

# **On-line Farm Energy Assessment**

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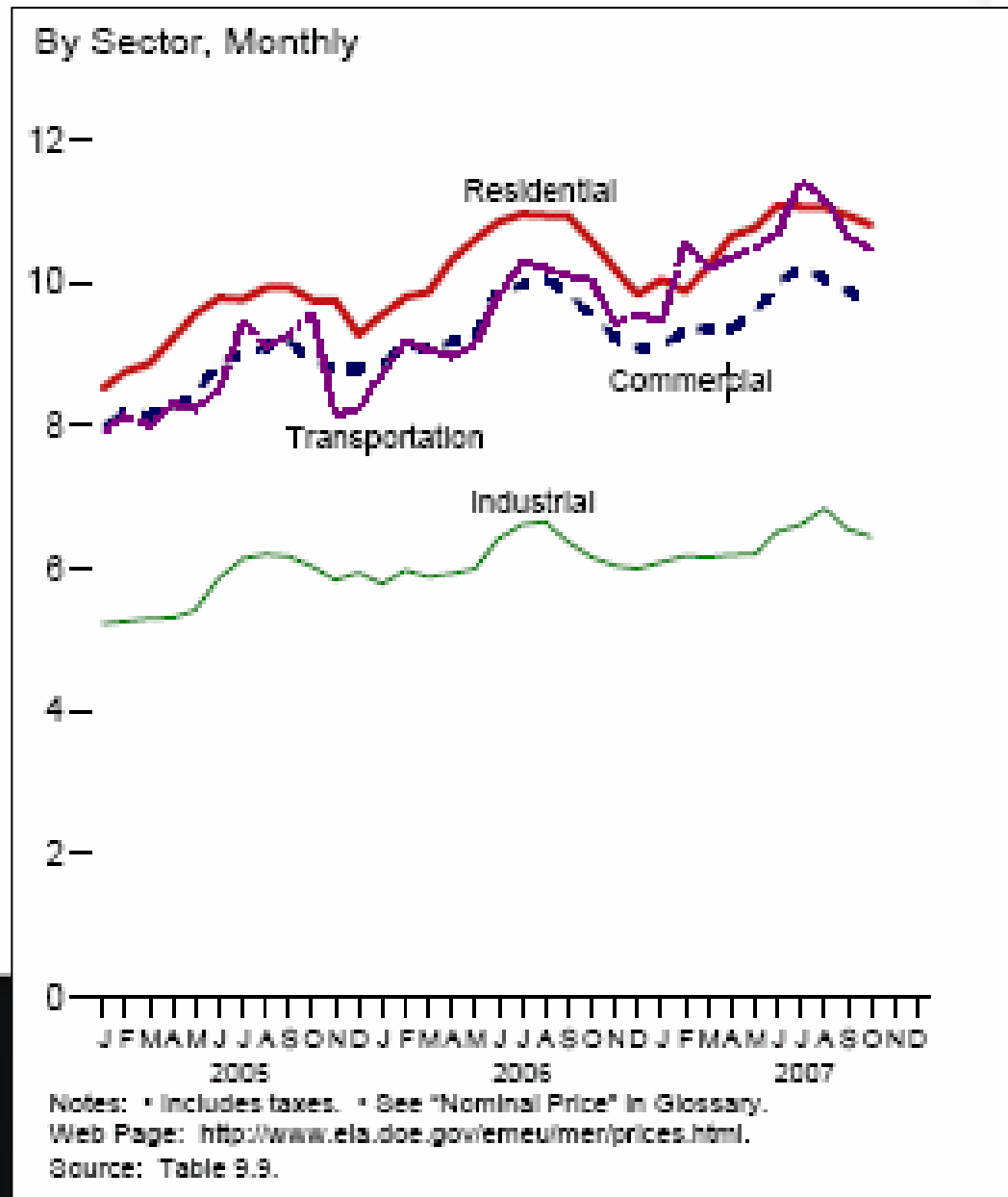
# Objectives

- Demand for Farm Energy Assessments
- Existing Farm Energy Assessment Tools
- Demonstrate Current CIG Project
- Encourage Reviewer Feedback
- Recommend How to Use the Tool



