



U.S. Department of Energy
Energy Efficiency and Renewable Energy



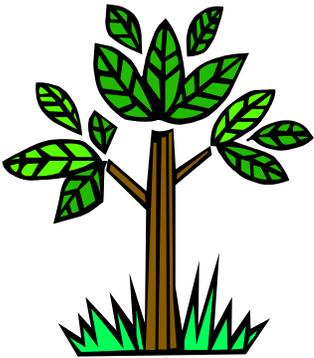
Presented by:

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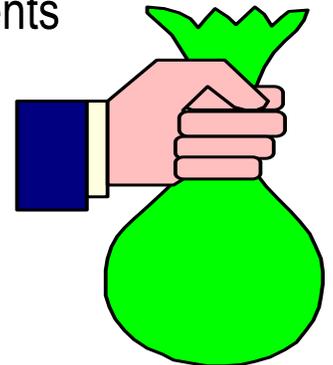


Why Use Lighting Controls?

Practicing environmental responsibility in designs



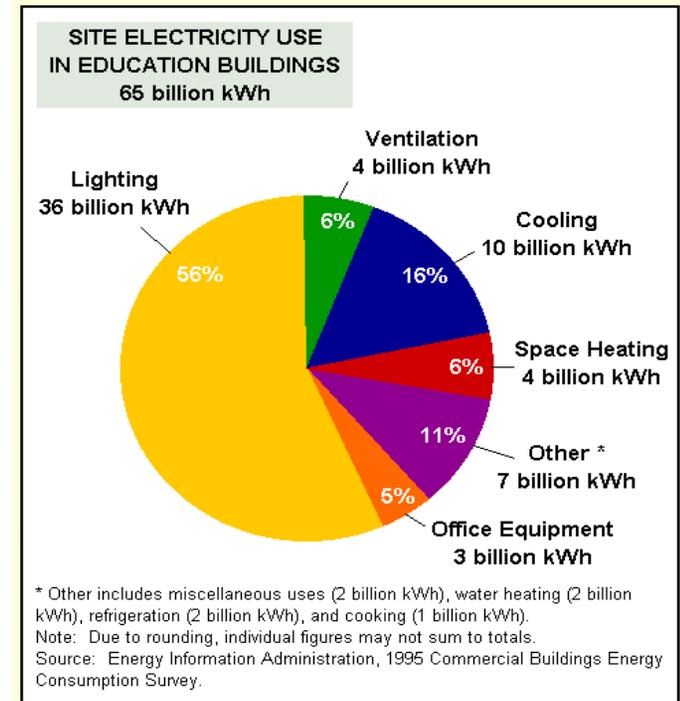
- Lowers pollutants in atmosphere
- By-product is energy savings
 - Lowers operational costs of facility
 - Funds can be used in other areas or departments





Expected Energy Savings

- **Electricity Expenditures account for 72% of energy costs**
- **At least 50% is consumed by lighting**
- **Expected savings in classrooms is 10-50%**
- **Daylighting savings can be up to 40%**

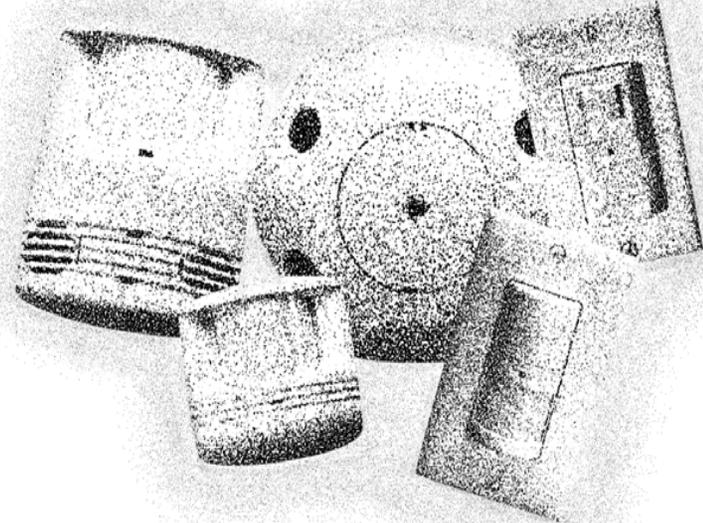


Source: www.eia.doe.gov



Types of Controls

- **Occupancy Sensors**
 - Automatic On/Off
 - Integration with HVAC





Occupancy Sensors

Technologies:

