Poultry House Lighting

A Move Toward Lighting Efficiency

Andrew J. Courts, Jr., LEED AP

Certified Energy Manager

800.570.0105

"Efficiency is doing better what is already being done."

Peter F. Drucker

Why Change Lighting?

* Utility rates are rising!!!!
* Incandescent bulbs are going away.
* Payback is easily calculated.
* Low maintenance/durability
* Profits can be increased/maintained.
* It's easy to integrate into existing systems/technology.
* New lights have no mercury - easy disposal.

6 Steps to Energy Efficiency

HOW DO YOU STACK UP?
The first step in reducing energy use is to determine how much energy you are using now – for what functions – and how this use compares with others. The analysis will reveal opportunities. This review can be completed by you or by contracting a professional.

BEHAVORIAL CHANGES
Low hanging fruit. How can your daily activities affect energy use? Do you run lights when not needed? Are your thermostat and sensors cleaned on a maintenance schedule? Is your equipment maintained for efficiency?

PASSIVE OPPORTUNITIES
The Sun is the **greatest** source of energy known to man. There are many proven techniques to capture, store and use the radiation from the Sun for space heating and liquid heating. The strategic placement of trees and shrubs can have a material effect on heating and ventilation as well as odor control.

EFFICIENT EQUIPMENT
This ladder step deals with analysis and possible replacement your existing equipment. The goal is to accomplish more or the same output with reduced energy input.

AUTOMATION
This step revolves around replacing our efforts to control various energy consuming tasks with an automated system that never forgets.

RENEWABLES
Once all other steps are complete and energy use is reduced, power generation through solar, wind and methane digesters are good long term investments in energy independence.

Renewables

Automation

Efficient Equipment

Passive Opportunities

Behavioral Changes

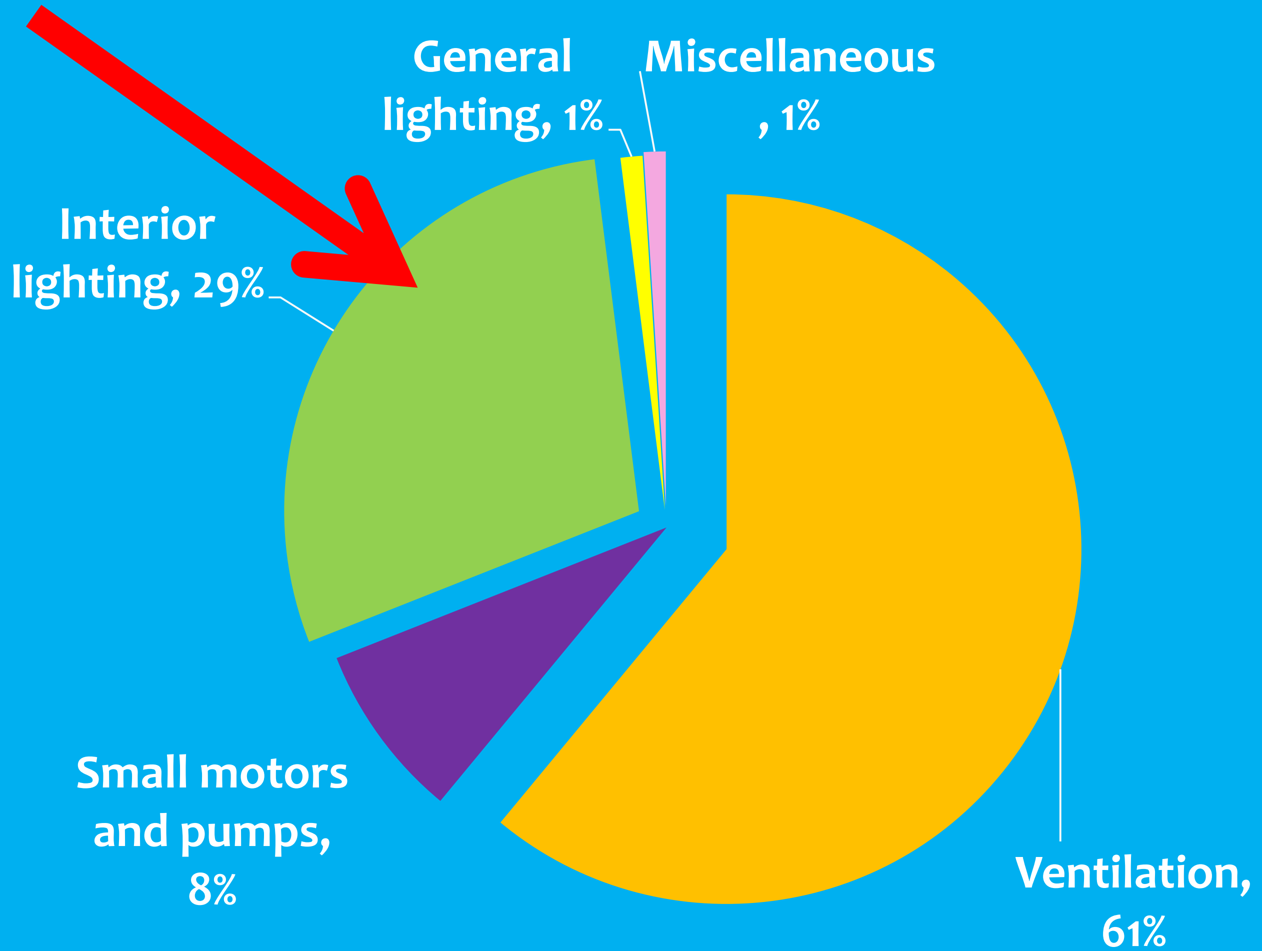
How Do You Stack Up?

