Cornell University

Energy Efficiency & Greenhouse Gas Mitigation Opportunities

Information Sheet #4 – OVERVIEW

Deborah Grantham
Soil and Crop Sciences Section, School of Integrative Plant Science
College of Agriculture and Life Sciences, Cornell University

Fast Facts

- **Trends**: Nationally, energy efficiency on farms has increased dramatically, but there are still additional cost-effective opportunities that will increase profitability and reduce greenhouse gas (GHG) emissions.
- **An imperative to act:** Actions taken on farms to improve energy efficiency and energy conservation, particularly liquid fuel conservation, can increase profits and reduce GHG emissions.
- **Concerns for implementation:** It makes sense to start with actions that are simple and provide a quick payback. Also, improving energy efficiency is important before replacing equipment such as furnaces or boilers or implementing renewable energy systems, to avoid wasting money due to over-sized energy systems. However, some changes may require too long a return on investment to warrant implementation.
- **An opportunity for proactive change:** Energy conservation can be implemented through changes in habits and practices. Energy efficiency changes can be planned as the operation changes; equipment and buildings upgrades can be prioritized according to ease of implementation and potential financial and other assistance with implementation.

Introduction

Agriculture is a source of greenhouse gas emissions (GHG) but there are Best Management Practices (BMPs) to help mitigate these emissions. On-farm energy efficiency is a critical component of reducing GHG emissions while increasing farm viability into the future.

An ACEEE (American Council for an Energy-Efficient Economy, based on Energy Information Administration and USDA data in 2000 and 1999 respectively) report finds that in the US all on-farm energy use ranks sixth out of the total production expenses (6%) and costs over $9 billion per year. The US Energy Information Administration (US EIA, 2014) reports that US crop production in 2012 used almost 500 trillion BTUs compared to just under 300 trillion BTUs for livestock production in the same year (direct energy costs). In NYS, across all types of farms, about 8% of production expenditures were on energy, about 2% higher than the national average. NYS farmers spend about 1% above the national average on energy (Brown and Elliott, 2005a). A second ACEEE analysis indicates that diesel fuel energy efficiency could offer savings as high as 50% for NYS agriculture, including motors, on-site transportation, and machinery (Brown and Elliott, 2005b). The projected savings statewide were 1 million BTUs and 14 million dollars. A 2003 NYS electrical energy audit of 32 dairy farms statewide found that four categories (milk cooling, lighting, ventilation/cow cooling, and vacuum pumps) account for 88% of all electric energy (Ludington and Johnson, 2003).

Farmers have stewarded the land for decades, making incremental changes and active improvements in practices to protect environmental resources, such as installing riparian buffers to reduce nutrient loads to nearby surface water. Energy efficiency is a BMP for addressing local and global air emissions (particulate matter and greenhouse gases). Actions taken by the farmer will benefit the farm's bottom line, help to mitigate GHG emissions, and often have other environmental benefits.

Concerns

Currently most energy comes from fossil fuels. However, fossil fuel combustion releases carbon dioxide (CO_2) into the atmosphere and is the primary cause of climate change. Agriculture is vulnerable to the impacts of climate change, such as crop and livestock responses to temperature, increased pest and pathogen pressure, variation in seasonal precipitation, and changing precipitation and therefore soil water patterns. Irrigation may be required in regions where it has not been necessary. Late frosts and high-intensity storms are more likely to reduce productivity. Increased temperatures affect livestock production, including meat, eggs, and dairy, and increased need for cooling livestock will increase energy costs. Agriculture is also vulnerable to fluctuations in energy prices. Improving on-farm energy efficiency and reducing use helps reduce risk from price fluctuation and climate change impacts on farms.

Summary of Regulation of GHG Emissions

While there are regulations on GHG emissions from the electric sector, there are no regulations of GHG emissions from agriculture. Action in this arena continues a tradition of stewardship and voluntary action by farmers.

Goal

This Information Sheet is intended to help educators and technicians assist farms in navigating voluntary methods for reducing GHG emissions from energy efficiency mechanisms.

Summary of Potential On-Farm Energy Efficiency Strategies

Description of Strategy	Opportunities	Considerations
Energy Audit (self)	Self-Audit. Collect your major energy expenses and identify top 3 energy uses.	Self-audits may miss opportunities with greater financial benefit, e.g. Increased cooling costs might be worth the increase in milking productivity.
Energy Audit (professional)	Get a professional energy audit. These generally prioritize opportunity based on financial return on investment.	While there are some grants for free energy audits, other cost money. Be sure to ask for a second-opinion for any improvements the audit suggests.
Re-Think Farm Operations	Assess your long-term goals to identify ways to improve efficiency of new infrastructure systems.	Oversizing infrastructure now, when expecting to 'grow' the size of your operations, can actually have greater energy and financial costs. However, sizing infrastructure to allow for increased capacity can be helpful.
Consider changing your fuel supply.	Farms are great sites to produce on farm energy to improve resiliency and long-term cost effectiveness and have great benefit on climate.	While fossil fuel is now cheap, energy prices are volatile, adding additional longer-term risk. That said, alternative energy can be costly, though there may be grants for on-farm energy projects.

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