



DANE COUNTY

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Dane County has a wonderful and varied history that includes strong economic growth and development, continued protection of our lakes and other natural resources, and a very strong farming industry. 2008 was a very volatile year with fuel prices, feed costs and fertilizer prices all skyrocketing and with the price of milk, soybeans and corn starting high for producers in the beginning of the year and dropping by the end. For 2009, it's hard to predict what our local economy will be in light of an international recession, so meanwhile, what can we try to do here to provide more profitability for farmers?

In the dairy industry alone, Dane County has approximately 400 dairy farms with about 50,000 cattle. Every day, these animals generate millions of pounds of manure. That vast quantity of manure contains a very significant amount of potential renewable energy, or Cow Power, which we can harness with manure digesters. The potential for creating new jobs and renewable energy from manure is an important reason why I have worked so hard to create the possibility for manure digestion to become part of Dane County agriculture. But there is another good reason, too. That reason is water quality, especially in our lakes. Manure introduces phosphorous and ammonia into a lake or stream and robs those waters of their oxygen. The latter two can kill fish; phosphorous is the perfect fertilizer for blue green algae, which is the single biggest

problem in our lakes. Because of these factors, the County has required farmers to be more careful in spreading manure, especially in the winter and early spring. We've approached regulation to achieve fairness and balance. As examples, we've adopted strict stormwater management and construction site erosion control ordinances, which have big impacts in urban and suburban areas, and we have banned phosphorous in lawn fertilizers. But, moving beyond regulations, the County Board and I wanted positive, creative, fiscally sound approaches to manure management. That is why I formed a feasibility advisory committee in the spring of 2006 with representatives from the County Board, County staff, UW, the local utility companies, and farmers. The Committee's task was to find economical ways to strengthen the livestock industry in Dane County, and protect water quality as related to manure management. The committee and we were looking for manure management to meet three specific goals.

First, a manure management system has to ensure agricultural viability and sustainability. Second, it has to protect the quality of our waterways. Third, it has to be economically feasible. I strongly and directly support manure management that meets all of these tests. My support has taken several forms but a big one has been funding. I have allocated over \$200,000 for the feasibility study and for the business plan study. With these goals in mind, the County hired Strand Associates to first perform the feasibility study, which started in the spring of 2007. The study focused on 23 different variations of manure management technology and on two test areas within the County, an area near Waunakee and an area near Middleton. We chose these areas because of farm proximity to one another and because of farmer responses to an initial survey, not because of how these farms are currently handling their manure. We wanted farms

in clusters because Dane County does not have many farms large enough to support a digester on its own but many small to medium sized farms with manure issues and in close proximity to one another. Figuring out how neighborhood or regional digesters could work will be a huge boost to our farm economy and lakes.

With extensive investigation, Strand completed the feasibility study in the spring of 2008. It concluded that there are indeed manure management systems that provide agricultural viability and sustainability, protect water quality, and are economically feasible. The best of these was anaerobic digestion with solid separation.

In this type of system, manure will enter a digester, where it will be heated enough to allow bacteria to break the manure down into two main byproducts. The first byproduct of the digester is digestate, which is simply the liquid and solid portion of manure that is remaining. The digestate is run through a solid separator, with the resulting liquids sent to a lagoon for land application and the resulting solids stored on site for bedding, sale as compost, or possible land application consistent with a nutrient management plan. The second product from the digester is biogas, which can be burned in a generator to produce electricity, or it can be cleaned and used as natural gas.

This system should be especially feasible in the Waunakee cluster because the proximity of the farms allows for much of the manure to be pumped instead of trucked to the digester.

Anaerobic digestion with advanced solid separation is denoted as C-3W on the attached slide, which shows the economics of the various manure management systems that Strand studied. It also shows the existing costs for manure management

on the studied farms. This cost evaluation includes: changes in the cost for manure management, greenhouse gas credits, renewable energy credits, electricity or gas production, value of extra solids, and bedding costs, among other items.

Alternative	P Removed (%)	Opinion of Net Annual O&M Expense (Revenue)			
		Year 2007	Year 2012	Year 2012 + 25% (design A.U.)	Per A.U. (2007)
Individual Farm^a					
Existing	0%	\$82,000	\$93,000	\$107,000	\$164
F-1	45%	\$152,000	\$165,000	\$193,000	\$304
F-2	85%	\$53,000	\$47,000	\$48,000	\$108
F-3	85%	\$82,000	\$78,000	\$80,000	\$164
Waunakee Cluster^b					
Existing	0%	\$936,000	\$1,059,000	\$1,218,000	\$298
C-1W	45%	\$1,007,000	\$1,086,000	\$1,291,000	\$320
C-2W	85%	\$98,000	\$20,000	(\$13,000)	\$31
C-3W	85%	(\$220,000)	(\$350,000)	(\$480,000)	(\$70)
C-4W	90%	\$884,000	\$890,000	\$1,072,000	\$281
C-5W	100%	(\$183,000)	(\$296,000)	(\$409,000)	(\$58)
Middleton Cluster^c					
Existing	0%	\$682,000	\$772,000	\$926,000	\$179
C-1M	45%	\$946,000	\$1,031,000	\$1,222,000	\$248
C-2M	85%	\$600,000	\$612,000	\$701,000	\$157
C-3M	85%	\$304,000	\$268,000	\$271,000	\$80
C-4M	90%	\$1,144,000	\$1,210,000	\$1,451,000	\$300
C-5M	100%	\$235,000	\$199,000	\$193,000	\$62

