

Market Based Collaboration to Deliver Energy Efficiency and Economic Development in the Agriculture Sector

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Program Overview and History

GDS Associates manages Agriculture and Rural Business Program for Wisconsin's Focus on Energy Program. State legislation, Act 9, passed in 1999, created the Focus on Energy program. The vision for the program is to educate and support the people of Wisconsin to make sound energy efficiency and renewable energy investments that result in sustained economic growth and a healthy environment for current and future generations.

The Focus on Energy program as a whole, is a combined market transformation and resource acquisition program that services a full range of residential and non-residential customers with energy efficiency and renewable energy program services. Four programs serve non-residential markets including:

- Industrial customers
- Commercial customers
- Schools and local governments
- Agriculture related customers

Wisconsin has historically been an agricultural state with rich traditions, particularly in the dairy industry. However, today's Wisconsin farm communities stand at the crossroads of significant change. Increasing pressures from volatile agricultural commodity prices; increased production costs; encroachment of urban and suburban communities; increased regulation regarding land use, air, surface and ground water quality, along with an aging infrastructure combine to create serious barriers to Wisconsin's economic competitiveness in the worldwide agricultural marketplace. Further, declining farm numbers, aging farmers, and population shifts away from rural communities add to the sense of urgency if Wisconsin is to maintain and build upon its agriculture traditions.

Significant resources and support—economic or otherwise—are needed by Wisconsin rural communities to better position them to compete in a global economy. Many resources are available through associations, state agencies, and targeted programs. Despite the resources currently available, there remains a critical need for increased coordination of services, information exchange, and new opportunity development to address critical needs (energy and energy-related) in a timely fashion.

The overall goal of the Agriculture and Rural Business program is to improve the overall efficiency and sustainability of production agricultural and to reduce energy use and prevent pollution for all agricultural customers in Wisconsin.

The Focus on Energy Agriculture and Rural Business Program (the Agriculture Program) serves markets related to agricultural production, hobby farms, green houses, processing, and storage facilities. The program offers general energy efficiency information related to these markets, consultation for specific customer needs, and energy efficiency grants for implementing projects. The Agriculture Program does not address farmhouse energy needs (the Residential Program provides the programs for the home). Additionally, renewable energy opportunities are referred to the Renewable Energy Program, though the Agriculture Program may provide the first customer contact.

The Agriculture program was designed in 2001 and began providing services to customers beginning in late 2001. The program’s fiscal year begins on July 1st and ends on June 30th of the following year. The Agriculture Program’s gross annual savings¹ are as follows:

Table 1 Agriculture Program Annual Energy Savings

Year	Projects*	Kwh Saved	kW saved	Therms saved
FY02	79	930,000	278	1,300
FY03	210	7,130,000	1,805	61,000
FY04	403	16,036,000	3,550	92,000
FY05	457	15,132,000	3,622	260,000
FY06 (as of 10/31)	210	4,112,000	1,093	52,000
Totals	1,359	43,340,000	10,348	466,300

*Projects can include multiple measures. Although not typical, some customers may have more than one project in a given year. Note that FY02 was only a partial year.

The program’s eligible population includes approximately 10,000 dairy operations as well as more than 5,000 livestock, irrigation, greenhouse, grain operations and other agriculture related businesses. Assuming an average measure life of 10 years and an average cost of electricity and natural gas of \$0.092 per kwh and \$1.00 per therm, respectively, means that the lifetime energy savings to Wisconsin agriculture customers for equipment that has been installed to date through the program will be more than \$44 million dollars. With an approximate budget of \$5.4 million covering the timeframe in Table 1, the program has a benefit cost ratio of eight to one. This does not count overarching Focus on Energy administrative or marketing efforts.

Agriculture Market Characteristics and Program Considerations

One of the greatest challenges the Agriculture Program faces is keeping up with a very diverse and rapidly changing marketplace. As a customer group, the market for agriculture energy efficiency is somewhat of a cross between industrial customers and small commercial customers. The agriculture market is characterized by capital intensive and specialized operations, similar to a small industrial firm, though with a decision making hierarchy more characteristic of small businesses.

