Written Testimony for House Bill 1349 for the House Consumer Affairs Committee Hearing on September 2, 2015:

By
John Williamson
TeamAg, Inc.
Ephrata, PA

Introduction:

The Professional Dairy Managers of Pennsylvania (PDMP) and TeamAg, Inc., as well as family dairies and livestock operations are grateful for the opportunity for us to provide testimony today to the Consumer Affairs Committee in support of the House Bill 1349. This bill, if passed, will amend Title 66 (Public Utilities) of the Pennsylvania Consolidated Statutes, by abrogating or repealing provisions relating to the production of electrical power from biologically derived methane gas. This bill addresses concerns that we have from the PA Public Utility Commission in its proposed rule changes to net metering which would limit the net metering provisions that have benefit dairies and livestock operations with digesters.

The Pennsylvania Public Utility Commission (PA PUC) in February, 2014 introduced a proposal – Docket L-2014-2404361 "Proposed Net Metering Changes," that if approved, will limit the amount of excess energy a farm (or any customer/generator) can sell to utilities through net metering. The purpose of the proposed changes is to the level the playing field among retail renewable energy sellers and payers. Farm-based anaerobic digesters are included in that category, along with solar and wind power distributed energy generators. Our main concern with the original proposed requirement was ***that the alternative energy system must be sized to generate no more than 110% of the farm's annual electric consumption.*** Later, in April 2015 PA Public Utility Commission after receiving many public comments proposed a ***net metering system size cap of 200%*** for on-site generation. The PUC ended public comment on the rules at the end of May, and the draft will be subject to 18 months of reviews by state lawmakers and regulators before it is finalized. The documents associated with the case can be accessed at Docket L-2014-2404361

I speak from experience of having been involved with 11 anaerobic digesters that are in operation in Pennsylvania, as well as others in New York and Vermont. In my testimony today I

will first explain the evolution of digesters and how they work in addition to how Pennsylvania family farms have benefitted from these. Next, I will outline some of the environmental benefits from manure digesters. At the end, we will take a look into the future and the importance that net metering has on the development of digesters to mitigate important environmental challenges facing the Commonwealth.

The evolution of digesters

Anaerobic digestion is a simple technology that has been used for millennia. It basically consists of a covered tank containing manure, food waste, sewage, or other organic material in conditions without oxygen. The bacteria in the waste continue to digest this material and produces methane gas, which can be converted into energy by means of an engine/generator set. The digester is in a way, an extension of the cow's digestive process and continues digesting grain and feed. The excreted manure contains a lot of undigested feed which when in anaerobic conditions (without oxygen), the feed continues to get broken down and digested by bacteria. Typically, this process takes approximately 25-30 days. The digestion process works best when the temperature is constant at about 103 degrees, similar to the temperature of a cow. The farm digester allows the farm to extract maximum value from the investment and labor they make in their crop production.

Commonwealth of Pennsylvania in 2004 began promoting digesters through its Pennsylvania Energy Harvest Grant Program administered by DEP. At about the same time, the Alternative Energy Portfolio Standards (AEPS) Act was passed which provided the opportunity for net metering for digesters and other alternative energy producers. Simply put, net metering is a means by which a utility producer/customer has a meter that flows in either direction, depending on whether electricity is produced and sent into the utility grid or being consumed and taken off the grid. The advantage is that basically the same retail rate is applied both for production and consumption of electricity.

Dairy farms, in particular, benefit from anaerobic digesters. Dairies are large consumers of electricity. A 750-cow dairy may annually pay $75,000 for electricity. With a digester, a dairy can sell their excess electricity to the utility company and receive a significant income. During a

time of price instability for their milk, a constant source of revenue is most welcome! Another benefit is the use of the fibrous manure solids which is used for bedding the cows. When the manure has been digested, nearly all of the pathogenic bacteria has been killed and it can be a clean source for bedding. Another benefit is that digested manure has very little odor. This results in improved relationships with neighbors.

