
<input type="checkbox"/>	December
<input type="checkbox"/>	Did not completely empty manure storage in 2013

3.4.4 Did you compost your manure in 2013? If so, for approximately how many months was the solid manure from your farm operation composted? *For the purposes of this questionnaire, composted manure is manure deliberately managed (i.e. turned and aerated) by means other than anaerobic digestion to reduce weeds, bacteria, and reduce volume.*

Compost Manure	Number of Months
<input type="checkbox"/> Yes	<input type="checkbox"/>
<input type="checkbox"/> No	

3.4.5 In 2013, how did you manage composted manure from your farm operation while it was in storage? *Select all that apply.*

Method of Managing Composted Manure	
a.	<input type="checkbox"/> Routinely and thoroughly mixed or turned (to accelerate decomposition)
b.	<input type="checkbox"/> Stationary piles actively aerated with fans
c.	<input type="checkbox"/> Stationary piles passively aerated with porous floor and added litter to improve porosity

3.4.6 Did you routinely analyze your solid manure at a certified laboratory for N, P and K in 2013?

Solid Manure Analysis	
<input type="checkbox"/> Yes	(Move to Section 3.4.6.1)
<input type="checkbox"/> No	(Move to Section 3.4.7)

3.4.6.1 What were the lab results of the most recent lab analysis of solid manure (before anaerobic digestion) from your farm operation?

		Solid Manure Lab Result	Unit of Measure
a.	Moisture Content		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage
b.	Dry Matter Content		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage
c.	Total Nitrogen (N)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)

d.	Ammonium (NH ₄)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
e.	Phosphorus (P)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
f.	pH		

3.4.7 In 2013, approximately what percentage of solid manure from your farm operation was...
Total percentage must add up to 100%.

			Percentage of Solid Manure From Your Farm Operation in 2013
a.	Spread on your land used for feed	(Move to Section 3.4.8)	%
b.	Used on other crop land on your farm not used for feed	(Move to Section 4)	%
c.	Spread on neighbours' land	(Move to Section 4)	%
d.	Removed by a contractor (don't know how it was used)	(Move to Section 4)	%
e.	Sold off the farm	(Move to Section 4)	%
f.	Or, other (please specify)	(Move to Section 4)	%
	Total		100%

3.4.8 In 2013, when was the solid manure land applied and in what percentage?

	Timing of Land Application of Solid Manure	Percentage
a.	<input type="checkbox"/> spring	%
b.	<input type="checkbox"/> summer	%
c.	<input type="checkbox"/> fall	%

3.4.9 In 2013, on what crops did you apply solid manure from your farm operation and approximate volume applied?

	Type of Crop Receiving Solid Manure	Amount of Solid Manure	Land area over which solid manure was applied	Percentage of total solid manure applied
a.	<input type="checkbox"/> hay	<input type="checkbox"/> lbs/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
b.	<input type="checkbox"/> corn	<input type="checkbox"/> lbs/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
c.	<input type="checkbox"/> soybeans	<input type="checkbox"/> lbs/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
d.	<input type="checkbox"/> small grains (barley, wheat, oats)	<input type="checkbox"/> lbs/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
e.	<input type="checkbox"/> Other (please specify)	<input type="checkbox"/> lbs/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
	Total			100 %

Comment [MSOffice6]: Question only prompted if land application selected in previous question.

Section 4: About Your Commercial Fertilizer Practices

The questions in Section 4 are designed to obtain information regarding commercial fertilizer practices, specifically nitrogen that may change greenhouse gas emissions. To help understand greenhouse gas and air pollution emissions from commercial fertilizer practices, please answer the following questions.

