A Suggested Approach To Farm Energy Audits

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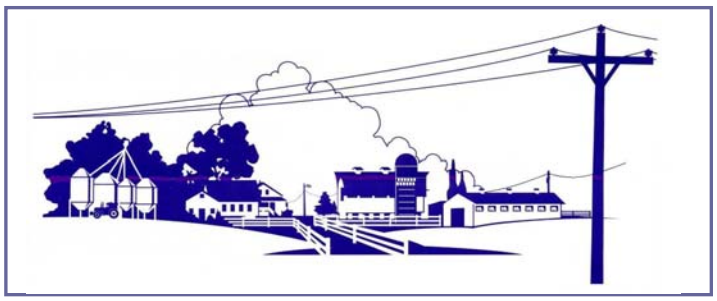
We receive requests occasionally at the National Food and Energy Council to provide information on performing farmstead energy audits. Often the caller is hoping to find a standardized form or computer program that makes the process simpler. Because these calculation aids exist for home energy audits, it seems logical that a similar method should exist for farms. But unfortunately, there is no simplified method that works for all types of farms, and for good reason. This article will explain those reasons, and outline a better approach - - one that divides the major areas of electricity use into manageable categories.

First, let's clarify that energy use in a home involves primarily heating/cooling, water heating, some lighting and appliance use. By contrast, a modern, diversified farm may use electricity to dry grain, ventilate buildings, cool milk, pump water, illuminate work areas, transport materials, and perform a variety of other tasks. With all these different electric end-uses, an organized approach is needed, i.e. a "road map" to stay organized. This method should: (1) divide the farm's energy use into categories, (2) estimate the significance of each in terms of energy consumption, and (3) determine if efficiency measures can be justified.

Listed at right are categories you might use. Most farms will not employ each category. Some farms, like cow/calf operations may have only livestock waterers and a little lighting. Others, like dairy farms, will have energy-using equipment in almost every category. This method lets you select and organize those electric end-use groups that apply to a particular farm, and leave out the rest.

The value and significance of organizing loads in this manner may not be clear to some people, but don't under-rate it. This process of grouping end-uses has already simplified your task, and organized your approach. What began as a confusing farmstead full of equipment has now



become a manageable list. It is easier to see where energy is used, and what areas should be evaluated first.

Begin with the category that is likely to account for the most energy use, and list the on-farm equipment found in that group. The list should include the horsepower size or watt rating that is found on the device or its nameplate. For example, under "Refrigeration", list the horsepower size of cooling compressor motors. This most often applies to dairy farms for milk cooling, but refrigeration loads may exist on fruit or vegetable farms, and in egg-laying facilities. To save time for each of the categories, ignore very small equipment or those items that operate only an hour or less a day. These will have very little effect on total electricity use.

Categories of Farm Energy Use

(The order of importance varies by farm)

1. Lighting
2. Fans & Ventilation
3. Water Heating
4. Space Heating
5. Livestock Waterers
6. Heat Lamps/Mats & Brooders
7. Well Pumps
8. Irrigation Pumps
9. Materials Handling
10. Refrigeration
11. Milking Equipment
12. Farm Wiring*
13. Misc. Loads

**Farm wiring is included because energy can be wasted from undersized wires, creating voltage drop and reduced performance of equipment.*

This listing of equipment aids the evaluation process in two ways. First, it begins to reveal those categories or farm operations that use larger horsepower or higher wattage equipment. You'll want to focus on these, but only if the daily hours of run time are significant.

Second, this inventory can be a useful tool for the customer. Most farmers have never seen a list (or even considered) all the electrical appliances and equipment on their farm. It's an eye-opener; also it helps connect the value of electricity to the monthly bill.

Once you've made a listing of the equipment within each category, you're ready to determine where improvements in energy use can be made. The first effort should be targeted to low-cost measures that yield significant savings. Examples include lowering temperature settings on water heaters or livestock fountains, aligning pulleys on belt-driven equipment or adjusting belt tension to reduce drag, cleaning refrigeration coils, sealing air leaks in buildings, or turning off heat lamps when not needed.

The next level of savings will demand closer evaluation of specific equipment. This requires a more complete understanding of principles like heat loss, motor efficiency, lighting technology, and the factors affecting pump or fan performance. Although some of these principles are fairly straightforward, like changing incandescent bulbs to fluorescents, or reducing heat loss by adding insulation, other energy measures are more complex. Knowledge of how the equipment uses energy, and measurements of existing energy consumption, will determine if an efficiency measure is justified. For example, some ventilation fans for livestock buildings can be real energy "hogs"; but to evaluate a specific case requires a knowledge of ventilation principles and fan ratings (in CFM per watt).

In some cases, there have been computer programs and other "cook book" methods developed to help evaluate specific equipment. But to apply these calculation aids correctly still requires a basic knowledge of the energy principles involved. Consulting firms can help, but there are only one or two that have experience in farm applications

The approach we've taken at the National Food and Energy Council is to help rural customers and energy suppliers increase their understanding of these involved topics. Education is the key. By providing instructional materials and training courses on most of the energy categories listed in this article, we can help users gain a more complete understanding of energy use.

Farms like this have multiple categories of electric equipment, and associated energy use.

The first step though, for any on-farm energy audit, is to group energy use into categories as described in the first part of this article. This can take you a long way toward understanding and organizing the process. To learn more about specific assistance that we can provide, visit www.nfec.org and click on "Materials To Order". A description of each resource, both for farms and other types of rural businesses, is provided at the site.

In summary, different types of farms use energy in many different ways. Understanding the process, rather than plugging in numbers on a form, is the only way to effectively evaluate energy saving options. We stand ready to assist you in this effort. #

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