In the US, Pennsylvania has the second highest number of manure ADs-- 30, with the majority (23) being located on family dairy farms[1]. TeamAg has been involved with 16 of these family farms. In the past couple of years, there have been no new digesters coming online, even though there is still high interest. One reason is the proposed rule change from the PUC which would limit the amount of electricity available for net metering. This has created high uncertainty since farms do not know what they can expect for annual revenue from the sale of excess energy. The second reason is that Pennsylvania has not provided grants to farm digesters for the past two years.

Digesters may be a simple technology, but they are still expensive to construct. The digester tank has to be sized to hold 28 days worth of manure. It has to be insulated and kept at a constant temperature. This all requires piping, heat exchangers and electronic controls. There needs to be safeguards for the methane gas. The engine and generator has to be sized to handle all of the gas. The interconnection with the utility has to be done according to high standards of the utility. Often, 3-phase electric line needs to be brought to the farm. These projects typically now cost $1.5 to $2.5 million, depending on number of animals and other site costs. Operation and Maintenance costs for keeping the digester running cost about 2-3 cents per kW-hour of electricity produced.

The provision of net metering has been essential for the development of digesters in the Commonwealth, as well as keeping them in operation. Dairies realize that the digester is an important source of income, similar to their cows that produce milk. A dairy hopes to earn a net profit of $500- $800 per cow. A digester also adding food waste can earn up to an additional $200 per cow. Due to this income, dairies are committed to properly maintain the digester and

[1] Agstar database found at http://www.epa.gov/agstar/projects/

keeping it operational. Certain years such as 2009 and what is being predicted for 2016, due to global milk prices, for which dairies have no control, the price of milk has "tanked". During these times, in particular, a dairy appreciates the extra income received from the check provided by the utility company through the sale of electricity.

Environmental Benefits from Manure Digesters:

The Commonwealth also benefits from farm digesters in the following ways:

1. **Anaerobic Digesters make an important impact on Water Quality in the Commonwealth:** During the treatment process within a digester, the organic forms of Nitrogen and Phosphorus shift to inorganic forms which are more readily available and more efficiently taken up by crops. Digesters convert organic Nitrogen into Ammonia which is more predictable and controlled than the less controlled release of Nitrogen from organic compounds to the soil, thereby providing an improved water quality benefit.

2. **Anaerobic Digesters provide significant support to the goals established for the ongoing effort to restore the Chesapeake Bay:** Digesters and other manure-to-energy technologies is a key element of Pennsylvania's Watershed Implementation Program (WIP)[2]. After digester treatment, Phosphorus is reduced when manure solids are utilized for bedding. Nitrogen is more efficiently used in the inorganic form of ammonia.

3. **Anaerobic Digesters significantly reduce odors:** AD is the best strategy for reducing odors from all livestock operations of its manure and to offset complaints from nearby neighbors.

4. **Anaerobic Digesters reduce Greenhouse Gas Emissions**: Greenhouse gas (GHG) reduction is critical in mitigating climate change. Anaerobic digesters (AD) reduce greenhouse gas emissions in two different ways: substantially reducing uncontrolled methane gas from manure storage facilities and by offsetting fossil fuels used in the

[2] Pennsylvania Department of Environmental Protection, "Pennsylvania Chesapeake Watershed Implementation Plan" January 11, 2011, page 90.

generation of electricity. While other alternative energy producers (wind and solar) reduce GHG emissions through providing "clean" energy, manure digester have the added advantage that it reduces methane gas from the manure storage facility. Farm digesters capture and destroy approximately 4 TCO_2e (tons Carbon Dioxide equivalent) per lactating cow per year—or the equivalent of removing 0.72 cars from the road each year[3]. The GHG emissions being removed by the existing 30 Pennsylvania anaerobic digesters in Pennsylvania is annually reducing over 55,000 TCO_2e or the equivalent to removing approximately 14,000 cars from the road. The second way that ADs improve air quality in Pennsylvania is through generating "clean" electricity. A typical dairy farm with an AD has 750 cows which will generate approximately 1500 MWh of clean renewable energy in a year, meeting the consumption needs of about 130 Pennsylvania households. This clean energy removes the equivalent of 1560 TCO_2e from the atmosphere that is being generated from thermal (coal) power plants.[4]

Looking into the Future:

We want to look strategically into the future at how several future trends will affect the development of digesters and the importance of net metering. The first trend is related to upcoming possible regulations directed towards livestock operations related to Green House Gases. The second trend is the recently introduced EPA's Clean Power Plan. Another trend is the increased opportunity of organic diversion of food waste to farms.

