

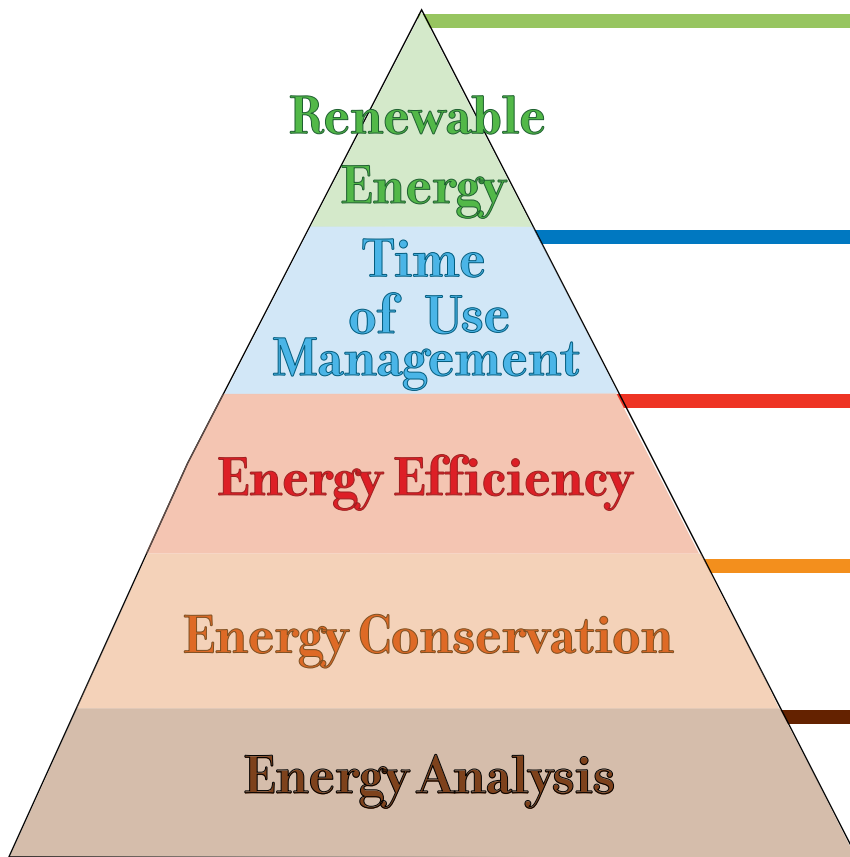
Best Practices Guide

Energy Savings for Poultry



The logo for EnSave, featuring a yellow arc above the text. The word "EnSave" is written in a blue, serif font, with "En" and "Save" in a larger size than the "S".
EnSave

The Energy Pyramid



The last step on the energy pyramid is renewable energy, which is using resources that are naturally replenished. Solar power, wind power, hydroelectricity, and biofuels (like methane) are examples.

Electricity costs can vary over the course of the day. Running equipment during peak hours can be costly. By running equipment during off-peak hours, money and energy can be saved.

The third level on the energy pyramid is energy efficiency, which is performing the same services while using less energy. Work smarter and save money with more energy efficient equipment.

The easiest way to conserve energy is to change current behavior: turn off lights if no one is using them, unplug unused equipment, and turn the thermostat lower in the winter and higher in the summer.

This is the very first level towards reducing energy usage. By having an audit or assessment done (or doing an assessment on your own), opportunities to reduce energy use and costs can be identified.

What is the Energy Pyramid? The energy pyramid is a useful concept designed to help people understand the process of using energy efficiently. In some cases too much emphasis is put on renewable energy to solve the nation's energy needs. Rather than being the first course of action, renewable energy should be considered only after a farm has considered all other steps of the pyramid.

The energy pyramid illustrates the steps in the process of becoming more energy independent, from the simplest and least expensive technique to the most complex.

Throughout this brochure, you will find helpful ideas that address each step of the pyramid, from bottom to top. They are arranged according to their relevance on the pyramid, and color coded for easy reference.

