Building Performance

& Common Energy Conservation Measures

Acknowledgement & Disclaimer

Acknowledgment: "The information, data, or work presented herein was funded in part by the U.S. Department of Energy, Energy Efficiency and Renewable Energy Program, under Award Number DE-EE0006496."

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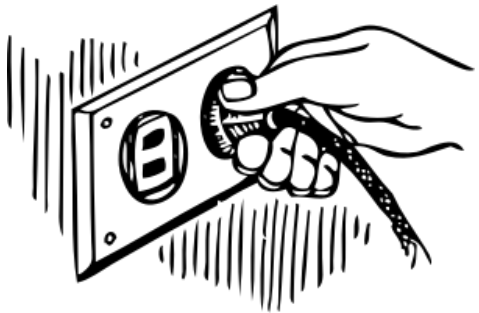
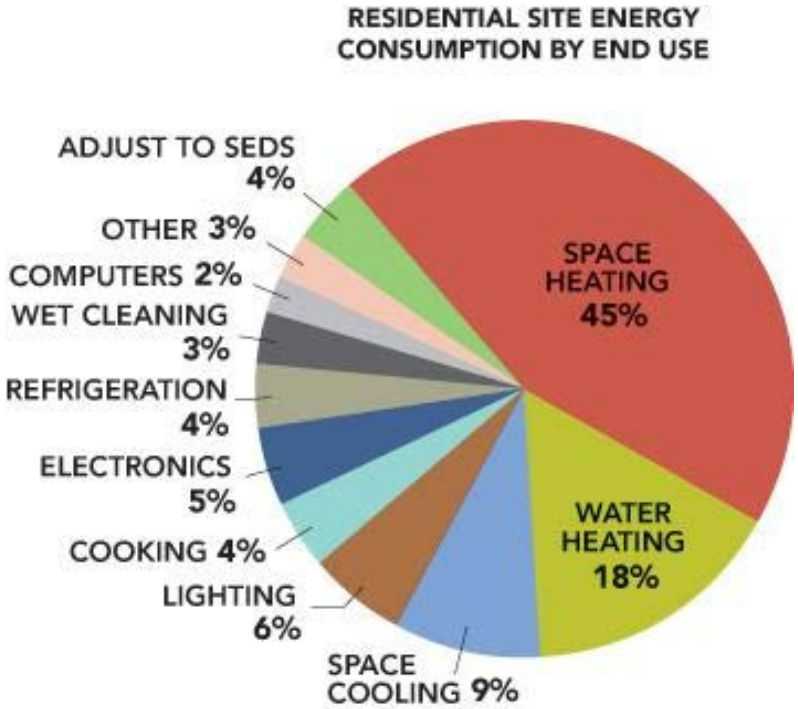
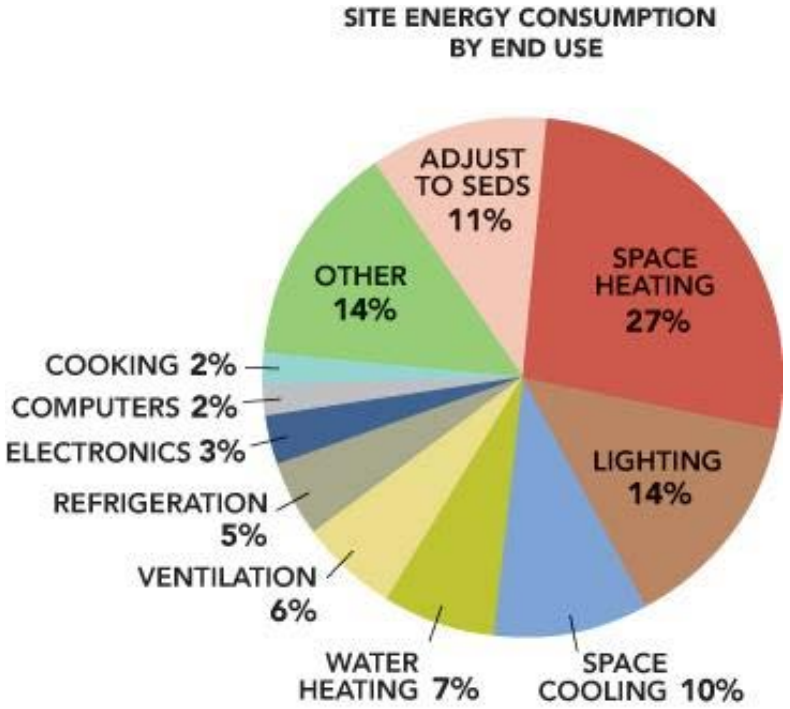
U.S. Building Energy Use

- The US buildings sector currently accounts for about 41% of primary energy consumption.(Industial=30%, Transportation=29%)
- Commercial sector represents 46% of buildings sector, with residential representing the other 54%.
- In 2009, total primary energy consumption in the commercial sector was up 48% from 1980.
- Commercial sector represents office, educational, and public assembly facilities.
- The EIA predicts total energy consumption will increase by 17% by 2035, from a 2009 baseline.