The EPA has identified that agriculture contributes 9% of the total Greenhouse Gas Emissions[5]. Methane gas coming off liquid manure storage facilities account for 12% of the total GHG emissions from the Agriculture Sector. Digesters capture the methane gas to produce renewable energy. Will the EPA go after Pennsylvania's dairies and livestock operations in order to reduce these GHG emissions? Time will tell.

---

[3] Pronto, Jennifer and Curt A. Gooch, "Greenhouse Gas (ghg) Emission Reductions Due to Anaerobic Digestion of Dairy Manure," 2009 ASABE Annual International Meeting, 2009.

[4] Steam electric generators using bituminous coal produce 2.08 pounds CO2 per kWh. See http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11

[5] http://www.epa.gov/climatechange/ghgemissions/sources/agriculture.html

On August 3, 2015, President Obama and EPA announced the Clean Power Plan to reduce carbon pollution from power plants. The Clean Power Plan gives each state a choice in how they meet their goals. The EPA is providing a Clean Energy Incentive Program to reward early investments in certain renewable energy and demand-side energy efficiency projects that generate carbon-free MWh.[6] Anaerobic digesters provide renewable energy which can contribute to Pennsylvania's plan to reduce its overall carbon pollution.

Several states (Connecticut,[7] Massachusetts,[8] Vermont[9] in our region already have regulations where food waste is being diverted from landfills to farms where it is treated by means of composting or ADs and then used as a soil amendment. Will Pennsylvania be following this trend? Even without regulation, here in Pennsylvania, many companies, such as Weis Supermarkets, McDonalds, are already sending their food waste to digesters, instead of the landfill. Food waste diverted to digesters and then land applied on farms not only build up soils, but also significantly reduce the volume of waste being sent to the landfills.

Summary and Conclusion:

Pennsylvania was a leader in the development of manure anaerobic digesters during the first decade of 2000's, with the Commonwealth's promotion strategy through its Pennsylvania Energy Harvest Grants and net metering provisions of the Alternative Energy Portfolio Standards (AEPS) Act of 2004. Through these two strategies, we have benefitted through cleaner air and water. Since the PUC's proposed rule change in 2014, there have been no more new digesters. The uncertainty of farms not knowing what price they can sell their electricity and the possible limitations on the size of their generators is the main cause attributed to the lack of development of new digesters. Setting limits of 110% or even 200% caps of electricity production over consumption hampers innovative uses of digesters for treating food waste or for setting up digesters on small farms which may take manure from several sources from nearby farms.

[6] http://www2.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-and-role-states
[7] http://www.ct.gov/deep/cwp/view.asp?a=2718&q=552676&deepNav_GID=1645
[8] http://www.mass.gov/eea/agencies/massdep/recycle/reduce/food-waste-ban.html
[9] http://www.americanrecycler.com/0114/2428more.shtml

House Bill 1349, if it becomes law, will exempt digesters and other sources of biologically derived methane gas from PUC's regulation of electricity allowing farms to continue to benefit from net metering. This, along with providing grants for renewable energy, will help dairies and livestock operations to both improve their environmental stewardship and economic performance. Anaerobic digesters are the best practice to meet both of these goals on a farm.