The lack of hierarchy and the fact that most agriculture producers are very technologically savvy, means that when decisions are made and plans executed, the time frame is often very short. This requires a program that can operate in “real-time” and attempt to influence thinking long before a final purchase decision is made. There is no situation in which a customer is waiting around to be told he needs to save energy and how to do it. Purchases and decisions happen constantly and the Agriculture Program must find ways to influence that decision. As a result, the Agriculture Program relies heavily on existing market actors to make end-use customers aware of the program and energy efficiency options. The Agriculture Program cannot be involved directly with every market decision that might involve energy efficiency. In order to make ourselves “present” at these decisions, we work closely with program allies.

¹ Gross savings numbers are presented due to changes in program offerings, evaluation methods and differences in year to year verified and attributed savings factors. For example, in FY06, the Agriculture and Rural business program no longer takes credit for compact fluorescent light savings. CFLs have their own adjustment factors and thus comparisons from one year to the next are not directly applicable. Further, traditional DSM attribution factor methodology may not be relevant for economic development and market collaboration efforts.

Program allies include trade allies, but go well beyond the trade ally definition. Program allies are anyone who is serving the interests of the end use customer and may have an influence on decision making. In the agriculture sector, most decisions are made by an owner or operator, sometimes by only one person. Most agriculture owner/operators must be “jacks of all trade” and rely on service providers for technical advice. Significant trust is placed on agriculture market service providers and close relationships are developed. For example, in the dairy industry there is little thought for a dairy equipment supplier currently serving a farm to enter a farm’s milk house unannounced and start checking equipment. For greenhouses, many supply companies provide careful education and advice, particularly for greenhouse structures and the use of chemicals. The level of involvement that the program allies have with the customer and the level of trust placed in those individuals by the customer makes the program allies a critical part of the program’s delivery mechanism. Their advice carries weight.

Program allies may also be individuals with no direct interest in the use of energy efficient equipment. Veterinarians and nutritionists may offer opinions on equipment or recommend that a customer contact the Agriculture Program. Their recommendations help provide credibility and credentials to an individual energy advisor in the Agriculture Program with whom the customer may never have had contact. In order to gain credibility with program allies not directly related to energy efficiency, the Agriculture Program must interact with these companies at general agriculture related trade shows and professional conferences.

The benefit of relying on a wide network of program allies is that the customer may come into contact with the program in any number of ways and likely several times before an energy efficiency decision is made. This allows the program to maintain efficient operating costs while maintaining a strong presence in the marketplace. However, there are costs associated with this approach. Time is required to learn the language and issues of both direct and indirectly related program allies. Energy advisors must become familiar with the issues and concerns across the agriculture marketplace. For example, GDS Associates has a Certified Nutrient Management Planner and Certified Crop Advisor on staff. The breadth of understanding of the agriculture markets is what ensures the network approach can work.

Perhaps even more important to broad expertise is maintaining a simple to use program with highly responsive customer service. Just as the network can be useful in broadcasting the energy efficiency message and accolades of the Agriculture Program, so to can it create broad ramifications to poor customer service or cumbersome procedures. How the program handles this issue is addressed further in the paper.

Specific Characteristics of Agriculture Markets in Wisconsin

As alluded to above, the agriculture market is not monolithic. Both between agriculture markets and within agriculture markets there are significant differences that influence economic decisions, including energy efficiency. We cover a few of the critical differences between and within the major agriculture markets in Wisconsin. This paper will focus specifically on the dairy and greenhouse markets.

