

Efficiency Options for Existing Facilities

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Types of Measures

► Energy

- Lighting
- Heating/cooling
- Hot water
- Envelope (e.g., windows, insulation)
- Controls
- Appliances
- Renewable technologies

► Water

- Indoor (e.g., toilets)
- Outdoor (e.g., irrigation)
- Laundry
- Reclaimed water
- Gray water
- Rain water harvesting

Types of Measures

► Site Sustainability

- Reduced heat islands
- Storm water management
- Erosion control

► Indoor Environment

- Ventilation effectiveness
- Insect management
- Cleaning supply use and management

► Resource Efficiency

- Recycled content
- Rapidly renewable materials
- Recycling programs

► Transportation

- Hybrids
- Biofuels
- Teleconferences
- Flexible work options

Energy Efficiency

- ▶ Seek to reduce climate change through energy efficiency, operations, and maintenance improvements

Energy Efficiency

- High efficiency heating / cooling equipment and systems
 - ▶ Condensing furnaces and boilers
 - ▶ High SEER air conditioners
 - ▶ Improved controls
 - ▶ Improved ventilation designs
 - ▶ Improved duct and distribution system designs

Energy Efficiency

- Hot water systems
 - ▶ Reduced hot water usage through equipment, fixtures, and controls
 - ▶ Higher efficiency equipment
 - Condensing hot water heaters
 - Combined heat and hot water
 - Cogeneration
 - Tankless or demand systems
 - Geothermal preheating systems
 - ▶ Improved controls

Energy Efficiency

- Envelope systems
 - ▶ Increased insulation levels – walls, ceilings, roofs, foundations (crawlspaces, basements)
 - ▶ Improved windows and selective coatings
 - Also, passive solar and day lighting designs
 - ▶ Improved air and duct sealing
 - ▶ Cool roofing (low emissivity) and vegetative (green) roof options
 - ▶ Radiant barriers for attics

Energy Efficiency

- Lighting and appliances
 - ▶ High efficacy lighting, controls, and sensors
 - CFL, induction, LED
 - Occupancy and daylight controls and timers
 - ▶ Refrigerators, dish washers, ceiling fans, exhaust fans
 - ▶ Laundry equipment – high efficiency vertical axis and horizontal axis machines

Energy Efficiency

- Renewable systems
 - ▶ Photovoltaic panels
 - ▶ Solar hot water systems
 - ▶ Wind energy systems
 - ▶ Cogeneration systems with absorption cooling and hot water
 - ▶ Geothermal systems

Energy Efficiency

- Benchmarking
 - ▶ Track and compare usage across buildings
- Building commissioning
 - ▶ Verify retrofits are designed, installed, functionally tested, operated and maintained to meet an established design intent
- Measurement & Verification
 - ▶ Verify performance of installed retrofits

Water Efficiency

- ▶ Reduce potable water usage, reducing the energy & environmental impact for pumping and treatment
 - High efficiency products
 - ▶ Low flow commodes and urinals
 - ▶ Low flow shower heads and aerators
 - Laundry equipment
 - ▶ Central versus individual systems
 - ▶ High efficiency front and top load equipment

Water Efficiency

▶ Exterior Water Use Reductions

- Water efficient landscaping

- ▶ Efficient designs, better plant selection, limited or efficient irrigation and controls

- Reuse systems

- ▶ Rain and storm water recovery systems

- ▶ Gray water recovery systems

- ▶ Treated waste water

Site Sustainability

- ▶ Seek to reduce the environmental impact of development
 - Redevelopment of existing sites
 - Reduce erosion through Low Impact development practices
 - Reduce heat islands
 - Improve land use practices

Materials & Resource Efficiency

- ▶ Reduced environmental impact through selection of engineered, long lived, rapidly renewable materials
 - Reuse of materials
 - Locally & regionally manufactured, harvested, or assembled products
 - Engineered materials and optimum value engineering
 - Recycled content materials
 - Long lived materials
 - Rapidly renewable and certified materials

Improved Indoor Environment

- ▶ Reducing the environmental impact on the local or micro environment
 - Low emitting materials, adhesives, and paints
 - Improved and more effective ventilation systems
 - ▶ Meet minimum code requirements, ASHRAE 55, and ASHRAE 62 indoor air standards; improve control
 - Healthy design practices

Fleets / Transportation / Purchasing

▶ Fuel options

- Hybrid vehicles
- Natural gas vehicles
- Electric vehicles
- Bio fuels

▶ Refueling stations

- Natural gas, electric
- Solar charging

Operations & Maintenance

- ▶ Landscape maintenance
 - Equipment practices
- ▶ Office operations
 - Building operation
 - Flexible work options
 - ▶ Home offices
 - ▶ Teleconferences

Evaluating Efficiency Options

- ▶ Inspect / analyze representative properties
- ▶ Identify sustainability upgrade options
 - ▶ Energy / renewable technologies
 - ▶ Water efficient technologies
 - ▶ Site opportunities
 - ▶ Material alternatives
 - ▶ Indoor environment improvements

Develop a Energy/Sustainability Plan

- ▶ Develop a top level planning document that directs policy downward
 - ▶ Assess buildings on a sampling basis
 - ▶ Set goals, strategies and actions
 - ▶ Cascade to policies
- ▶ Light green / dark green

Planning

- ▶ Options depends on the age, condition, and use of buildings
 - Substantial rehabilitation – More options since often gutted to the frame
 - Light rehab – Interior finishes and certain mechanical systems at the end of life
 - Operations/Maintenance – Replacement parts and systems

Assessments

- ▶ Three grades of audit
 - Walkthrough
 - ▶ Performed quickly to get a quick list of measures and range of savings and costs
 - Engineering audit
 - ▶ A more detailed analysis of all measures supported with utility bill analysis. Utilizes capital plans and needs
 - Calibrated or Investment grade audit
 - ▶ A rigorous analysis of specific measures, costs, and savings supported with measured data

Assessments

► What audits offer

- Benchmark and trend performance across buildings
- Identify retrofits that generate significant utility savings
- Develop recommendation for operation, maintenance, and control of building systems
- Calculate anticipated savings

► Comments/Questions:

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