





Top 10 Technologies

Common and Not-So-Common
Energy Conservation Measures



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Primary Systems

- Lighting
- Building Management System / Controls
- Heating, Ventilating and Air Conditioning (HVAC) Systems
- Chiller Plants
- Boiler Plants
- Other Equipment and Systems
- Special Applications



Lighting Strategies

- Common Lighting Upgrades
 - Convert T12 fluorescent fixtures to T8 technology
 - Replace High-Bay high intensity discharge (HID) fixtures with T5, T6 or T8 fluorescent technology
 - Replace incandescent or fluorescent exit signs with LED technology
 - Install occupancy sensors in offices, conference rooms and common areas



Lighting Strategies

- Less Conventional Lighting Upgrades
 - Review / modify programmed lighting schedules
 - Implement day lighting with dimmable ballasts
 - Replace photo-sensors on exterior lighting
 - Replace exterior lighting with LED or induction systems
 - Scotopic lighting solutions



Control Strategies

- Common Control Upgrades
 - Convert pneumatic to DDC
 - Optimum start / stop of HVAC equipment
 - Occupied and unoccupied space temperature set points
 - Supply air temperature reset
 - Heating hot water reset
 - Airside economizer control



Control Strategies

- Less Conventional Control Upgrades
 - Demand based ventilation
 - Occupancy sensor controls
 - Advanced utility metering backbone
 - Electricity demand limiting
 - Elimination of simultaneous heating and cooling (shut off hot decks in summer and cold decks in winter)
 - Replace leaking valves, dampers, etc.
 - Re-commissioning



HVAC Strategies

- Common HVAC Upgrades
 - Replacement of aged equipment with modern high-efficiency equipment
 - Conversion of constant volume HVAC systems to variable air volume (VAV) systems
 - Replacement of electric heating systems with natural gas fired or hydronic systems
 - Replace inlet guide vanes or discharge dampers with variable frequency drives (VFDs)



HVAC Strategies

- Less Conventional HVAC Upgrades
 - Install dedicated HVAC systems for 24 hour/day areas allowing for fewer operating hours for large HVAC systems
 - Resize HVAC equipment to better align with facility loads
 - Utilize renewable energy sources, such as ground source heat pumps, water source heat pumps, solar thermal pre-heat coils
 - Install near-HEPA electrostatic filtration
 - Re-commissioning including test and balance



Chiller Plant Strategies

- Common Chiller Plant Upgrades
 - Expand controls from monitoring to monitoring and control
 - Install a winter load chiller
 - Water-side economizer
 - Chiller staging
 - Reduce condenser water temperature
 - Chilled water reset



Chiller Plant Strategies

- Less Conventional Chiller Plant Upgrades
 - Create a virtual chilled water plant
 - Install variable frequency drives (VFDs) on chillers
 - Convert chilled water systems to variable flow - primary or primary/secondary systems
 - Maximize chilled water temperature rise to minimize the number of chillers operating
 - Alternative condenser water treatment technologies
 - Utilize chiller waste heat for hot water generation



Boiler Plant Strategies

- Common Boiler Plant Upgrades
 - Steam trap replacement and on-going maintenance / repair program
 - Distribution system leak repair and insulation
 - Maximize condensate return
 - Stack economizers or condensing heat exchangers to preheat boiler feed water



Boiler Plant Strategies

- Less Conventional Boiler Plant Upgrades
 - Reduce parasitic loads on production
 - Use mud drum heaters to efficiently keep back-up boilers in hot standby
 - Solar thermal for make-up water preheat
 - Reduction of steam distribution pressure or hot water temperature
 - Conversion of steam to high temperature hot water
 - Advanced boiler control systems



Water Conservation Strategies

- Domestic Systems
 - Low flow toilets, flush valves, shower heads, flow restrictors, etc.
 - Domestic hot water control system
- Process Systems
 - Install evaporative fluid cooler to eliminate once-through process cooling
 - Repair cooling tower leaks
 - Irrigation control
 - Use of non-potable water



Other Equipment Strategies

- Replacement of aged transformers with right-sized dry high-efficiency transformers
- Personal computer power management
- Vending machine control
- Replacement of appliances with Energy Star rated appliances



Special Applications

- Utilize renewable plant fuels such as biomass and landfill gas
- Combined heat and power (CHP) or distributed generation through the use of micro-turbines, fuel cells and / or large scale cogeneration facilities
- Data center HVAC optimization through right-sizing and control of computer room air conditioning (CRAC) units
- Computerized maintenance management system (CMMS) with a results oriented management strategy (ROS)



Summary

- Admittedly, the material presented today provides many more than ten potential energy conservation measures. Hopefully, everyone was able to recognize ten potential ECMs to look for in your facility
- Energy prices today are making many more technologies cost effective than ever before.
- Please e-mail with comments or questions.
- Thank you!



For More Information

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