If you have any questions about the energy pyramid or would like to learn more about how these ideas can work on your farm or facility contact:

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Farm Energy Audits



There is a tremendous opportunity on the farm to save energy and money by upgrading or adding energy efficient equipment.

All of EnSave's energy audits begin with an initial interview with the farmer to gather information about the operation and what to expect from an energy audit. EnSave then collects energy usage data for:

- Heating/cooling
- Variable speed drives
- Water heating
- Compressors
- Lighting
- Ventilation
- Motors
- Production increase techniques
- Heat exchange
- Space heating
- Pumping

Following the data collection, EnSave analyzes the data and produces recommendations for energy efficient upgrades. The recommendations are compiled into a comprehensive, narrative audit report for the producer.



Audits are customized to fit the farmer's objectives. It identifies opportunities for pollution prevention and renewable energy on the farm. It focuses on electric energy savings as well as propane, natural gas, and diesel. Just as every farm is unique, so is each farm's energy priorities.

As energy and fuel prices climb, agricultural producers need customized solutions in order to stay competitive. A good farm energy audit educates producers about energy efficiency, and provides them with a decision-making tool they can use immediately as well as in the future.

Preventative Maintenance

If the time is not right for an upgrade, some simple preventative maintenance can often help reduce bills in the short term, and help extend the life of the equipment. Here are some ideas that can be implemented today.

Clean Equipment

Removing dust, soot, and debris from equipment will allow it to do more work with less effort, extending its life and reducing energy usage.

Inspect Regularly

Equipment should be checked regularly. Replace parts that are showing excessive wear before they break and cause irreparable damage.

Plug Leaks

Be it a pinprick hole in a hose or a drafty barn, leaks waste money, fuel, and electricity. By plugging the leaks, savings can be considerable.

Remove Clutter

Hoses should be regularly flushed to clear them of debris. Ensure fan and motor intakes and exhausts are clear of clutter for maximum circulation and efficiency.

Efficient Fluorescent Lighting



Incandescent light bulbs are inefficient, converting only 10% of the energy they use to light. There are many styles of fluorescent lights available that are much more energy efficient.

Compact Fluorescent Lamps (CFLs) deliver the same amount of light as incandescent bulbs, but use only 1/4 of the electricity. Installing CFLs may cost a little more initially, but they can last up to 10 times longer. Cold Cathode Fluorescent Lamps (CCFLs) can last up to 25 times longer and have around the same efficiency as CFLs.

T-8 and T-5 lights with electronic ballasts replace the older T-12s and have several benefits. The T-8 and T-5 generate less noise, more light per watt, better color rendering, minimal flickering, cooler operation, and provide electric cost savings.

Low-Cost Tips

- Turn off lights when not in use
- Light work areas, not the entire building
- Use daylight when possible
- Install dimmable ballasts to control light levels

Insulated Side Walls (solid)



Low-Cost Tips

- Seal all visible air leaks with caulking.

Historically, curtain side walls were thought to be the most efficient means of regulating poultry house temperatures. We now know that curtained walls leak heat and allow for cold spots.

While it is recommended that all houses eventually be enclosed, there are temporary measures that will reduce fuel costs. Polypropylene-faced fiberglass batt insulation comes in 50-foot long rolls, and is fairly inexpensive and quick to install. In a traditional stud-wall house, the curtains are sealed at the top and bottom, and the insulation is attached over the curtain on the inside of the house.

Installation is quick, and farms often see a fuel savings of about 25%. While plans for curtain side wall replacement should be made, this is a good start.

Brood Curtains



Low-Cost Tips

- Use bird boards that are 2' tall
- Position bird boards a foot or so toward the non-brooding side for a tighter fit
- Patch all holes in the brooding curtain
- Make sure the non-brooding end of the house is tight

Brooding curtains are a long sheet of plastic, spanning the width and height of the house. It contains the chicks to a smaller portion of the house, allowing them to stay warm without the expense of heating the entire house.

Problems arise when the curtain does not create a tight seal along the ceiling, walls, and floor. The cool air from the rest of the house seeps into the brooding area, leaching the moisture out of the litter pack, and chilling the chicks.