^a Year 2007 A.U. = 500; Year 2012 A.U. = 535; design A.U. = 669.
^b Year 2007 A.U. = 3,145; Year 2012 A.U. = 3,434; design A.U. = 4,293.
^c Year 2007 A.U. = 3,813; Year 2012 A.U. = 3,966; design A.U. = 4,957.
^d O&M costs do not include the cost for any commercial fertilizer required to replace manure-based fertilizer not applied to the soil in any of the alternatives.

Table ES.04-2 Opinion of Annual O&M Costs^d

While looking at this chart, please note that these cost projections should not be considered precise values, as they were developed using a number of assumptions and some data that has since improved. For example, the amount of revenue that is generated by electricity will likely increase because of recent increases in the rates that our local utilities are paying for this type of renewable energy. Also, as you know, the

value of fertilizer has increased significantly, which means that the extra solids from this system are likely more valuable. In addition, there is a strong likelihood that the renewable GHG credits will be worth much more with the change in the national administration. This too would lead to increased revenue for these types of digester projects.

Another big change in the economic evaluation is that, since the feasibility study was published, there has been some increased interest from additional area farms. This could potentially increase the size of the digestion facility, and significantly change the economic values. Strand is taking into account all of these factors during the second phase of Dane County's manure digester study which is currently underway.

Where We Are Now

During this phase, Strand is performing a much more in-depth evaluation to determine the feasibility of a specific manure management system (anaerobic digestion with solids separation) working at a specific location. The results of this phase will include: selection of potential sites, general tank and equipment sizing, possible uses for the digestion byproducts, more detailed capital and O&M costs analyses, and potential ownership models. These can be summarized as a site and equipment plan and a business plan for the digester.

So far, the Facilities Planning Phase is on schedule, and Strand is already starting to put together some concrete results. For example, Strand has provided the following preliminary numbers for potential renewable energy from the proposed digester.

Cogeneration

Electricity: >1 MW
Waste Heat: ~ 150 million BTU/day
Value (\$0.10/KWH): ~ \$900,000/year

One MW of electricity will power over 1000 homes in Dane County. Furthermore, the potential emission reduction from eliminating the long-term lagoon storage of the manure is estimated at approximately 19,800 metric tons per year of equivalent CO₂. This is equivalent to the CO₂ emissions from driving approximately 50 million miles/year at an average fuel economy of 25 miles/gallon.

Bio-Natural Gas (Methane)

Volume: ~ 360,000 ft³/day

Energy: ~ 360 million BTU/day

Value: (\$10/MMBTU): ~ \$1.3 million/year

In the coming weeks, we will be sharing additional preliminary information with the affected farmers to gather feedback from them, and their comments will help us to finalize the current phase of our study. So, clearly, there is still some work to be done, but the full report is expected in the next couple months. At that time, Dane County will hold a meeting with all interested parties to present the report and to discuss future options.

We've done more than study numbers. To see how all of this can work in southern Wisconsin with local dairy farmers, the farmers, engineers, planners, and county staff working on this have twice visited the Crave Brothers' Farm near Waterloo (not far from Marshall), the site of a large, state of the art manure digester. (Crave Brothers won an award at the recent annual World Dairy Expo.) I was on the first visit; like just about everyone else, I was impressed by the neatness and efficiency of the digester and the ways it has helped out the Crave Brothers' operation.

Once the current phase is completed, the next step is to help facilitate the construction of an actual digester facility. In this tough overall economy, financing the digester at a cost of probably several million dollars will be difficult. That's why I

proposed and the County Board approved about \$1 million to help finance this project, should such assistance be necessary. How this is accomplished has not yet been decided, but a likely path would be for Dane County to take the information we have gathered and issue a Request for Proposals (RFP). As a result of this RFP, companies interested in building and operating a digestion system similar to the one we are proposing would provide cost estimates, ownership models, and other information that may be important to this project. Following a review of each company's proposal, the participating farmers and County could then choose a company to start construction of a digestion facility in late 2009 or early 2010. This is an aggressive schedule, and there are still a lot of questions to be answered; this project is something that has many benefits that I am very committed to seeing completed.

Just think of the list of benefits -- 95% of phosphorous kept out of the lakes; better manure management and room for herd expansion for farmers; significant additional farm revenue; locally produced, sustainable green energy; local, good paying jobs for constructing and operating the digester.

This is a harvest we should reap.

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