# Why the demand? Rising Energy Prices

**Average Retail Prices  
of Electricity**  
(Nominal Cents per  
Kilowatt-hour), EIA,  
February 2008



# Why the demand? USDA Programs

- EQIP and CSP Programs
  - Call for producers to analyze and enact energy efficiency planning
  - Resources have been limited
- USDA 9006 Energy Efficiency Grants
  - Energy Assessments for projects <\$50,000
  - Energy Audits for projects >\$50,000





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The Natural Resources Conservation Service (NRCS) has developed four energy tools designed to increase energy awareness in agriculture and to help farmers and ranchers

- Energy Tools**
- All NRCS Energy Tools

- NRCS Energy Information
- USDA Energy Information
- Energy in Agriculture
- Conservation Technology Information Center
- CSP Energy Job Sheets
- Comment on Energy Tools

### Spotlights



**Energy Estimator: Animal Housing**  
The Energy Estimator for Animal Housing tool is designed to enable you to estimate potential energy savings associated with swine, poultry or dairy cows housing operations on your farm or ranch. This tool evaluates major energy costs in lighting, ventilation and heating costs for swine and poultry. It evaluates major energy costs with lighting air circulation, milk cooling, water heating and milk harvesting costs for typical dairy. This tool does not provide site specific recommendations.



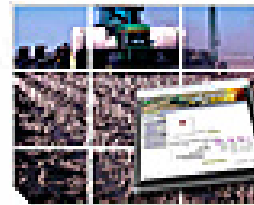
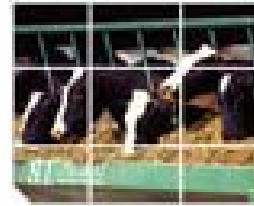
**Energy Estimator: Irrigation**  
The Energy Estimator for Irrigation tool enables you to estimate potential energy savings associated with pumping water for irrigation. NRCS technical specialists developed this model to integrate general technical information farm-specific crops, and various equipment. This tool does not

- Nitrogen
- Tillage



# USDA's Energy Estimator Tools

- Animal Housing
- Irrigation
- Nitrogen
- Tillage





United States Department of Agriculture  
Natural Resources Conservation Service

# Energy Self Assessment

- Conservation Innovation Grant (CIG)
  - Collaboration of UW-Madison & GDS Associates, Inc.
  - First award in 2006 for Midwest Ag Enterprises
  - Second award in 2007 for National Ag Enterprises



GDS Associates, Inc.  
Engineers and Consultants



United States Department of Agriculture  
Natural Resources Conservation Service

# Energy Self Assessment

- **CIG Objectives:**
  - Specific Inputs → Specific Energy Saving Outputs
  - Incorporate EE Recommendations for Several Midwest Farm Enterprises
  - Renewable Energy Calculators (Farm-based)
  - Guide Producers to Find More Information



GDS Associates, Inc.  
Engineers and Consultants





# Energy Self Assessment

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## Energy Self Assessment Calculator

### Energy Tools

- All NRCS Energy Tools
- Self Assessment Tools
- Roof

[www.uwex.edu/energy/esa](http://www.uwex.edu/energy/esa)

- Other Programs
- ▶ Link to
  - ▶ NRCS Programs
  - ▶ NRCS Energy Information
  - ▶ USDA Energy Information
  - ▶ State and Federal Incentives for Renewables and Efficiency

used and estimate the current energy usage. The tools will calculate the estimated energy and cost savings for the use of high efficiency equipment and energy conserving practices. The results generated by these tools are estimates based on models and help to determine which equipment or practices are worth pursuing to reduce energy consumption.

An on-site energy audit may be beneficial to uncover other energy conservation measures not covered by these tools. Please contact your local NRCS office for additional assistance.