- **Passive Infrared**
- **Ultrasonic**
- **Dual Technology**





Ceiling Mounted vs. Wall Mounted

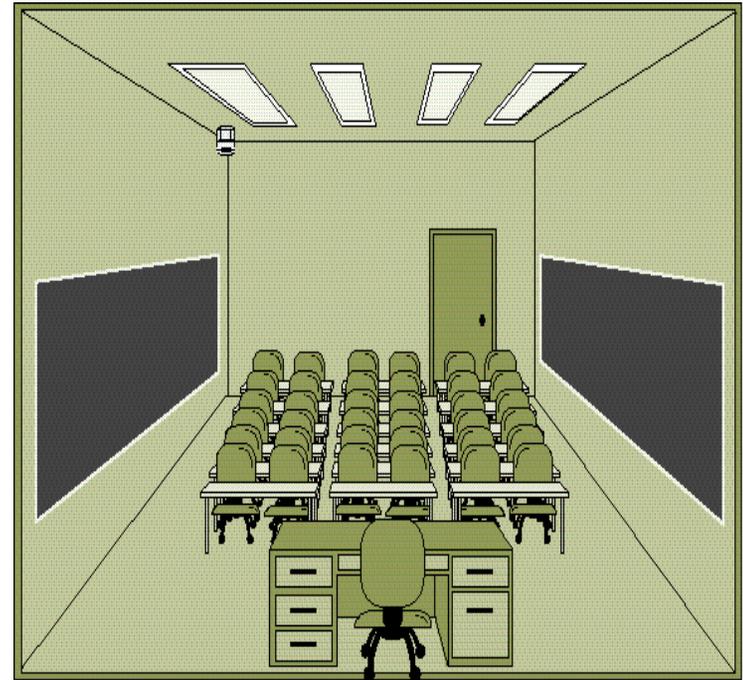
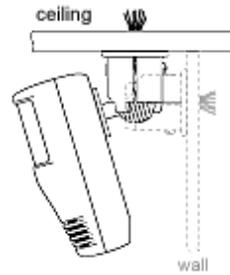
Common Applications:

Ceiling Mounted:

- Classrooms
- Teachers' Lounges
- Administrative Areas
- Restrooms

Wall Mounted:

- Janitorial Storage
- Non-Student Occupied Areas





Lighting Control Panels

Operation:

- Time clocks
- Indoor/outdoor lighting loads
- Local overrides





Control Panel Applications:

Applications

- Classrooms, Corridors
- Lobbies/Auditoriums
- Security and parking lots

Benefits

- Entire building control
- Maximum flexibility and energy savings
- Commonly combined with occupancy sensors





Daylighting

- Lighting controls which turn lights on and off or adjust them up or down based on sunlight *automatically*
- What are the benefits?
 - Productivity Benefits
 - Health and well-being
 - Codes and standard
 - LEED Program
(Leadership in Energy & Environ. Design)





Daylighting Strategies & Technologies

Strategies

- Continuous dimming
 - Requires dimming ballast
 - Switching
 - On/off
 - Stepped
- } Standard ballast

Technologies

- Photosensors
- Dimming ballasts
- Dimming controllers





Daylighting: Common Applications

Classrooms/Cafeterias



Corridors



Gymnasiums



Wrap-up Notes:

- Lighting controls much improved
- Local energy codes/national energy codes
- Environmentally responsible design



Additional Resources:

- **Government Programs**
 - **Rebuild America**
 - www.rebuild.org/index.asp
 - **Energy Smart Schools, a Rebuild America Campaign**
 - www.eren.doe.gov/energysmartschools/
 - **Alliance to Save Energy Green Schools Program**
 - <http://www.ase.org/greenschools>
- **Building Energy Rating Programs**
 - **EPA Energy Star Schools**
 - <http://www.energystar.gov/default.shtml>
 - **LEED Green Building Rating System**
 - www.usgbc.org/programs/leed.htm



Additional Resources Cont'd.

- **Codes and Standards**
 - **ASHRAE**
 - www.ashrae.org
 - **IESNA**
 - www.iesna.org
 - **U.S. DOE State Code Status**
 - <http://www.energycodes.gov/>
- **State Programs**
 - **Collaborative for High Performance Schools**
 - www.eley.com/chps/
 - **The Daylighting Collaborative**
 - www.ecw.org/