Dairy Farms

Table 2 illustrates several characteristics of the dairy market that can drive energy efficiency purchasing decisions. Dairymen can be grouped into two general categories: large and small. However, it is important to recognize differences within even the large and small designation. In some cases small farm dairymen may be seeking to just maintain equipment until retirement. In other cases, dairymen may view their small operation as a stepping stone to expansion. These two basic views have critical

impacts on how energy efficient equipment is viewed and how critical payback rates are to the purchase decision. In either case, smaller farms can be more sensitive to energy costs as the costs are often included with family finances or go straight to impacting a small profit margin. One similarity of dairy farms of all sizes is the time horizon of expected operations. There are few farms that don't plan on being in business well into the future, even if ownership may change. An aging farmer can be an exception, but in contrast to other markets, most dairy farm infrastructure is long lived.

In the case of large farms, many are organized as corporations and may be owned by several families or have significant investor support. In most cases newer large dairies are maximizing their use of debt simply to create economies of scale and to allow their operations to grow. Cash flows are significant but free capital for extra investment may be scarce. For larger farms, timing the energy efficiency purchase can be extremely important.

Table 2 Selected Dairy Market Characteristics

Dairy Size	Debt Leverage	Sensitivity to Energy Prices	Ownership Structure	Focus of Owner	Capital Investment View
Large	High	Less	Corporation	Management	Part of ongoing process improvement
Small	Low	More	Sole Proprietorship	Lifestyle	Desire to minimize capital expenditures; long term investment view

Greenhouses

In contrast to dairy farms, greenhouse operators are very sensitive to energy costs. Natural gas and propane heating costs are typically the second largest expense (after labor) of the operation. A dairy farm may see energy expenses as one to two percent of operating costs, whereas a greenhouse operator's heating expenses through the year may constitute from ten to thirty percent of operating costs. However, greenhouse operators have very short time horizons and own infrastructure that does not often have a long life. Greenhouse markets change rapidly and what was grown one year may be abandoned for another crop in another year.

Table 2 illustrates several key factors that segment the greenhouse industry and drive energy efficiency decisions.

Table 2 Selected Greenhouse Market Characteristics

Greenhouse Size	Markets	Sensitivity to Energy Prices	Option to Not Operate During Winter?	Time Horizon
Large	Wholesale	Highly sensitive	No	Longer
Small	Wholesale and Retail	Retail growers less sensitive	Yes, if largely retail	Shorter

Greenhouse owners that heat through the Wisconsin winter have many cost effective technology options. However, the ability to utilize these options can be limited by the type and age of structure. Savings can be significant. For example the Agriculture Program found a polyethylene greenhouse recently specified for a customer to have the potential for 75 percent energy savings with a 4 year simple

payback, not including any incentives. The impact on profit margins can be significant. For example, cutting energy costs that represent 20 percent of operating costs by 50 percent (a very realistic goal for many growers) improves operating margins by 10 percent. The impact on net income can be even greater.

The high sensitivity to energy prices is contrasted by a generally short time horizon. Greenhouse markets change rapidly and most greenhouse structures are designed to allow for rapid changes. Capital expenditures with payback time horizons beyond two years are often not considered a viable option. Tying up capital in an energy efficiency project is viewed as taking a significant risk as new market conditions may require investment in new growing infrastructure designed to address new crops. An energy efficiency program cannot predict the movement of greenhouse crop markets any better than a greenhouse owner and is in no position to second guess the owner's decision. We can only operate in the marketplace, one that places a premium on maintaining flexibility both physically and financially.

Clearly the agriculture industry is far from monolithic, even within major industry segments. Understanding the subtleties of customer motivation can inform program design and delivery mechanisms. A successful program will approach the agriculture industry with multiple technologies and several program delivery methods. Program flexibility that leaves room for further program refinement and expansion is critical to addressing new markets, technologies, or changes within the industry.

Working in Channels and Networks

The Focus on Energy Agriculture program has utilized a number of methods to facilitate participation. Direct marketing to agriculture producers has been successful. However, the diversity of agriculture markets and geographical complexities can make direct marketing to producers difficult. Channel strategies and networking have proven very successful for outreach to our customers. These strategies include supply chain marketing as well as utility and processor networking.

