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MODULE
20

Energy Efficiency (Plug Loads & HVAC Systems)

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"Energy Efficiency—Plug Loads & HVAC Systems in School Buildings" discusses the importance of energy conservation in school buildings. Plug loads refer to the energy consumed by electrical devices connected to electrical outlets, such as computers, projectors, printers, and other electronic equipment commonly used in classrooms and administrative offices.

Learning Objectives

- Green school buildings are dynamic learning environments.
- Operations and Maintenance for Whole School Sustainability
- Meaningful, purposeful, and engaging learning
- Sustainable Grounds & Transportation
- Indoor Environment—Air Quality
- Smart Cleaning & Integrative Pest Management
- Indoor Environment—Acoustics
- Water Efficiency and Quality
- Energy Efficiency—Lighting
- Plug Loads & HVAC Systems
- Materials and Resources
- Innovation & Conclusion
- Summary and Resources / GCP Quiz

INTRODUCTION

- Emphasizes the importance of energy-efficient practices in educational environments.
- Discusses strategies for managing heating, cooling, and plug loads in classrooms.

HVAC System Management

- Emphasizes the principle of thermal comfort, aiming for a balanced approach to energy consumption.
- Stresses the importance of unobstructed airflow around vents for optimal HVAC efficiency.
- Highlights the use of programmable thermostats in communal areas to reduce energy waste.

Addressing Plug Loads

- Discusses computer energy management and student energy patrols to reduce plug loads.
- Highlights the importance of regular maintenance and replacing outdated appliances.

Whole-School Involvement

- Advocates for education and engagement in energy conservation efforts.
- Discusses the concept of phantom load, where electronic devices consume energy even when turned off.

UNDERSTANDING HVAC SYSTEMS

- Highlights the importance of air quality monitoring and understanding the limitations of classroom thermostats.

Best Practices for Heating and Cooling

- Advocates for appropriate dressing, using window shades, and reporting issues to prevent energy losses.

Energy Trade-Offs

- Highlights the potential conflict between energy-saving measures and other environmental goals.
- Stresses the need for effective communication with building staff about HVAC settings and energy management practices.



UNDERSTANDING PLUG LOADS

- Plug loads refer to the energy consumed by electrical devices connected to electrical outlets.
- They account for 20-40% of the total energy consumption in commercial buildings, including schools.
- Examples of plug loads in school settings include computers and monitors, projectors, printers, and copiers.



STRATEGIES FOR REDUCING PLUG LOADS

- Invest in ENERGY STAR-rated devices to reduce energy consumption.
- Use smart power strips to automatically cut off power to devices not in use.
- Educate staff and students about the importance of turning off equipment when not in use



OVERVIEW OF HVAC SYSTEMS



- HVAC systems are integral to maintaining a comfortable indoor environment in school buildings.
- Components of HVAC systems include heating equipment, cooling equipment, and ventilation.
- Strategies for improving HVAC efficiency include regular maintenance, upgrading systems, smart controls and zoning, and Demand-Controlled Ventilation (DCV).

HEATING AND COOLING BEST PRACTICES IN EDUCATIONAL ENVIRONMENTS

Understanding HVAC Operations

- Use a "Get to Know Your Classroom" checklist to familiarize with HVAC systems.
- Checklist should cover temperature adjustment, time schedules, and outdoor weather response.

Temperature Regulation

- ASHRAE recommends maintaining classroom temperatures between 68°F (20°C) for heating and 78°F (26°C) for cooling.
- Encourage students to dress appropriately for seasonal changes.



IMPROVED INSULATION TECHNIQUES

- Reduce heat loss by closing window shades during non-operational hours.
- Large west-facing windows can mitigate solar heat gain.

Identifying and Reporting Drafts

- Educators should report potential energy loss sources.

Navigating Energy Trade-Offs

- Balance aesthetic and cognitive benefits of natural light with potential for increased energy use.
- Excessive window opening can cause discomfort.



ENERGY CONSERVATION IN SCHOOLS: A COMPREHENSIVE GUIDE

Direct Actions:

- **Use Power Strips for Equipment Management:** Power strips are essential tools for managing multiple electrical devices in a classroom or office. They can be used to turn off all devices with a single switch, reducing phantom loads.
- **Implement Sleep Mode on Computers:** Configuring computers to enter sleep mode during periods of inactivity can reduce power consumption by up to 80%.
- **Optimize Thermostat Settings:** If classroom staff have control over heating and cooling systems, set thermostats at 68 degrees Fahrenheit for heating and 78 degrees Fahrenheit for cooling.
- **Avoid Personal Electric Appliances:** Mini-fridges, microwaves, or coffee makers can significantly increase energy consumption. Schools can maintain a lower overall energy demand by avoiding the introduction of such appliances.





Communication Strategies:

- Engage Building Staff on HVAC Settings: Encourage building maintenance staff to explain how HVAC systems are controlled and the rationale behind temperature settings.
- Report Leaks and Drafts: Identify and report leaks or drafts to enhance a building's energy efficiency. Schools can address these issues swiftly, preventing unnecessary energy waste.

Advocacy Efforts:

- School-Wide Energy Audit: Advocate for a school-wide energy audit to identify areas for energy savings. This process can include a detailed evaluation of lighting, HVAC systems, insulation, and appliance use. Post-audit, schools can implement recommendations such as replacing incandescent bulbs with LED lighting, upgrading HVAC systems, or enhancing insulation.



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