To solve this problem, ensure that the curtain is sealing tightly. If using bird boards, set them back a foot or so into the non-brooding part of the house. This will ensure a tighter seal and lessen the likelihood of leaks. Patch holes in the curtain.

Finally, most brood curtains have no insulative value. Research methods of enclosing your house for brooding that have higher insulation values.

Radiant Heating



Radiant heating is one of the most efficient methods of heating, and can cut energy costs by 15%. They are fired with propane or natural gas, and the heat is radiated quietly from the heater to the floor. There are three main types: radiant brooder, radiant tube, and pancake.

Radiant brooders are very accurate and pose less risk: if one goes out, there is one close by to offer warmth. Radiant tube heaters offer a larger area of coverage, less maintenance, and fewer burners. Both are more efficient than pancake brooders. All three systems are more efficient than forced hot air. In each case, stir fans to circulate convective heat and a properly insulated house will help reduce fuel consumption.

Radiant tube heating is not currently recommended for turkey farms. Radiant brooders are preferred.

Circulation Fans



The hottest air in the poultry house is generally near the ceiling. To keep chicks warm, circulation fans should be used to push hot air back down to the floor. The more uniform the house temperature is, the lower the total heating costs.

The air must move gently around the floor, as fast-moving air will chill the chicks. By slowly rotating the air to the floor, the chicks will stay warm and the litter will remain dry.

Proper heat circulation also means the heaters will cycle on less frequently. This means less wear and tear on the brooders, and lower fuel consumption. Depending on the type of fan installed, fuel savings can be between 10 and 20%.

Be sure that all cracks and leaks in the walls are sealed and the fans are regularly cleaned.

Ceiling Inlets

Low-Cost Tips

- Clean inlets between flocks to insure best performance
- Seal up houses to prevent cold air from getting in and warm air from leaking out
- Install energy efficient ventilation fans
- Inlets must open 1-1.5 inches for proper air flow. Manually closing every other inlet will allow the others to increase air circulation

Ceiling (or attic) inlets are an effective way of keeping the flock warm during cooler months without increasing heating costs.

Ceiling inlets work with ventilation fans to provide clean air that has been naturally pre-heated in the attic. Daytime temperatures in attics often spike as high as 25° F above the outside temperature.

By circulating pre-warmed air into the house, less radiant heat is needed to keep the birds warm.

The number of inlets in use varies based on the age of the flock and the temperature outside.

While the ventilation fans tend to run more with ceiling inlets, the higher level of ventilation keeps the litter drier and the levels of ammonia lower.

The relative humidity inside the house is also significantly lower, even during time of precipitation.

Tunnel Ventilation Fans



Low-Cost Tip

- Be sure to keep your fans cleaned and well maintained. Dirty shutters can decrease airflow up to 40%.
- Plan on replacing tunnel fan belts every year or replace V-type belts with notched belts

When night air temperatures drop 20° to 25° F, it makes sense for growers to think turning off the ventilation fans save energy and money. But without the wind chill, larger birds cannot shed their core body heat. A few dollars might be saved, but poor feed conversion and lower final bird weight will reduce profits in the end.

In order to keep profits and bird-size high, instead choose energy efficient ventilation fans. Select fans that have been through standardized tests, such as the ones done by the Bioenvironmental and Structural Systems Laboratory (BESS) at the University of Illinois. BESS Lab tests fans with shutters, guards, and cones to determine their efficiency.

Tunnel Doors



Tunnel doors are sets of doors built into the wall of the house and cover the evaporation cooling pads. They provide a cost effective way to improve air flow and air mixing in the poultry house, and seal off the cold air coming through the pads in the winter. In the summer, they are effective at maximizing air flow and eliminating dead air spots.

Unfortunately, there were many problems with early designs, which led to doors that were more inefficient in colder months than the sidewall curtains they were meant to replace. Manufacturers have since improved the design and quality of their tunnel doors. Hinges are stronger, seals are tighter, and the R-value of many doors has improved.

As of this printing, testing data on the efficiency of the new doors was not yet available. However, they remain a viable option if correctly installed.