Energy Issues in the News

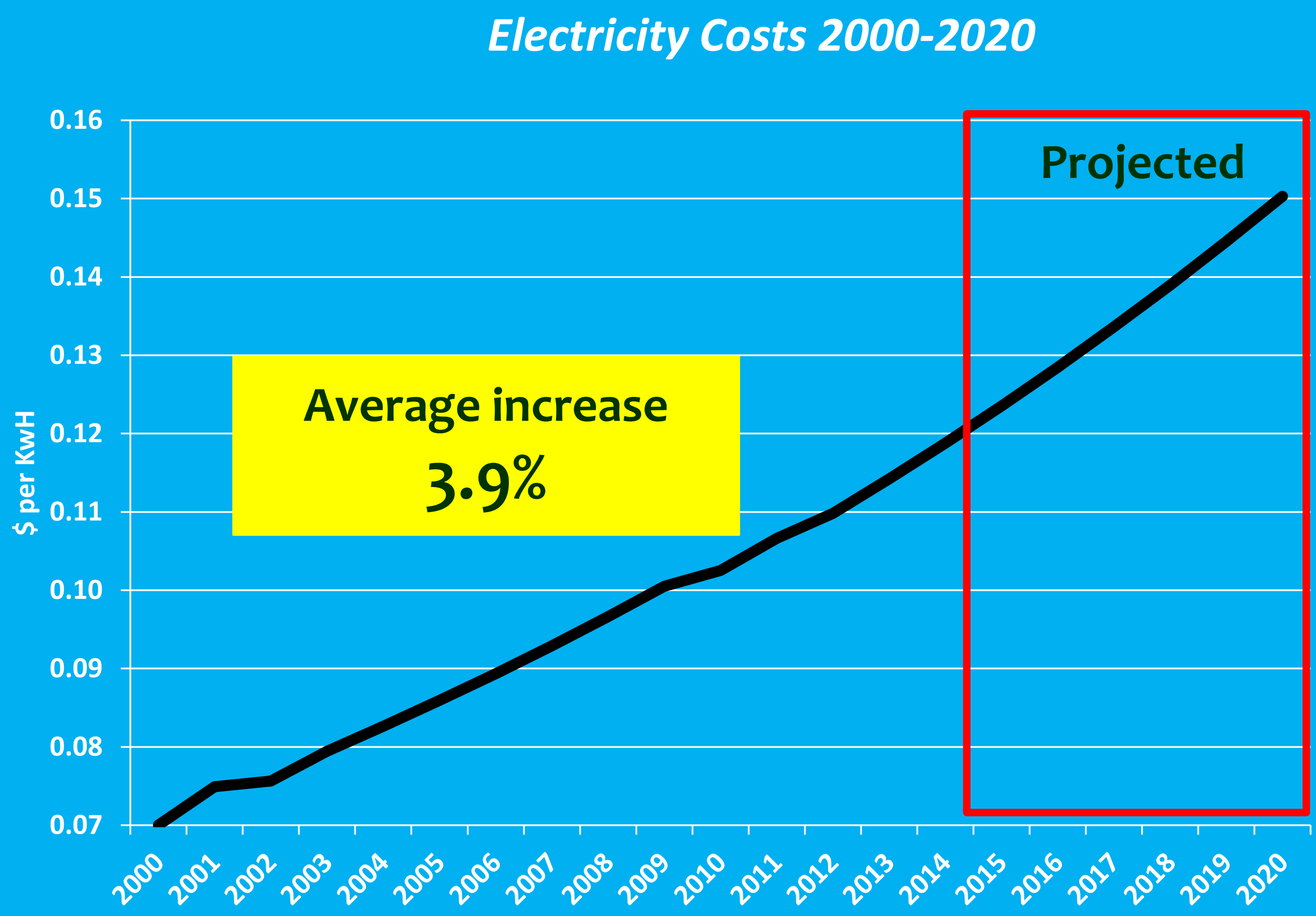
- **Duke Energy CEO: Customers will foot the bill to clean up toxic coal ash lagoons.**
- **ENERGY MATTERS: Energy plays a big role in the Russian-Ukraine conflict.**
- **China and India demand the Middle Class lifestyle.**

