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Commentary

Not Glamorous, but Needed: Teaching Energy Basics to Improve Farm Profitability

Abstract

Despite the increase in energy consumption, rising energy costs, and the overall financial strain in the agriculture sector, the Extension system has allocated limited resources to energy education in agriculture. Many energy programs focus on renewable energy and energy efficiency technologies whereas little attention is paid to developing an understanding of how farmers are billed for electricity, when electricity is used, and why. The first step in developing evidence-based solutions to improve farm profitability is clearly defining the problems that need to be solved. If not Extension, who will take on the responsibility of providing this critical education?

Keywords: farm profitability, energy education, electric bill, renewable energy

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Introduction

According to the U.S. Department of Agriculture (USDA) Economic Research Service (ERS) farm income and wealth statistics, those in U.S. agriculture have experienced rising debt levels and volatile net farm income (USDA ERS, 2019). During the period 2012–2018, net farm income of the U.S. agriculture sector reached a high of $123 billion in 2013 and a low of $62 billion in 2016 (Litkowski et al., 2020). Over this same period, the debt-to-asset ratio (a measure of total farm liabilities divided by total farm assets) of U.S. agriculture increased 16% (USDA ERS, 2020). According to Wilton and Newton (2019), as of June 2019, farm loan delinquency rates had risen for 24 consecutive months and bankruptcy filings had increased 13% as compared to the previous 12 months. Commodity price estimates through 2027 are projected to be nearly flat for corn, soybeans, and wheat (USDA ERS, 2018). The financial strain in agriculture is real and is not likely to improve in the near term.

As agricultural operations have become more sophisticated and automated, the electrical demands of many farms have increased, leading to an enhanced need for high-quality power to operate electric motors and equipment. According to the U.S. Energy Information Administration, farmers often account for a significant

share of industrial electricity consumers in states with strong agricultural sectors (Brown & Harnish, 2014). In these states, utility providers experience a high cost related to connecting these facilities to the electric grid and providing enough capacity to meet seasonal demand loads. As a result, farmers often face a high cost for connecting rural facilities with seasonal demand to the grid and pay higher ongoing prices for electricity (Hitaj & Suttles, 2016). Whether for powering lights, fans, heating systems, grain dryers, or a number of other pieces of equipment, most farms use some form of electricity. Data from the USDA ERS (2020) show that electricity costs for all U.S. agriculture account for approximately 1.5% of total production expenses. These costs often account for a greater share of expenses for livestock (poultry, swine, and dairy) farms. Although electricity accounts for a small percentage of overall farm expenses, this is an area over which farmers have some level of control and may be able to make improvements. Little changes add up over time to make a difference and "changing energy prices affect farmers' input costs, as well as revenue from supplying energy products" (Hitaj & Suttles, 2016, "What Did the Study Find," para. 2).

Literature Review

A review of the literature showed that Extension should play a key role in energy education. In fact, the National Association of State Universities and Land-Grant Colleges identified energy education as an educational role of Extension (Wade, 2015). Romich (2015) cited a study showing that Extension is viewed as a reliable source for information about energy and the environment. Numerous studies have highlighted the role of Extension in alternative energy education, but we found none that focus specifically on electricity education for farmers.

Our review of professional journals using the keywords "energy," "energy education," "energy efficiency," "energy cost," and "farm electricity use education" revealed only two articles that were somewhat related to energy in agriculture. We were surprised at the lack of articles on the topic. This finding highlights an opportunity for Extension to offer educational programs to help farmers understand electricity use, billing, and management.

Lack of Energy Education Programming in Agriculture

Extension has a reputation across the country as a valued source of research-based information that can be used to guide informed decisions that improve conditions of farms. Through outreach programming, land-grant institutions provide resources to address critical issues, educating farmers on risk management, business operations, and modern technologies to contribute to the success of farm businesses. Despite the increase in energy consumption, rising energy costs, and the overall financial strain in the agriculture sector, the Extension system has allocated limited resources to energy education in agriculture.

According to the National Extension Energy Initiative, 45 states have ongoing efforts in energy programming; however, only 22 states have at least one dedicated energy staff member (Baye et al., 2018). Furthermore, a review of existing programs showed that programmatic focus on energy in agriculture is related to biofuels, energy efficiency, and renewable energy systems (i.e., wind, solar, anaerobic digestion). Although these programs are indeed important and provide valuable information, little attention has been paid to developing an understanding of how farmers are billed by utility providers and when and why farms use electricity. The first step in providing evidence-based solutions is clearly defining the problems that need to be solved.

Opportunity for Extension Energy Education, Strategies, and Solutions

Extension needs to better understand the problem before we start blindly recommending solutions. In some cases, renewable energy and energy efficiency solutions are presented without teaching the farmer how to fully understand the associated implications on an electric bill. We need to do a better job of educating farmers to understand how their electric bills are calculated and how energy management decisions and/or investments in energy efficiency or renewable energy equipment can affect the overall cost of electricity. For example, in June 2019 an Ohio farmer with 3,400 ac received a $328 monthly electric bill for his grain dryer facility. However, of the $328 total, he was charged only $23 for the electricity generation over the billing period, whereas the delivery charges based on a peak demand were $305. In summary, 92% of the monthly bill was based on a 15-min increase in electricity usage, or peak demand spike. Furthermore, the monthly minimum demand on this rate tariff is based on 25% of the highest peak demand over the course of the year, which was established when the farm was drying corn the previous fall.