4.1 Which type(s) of commercial nitrogen fertilizer did you apply to your crops in 2013?

	Commercial Nitrogen Fertilizer Applied to Crops in 2013	Please check all types used in 2013	If more than one type used, please check the main one used in 2013 (select only one)
a.	46-0-0 / Urea	<input type="checkbox"/>	<input type="checkbox"/>
b.	34-0-0 / Ammonium nitrate	<input type="checkbox"/>	<input type="checkbox"/>
c.	28-0-0 / UAN (urea ammonium nitrate solution)	<input type="checkbox"/>	<input type="checkbox"/>
d.	21-0-0-24 / Ammonium sulphate	<input type="checkbox"/>	<input type="checkbox"/>
e.	82-0-0 / Anhydrous ammonia	<input type="checkbox"/>	<input type="checkbox"/>
f.	Other (please specify _____)	<input type="checkbox"/>	<input type="checkbox"/>
g.	Don't know	<input type="checkbox"/>	<input type="checkbox"/>

4.2 On average, what was the application rate (volume per area) of the main type of commercial nitrogen fertilizer you applied to crops in 2013? What was the number of acres?

	Type of Crop Receiving Additional Nitrogen Fertilizer	Amount of Additional Nitrogen Fertilizer	Number of Acres	Percentage
a.	<input type="checkbox"/> hay	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
b.	<input type="checkbox"/> corn	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
c.	<input type="checkbox"/> soybeans	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
d.	<input type="checkbox"/> small grains (barley, wheat, oats)	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
e.	<input type="checkbox"/> Other (please specify)	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
	Total (must equal 100%)			100 %

4.3 What was your annual energy consumption to land apply commercial fertilizers in 2013? Indicate approximate number of tractor hours.

Number of Tractor Hours for Land Application of Commercial Nitrogen Fertilizer in 2013	
a.	<input type="checkbox"/> less than 5 hours
b.	<input type="checkbox"/> between 5 and 10 hours
c.	<input type="checkbox"/> over 10 hours

4.4 In 2013, how much diesel fuel was consumed specifically for land application of commercial nitrogen fertilizer? Enter litres of diesel fuel per year.

L Diesel/Year
<input type="text"/>

Section 5: About Your Biogas Operation

The questions in Section 5 are designed to obtain information regarding your biogas operation and organic material inputs to the anaerobic digester. To help understand greenhouse gas and air pollution emissions from your biogas operation, please answer the following questions.

5.1 Anaerobic Digester Information

Information is being collected on anaerobic digester types and infrastructure to help quantify and manage influence greenhouse gas and air pollution emissions from biogas systems.

5.1.1 When did your biogas system begin operation? *Enter month and year.*

Month, Year
<input type="text"/>

5.1.2 Please indicate the date (*month and year*) and type of any biogas system expansion your farm has undertaken. This could include addition of a digester, separator, etc.

Month, Year	Type of expansion
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

5.1.3 What type(s) of anaerobic digester did you operate in 2013? Select all that apply and indicate size of the digester(s) in cubic metres.

	Type of Anaerobic Digester	Number of digesters	Size (cubic metres)
a.	<input type="checkbox"/> Single stage (i.e. vessel(s) operate at same temperature, pH, with variation in retention time, e.g. UASB)	<input type="text"/>	
b.	<input type="checkbox"/> Dual stage (i.e. separate vessels which are managed at different temperature, pH - such as a hydrolysis tank)	<input type="text"/>	
c.	<input type="checkbox"/> Covered lagoons	<input type="text"/>	

5.1.4 What was your average hydraulic retention time in 2013? *Select one response.*

	Hydraulic Retention Time
a.	<input type="checkbox"/> less than 20 days
b.	<input type="checkbox"/> 20 days but less than 40 days
c.	<input type="checkbox"/> 40 days but less than 80 days

5.1.5 What was the average digester temperature in 2013? *Select one response.*

	Temperature (degrees Celcius)
a.	<input type="checkbox"/> 35 - 40
b.	<input type="checkbox"/> 40 - 45
c.	<input type="checkbox"/> 45 - 50
d.	<input type="checkbox"/> >50