Power rates

Electrical Use Breakdown

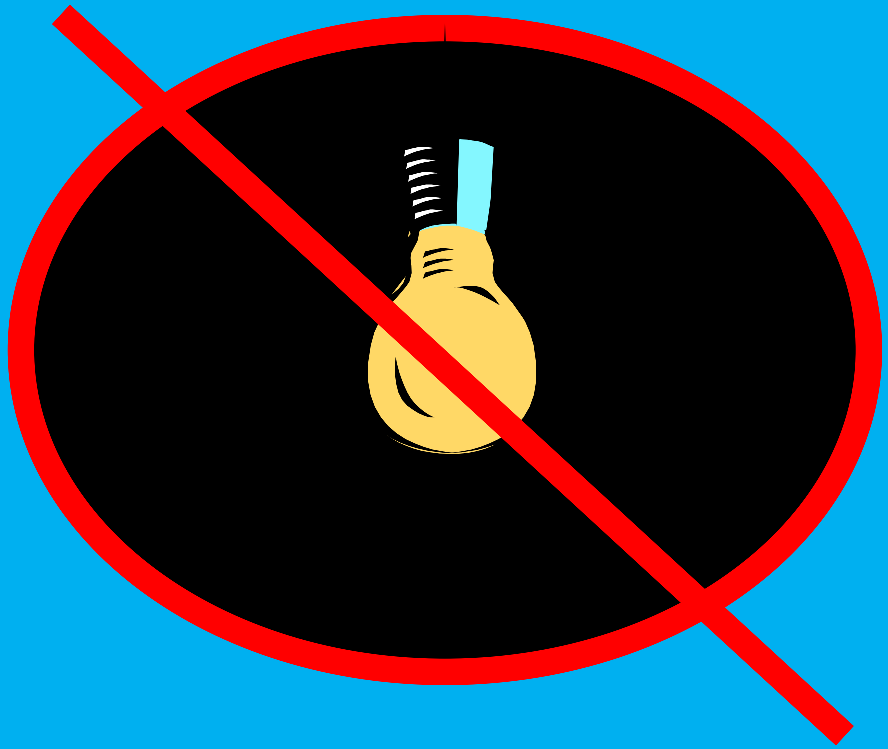


Utility Rates are Rising



Source: Energy Information Administration
www.eia.gov

60 watt incandescent light bulb



A heating device that makes light as a by-product

LED Lamps are an Investment!!!!!

Treat them accordingly.