- Irrigation
- Lighting
- Potato Storage
- Water Fountain

### Feedback

- ▶ Comment on Energy Self Assessment Tools

### Spotlights



# Energy Assessment Modules

## Existing:

- Beef
- Dairy
- Grain Drying
- Irrigation
- Lighting
- Potato Storage
- Water Fountain

## Soon to Come:

- Biogas
- Biomass  
Combustion
- Solar PV
- Solar Thermal
- Wind



Go

## Other Resources

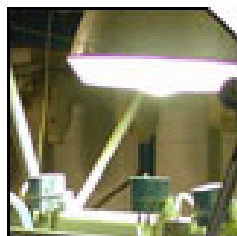
- ▶ [Link to NRCS Office](#)
- ▶ [NRCS Programs](#)
- ▶ [NRCS Energy Information](#)
- ▶ [USDA Energy Information](#)
- ▶ [State and Federal Incentives for Renewables and Efficiency](#)

## Feedback

- ▶ [Comment on Energy Self Assessment Tools](#)

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## Lighting Self Assessment Tool



The Lighting Self Assessment Tool has been developed to increase awareness of the energy efficiency of different types of lights commonly used in agriculture and to calculate the potential savings from high efficiency lamps. This energy calculator is designed to estimate your current lighting energy usage based on your inputs and suggest more efficient alternatives. This tool incorporates all types of lighting including incandescent, halogen, mercury vapor, compact fluorescent (CFL), T12 Fluorescent, metal halide, T8 Fluorescent, high pressure sodium and T5 fluorescent lamps. Generic lamp replacement recommendations are made based on the current lamp type used and the typical replacement options.

### Step 1: Zip Code

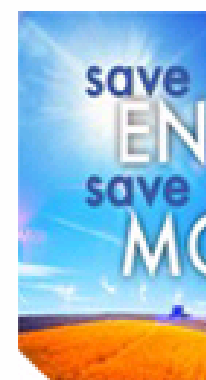
To use this tool, begin by entering your zip code, then click Continue.

Zip code:

\* Required Input

Continue

- [All NRCS Self Assessment Tools](#)
- [Beef](#)
- [Dairy](#)
- [Grain Dry](#)
- [Greenhouse](#)
- [Irrigation](#)
- [Lighting](#)
- [Potato Storage](#)
- [Water Fertilization](#)



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## Step 2: Pre-Qualifying

This section will prescreen your situation to see if a detailed analysis would be

- **Prequalifying Step**
  - Actual assessment (step 3) requires producer to inventory all their lights
  - This step rules if the inventory is necessary

**Click on the pictures of the different light types below** to get a brief description of the lighting technology and some of the important operating parameters, lamp life and lamp efficiency.

**Indicate which lighting technologies you currently use** and approximately how many of each lamp type.

At the end of the session your data will be erased for your privacy.

Click on the picture for a definition.

Answer the questions below.



What is the approximate number of Incandescent lamps you use?



What is the approximate number of Tungsten-Halogen lamps you use?



What is the approximate number of Compact Fluorescent lamps you use?



# Energy Self Assessment

## Mercury Vapor (MV) Lamp

The mercury vapor (MV) lamp has been used for decades on farms for "yard lights". They emit a greenish-blue light and have lowest efficiency of the HID lamps at 35 lumens per watt. These lamps have low color rendering properties which makes it difficult to differentiate between colors so they are not a good choice for warehouses or dairy barns. Mercury vapor lamps have a useful life of about 24,000 hours and have higher lamp depreciation than other HID lights, losing half their output over their life. The arch tube of the lamp contains mercury and small quantities of argon, neon and krypton. MV lamps have the lowest efficiency of the HID type lights with efficiencies of about 32 lumens per watt.

Close





# Energy Self Assessment

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DENMARK, WI 54208

## Step 2: Pre-Qualifying

It is RECOMMENDED that you proceed to the detailed analysis for lighting. Significant savings are possible. You will be asked to provide details about the different types of lights used on your farm.