5.1.6 What pre-processing infrastructure was included in your biogas system in 2013? *Indicate all that apply.*

Pre-Processing Infrastructure
<input type="text"/>

a.	<input type="checkbox"/>	Holding tank(s)
b.	<input type="checkbox"/>	Heat treatment (i.e pasteurization)
c.	<input type="checkbox"/>	Hydrolysis
d.	<input type="checkbox"/>	Plastic separation
e.	<input type="checkbox"/>	Screens
f.	<input type="checkbox"/>	Other (please list) _____

5.1.7 What post-processing infrastructure was included in your biogas system in 2013? Indicate all that apply:

Post Processing Infrastructure		
a.	<input type="checkbox"/>	Solid separator
b.	<input type="checkbox"/>	Sulphur removal
c.	<input type="checkbox"/>	Nitrogen removal
d.	<input type="checkbox"/>	Phosphorus removal
e.	<input type="checkbox"/>	Potassium removal
f.	<input type="checkbox"/>	Carbon dioxide removal
g.	<input type="checkbox"/>	Other (please list) _____

5.1.8 If separated solids were used in 2013, what percentage of solids was separated? *Select one response.*

Percentage	
a.	<input type="checkbox"/> <20%
b.	<input type="checkbox"/> 20-50%
c.	<input type="checkbox"/> >50%
d.	<input type="checkbox"/> Don't know

5.2 Organic Material Inputs

5.2.1 What percentage of your farm's **liquid** manure was used in the anaerobic digester in 2013? *Select one response.*

Percentage	
a.	<input type="checkbox"/> 0 - 25%
b.	<input type="checkbox"/> 26 - 50%
c.	<input type="checkbox"/> 51 - 75%
d.	<input type="checkbox"/> 75 - 100%

5.2.2 What percentage of your farm's **solid** manure is used in the anaerobic digester? *Select one response.*

Percentage	
a.	<input type="checkbox"/> 0 - 25%
b.	<input type="checkbox"/> 26 - 50%
c.	<input type="checkbox"/> 51 - 75%
d.	<input type="checkbox"/> 75 - 100%

5.2.3 How much manure from your farm, or from other farms, was digested in your biogas system in 2013? *Select type of manure and indicate*

Type of manure	Tonnes of Manure From Own Farm	Tonnes of Manure From Other Farms
<input type="checkbox"/> Liquid	<input type="checkbox"/> Gallons <input type="checkbox"/> Cubic metres	<input type="checkbox"/> Gallons <input type="checkbox"/> Cubic metres

<input type="checkbox"/> Solid	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons
--------------------------------	--	--

5.2.4 If manure was transported from other farms in 2013, what was the approximate distance of transport (indicate the average kilometers if manure comes from multiple sources)?

	Distance of Manure Transport (km)
a.	<input type="checkbox"/> < 10 km
b.	<input type="checkbox"/> 10 - 25 km
c.	<input type="checkbox"/> 26 - 50 km
d.	<input type="checkbox"/> >50 km

5.2.5 What organic materials (beyond livestock manure) are being used as inputs to the anaerobic digester? *Indicate volumes per type of material.*

	Organic Material Inputs	Volume
a.	<input type="checkbox"/> Waste animal feeds	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons
b.	<input type="checkbox"/> Food processing materials	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons
c.	<input type="checkbox"/> Fats, Oils and Greases (FOG)	<input type="checkbox"/> Cubic metres
d.	<input type="checkbox"/> Spoiled crops	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons
e.	<input type="checkbox"/> Crops - residue harvested	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons
f.	<input type="checkbox"/> Crops – purpose grown	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons
g.	<input type="checkbox"/> Other (please specify) _____	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons

5.3 Organic Material Storage, Feeding, and Ventilation

5.3.1 What type of organic material storage did you have as part of your biogas system in 2013? *Select all that apply and indicate volume and units of measurement.*

	Organic Material Storage Type	Volume
a.	<input type="checkbox"/> Sealed Tanks	<input type="checkbox"/> Cubic metres <input type="checkbox"/> Imperial Gallons
b.	<input type="checkbox"/> Unsealed Tanks	<input type="checkbox"/> Cubic metres <input type="checkbox"/> Imperial Gallons
c.	<input type="checkbox"/> Bunker silos	<input type="checkbox"/> Metric tonnes <input type="checkbox"/> Imperial tons