Appendices:

TeamAg Pennsylvania clients with digesters:

1. Dovan Farms (Somerset County)
2. Hillcrest Saylor Farm (Somerset County)
3. Schrack Farms (Clinton County)
4. Four Winds Farms (Potter County)
5. Wanner's Pride-N-Joy Farm (Lancaster County)
6. Brookside Dairy (Indiana County)
7. Brubaker Farms (Lancaster County)
8. Reinford Farms, Inc. (Juniata County)
9. Kish View Farm (Mifflin County)
10. LandyShade Farms (Lancaster County)
11. Gerald Zimmerman (Lancaster County)
12. S & A Kreider and Sons (Lancaster County)
13. Oregon Dairy Farm, LLC (Lancaster County)
14. Reinford-Frymoyer, LLC (Juniata County)
15. Pennwood Farms (Somerset County)
16. Ideal Family Farms (Snyder County)

Overview of net metering (from pennfure.org)

For the average customer, electric meters measure the electricity consumed at a home or business. As a customer takes electricity from the electric grid to meet their power needs, the meter runs forward, counting all of the kilowatt-hours (kWh) consumed.

Net metering comes into play for customers that install an on-site clean energy system such as solar that is tied into the electric grid. Net metering works by using one or more meters that record both the amount of electricity the customer takes from the grid and the amount of electricity the clean energy system delivers to the grid. When a customer consumes more electricity than they generate, the meter spins forward; if a customer produces more electricity than they consume, the meter spins backward. At the end of the month, the customer is only billed for the "net" amount of electricity consumed.

The Pennsylvania PUC has specific regulations pertaining to net metering that set standards for how electric utilities meter and compensate customers who generate their own electricity. These regulations allow customers to reduce their monthly electricity bill by selling excess power generated at their homes or businesses back to the utility.

By adopting forward-thinking net metering regulations, Pennsylvania is encouraging the installation and use of clean energy systems. This will reduce our carbon footprint, increase the reliability of our electric grid and diversify our power supply.

Eligible systems: solar, landfill gas, wind, biomass, fuel cells, municipal solid waste, combined heat and power/co-generation, and others.

Size limits of Net metering provisions:

- Residential customer = 50 kilowatts (KW)
- Non-residential residential customer = 3 megawatts (MW)
- If a non-residential customer is willing to operate its system in parallel with the electric grid during emergencies they can net meter up to 5 MW.

Monthly credit: When your clean energy system produces more electricity than you consume, the excess is delivered back to the grid for others to use. Every month, your utility must credit you for each kilowatt-hour (kWh) of excess electricity delivered to the grid. This credit must be given at the full retail rate — meaning it is equal to the charges you currently pay for generation, transmission and distribution. Your monthly electric bill, in turn, will be reduced by these credits. In a given month, if you produce more electricity than you consume, the extra credits will be rolled over to the next month's bill.

Excess generation: If there are still carryover credits at the end of the year — meaning over the course of the year you have produced more electricity than you consumed — the utility must pay you for that excess generation at a rate equal to the utility's price-to-compare (transmission and generation charges).

Virtual and physical meter aggregation: Some customers, like farmers, may have a wide variety of structures on their lands: barns, buildings, shops and residences. Each of these structures has its own electric meter and associated rate class - some commercial, others residential. Current net metering regulations allow for customers to either physically (hard wire) or virtually (through billing) aggregate these meters of varying rate classes with a clean energy system to help offset the electricity usage at each structure.