[On To Step 3](#)

[Comment on Energy Self Assessment Lighting](#)



DENMARK, WI 54208

[Comment on Energy Self Assessment Lighting](#)

**Click on more info:**

- [Incandescent](#)
- [Halogen](#)
- [Compact Fluorescent \(CFL\)](#)
- [T-12 Fluorescent](#)
- [T-12 HO Fluorescent](#)
- [T-8 Fluorescent](#)
- [T-8 HO Fluorescent](#)
- [T-5 Fluorescent](#)
- [Mercury Vapor](#)
- [Metal Halide](#)
- [Pulse-Start Metal Halide](#)
- [High Pressure Sodium](#)
- [Yard Lights](#)
- [How estimates are made?](#)

### Step 3: Lighting System Input

This section collects the data about the lights used at your facility so it can calculate your baseline energy use and cost. The assessment **cannot be saved** so make sure you know all of the required data before starting. Please refer the [Data Sheet](#) before carrying out the audit. Once data is collected, the self assessment survey will require about 10 minutes to complete.

#### STEPS:

- Select the desired enterprise from the pop-up menu – this will provide descriptions of locations where lights are typically used for different enterprises. The location descriptions can be modified if you prefer a different description.
- Input your current electric cost - \$ per kWh.
- Select the lamp type from the pop-up window. If you are using you may need to click on the side bar in window to scroll to find it. If you don't find the exact lamp type used, please select the closest one and enter the size and type of light you are using.
- Enter the number of fixtures.
- Enter the number of days and hours per year lights are used.

[Dairy](#)

[Poultry](#)

[Swine](#)

[Equine](#)

[Beef](#)

Lighting system for

Electricity Cost



[T-12 Fluorescent](#)  
[T-12 HO Fluorescent](#)  
[T-8 Fluorescent](#)  
[T-8 HO Fluorescent](#)  
[T-5 Fluorescent](#)  
[Mercury Vapor](#)  
[Metal Halide](#)  
[Pulse-Start Metal Halide](#)  
[High Pressure Sodium](#)  
[Yard Lights](#)  
[How estimates are made?](#)

you are using you may need to click on the side bar in the pop up window to scroll to find it. If you don't find the exact wattage of the lamp type used, please select the closest one and email a comment with the size and type of light you are using.

- Enter the number of fixtures.
- Enter the number of days and hours per year lights are used.

Lighting system for

Electricity Cost

### Lighting System

Locations	Current Lighting You Have	Number of Fixtures	Days per year used	Hours per day used	
Yard Lights	Mercury Vapor - 250W <input type="button" value="v"/>	<input type="text" value="4"/>	<input type="text" value="365"/>	<input type="text" value="12"/> <input type="button" value="v"/>	<input type="button" value="Delete"/>
Feeding Mixing Center	Incandescent - 100W <input type="button" value="v"/>	<input type="text" value="4"/>	<input type="text" value="365"/>	<input type="text" value="4"/> <input type="button" value="v"/>	<input type="button" value="Delete"/>
Office	T-12-HO Fluorescent 2 bulb x 4ft <input type="button" value="v"/>	<input type="text" value="1"/>	<input type="text" value="365"/>	<input type="text" value="1"/> <input type="button" value="v"/>	<input type="button" value="Delete"/>
Feed Lot #1	Select a Lighting Type <input type="button" value="v"/>	<input type="text" value="0"/>	<input type="text" value="365"/>	<input type="text" value="1"/> <input type="button" value="v"/>	<input type="button" value="Delete"/>
Feed Lot #2	Select a Lighting Type <input type="button" value="v"/>	<input type="text" value="0"/>	<input type="text" value="365"/>	<input type="text" value="1"/> <input type="button" value="v"/>	<input type="button" value="Delete"/>
Utility Room	Select a Lighting Type <input type="button" value="v"/>	<input type="text" value="0"/>	<input type="text" value="365"/>	<input type="text" value="1"/> <input type="button" value="v"/>	<input type="button" value="Delete"/>

### What does the output tell me?

The program calculates the amount of light generated from each lamp type selected and then calculates the energy savings potential if an appropriate high efficiency lamp type was used to produce the same amount of light. The energy savings value is listed in the summary table. The summary table lists the estimated baseline energy use and four types of high efficiency lamp types that are recommended for use in agricultural facilities. If there is a value listed in the table under the lamp type, then it would be an appropriate replacement lamp. If the value is zero, then this is not an appropriate replacement. If all the values are zero, then the lamp is already a high efficiency lamp. The maximum potential savings column selects the highest energy savings from the row and then sums the column to indicate the total potential energy savings. The percent savings and the estimated reduction in greenhouse gases in pounds of CO<sub>2</sub> are also calculated.

