

# Energy Efficiency on Poultry Farms



**High energy efficiency on poultry units mean simple efficiency measures can yield significant savings, especially in older buildings. The first step in improving energy efficiency requires knowing how much, where and when energy is used.**

**This can be done at a basic level by regularly recording utility meter readings or fitting advance data logging equipment. This information allows energy consumption patterns to be identified and performance benchmarked.**

## ENERGY CONSUMPTION

A standard 73m x 18m 27,000 bird broiler house (without renewable energy installed) on average consumes between 240-266 Mega Watt hours (MWh) of heat energy that's the same as 36,000-40,000 litres of LPG or 23,000-26,000 litres of kerosene heating oil together with 35,000 kWh of electricity. Many measures are fairly simple, yet have a considerable payback. Pay attention to detail and make energy efficiency part of routine procedure at every cycle prior to bird replacement.

## CONTROL AIREFLOW

Insulating buildings and reducing air leakage by sealing gaps in walls, around windows doors louvres or fans are priorities. Poultry buildings are designed to be ventilated but you must have control over airflow especially in winter. A lot of poultry houses work on negative pressure, so a good way to test for leaks is to close all vents and switch fans on to see what pressure you get. If 20-30Pa cannot be reached in a standard house with four fans there is likely to be a serious leakage. Improving insulation keeps heat in and reduces "solar gain" in summer, helping to keep the inside cool, reducing energy requirements for heating and ventilation.

## INSULATION

Adding 400mm of insulation is recommended. This is double the previous standard. Adding insulation can be difficult in older houses, but it is relatively easy and cheap for new units. Many existing units fall well below that, with typically 100mm or less despite young birds often being kept at a constant 30°C. Payback from sealing buildings can be less than a year, while for insulation it is seven to eight years.

## INDIRECT BENEFITS

Indirect heating systems where the boiler is located in an annex adjacent to the poultry building and transfers heat via a radiator system within the poultry house are more efficient than direct acting systems. While costly to install, new systems typically offer 93% efficiency, compared to 60% from older box heaters and are likely to retain efficiency better by not being within the poultry house.

Biomass boilers have found favour with UK poultry producers since the introduction of the Renewable Heat Incentive (RHI) there and offers a relatively short payback.

## POULTRY ENERGY-EFFICIENCY TIPS

### Ventilation

- Match duct and fan sizes to ventilation system.
- Regularly clean and maintain fans, ducts and louvers to improve airflow.

- Replace old fans with energy efficient models. A fan consumes its value in energy in about 18 months. Belt driven fans use one third less energy than direct-drive units
- Use recirculation fans (Cost about €350) to improve heat distribution, especially for direct acting heating systems. Link to first stage fans to maintain normal airflow.
- Seal gaps around doors, walls, windows and ventilation louvers to reduce air leakage – raises static pressure and improves ventilation efficiency and natural air mixing.
- Fit proprietary "bell-mouths" to fans or "cones" to outlet fans to increase aerodynamic efficiency by typically 10%

### Heating

- Position thermostats carefully to avoid overheating buildings (avoid draughts/doors).
- Insulate roof, floors and walls (insulate concrete mass walls to the ground).
- Link heating and ventilation systems.
- Use heat recovery to pre-heat incoming air with warm extract air. Savings of 10-25% are achievable.
- Service boilers regularly – clean heat transfer surfaces.
- Replace ageing boilers with energy efficient models or renewable energy systems – for example biomass boiler, ground/air source heat pump, solar)
- Consider radiant heaters to directly heat floor area and minimise air temperature rise.
- Restrict chicks to smaller areas with zonal control/brooding curtains – ensure a tight seal.

### Lighting

- Reduce lighting (within regulations) – current minimum is 20 lux over at least 75% of the floor.
- Replace old incandescent and tungsten halogen lights with energy efficient fluorescent systems inside and high pressure sodium or metal halide lamps outside.
- Modern LED's are dimmable and fit existing sockets. Costs are higher than standard bulbs (€11 per bulb versus €0.75 per bulb) but life span is longer 50,000 hours v 1,000 hours) and use less energy to produce twice as much light.
- Use photoelectric sensors to control lighting in buildings with windows.