RESIDENTIAL



COMMERCIAL

From the Buildings Energy Data Book, 2011, EERE

Why Energy Efficiency?

- **Reduced** operating costs and increased asset value
- **Improved** indoor environmental quality and occupant comfort
- **Immediate** impact on energy use & energy bill
- **Low-cost and low-risk**: improving O&M practices and retrofitting are lower cost options than new construction
- **Mitigate** potential increases in cost of energy
- **Lower** environmental impact of day-to-day operations
- **Increase** energy savings and sustainability & benefit from associated marketing and public relations opportunities

Common ECMs

Commercial:

- Heating/Cooling: HVAC replacement can dramatically reduce building energy use, especially with incorporation of “smart” monitoring
- Lighting: Upgrades to CFL or LED for longer life-span and lower replacement and utility costs

Residential/Multi-Family:

- HVAC replacements
- Water heating/water conservation systems
- Insulation/Weatherization

K-12 School Systems:

- Lighting, HVAC

City of Clearwater, FL

Background

- Population: 107,685
- Two phase performance contract with Honeywell
- Phase I: 75,000 sq. ft. recreation complex
- Phase II: 23 city buildings including government buildings, parks and recreation center buildings, city hall, fire stations, the library, fleet center, municipal facilities and solid waste facilities

Main Objectives

- Reduce operating expenses & increase efficiency
- Replace aging infrastructure and inefficient systems
- Improve indoor comfort level for visitors and employees

City of Clearwater, FL

Key Improvements

- High efficiency HVAC upgrades
- HVAC cleaning and air distribution
- LED lighting upgrades
- Web-enabled thermostats in eight buildings with central set-point control
- Building management software for real-time monitoring, management and optimization

City of Clearwater, FL

Results of Phase I

- Cost avoidance in year one: $227,000 (exceeded guarantee by 23%)
- Expected 15-year energy savings: $1,870,815
- Expected 15-year operational savings: $1,440,832

Results of Phase II

- Guaranteed cost savings over 15-years: $6 million+
- Expected 15-year energy savings: $4,217,851
- Expected 15-year operational savings: $1,901,767

Environmental Impact

- Expected carbon reduction: 2,000 metric tons
- Equivalent to: 400 cars off the road 11,400 trees grown for 10 years or 250 homes' electrical use

Metropolitan Development and Housing Authority (MDHA)

Background

- Operates more than 5,500 units of affordable public housing
- Provides housing for more than 28,000 residents
- Performance contract with Siemens

Main Objectives

- Increase resident comfort
- Reduce utility expenses
- Promote sustainability

Nashville, TN

MDHA Case Study

Solutions

- Implement state-of-the-art water conservation program
- Upgrades to high-efficiency variant refrigerant volume (VRV) heat pumps, instantaneous domestic hot water heating systems and lighting systems
- Installation of 280 photovoltaic panels on two MDHA high-rise properties: 280 solar panels on Parthenon Towers and 300 more at the agency's Madison high-rise property

MDHA Case Study

Results

- $1.65 million in annual energy savings that Siemens guarantees
- 76,000 kWh of energy will be produced annually from solar panels at Parthenon Towers
- MDHA was largest producer of solar in TN in 2010
- First HUD-approved Energy Incentive Extension in the nation
- Solar panels used were manufactured at a Memphis plant

Adair County Schools, KY

Background

- Serves rural community of ~17,000 residents
- Over 2,500 students enrolled in ACS
- 9 school buildings and 231,990 square feet
- Ameresco chosen from competitive bid process
- Performance contract

Main Goals

- Finance comprehensive building retrofit at high school
- Reduce operations and maintenance costs
- Improve learning environment for students
- Improve staff efficiency through training

Energy Project Size:
$2.7 million

Energy Savings:
$133,383 annually

TN

Adair County Schools, KY

Main Goals, cont.

- Improve building comfort and operational efficiency
- Upgrade HVAC systems and replace/modify lighting

Mechanical Improvements

- Geothermal hybrid HVAC system and 100% outside air HVAC system at high school
- New packaged rooftop units
- High efficiency pumps
- Water retrofits
- VFD controls & 2-way valves for hydronic distribution system
- Indoor and outdoor lighting
- DDC building management system

Adair County Schools, KY

Mechanical Improvements, cont.

- Central web-based monitoring and programmable thermostats
- Smart vending machine controls
- Plug load control devices for computer and task lighting
- High efficiency transformers

Building Envelope Improvements

- Repair of window leaks & flashing on lean-to roof area
- New gutters & new drain system at front door
- New bottom door seals and weather stripping

Other Improvements

- Implemented a district-wide recycling program

What ECMs Are Right for Me?

Three step process:

1) **Brainstorm:** List all potential measures or places in need of improvement, i.e. lighting, heating, cooling, ventilation, windows, weatherization

2) **Prioritize:** Narrow list based on building's unique needs & opportunities, technical feasibility. Look at cost-effectiveness & energy savings.

3) **Finalize:** Choose measures for implementation, analyze package as a whole to determine cost-effectiveness and energy savings

Contact Us!

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