# How does energy use influence GHG emissions?
GHG Fact Sheet Series

Energy use includes both fuel and electricity use on-farm. Dairies use electricity and fuel for essential functions within their operation: milk transfer and cooling, washing and water heating, lighting, farm equipment and ventilation. Though energy consumption only contributes a small portion of dairy GHG emissions, employing energy conservation techniques can offer financial savings as well as reduce a farm's GHG footprint.

Energy use is responsible for about 6% of farmgate emissions.[1]

FACTORS THAT INFLUENCE EMISSIONS FROM ENERGY USE

Both generation of electricity and fuel use can influence GHG emissions. Burning fossil fuels (diesel, natural gas, gasoline, propane, etc.) for electricity, heat, and transportation purposes releases GHG emissions into the atmosphere. Various equipment and activities on the dairy farm use energy and influence emissions. While the breakdown of energy use varies by farm, the following chart offers a rough breakdown from a study in New York[2]:
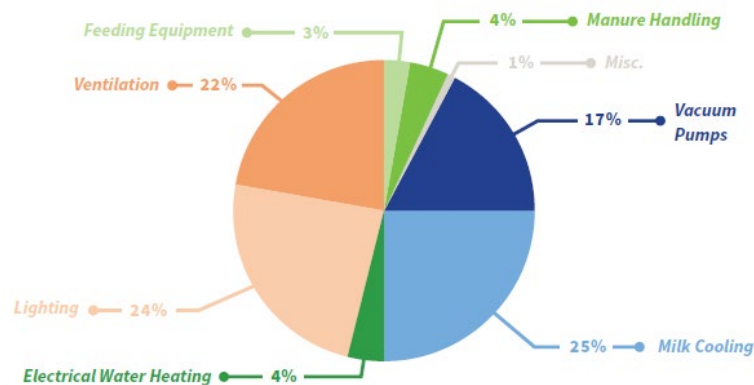
Renewable energy helps farmers save money over time, increase energy independence, and reduce GHG emissions. Examples of on-farm renewable energy technologies include anaerobic digesters, solar, geothermal, and wind.

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[1] Adapted from Thoma 2013, *Regional Analysis of greenhouse gas emissions from USA dairy farms. A cradle to farm-gate assessment of the American dairy industry, circa 2008.* https://www.sciencedirect.com/science/article/pii/S0958694612002051

[2] Dairy Farm Energy Audit Summary. (2003). Ludington, D. and E. Johnson (DLtech, Inc.). New York State Energy Research and Development Authority.: https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Energy-Audit-Reports/dairy-farm-energy.pdf

OPPORTUNITIES

Ways to reduce GHG emissions from energy use include:
- Perform regular equipment maintenance (cleaning, regular inspections, repairs, etc.) to optimize performance and fuel-efficiency.
- Consider energy-efficient options when old equipment must be replaced.
- Choose properly sized motors and other equipment for the given task.
- Reduce idling time to reduce fuel usage over time.
- Conduct an energy audit or assessment – the local NRCS office may have a list of service providers; funding may be available through EQIP or the farm's utility company.
- Install equipment and technologies that contribute to energy efficiency, for example:
  - **Variable Speed Drive (VSDs)** for the milk vacuum pump, milk transfer pump and/or fans. VSDs reduce vacuum pump electricity use by 50 - 60% with payback periods of 3 - 7 years.
  - **Plate coolers** can reduce refrigeration costs by 60% with simple payback periods of 3-5 years.
  - **Discus or scroll refrigeration compressors** use 30% less electricity with a simple payback period of 5-7 years.
  - **Energy-efficient lighting** such as LED bulbs.
  - **Timers on lighting.**
  - **Ventilation control systems**, such as thermostats.
  - **Fan Variable Frequency Drive (VFD) control systems** match the system capacity to the actual load, reducing energy consumption.
- Evaluate whether renewable energy generation opportunities, including anaerobic digesters, solar, geothermal and wind, may be a good fit for the farm.

An energy audit looks at a farm's current energy use and makes specific recommendations on how to save energy, including cost estimates and payback periods.

LEARN MORE

- FARM Environmental Stewardship Continuous Improvement Reference Manual
  https://nationaldairyfarm.com/producer-resources/environment/
- Penn State Extension: How a Dairy Farmer Can Improve Energy Efficiency
  https://extension.psu.edu/how-a-dairy-farmer-can-improve-energy-efficiency
- UMass Extension: Reducing Energy Use on the Dairy Farm
  https://ag.umass.edu/crops-dairy-livestock-equine/fact-sheets/reducing-energy-use-on-dairy-farm
- Minnesota Department of Commerce: Dairy Energy Efficiency
  https://mn.gov/commerce-stat/pdfs/card-report-tmp-dairy-ee.pdf
- Dairy Farm Energy Self-Assessment Tool
  http://www.ruralenergy.wisc.edu/conservation/dairy/default_dairy.aspx

ENVIRONMENTAL STEWARDSHIP