End Wall Doors



End wall doors are usually used only twice per flock, but can be a costly drain on the wallet if they are not performing properly. Old, poor-sealing doors can allow air leaks, which negatively effect the temperature within the poultry house. This can lead to higher heating costs, litter caking, less feed intake, and smaller birds.

There are many efficient doors now available. A good door should withstand the elements, have a good seal to eliminate leaks, have insulating properties, and meet the pressurization requirements of your house.

Doors such as Roll-Seal® and V-Flex® are durable and well-sealing. They have been installed in new houses and in retrofits, and growers have been impressed with their performance. A door that is durable, insulated, and seals well is an excellent investment, and will help save on heating and repair costs down the road.

NEMA Premium® Motors



Low-Cost Tips

- Select the right size motor for the job
- Inspect all motors on a regular basis
- Clean regularly
- Replace V-type belts with notched belts

When installing a new motor or replacing an old motor, consider using a NEMA Premium® motor. While they may cost more initially, they are often cheaper to operate in the long run.

When purchasing a new motor, take into account the length of time the motor will run, how high electric bills currently are, and the right sized motor for the job. If the motor is only running sporadically, a retrofit to a NEMA Premium® motor may not make sense. However, the longer the motor runs, the greater the potential for savings. In new installations, NEMA Premium® motors are the standard.

Premium efficiency motors are usually made to higher manufacturing standards, and stricter quality controls. For more information, visit: www.nema.org/gov/energy/efficiency/premium/

Controllers



Benefits of a Controller

- Controllers can make immediate adjustments to house conditions
- Money, energy, and time are saved
- Provides an alarm system to alert you to environmental changes that could threaten bird health

Poultry houses require constant monitoring to ensure adequate heating, cooling, and ventilation. This can be an overwhelming task to do manually if the farm is larger than a couple poultry houses.

Installing controllers in the poultry houses makes this task easier. Controllers coordinate heating, ventilation, cooling, and lighting systems so everything works in an integrated fashion. The environment remains constant, allowing the birds to realize their maximum potential. Such precision controls can help reduce energy costs by eliminating over-heating and over-cooling.

Controllers are compatible with PCs, so regular reports on temperature, feed and water condition, and bird weights can be sent directly to the office computer.

Time of Use Management



Farmers often have the opportunity to reduce their electricity costs by participating in demand response programs offered by their utility.

Electric utilities must maintain the ability to supply sufficient electricity to the grid during periods of extremely high demand. These periods typically occur in the middle of hot summer weekdays when air conditioning and refrigeration loads are at their peak. Thus, utilities often provide incentives to their customers for switching to alternative electric sources such as on-farm generators during these times.

We recommend contacting your electric utility to determine what opportunities exist for reducing electric costs through Time of Use Management.

Renewable Energy



It is recommended that, before pursuing a renewable technology, current operations be as energy efficient as possible.

However, once a farm has implemented all cost effective energy efficient equipment, renewable energy projects may make sense.

EnSave offers services to help you decide what your next steps should be regarding renewable energy.

For resource information on wind energy, photovoltaic and thermal energy, geothermal, and other renewable energy technology, call EnSave at 800-732-1399.

About EnSave

EnSave supports the American agricultural sector with innovative energy efficiency and resource conservation programs. EnSave provides agricultural producers and food processors with cost effective ways to reduce operating costs while saving energy and reducing pollution.

EnSave's clients include state and federal energy and environmental agencies, investor owned utilities, and rural electric cooperatives. EnSave implements its programs by developing relationships with equipment manufacturers, local equipment dealers, and the local agricultural community. Ultimately, these programs promote economic investment in the rural economy and improve the quality of America's land, air, and water.

EnSave does not represent any equipment manufacturer, nor does EnSave represent any one equipment dealer. EnSave's goal is to help our clients save energy and reduce pollution on America's farms and food processing facilities. EnSave also wants to keep our clients safe, so please consult a licensed professional before installing any new or retrofit equipment.

If you would like information on how EnSave can work with you, please contact us at (800) 732-1399.

The image used on the front cover and on the last inside page is courtesy of USDA.gov

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