Energy efficiency in agriculture is limited to a handful of technologies and processes. It is further limited by the manufacturers and professional providers promoting these technologies. These limitations create an atmosphere beneficial to supply chain marketing. A simple supply chain example can be recognized in Figure 1.

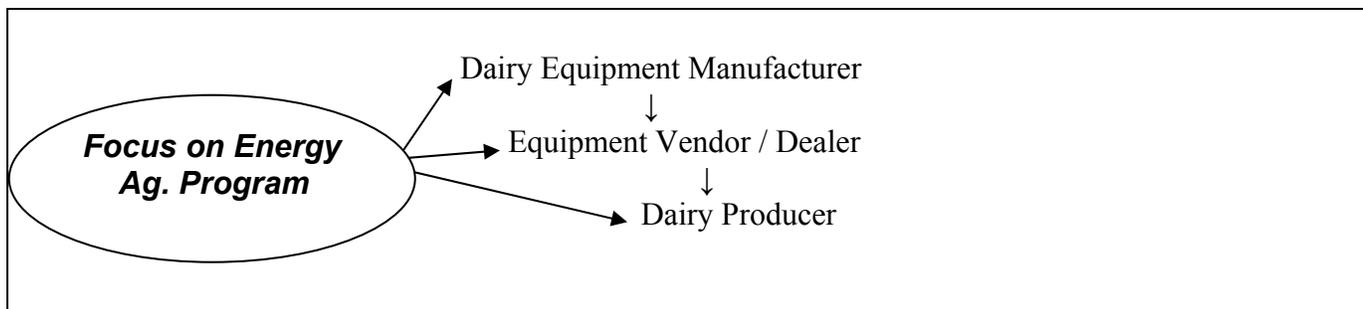


Figure 1. Example of supply chain marketing with the dairy industry.

In this supply chain example, the manufacturer of dairy equipment is the top of the chain. The manufacturer produces energy efficient technologies, for example, a refrigeration heat recovery unit which transfers heat to water through a farms milking cooling system. Next in the chain are the product

dealers and vendors, known as “Program Allies.” These dealers and vendors work directly with the producers, completing the chain. The effectiveness of this strategy lies in the vendor-producer relationship. It is often a well developed, business relationship. The producer is often dependent upon the vendor for new and energy efficient technology developments. The Agriculture Programs close interactions with program allies provides an opportunity to efficiently channel the programs mission to the customer base.

The Agriculture program capitalizes on the vendor-producer relationship through both a prescriptive incentive application form and custom energy audit services. In general, incentives cover approximately ten percent of equipment costs. However, for some technologies (such as grain drying) the incentive is less. With other technologies, the incentive may be more than ten percent. Incentives must be justified by the level of energy savings. Custom energy audit services provide program representatives the opportunity to directly market the program to producers, with no cost or risk to the producer. Although energy audits are an important program offering, equipment vendors become the leading informant for upcoming construction and development projects. Through the custom energy audit services, agriculture representatives work closely with the program ally to develop the most energy efficient and feasible system available to meet the producer’s needs. The prescriptive application has proven very effective in cases where less project development is needed or more immediate action is needed at the point of sale. A producer may have an equipment failure or be making a routine purchase requiring a quick turnaround service. The prescriptive incentive application form allows the program ally to advise the producer on energy efficient technologies during the buying process. This reduces time constraints for the producer, with program overhead, while maintaining the programs influence on the producer’s decisions.

The Agriculture Program is continually developing program outreach to agricultural producers through new networks and channels. Potential networks and channels that the program is investigating include those in Figure 2.