### Other

- Use multiple electronic sensors at bird height to improve ventilation and heating accuracy – consider systems that record temperature/ventilation data to aid management.
- Inverters (variable speed drive) to speed up or slow down fans as required. (not just on/off)
- Commission an energy audit.

## FINANCING

At present the RDP funded Targeted Agricultural Modernisation Scheme (TAMS) is in operation until 2020 and will cover 40% of the cost of many upgrades and 60% for you trained farmers up to a maximum spend of €80,000, including the following:

- Energy efficient lighting
- Biomass boiler
- Solar panels / PV
- Heat pumps

- Heat recovery units
- Insulation
- Ventilation systems
- Upgrade / new wet feeding systems

For more information on this scheme consult the website of the Department of Agriculture, Food and the Marine.

<https://www.agriculture.gov.ie/media/migration/farmingschemesandpayments/farmbuildings/tamsiisupportdocs/pigandpoultryinvestmentscheme/TAMSIIPPIS210616.pdf>

## POULTRY CHECKLIST

### Are your heated buildings insulated?

Thermal conductivity for buildings of 0.4 watts per m<sup>2</sup> or better is recommended and this should be incorporated in all new poultry houses or extensive refurbishments.

Yes  No

### Is insulation kept dry?

When fibrous insulation material becomes wet it loses its insulation properties so a water vapour barrier must be used. Replace damaged or wet insulation to reduce losses.

Yes  No

### Do you have interlinked heating & ventilation controls?

Heating should be linked to ventilation, operating at minimum ventilation rates to avoid losses. If heating is required for litter moisture control, first rectify all sources of unnecessary wetness, e.g. leaks or drinkers.

Yes  No

### Do your ventilation fans have speed controls?

Use speed control on a reduced number of fans with the majority automatically switched off to achieve target minimum ventilation rates and better control.

Yes  No

### Have you reviewed ventilation system maintenance and design?

Match size and number of fans to the number of birds to minimise consumption. Check there are no constrictions from inadequately sized ducts and cowls, or from blocked inlets and outlets. For new buildings consider automatically controlled natural ventilation. Saving up to 20% if over ventilating by 10%.

Yes  No

### Have you considered fitting back draught shutters?

Fans that operate intermittently should be fitted, with back draught shutters to reduce heat loss. Saving up to 20% if over ventilating by 10%.

Yes  No

### Have you sealed buildings against air draughts?

Ensure buildings are well sealed so that air only enters or escapes from the envelope at the desired inlet and outlet positions, minimising heat loss.

Yes  No

### Can you control temperature?

Younger birds require temperatures up to 31°C depending upon age, but adult birds require only 22°C. It is important that temperature is reduced as the birds mature to minimise consumption.

Yes  No

### Do you regularly check sensor accuracy and condition?

Check sensors and controllers against a thermometer. Ensure that sensors are clean and located where they will give a representative stock temperature.

Yes  No

### Bearing welfare and husbandry requirements in mind can you reduce lighting intensity?

Luminaire distribution and control should provide even lighting throughout the room for optimum efficiency. Fluorescent lights should be used with care for poultry because of uncertainties over its biological suitability. High frequency electronic ballast are preferred. Save up to 50% of lighting costs.

Yes  No

### Do you use lighting dimmer controls?

Dimmer switches and multi-circuit lighting should be used to provide long day lighting whilst controlling demand.

Yes  No

### Do you keep lights clean?

Clean light fittings regularly. If illumination levels are sufficient with dusty luminaires, clean them and reduce the number which are on, or lower the dimmer further. Saving up to 20% of lighting costs.

Yes  No

#### Links

Department of Communications, Energy and Natural Resources [www.dcenr.gov.ie](http://www.dcenr.gov.ie)  
Sustainable Energy Authority Ireland [www.seai.ie](http://www.seai.ie)

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