5.3.2 What kind of feeding system did you use to transfer organic materials into your anaerobic digester in 2013? *Select all that apply.*

	Organic Material Transfer System
a.	<input type="checkbox"/> Automatic piping
b.	<input type="checkbox"/> Dry feeder
c.	<input type="checkbox"/> Manually
d.	<input type="checkbox"/> Other (please list) _____

5.3.3 What type of ventilation was installed as part of the organic material storage in 2013? *Select all that apply.*

Ventilation of Organic Material Storage	
a.	<input type="checkbox"/> Natural ventilation
b.	<input type="checkbox"/> Biofilter
c.	<input type="checkbox"/> Activated carbon filters
d.	<input type="checkbox"/> Other (please list) _____

Section 6: About Your Energy Production

The questions in Section 6 are designed to obtain information regarding energy production from your biogas operation, and how much biogas generated is converted to useable energy, and in what form. Please answer the following questions.

6.1 What was the nameplate capacity of your combined heat and power (CHP) unit in 2013? *Enter size in kilowatts (kW).*

CHPSize (kW)
<input type="text"/>

6.2 Please indicate your total biogas production in 2013 and the average methane content. *Enter biogas production in cubic metres per year and average methane content in percent methane.*

Biogas Production in 2013	Average Methane Content
<input type="text"/> m ³	<input type="text"/> % methane

6.3 Was all the biogas produced in 2013 used to generate electricity? *Select one response.*

Electricity Generation Only
<input type="checkbox"/> Yes
<input type="checkbox"/> No

6.4 How much of the electricity produced in 2013 was used by the biogas system (parasitic load)? *Select one response.*

Electricity Used by Biogas System
<input type="checkbox"/> <5%
<input type="checkbox"/> 5-10%
<input type="checkbox"/> >10%

6.5 What was your average monthly electricity generation from biogas in 2013? *Select one response. Refer to your electricity generation statement from your local distribution company.*

Biogas Generation Per Month	
a.	<input type="checkbox"/> less than 90,000 kWh
b.	<input type="checkbox"/> 90,000 - 180,000 kWh
c.	<input type="checkbox"/> 180,000 - 270,000 kWh
d.	<input type="checkbox"/> 270,000 - 360,000 kWh
e.	<input type="checkbox"/> 360,000 - 720,000 kWh
f.	<input type="checkbox"/> greater than 720,000 kWh

6.6 What was your average monthly downtime for system maintenance in 2013? *Enter number in hours per month.*

Hours/Month
<input type="text"/>

6.7 Did you have a flare in 2013, and if so, what type? *Select all that apply.*

Flare	Type
a. <input type="checkbox"/> Yes	<input type="checkbox"/> open flare <input type="checkbox"/> closed flare
b. <input type="checkbox"/> No	

6.8 How much generation was flared in 2013? *Select one response.*

Biogas Generation Flared in 2013	
a. <input type="checkbox"/>	< 5%
b. <input type="checkbox"/>	5-10%
c. <input type="checkbox"/>	10-15%
d. <input type="checkbox"/>	>15%

6.9 Did you use biogas for direct combustion in a boiler in 2013? *Select one response.*

Biogas Direct Combustion in Boiler	
<input type="checkbox"/> Yes	(Move to Section 6.9.1)
<input type="checkbox"/> No	(Move to Section 6.10)

6.9.1 How much biogas was used for direct combustion in a boiler in 2013? *Select one response.*

Biogas Generation Used for Heating in 2013	
a. <input type="checkbox"/>	1 - 20%
b. <input type="checkbox"/>	20 - 50%
c. <input type="checkbox"/>	50 - 100%

6.9.2 How much money did you save in heating costs in 2013 from using biogas for direct combustion in a boiler? Enter number. Example calculation below:

A - B = C, where

A = Dollars spent for direct combustion in a boiler before installing the anaerobic digester