In reaction to increasing electric bills, many U.S. farmers are investing in renewable energy systems to produce electricity to power their farming operations. For example, the number of U.S. farmers who have installed solar panels has increased by 148%, from 36,331 farms in 2012 to more than 90,142 in 2017 (USDA National Agricultural Statistics Service, 2019). However, a comprehensive understanding of the energy usage profile combined with the electric rate tariff and net metering rules will ultimately determine whether investing in renewable energy generation will save a farm money. For example, in the case of the grain farm referenced above, a solar system capable of offsetting all the farm's monthly electricity likely would not reduce the peak demand that was responsible for 92% of the monthly bill. Although every situation is unique, on this particular farm the payback period for investing in a solar project would be much longer due to the high peak demand cost. This example illustrates the importance of educating farmers to better understand how their electric bills are calculated and when their farms are using electricity and why before they make investments in alternative energy generation and energy efficiency.

Conclusion

Research and teaching programs to help farmers understand their electric bills may not be a glamorous topic; in fact, fully understanding electric utility rate tariffs is a complex, time-consuming, and tedious task. However, helping consumers gain this knowledge has the potential to improve farm business profitability and long-term sustainability. Many organizations and companies are interested in energy education, but this education is often tied to a sales pitch encouraging farmers to buy new equipment or enroll in an energy savings program.

Energy education is a topic that no one besides Extension has a vested interest in providing without having an alternative motivation to sell a product or service. As a result, farmers do not know whom to contact to obtain credible information. County Extension educators gain respect and trust from farmers, the public, and the local community when they provide evidence-based, objective, and accurate information. Understanding the basics of how farms are charged for electricity is essential for developing a farm energy management strategy. It is a required step, or prerequisite necessary to building knowledge that will lead to an informed discussion on investment decisions for energy efficiency and/or renewable energy solutions on farms. If not Extension, who will take on the responsibility of providing this critical education?

References

Baye, T., Euken, J., Gould, C., Haskard, J., Hay, J., Ignosh, J., . . . Weiner, C. (2018). National energy education needs and priorities: A roadmap for the Cooperative Extension System [PDF file]. Retrieved from http://www.anrep.org/people/initiatives/neei/roadmap

Brown, M. T., & Harnish, M. (2014). *Many industrial electricity users are farmers*. Retrieved from the U.S. Energy Information Administration's Today in Energy website: https://www.eia.gov/todayinenergy/detail.php?id=16231

Hitaj, C., & Suttles, S. (2016). *Trends in U.S. agriculture's consumption and production of energy: Renewable power, shale energy, and cellulosic biomass* (EIB-159, U.S. Department of Agriculture Economic Research Service). Retrieved from https://www.ers.usda.gov/webdocs/publications/74658/60128_eib159.pdf?v=0

Litkowski, C., Hopkins, J., Subedi, D., Whitt, C., Dubman, R., Law, J., . . . Mandalay, O. (2020). Data files: U.S. and state-level farm income and wealth statistics. Retrieved from https://www.ers.usda.gov/media/10472/farmsectorindicators_february2020.xlsx

Romich, E. (2015). The role of Extension in energy education, *Journal of Extension*, *53*(2), Article v53-2comm1. Available at: https://www.joe.org/joe/2015april/comm1.php

U.S. Department of Agriculture Economic Research Service. (2018). *USDA agricultural projections to 2027*. Retrieved September 26, 2019, from https://www.ers.usda.gov/publications/pub-details/?pubid=87458

U.S. Department of Agriculture Economic Research Service. (2019). *Data files: U.S. and state-level farm income and wealth statistics*. Retrieved September 26, 2019, from https://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/data-files-us-and-state-level-farm-income-and-wealth-statistics/

U.S. Department of Agriculture Economic Research Service. (2020). *Farm sector financial ratios*. Retrieved February 5, 2020, from https://data.ers.usda.gov/reports.aspx?ID=17838

U.S. Department of Agriculture National Agricultural Statistics Service. (2019). *2017 census of US agriculture*. Retrieved from https://www.nass.usda.gov/Publications/AgCensus/2017/index.php

Wade, J. (2015). *Cooperative Extension Service and energy education*. Washington, DC: National Association of State Universities and Land-Grant Colleges. Retrieved from https://www.energy.gov/sites/prod/files/2015/07/f25/Cooperative_Extension_Energy_Education.pdf

Wilton, A., & Newton, J. (2019). *Farm loan delinquencies and bankruptcies are rising.* Retrieved from https://www.fb.org/market-intel/farm-loan-delinquencies-and-bankruptcies-are-rising

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