- Good idea to change our keyless sockets with nickel or brass coated one.
- Purchase new dimmers that are appropriate for LED lamps and will extend lamps.
- Consider jelly jars or globes to protect lamps and make cleaning easier. *

- *Make sure LED lamps are designed to be enclosed

Life of Bulbs
in **Rated Hours**

Longer life means fewer burnouts and changes

25,000 +

4000 -6000

750 - 1000

Incandescent **CFL** **LED**

Cost of Changing a Light Bulb

- First, you have to find the ladder.
- Then you have to find the light bulb.
- Then you have to carry the ladder to the burnt out bulb.
- Then you have to change the bulb.

- Then you have to carry the ladder back.
- Heaven forbid you fall, then you have to call your spouse…
- Cost in time = 1.15 hours = **$30 - $50**

Source: DOL

Lighting From a Salesman's Point of View

Realistic Lighting View

Adjustments to:

- kWh price
- Run times
- Dimming policies
- Days in house

Will affect savings and payback. Each situation is different.

Call today for a quote on your growing schedule **800.570.0105**

Poultry House Lighting Comparison

		Costs		
Electric Cost ($/kWh)	$0.10	CFL	156	
Flocks/year	4.5	LED	960	
Market Age (days)	52	Dimmer	200	
		Electrician	300	X 4 houses
		Total	$1,616	$6,464

Lighting System 1

	watts/bulb	Bulb Type
Before	100	Incand.
After	23	CFL

Lighting Period Start	End	# of Bulbs	% Light Intensity	Hours/Day	Before	After
1	5	20	100	24	$86.84	$19.97

Lighting System 2

$86.84

	watts/bulb	Bulb Type
Before	40	Incand.
After	8	LED

Lighting Period Start	End	# of Bulbs	% Light Intensity	Hours/Day	Before	After
1	10	224	100	24	$875.33	$175.07
11	15	224	50	23	$271.34	$54.27
16	21	224	50	22	$324.43	$64.89
22	28	224	50	21	$371.62	$74.32
29	36	224	50	20	$412.91	$82.58
37	44	224	60	23	$516.24	$103.25
45	52	224	100	24	$680.81	$136.16
Days Lights are Operated Between Flocks						
7		224	50	8	$165.16	$33.03

Results

	Before	After	Savings
Electrical Cost ($/year)	**$2,970.04**	**$596.50**	**$2,373.54**
Electrical Energy (kWh/year)	**29,700**	**5,965**	**23,735**

Accurate numbers are critical for good decision making.

This is what you **DO NOT** want……

Fins on your lamp!!!!

- They fill with dirt and litter.
- They never get clean.
- <u>They can cut your lamp’s life in half!</u>

80 Watt Bulbs

	Before	After	Savings
Electrical Cost($/year)	$7,322.51	$743.54	$6,578.97
Electrical Energy (kWh/year)	73,225	7,435	65,790

60 Watt Bulbs

	Before	After	Savings
Electrical Cost($/year)	$5,513.59	$743.54	$4,770.05
Electrical Energy (kWh/year)	55,136	7,435	47,701

United States Department of Agriculture
Natural Resources Conservation Service

Energy Estimator: Animal Housing

User Input

State: North Carolina	**Town:** Denton
Animal Operation: Poultry	**Poultry Houses:** 4 40'X500' houses

Annual Poultry Housing System Analysis

Lighting System: Incandescent	**Ventilation:** Energy Efficient Fans
Facility Heating: Radiant Tube	**Fuel Type and Cost:** Propane $2.2 / Gallon
General Heating: None	**Total Annual Fuel Use:** 21,300 Gallons

#s are wildly inflated

Description	Estimated Annual Energy Use (Units)	Unit	Estimated Annual Energy Cost ($)	Estimated Annual Energy Savings ($)
Your Lighting	**87,500**	**kWh**	**$8,750**	
Change to LED	17,500	kWh	$1,750	$7,000
Change to T8	21,900	kWh	$2,190	$6,560
Change to Compact Flourescent	30,600	kWh	$3,060	$5,690
Your Ventilation	**106,200**	**kWh**	**$10,620**	
Add cleaning fans regularly and mantaining fan motors and belts	63,800	kWh	$6,380	$4,540
Add cleaning fans regularly	75,000	kWh	$7,500	$3,120

www.usda.gov (NRCS Energy Consumption Awareness Tool)

Financial Analysis

Sustainable businesses require effective planning and financial management. Ratio analysis is a useful management tool that will improve your understanding of financial results.