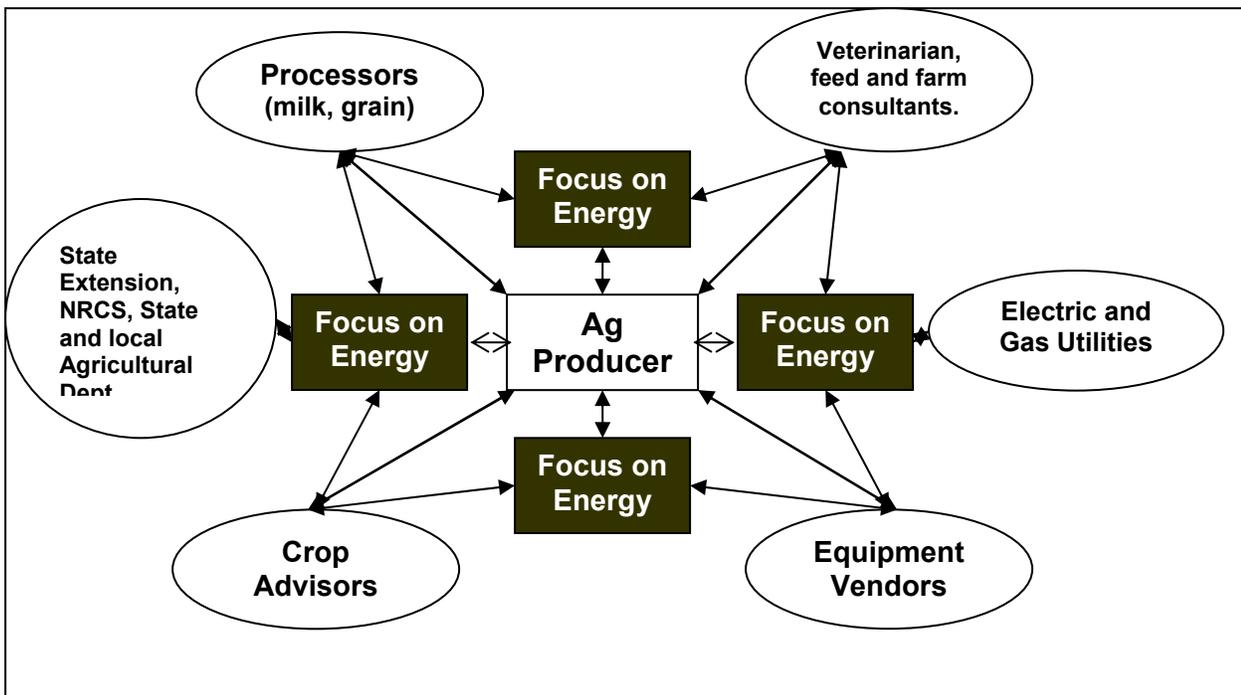


Figure 2: Agricultural network community.

Recognizing the success of the programs outreach through the vendor-producer network, the program is currently developing a processor-producer model. Energy efficiency saves more than energy, it reduces overhead costs for the producer and commodity, stabilizing the producer. Any improvements to the producer will, in the end, benefit the processor dependent on the commodities. For example, a grain mill or bio-refinery requires clean and dried grains. Energy efficient technologies that can produce a better product, faster will benefit the processor. In one recent case, the program worked with a production agriculture fertilizer plant. The fertilizer plant could use reclaimed drywall as a source of gypsum rather than their current source. Using the reclaimed drywall will allow the plant to significantly change their process, resulting in substantial energy savings. The drywall supplier needs to make a significant investment in order to provide the quantity needed by the fertilizer plant. Thus, the capital investment does not occur at the fertilizer plant, though energy savings will accrue to the fertilizer plant. The program is currently implementing this project that will share risk between the fertilizer plant and drywall supplier. The program views these production chain efficiencies as a major next step in improving the economics and energy efficiency of the agriculture sector.

Lastly, the Agriculture program works very closely with the network of public and private utilities that participate with the program. Most utilities have extensive programs devoted to agricultural business improvements including farm re-wiring programs. The Agriculture Program representatives work very closely with the different utilities with consultation and recommendations on the many re-wire and farm tie-in projects. Producers can be dually benefited from these programs with multiple grants and low interest loans offered for these projects.