B = Dollars spend for direct combustion in a boiler after installing the anaerobic digester

C = Money saved per year in heating costs for direct combustion in a boiler

Dollars Saved/Year
<input type="text"/>

6.10 Did you use residual heat from the CHP for heating purposes in 2013? *Select one response.*

Biogas Direct Combustion in Boiler	
<input type="checkbox"/> Yes	(Move to Section 6.10.1)
<input type="checkbox"/> No	(Move to Section 7)

6.10.1 How much money did you save in heating costs in 2013 from using residual CHP heat? *Enter number.*

Dollars Saved/Year
<input type="text"/>

Section 7: About Your Digestate Management Practices

The questions in Section 7 are designed to obtain information on digestate management practices you employ that may change greenhouse gas emissions (such as methane) and air quality emissions (such as ammonia). To help understand greenhouse gas and air pollution emissions from anaerobically digested materials, please answer the following questions.

7.1 What type of digestate storage system was associated with your farm/biogas system in 2013?

	Digestate Manure Storage Type	Dimensions (indicate depth of digestate storage)		
a.	<input type="checkbox"/> Tanks (above ground)	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
b.	<input type="checkbox"/> Tanks (mostly below ground)	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
c.	<input type="checkbox"/> Earthen (single cell)	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
d.	<input type="checkbox"/> Earthen (multiple cells)			
	Cell #1	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
	Cell #2	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m
	Cell #3	<input type="checkbox"/> <1m	<input type="checkbox"/> 1 - 2m	<input type="checkbox"/> >=2m

7.2 In 2013, when did you agitate the digestate storage? *Select all months that apply.*

Months Digestate Storage was Agitated in 2013	
<input type="checkbox"/>	January
<input type="checkbox"/>	February
<input type="checkbox"/>	March
<input type="checkbox"/>	April
<input type="checkbox"/>	May
<input type="checkbox"/>	June
<input type="checkbox"/>	July
<input type="checkbox"/>	August
<input type="checkbox"/>	September
<input type="checkbox"/>	October
<input type="checkbox"/>	November
<input type="checkbox"/>	December
<input type="checkbox"/>	Did not agitate digestate storage in 2013

7.3 What was your annual energy consumption for digestate agitation in 2013? *Indicate approximate number of tractor hours.*

Number of Tractor Hours for Digestate Agitation in 2013	
a.	<input type="checkbox"/> less than 5 hours
b.	<input type="checkbox"/> between 5 and 10 hours
c.	<input type="checkbox"/> over 10 hours

7.4 How much diesel fuel was consumed in 2013 specifically for agitation of digestate? *Enter litres of diesel fuel per year.*

L Diesel/Year
<input type="text"/>

7.5 Did your agitation practices change between liquid manure and digestate after your biogas system was installed? *Select one response.*

Agitation Frequency Comparison	
a.	<input type="checkbox"/> increased
b.	<input type="checkbox"/> decreased
c.	<input type="checkbox"/> stayed the same

7.6 Did you routinely analyze your digestate at a certified laboratory for N, P and K in 2013?

Digestate Analysis	
<input type="checkbox"/> Yes	(Move to Section 7.6.1)
<input type="checkbox"/> No	(Move to Section 7.7)

7.6.1 What were the lab results of the most recent analysis of digestate from your farm operation? If more than one sample analyzed choose the most typical.

		Digestate Lab Result	Unit of Measure
a.	Moisture Content		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage
b.	Dry Matter Content		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage
c.	Total Nitrogen (N)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
d.	Ammonium (NH ₄)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
e.	Phosphorus (P)		<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
f.	pH		

7.7 What was the average FOS/TAC reading of the digestate in 2013?
FOS/TAC values are a measured ratio of the volatile organic acids (FOS) and the total inorganic carbonate (TAC) of digestate.