[Show All](#)[Show Energy Savings in kWh](#)[Show Energy Savings in \\$](#)[Show User Input](#)[Back](#)[Start Over](#)[Print](#)[Links & Resources](#)

## Step 4: Annual Lighting System Analysis

Estimated Annual Cost Savings in \$							
Location	Current Fixture Type	Current Annual Cost	Compact Fluorescent Lamps	Linear T8 Fluorescent Lamps	Pulse Start Metal Halide Lamps	High Pressure Sodium Lamps	Potential Savings
		\$/yr	Cost savings per year (\$)				
Yard Lights	Mercury Vapor - 250W	526	0	356	296	365	365
Feeding	Incandescent -						

### Estimated Annual Energy Savings in kWh

Locations	Current Fixture Type	Current Energy Use	Compact Fluorescent Lamps	Linear T8 Fluorescent Lamps	Pulse Start Metal Halide Lamps	High Pressure Sodium Lamps	Potential Savings	
		kWh/yr	Energy savings per year (kWh)					
Yard Lights	Mercury Vapor - 250W	5256	0	3556	2962	3650	3650	
Feeding Mixing Center	Incandescent - 100W	584	420	468	0	0	468	
Office	T-12-HO Fluorescent 2 bulb x 4ft	100	0	40	0	0	40	
Feed Lot #1	Mercury Vapor - 250W	5256	0	3556	2962	3650	3650	
Feed Lot #2	Mercury Vapor - 250W	5256	0	3556	2962	3650	3650	
Utility Room	Incandescent - 100W	18	13	14	0	0	14	
	<b>Est. Annual Energy Use</b>	<b>16470</b>					<b>Total Potential Savings (kWh)</b>	<b>11472</b>
							<b>Percent</b>	<b>70%</b>

Value of "0" indicates "No Savings" or it's not a recommended replacement



# Energy Self Assessment

Contact Us

of Lighting

**Your feedback can help us improve  
our tools!**

You are  
Systems



DENMARK, WI 54208

We Would Appreciate Your Feedback

Please take some more time to answer a survey  
and send comments you might have so we can  
improve our tools for you.

[Click Here To Visit the Survey](#)

### What does the output tell me?

The program calculates the amount of light generated from each lamp type selected and then calculates the energy savings potential if an appropriate high efficiency lamp type was used to produce the same amount of light. The energy savings value is listed in the summary table. The summary table lists the estimated baseline energy use and four types of high efficiency lamp types that are recommended for use in agricultural facilities. If there is a value listed in the table under the lamp type, then it would be an appropriate replacement lamp. If the value is zero, then this is not an appropriate replacement. If all the values are zero, then the lamp is already a high efficiency lamp. The maximum potential savings column selects the highest energy savings from

Did you like or dislike the use of pop-up windows (definitions, reports)?

- Like
- Dislike

Do you think the reading sections (definitions, explanations of technologies) were clearly written?

- Yes

**10 Multiple choice questions**

How much do you think this tool is:

- Just Right
- Too Little
- Too much

How understandable is the organization of the reports?

- Understandable
- Somewhat understandable
- Somewhat confusing
- Confusing

How useful are the reports?

- Useful
- Somewhat useful

# Advice for Using the Tool

- Producer's utility bill provides a sum of **all** energy used on the farm
- This tool can provide baseline energy use **per technology** used on the farm
  - BUT! Energy use and energy efficiency recommendations are based on **user input**



# Machine Won't Take Our Place

- Purpose of the Tools
  - Provide an idea of projects to pursue
  - Encourage individual action based on energy savings
- The Tool Does Not
  - Provide a formal energy assessment/audit required by the USDA
    - These still require a certified energy manager



# Thank You!

## Acknowledgements:

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Richard Hackner, Richard Hasselman, & Joe Schultz GDS Associates, Inc.

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