The Agriculture Program has placed much effort in providing program allies and network partners with the necessary information to facilitate producer decisions in energy efficient technology purchases. The program continually develops fact sheets and case studies to educate producers and program allies on the benefits of the energy efficiency systems available to agriculture. The most extensive and successful promotional piece was developed for the dairy sector. The Agriculture Program coordinated efforts with a leading national dairy publication, "Hoard's Dairyman" and a number of state and private groups to develop a magazine supplement entitled, "Is your farm an energy hog or a lean machine?" The supplement extensively covered all of the major energy efficiency and consuming components on dairy farms in a single, easy to read publication. Through promotion and close interaction with program allies and technology developers, the program will continue to promote an atmosphere of growth in the services it can provide to strengthen and improve the agricultural industry within Wisconsin.

Numerous agriculture organizations, associations, government agencies (national, regional, state, and local), utility (co-op, municipal, and IOU) actively supply various services and support according to their individual mission and objectives. The program's marketing strategy specifically makes use of these channels to achieve the objectives of the Focus on Energy agriculture sector. In-kind and direct support is sought from the multitude of stakeholders who have vested interests in helping Wisconsin agricultural communities remain vibrant and competitive in producing goods for global markets.

Two of the primary objectives for the Focus on Energy program are to "enhance economic development and make Wisconsin firms more competitive" and to "reduce the amount of energy used per unit production in Wisconsin while improving electric reliability." These two objectives are being addressed through the Agriculture program in several different ways. For example:

Dairy Example

Improved dairy lighting has multiple benefits that often exceed the benefits of energy savings. Energy efficient lighting can save the farmer 15 to 60% on lighting energy needs. However, improved lighting promotes a better working environment, increasing worker productivity. Scientific analysis of regulated lighting like “extended-day lighting” can boost a cows milk production by as much as 3-15%.

Improved dairy ventilation is a production and health matter. Proper air exchange and transfer is important for many agricultural applications including grain and vegetable storage as well as chicken, hog, and dairy animal management. The barn fan and ventilation promotions through the program have benefited producers as they increase animal capacity or new and better systems are made available in the marketplace. In enclosed stall barn situations, the replacement of many smaller, less effective fans with larger more energy efficient fans is improving herd health, reducing veterinarian costs, and increasing production. New technologies in the industry for larger farms utilizing free-stall and open air barns are helping producers maintain high production during hot summer months while maintaining a controlled and free-flowing air exchange during the off-season months.

Greenhouse Example

Growing flowers in Wisconsin during the middle of the winter can be an expensive proposition. In fact, heating costs can be as much as 30 percent of a greenhouse’s operating expenses during a typical year. Further, research indicates that 80% of the energy to heat a single pane glass-glazed greenhouse is required at night, so reducing heat loss at night can pay dividends. A movable insulated curtain can reduce the heat loss by up to 70% when the curtain is closed. There are several types of blanket materials available with different advantages and disadvantages. Besides night curtains there are several other cost effective measures that can be used to reduce heating costs these include: better glazing materials, perimeter insulation, reducing infiltration, improving heating system efficiency, and converting to renewable energy heating fuels such as corn or waste wood.

The impact for greenhouses that heat through the winter is significant. Saving significant percentages on their operating expenses has a major impact on net income. For example, a greenhouse with a net income of \$100,000 may spend \$60,000 on natural gas during the year. If that gas expense can be cut by 50 percent, the resulting benefit is to increase net income by 30 percent. A thirty percent gain on net income is a significant benefit to the customer’s income and Wisconsin’s economy.

Why Do We Take This Approach?

The preferred method of interaction with any customer is direct one-on-one consultation. However, limiting budgets and staff forces the Agriculture Program to develop efficient and productive alternatives for program promotion and implementation. Extensive geographical and knowledge based coverage for the program ensures all services are available when necessary. The small staff can efficiently cover the state through the channels and networks developed. Four regional field representatives with the support of a fifth centralized field representative support the program allies and the custom audit services delivered by the program. Field advisors also have areas of expertise. One representative may be more knowledgeable with energy efficiency in irrigation and cold storage, while another will be more acquainted with greenhouse energy efficiency services. Niche based expertise allows field representative to develop close professional relationships with these often limited program ally networks.