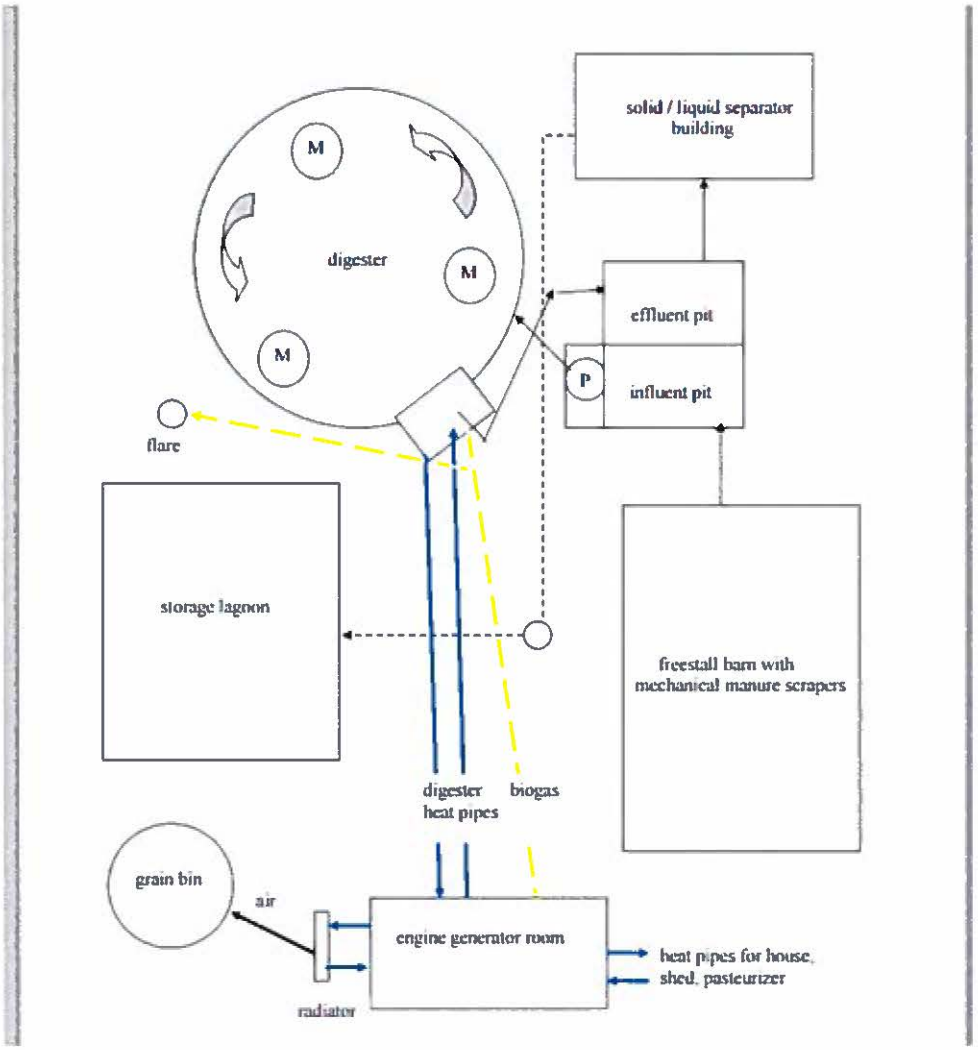
For a customer to be able to participate in meter aggregation they must meet the following criteria: The customer must own or lease the property where the clean energy system is installed; the meters must be within two miles of the property; and the meters must all be in the same utility's service territory. The utility is required to provide the necessary equipment and billing changes to accommodate physical or virtual meter.

257 **Economic Feasibility, using current information for three dairies In**
258 **Pennsylvania:**
259

Farm	1	2	3
Location	Cambria	Lancaster	Centre
# of Cows	438	950	1100
Annual Electricity Consumption, kWhr	215,000	763,256	1,023,880
Proposed Annual Electricity Output, kWhr/yr	788,400	1,558,000	2,496,000
Estimated Cost	$1,840,000	$1,818,000	$2,015,000
Estimated Grants	$1,200,000	$1,300,000	$1,550,000
Annual Total Revenues & Savings	$198,000	$229,000	$314,000
Annual Electricity Sales/Savings	$47,500	$153,000	$170,000
Tipping Fees from Food Waste	$105,000	Farm does not want to take food waste	$100,000
Estimated Greenhouse Gas Emissions Reduction (TCO_2e (tons Carbon Dioxide equivalent)	1600	3680	4400

260
261
262

Figure: Reinford digester system schematic (http://extension.psu.edu/natural-resources/energy/waste-to-energy/resources/biogas/documents/reinford-1209.pdf)



268 Reinford Farms, Complet Mix Digester Juniata County

269
270

Plug-flow Digester at Schrack Farms in Clinton County, 2006.