FOS/TAC Reading
<input type="checkbox"/>

7.8 In 2013, when was the digestate storage emptied completely to within one foot of the bottom? *Select all months that apply.*

Months Digestate Storage is Completely Emptied in 2013	
<input type="checkbox"/>	January
<input type="checkbox"/>	February

<input type="checkbox"/>	March
<input type="checkbox"/>	April
<input type="checkbox"/>	May
<input type="checkbox"/>	June
<input type="checkbox"/>	July
<input type="checkbox"/>	August
<input type="checkbox"/>	September
<input type="checkbox"/>	October
<input type="checkbox"/>	November
<input type="checkbox"/>	December
<input type="checkbox"/>	Did not completely empty digestate storage in 2013

7.9 Did you separate solids from your digestate for use as bedding in 2013?

Separated Solids From Digestate	
<input type="checkbox"/>	Yes (Move to Section 7.9.1)
<input type="checkbox"/>	No (Move to Section 7.10)

7.9.1 What percentage of your digestate was separated in 2013?

Percentage of Separated Solids	
<input type="checkbox"/>	0 - 25%
<input type="checkbox"/>	26 - 50%
<input type="checkbox"/>	51 - 75%
<input type="checkbox"/>	75 - 100%

7.9.2 How did you store the separated solids in 2013?

Separated Solid Storage	
<input type="checkbox"/>	Enclosed building
<input type="checkbox"/>	Freely ventilated building

7.10 Was digestate land applied on your farm in 2013?

Digestate Land Application on Your Farm	
<input type="checkbox"/>	Yes (Move to Section 7.10.1)
<input type="checkbox"/>	No (Move to Section 7.11)

7.10.1 At what time of year was the digestate land applied and in what percentage?

	Timing of Land Application of Digestate	Percentage
a.	<input type="checkbox"/> spring	%
b.	<input type="checkbox"/> summer	%
c.	<input type="checkbox"/> fall	%

7.10.2 In 2013, approximately what percentage of digestate from your farm operation was... *Total percentage must add up to 100%.*

		Percentage of Digestate From Your Biogas Operation in 2013
a.	Spread on your land used for feed	%
b.	Used on other crop land on your farm not used for feed	%
c.	Spread on neighbours' land	%

d.	Removed by a contractor (don't know how it was used)	%
e.	Sold off the farm	%
f.	Or, other (please specify)	%
	Total (must equal 100%)	100%

7.10.3 In 2013, on what crops did you apply digestate from your farm operation and approximate volume applied?

Comment [MSOffice7]: Question only prompted if land application selected in previous question.

	Type of Crop Receiving Digestate	Amount of Digestate	Number of Acres	Percentage
a.	<input type="checkbox"/> hay	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
b.	<input type="checkbox"/> corn	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
c.	<input type="checkbox"/> soybeans	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
d.	<input type="checkbox"/> small grains (barley, wheat, oats)	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
e.	<input type="checkbox"/> Other (please specify)	<input type="checkbox"/> gal/ac <input type="checkbox"/> m3/ha	<input type="checkbox"/> ac <input type="checkbox"/> ha	%
	Total			100 %

7.11 Did you routinely analyze your digestate at a certified laboratory for N, P and K in 2013?

Digestate Analysis	
<input type="checkbox"/> Yes	(Move to Section 7.11.1)
<input type="checkbox"/> No	(End of Survey)

7.11.1 What were the lab results of the most recent lab analysis of digestate from your farm operation? *If more than one sample analyzed choose the most typical.*

	Digestate Lab Result	Unit of Measure
a.	Moisture Content	<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage
b.	Dry Matter Content	<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage
c.	Total Nitrogen (N)	<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
d.	Ammonium (NH4)	<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)
e.	Phosphorus (P)	<input type="checkbox"/> Kilograms (kg) per metric tonne of manure <input type="checkbox"/> Pounds (lb) per imperial ton of manure <input type="checkbox"/> Percentage <input type="checkbox"/> Parts per million (ppm)

f.	pH		
----	----	--	--

That completes our survey. Thank you very much for your time and participation in our survey. Your input is greatly appreciated.

First Name
Last Name
Address
Town
Province
Postal code

Thank you very much for your time and input.