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INSTITUTE OF INFORMATION TECHNOLOGY

ADDING VALUE TO ENGINEERING



“Smart Campus”

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Introduction

Buildings are responsible for nearly 40% of global energy consumption and carbon emissions. Improving energy efficiency in modern buildings not only reduces operational costs but also contributes to climate change mitigation. This presentation explores the top strategies to enhance energy performance in residential, commercial, and industrial buildings.



Strategy 1: Smart HVAC Systems

High-Efficiency Units

Using furnaces, boilers, and air conditioners with advanced efficiency standards reduces energy demand.

Programmable Thermostats

Optimizing temperature settings based on occupancy saves energy without sacrificing comfort.

Zoned HVAC

Heating or cooling only occupied zones improves cost and energy effectiveness.

Geothermal Heat Pumps

Leveraging earth's stable temperatures can cut energy use by up to 60% compared to conventional systems.

Strategy 2: LED Lighting and Lighting Controls

➤ LED Efficiency

LEDs consume up to 75% less energy than incandescent bulbs, with longer lifespans reducing maintenance.

➤ Occupancy Sensors

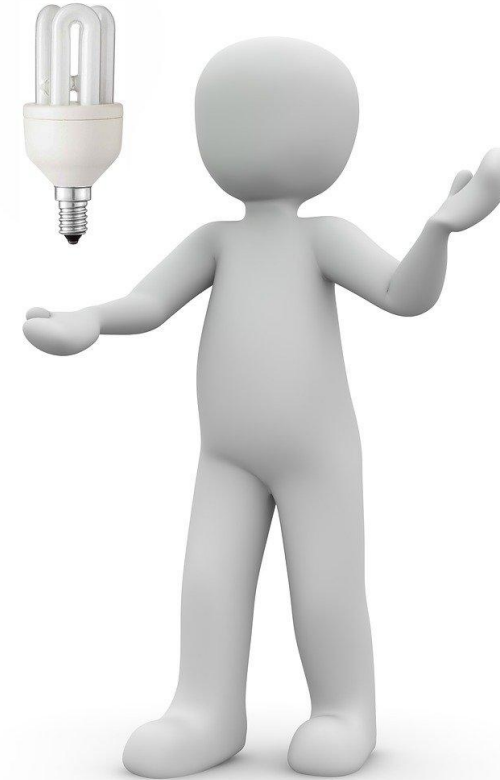
Automatically turn off lights when rooms are unoccupied to avoid wasted energy.

➤ Daylighting Controls

Adjust artificial light levels according to available natural light, enhancing comfort and savings.

➤ Circadian Lighting

Lighting systems designed to support natural human rhythms improve wellbeing and productivity.



STRATEGY 3: RENEWABLE ENERGY INTEGRATION:

- ✓ Integrating solar panels facilitates onsite clean electricity generation, greatly reducing reliance on fossil fuels. Wind turbines can complement solar in suitable locations.
- ✓ Green roofs add insulation, lower urban heat, and reduce stormwater runoff. Battery storage can store renewable energy for use during peak demand or outages.

- Solar panels offset up to 100% electricity use
- Wind turbines harness local wind resources
- Green roofs improve thermal performance
- Battery integration enhances energy resilience

Strategy 4: Building Automation Systems (BAS)

Centralized Control

Managing HVAC, lighting, and other systems through BAS enables seamless coordination and efficiency.

Data-Driven Management

Analytics extracted from BAS support informed decision-making and predictive maintenance.

Automated Optimization

Systems adjust operations dynamically based on occupancy, time, and environmental conditions for peak efficiency.

Real-Time Monitoring

Continuous tracking of energy use helps identify inefficiencies immediately.

Strategy 5: Water Conservation Measures



Low-Flow Fixtures

Toilets, showerheads, and faucets designed to reduce water use without sacrificing functionality can cut water consumption by 20-40%.

Graywater Recycling

Treating wastewater from sinks or showers allows reuse for toilet flushing or landscaping, further conserving water.

Rainwater Harvesting

Collecting rainwater for irrigation and non-potable uses frees potable water resources and reduces runoff.

Conclusion:

Energy efficiency is no longer just a design preference — it is a critical necessity for modern buildings aiming to reduce environmental impact, minimize operating costs, and meet evolving sustainability standards. By implementing smart technologies like Building Management Systems, optimizing HVAC and lighting, incorporating renewable energy sources, and using energy-efficient appliances, buildings can significantly enhance performance while reducing carbon footprints. A holistic approach that includes continuous monitoring, regular audits, and user engagement ensures long-term energy savings. Ultimately, energy-efficient buildings not only benefit the environment but also improve occupant comfort and economic resilience, setting the benchmark for the future of sustainable urban development.



Thank You !