Simple Payback (SP) for LED Light Change

= Installed cost / Yearly savings

= **$4,856/ $2,373.54** = **2.04 Years**

Lower Emissions (GHG, CO2, etc)

Measure	Electricity Savings (kWh)	Propane Savings (gal)	Energy Savings (MMBtu)	Installed Cost [a]	Energy Cost Savings [b]	Est. Payback in Years [a]/[b]	CO_2 (lbs)	N_2O (l,bs)	CH_4 (lbs)	SO_2 (lbs)	NO_x (lbs)
Poultry House Lighting	23,735		81	6,464	2,961	2.2	25,483.1	0.4	0.5	48.4	19.0

http://www.comet2.colostate.edu/

Know what you are buying

No FINS

Lumens of at least 800

ENERGY STAR
- Rebates

Dimmable

Specifically designed for the rigors of Poultry Houses.

ETL or UL Certified for damp locations

4000 Kelvin or higher

Confirm Wattage of 60W equivalent

Rated life (Hours)

Maintenance

Use a backpack blower to get the first layers of dirt off. Then use a lightly dampened cloth with a mixture of 1 part ammonia to 10 parts water to wipe off lamps. Dirt and debris will clean easily. You'll be glad not to have fins!

Purchase Upgraded Dimmers
Connect Dimmer to Control System and Calibrate each Dimmer

Dimming lower than 10% may affect the life expectancy of your bulbs!

Hire an Electrician

Don't be penny wise and dollar foolish

- Article 547 of the National Electric Code (NEC) has livestock house requirement.
- Consult with your insurance agent.
- Tight fixtures help prevent dust and moisture.
- Clean keyless sockets before inserting LED lamps.
- Use nickel plated bases to minimize corrosion.
- Calibrate lights with dimmers.

Calibrate your Dimmer When Installing New Lamps

Steps for Proper Use of a Light Meter to Understand and "Calibrate" Your Dimmer:

1. Use a light meter capable of measuring to 0.01 footcandles (fc). These are not too expensive, usually around $150 or less.
2. Take all light meter readings at bird level, along feed lines and halfway between bulbs.
3. Measure footcandles with brood lights off and dim lights at full (100%) intensity. This will provide a baseline footcandle level for your dimmer at full intensity.
4. Measure footcandles at bird level between bulbs along feed line until your desired fc reading is achieved. For example, if 0.25 fc is desired, keep turning the dimmer down in small steps until the 0.25 level appears on the light meter display.
5. Observe the dimmer's dial or display setting at the desired fc level, and mark the dimmer accordingly or record the correct setting nearby the dimmer.
6. If you have trouble getting a footcandle reading low enough, it may indicate that the bulbs you are using are providing too much light to be dimmed to the desired level, and you may want to consider replacing them with lower wattage bulbs.
7. While you are taking light intensity measurements, it is a good idea to determine what setting on the dimmer dial or display corresponds to 10% of full light intensity. This is because setting dimmers too low, typically below around 8-10% of full intensity, can cause premature bulb failure (as explained below).

Auburn World Poultry Center
http://www.aces.edu/poultryventilation/documents/Nwsltr-68LightDimmingIssues.pdf

- **<u>Get integrator approval prior to moving forward!!!</u>**
- Use your integrator to assist in bulk buying… as much as 35% savings are possible.
- A light meter is a valuable tool to determine light efficacy.
- Paint walls to increase lumen output.
- You’ll need to purchase far less replacement bulbs.
- Have NO fins on base of bulb – they grab dirt.

Fins are the enemy of good lighting!!!!

Leading the Way

Please Contact us or visit us on the Web for more Information

A.J. (Andy) Courts, Jr.

800-570-0105 ext 702

336-402-4118

888.509.9017 Fax

Andy@aglightinnovation.com