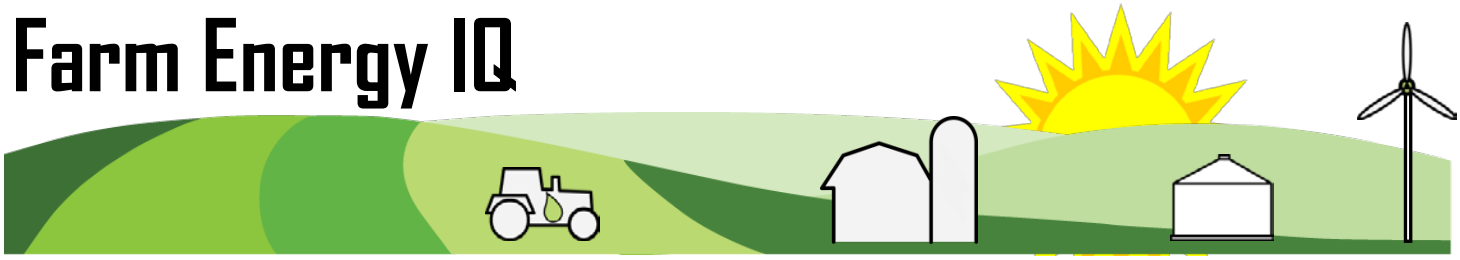
Farm Energy IQ



Farm Energy Audits – Farmer Presentation Outline

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Slide 1 Introduction

Slide 2 This is the American Society of Agricultural and Biological Engineers' definition of an audit in its standard for agricultural energy audits (ASABE Standard S612). NRCS audit guidelines reference the ASABE standard. The definition emphasizes the need to establish and document current energy use and identify opportunities for energy conservation.

Slide 3 A useful energy audit report will include information that answers these questions in a clear and straightforward manner. NRCS guidelines for Agricultural Energy Management Plans provide detailed information on data the plan should include and the form and sequence for presenting data.

Slide 4 Agricultural energy use is sufficiently different from residential, commercial, and industrial applications Auditors with experience in only these sectors may not be well prepared to develop energy management plans that address producers' most important needs in a way that is compatible with the operation. Additionally, different types of farming operations have very different energy needs. Greenhouses, dairies, poultry facilities, horse farms and other types of operations have unique energy requirements. Energy systems within operations are often specifically tailored for each type of farm.

Slide 5 The compilation of utility bills should include a minimum of 1 year of utility data (electricity, natural gas). A visual Inspection is most often conducted during a walk-through of facilities to identify zones of energy use and energy-using systems. An auditor will characterize equipment by collecting detailed information on all major equipment (hp, watts, nameplate efficiency, etc.). Auditors interview owners and operators in an attempt to obtain information related to occupancy, hours of operation, maintenance programs, specific problems, and needs. Longer term on-site measurement is not often a component of a simple farm energy audit. When measurements are taken, they can include any of the options shown. A blower door is a variable speed fan placed in a door or window that is used to evaluate infiltration and leakage. Power monitoring equipment can continuously monitor and log electrical (or natural gas) use. IR imaging can show leaks, poor insulation, and other inefficiencies. Lower cost options for infrared imaging may make this technique more

common in future farm audits. Computer simulation modeling, usually reserved for larger facilities, can be basic or very detailed and complex. There are a variety of energy models for different types of agricultural operations, many of them developed for research use rather than for application in practical energy audits.

Slide 6 This is a detailed list of the various aspects of a farm energy audit. The remainder of this presentation provides more detail and examples for each item.

Slide 7 An operational overview may include the type and size of the operation. A site plan or aerial view can be useful for describing the facilities. A building summary should include all the structures in the operation, including their square footage, primary uses, details of construction and energy-using systems. The infrastructure summary will describe the facilities for receiving, storing (where applicable) and distributing energy. Electrical supply includes the electrical phase (single, three phase), voltage and amperage of main panels. Information on other energy sources (natural gas, LPG, oil, vehicular fuels, coal, wood, solar, wind, etc.) describes the related infrastructure (size and capacities). The audit report will identify and describe major energy consuming systems within the operation. Farms may have more than one metering location for natural gas or electricity, and may have multiple fuel storage facilities.

Slide 8 It is not always possible to dissect electricity or other energy consumption into its different applications. Often there is sufficient information to make some estimates. This information is useful in that it identifies the areas that are most promising for energy conservation. In this case, reducing electrical use in air conditioning will likely have a greater impact than efficiency in other measures.

Slide 9 This graph, from a poultry operation, shows definite seasonal patterns. The variations may have to do with different weather patterns and changes in production (timing, quantities and types). Among other factors, seasonal energy use in agricultural operations can be influenced by holidays.

Slide 10 In this example it is clear that oil and electricity are the largest energy uses. Even though oil represents a slightly higher energy consumption, it may not be the most attractive area for energy conservation, because electricity is the more expensive fuel source, as we will see in a subsequent slide. In this case, which includes a building with heating and air conditioning, efficiency upgrades (such as adding insulation) which affect electrical use may also impact oil consumption.

Slide 11 Annual costs for electricity are significantly higher than other energy sources. This changes over time as prices respond to market conditions, but electricity typically costs more per unit of energy than other sources do.

Slide 12 Most energy bills include a demand charge that is based on the maximum power draw during any 15-minute period in a month. A high ratio of demand (kW) to use (kWh) in a given month can indicate that load management (for example, changing operational schedules to reduce peak demands) may help reduce electrical costs. Peak use and peak demand occur in September for this example. The highest cost is

in July, when the average kWh charge is higher, and the highest rate is in June, when the demand is high and use is low.

Slide 13 An energy audit will include information about equipment; the level of detail provided will depend on how significant the use is and how much information about the equipment and its operation is available.

Slide 14 A table of the characteristics of larger equipment can be used to compare alternatives when it is time for the equipment to be replaced. Just because a piece of equipment is relatively inefficient does not always justify its replacement with a more efficient model. For example, replacing motors that are rarely used will often have a very long payback period.

Slide 15 Manufacturer and model number can sometimes be used to find more information about the equipment. Often, nameplate data on agricultural equipment is unavailable or unreadable. Manufacturer's literature can provide details on efficiency and other equipment characteristics.

Slide 16 A lighting table provides estimated energy use for different lighting systems and can help identify inefficient bulb and fixture types. In this case, T12 fluorescent tubes and incandescent bulbs represent a significant portion of the electricity used for lighting. There are energy efficient replacements for both of these types of lights.

Slide 17 The table of energy conservation opportunities, in many respects, is the most important part of the audit report. NRCS also requires reporting of estimated emissions reductions for greenhouse gases and major pollutants. The table is listed in order of payback period, although the most important opportunities may not be those with the shortest payback. In this case, insulating walls has a much greater impact than replacing light bulbs. NRCS typically will not provide financial support for measures with paybacks longer than five years. Nonetheless, a farmer may wish to implement options with longer paybacks, particularly when these measures provide other benefits in addition to energy savings (for example, higher quality products, more comfort for workers, and less maintenance).

Slide 18 An audit report will often include a graphic such as this to portray potential savings of energy conservation measures.

Slide 19 Questions?

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