The relationship that develops between program allies and program energy advisors is critical for long-term market transformation. Over the long term, the program allies will be the ones “selling” energy efficiency. By working closely and developing a relationship, the non-energy benefits can begin to emerge as a key selling point. Energy efficiency becomes just one of many benefits. When energy efficiency is seen as just a part of a larger set of benefits it can take its appropriate role in the customer’s decision making process. Thus, seemingly long payback periods become less of an issue and no longer a detractor. Other factors weigh more significantly and provide a more customer centered approach to selling energy efficiency, rather than energy efficiency necessarily being at the forefront.

Programs that choose to take this approach must be extremely careful about how their relationship with program allies is perceived by customers. The Agriculture Program makes it clear to program allies that we will always maintain a “vendor neutral” position. Further, we make it explicitly clear to customers that they should feel comfortable that the program will honor any reputable vendor who offers products with similar energy benefits. That this relationship is explicitly stated from the start allows program allies and customers to remain comfortable working with the program.

A final benefit of developing close ties with market providers is helping the program stay up to date with industry changes and new technology options. The ongoing positive relationship allows program allies to approach the Agriculture Program with ideas for new technology options and new marketing efforts. This gives the general agriculture industry a feedback mechanism that has direct impacts for their business and provides a sense of “buy-in” and ownership to the program. Indeed, from the start of the Agriculture program we solicited ideas from program allies and offered program suggestions for their critique.

Program Challenges and Conclusion

The GDS Associates, Inc. approach to delivering the Agriculture Program for Wisconsin Focus on Energy has been successful. However, this approach is not without its challenges, both internal and external to the program. The primary challenge is maintaining an energetic and proactive customer service effort. However, there are significant challenges to program evaluation. We continue to struggle and learn the proper customer segmentation lines for each of the many markets in the larger agricultural market.

Maintaining customer service levels is our program’s highest priority. We experience significant demands from program allies and customers alike. We’ve found that customers tend to be pleasantly surprised at the program’s services and ease of access. Quick turnaround for customer calls or requests are noted and appreciated. Program allies tend to place the toughest standards on the program. Juggling the demands of utilities, contractors, manufacturers, and tangential industries can be a significant challenge. Good communication is essential.

The use of the channel and network approach to interacting with the marketplace seems to pose a challenge for traditional program evaluations. Because an individual customer could be influenced by an equipment seller, the primary motivation for making a product selection may not be attributable to the program by customer surveys. Another challenge for evaluation is contacting the right person at the farm. In many cases, the dairyman may be making the technology choice, but a spouse may be responsible for paying the bills. Getting a full picture of the market interaction is difficult using traditional Demand-Side Management methods. Another challenge the Agriculture Program faces is customer service impacts of the evaluation itself. Overly long surveys or awkwardly timed calls (such as during harvest season) can negatively impact the relationship the program has developed with the

customer or program ally. In Wisconsin, these details are slowly being sorted out, but offer a cautionary tale for other programs that choose to select this method of program delivery and evaluation methods.

In summary, the Agriculture Program delivered by GDS Associates, Inc. for the Wisconsin Focus on Energy Program offers a successful and proven pathway to serving a challenging market. Other programs that choose this path must understand several key characteristics of the agriculture market prior to embarking on such a program.

- The agriculture market is very complex and not monolithic;
- A high degree of technical competence is required to provide significant service;
- Customer service is highly valued and personal relationships are expected;
- Proper market segmentation can lead to good customer service and a diverse program;
- Program evaluation can pose a challenge unless issues are addressed early in the program.
- Programs limited by fuel type (electricity, natural gas) may have special challenges. In many cases farms or farm end uses do have access to traditional utility fuels (especially natural gas).
- Energy use and costs may not be prime drivers for investment decisions. Therefore, providing value-added information and services are critical to overall program acceptance and success