

# Electrical Energy Conservation

## Course 380: Electrical Energy Conservation

Covers electrical energy consumers in typical commercial and industrial facilities. Investigates utility rate structures and relates cost to load management. Examines power factors, including how they are calculated and how they affect energy usage. Shows methods of conducting lighting surveys and how lighting fixture and lamp selection can impact electricity costs.

TPC Training is accredited by IACET to offer **0.5 CEU** for this program.



### Lesson 1: Surveying Electrical Consumption

#### Topics

Identifying Electricity Consumers; Determining System Efficiency; Using Electrical Metering; Justification for Metering; Meters; Meter Selection; Determining Consumption; Evaluating Examples Using Meters

#### Objectives

- Conduct an electrical energy audit.
- Determine the efficiency of an electrical system.
- Give three reasons for metering electric energy use.
- Name the three basic types of meters used in energy conservation work and explain how each is used.
- Differentiate between indicating and recording meters.

### Lesson 2: Using Load Management Techniques

#### Topics

Electrical Quantities; Load Factor; Electric Bill Audit; Graphic Record of Demands; Equipment Audit; Target Demand; Methods of Control; Manual Control; Automatic Control; Demand Controllers; Electric Rates; Calculating the Cost of Electricity

#### Objectives

- Name the two metered quantities that determine the major part of an electric bill.
- Define power factor and load factor and explain why each is important.
- Show how to use meters to identify usage patterns and peak usage periods.
- Compare and contrast manual and automatic demand control and give an example of each.
- Name several types of demand controllers and tell how each operates.
- Describe the way in which electric bills are calculated.

### Lesson 3: Improving Electrical Equipment Efficiency

#### Topics

Energy, Watts, and the Electric Circuit; Electrical Quantities; Capacitors; Induction Motors; Motor Operation; Motor Efficiency; Determining Motor Loading; Variable-Speed Drives; Transformers; Energy-Saving Devices

#### Objectives

- Name the two familiar forms energy may take.
- List three elements of impedance in an ac system.
- Explain how power factor is calculated in a single-phase and a three-phase circuit.
- Tell why capacitors are important from an energy conservation standpoint and name three sources of capacitance in an electrical system.
- Explain the information found on a motor nameplate and tell how it relates to energy on a electrical system.
- Calculate load losses and no-load losses of motors, speed controls, and transformers.
- Evaluate the value of energy-saving devices.

### Lesson 4: Conducting a Lighting Survey

#### Topics

The Importance of Lighting; Lighting Levels; Measuring Lighting Levels; A Lighting Survey; Improve Switching; Remove Existing Lighting; Replace Existing Lighting; Reduce Lamp Size; Improve Lighting Controls; Modify Work Stations; Provide Task Lighting; Use Natural Light

#### Objectives

- Explain the importance of a good lighting system.
- Define uniform lighting and selective task lighting and tell how they affect energy consumption.
- Determine recommended and actual lighting levels
- Distinguish between lumens and footcandles as measures of light.
- Give examples of ways in which switching modifications can be used to reduce energy consumption.
- Describe several ways to use natural lighting more efficiently.

### Lesson 5: Evaluating Lamps and Fixtures

#### Topics

Lighting Fixtures and Their Maintenance; Incandescent Lamps; Fluorescent Lamps; Scheduling Lamp Replacement; Comparing Fluorescent and Incandescent Lamps; High Intensity Discharge Lamps; Mercury Lamps; Metal-Halide Lamps; High-Pressure Sodium Lamps; Low-Pressure Sodium Lamps; HID Lamp Maintenance and Replacement

#### Objectives

- Tell why cleaning lamps and fixtures is important.
- Compare and contrast incandescent and fluorescent lamps.
- Differentiate between R lamps and ER lamps.
- Name six types of lighting in order of efficacy.
- List advantages and disadvantages of each of the following types of high intensity discharge lighting: mercury, metal halide, HPS, and LPS.