

Operation & Maintenance Guidelines for Energy-Efficient Schools



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Motivation

Buildings:

- Use ~ 1/3 of total energy
- Use 65% of nation's electricity
- Use 40% of global raw materials (3 billions tons annually)
- Generate 25% materials landfilled & 33% global greenhouse gas emissions
- Consume \$82 billion per year energy (67 billion square feet)
- 20%-30% report IAQ problems, up to 43% in schools
- Produce \$29–168 billion in national productivity losses per year
- We will erect as many buildings in next 50 years as in last 5,000.

Operations & Maintenance

- Part of effective energy management
- **O&M** are the activities related to the performance of routine, preventive, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing:
 - Efficiency
 - Reliability
 - Safety
- Who's doing it?

Operations & Maintenance Benefits

- O&M practices save an estimated 5% to 27% on energy bills without a significant capital investment*

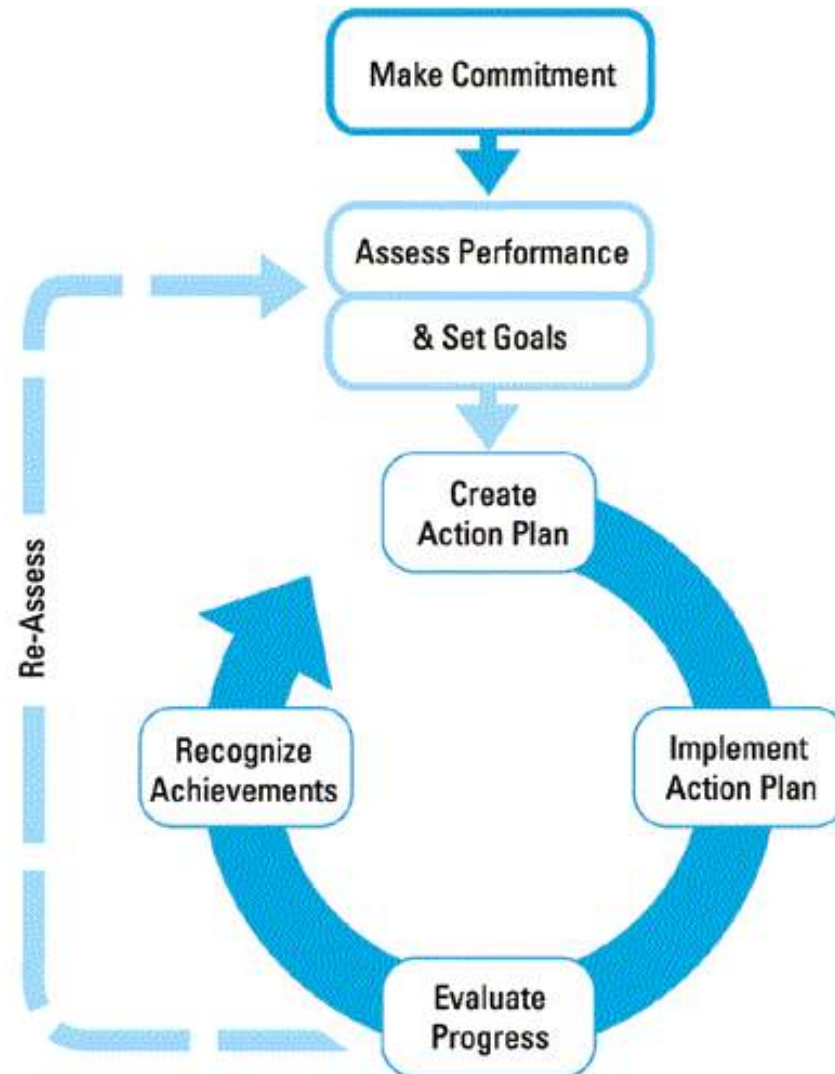
- Source: PECl. 1999. *Operations and Maintenance Assessments*. 5%-20%
- Source: Energy Forum Report, 1996 6%-27%

Operation & Maintenance Benefits

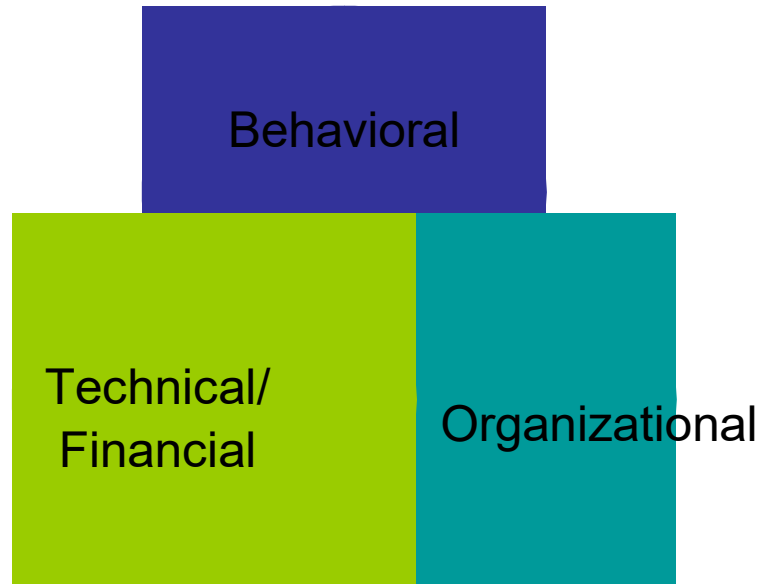
- Typically, O&M measures are low-cost or no-cost in nature.
- Many O&M measures are easily installed by in-house personnel.
- O&M measures can have immediate payback.
- These measures rarely require the design time, bid preparation, evaluation, and response, compared to capital projects that can take up to a year to implement.

O&M Management Cycle

Gain & Maintain

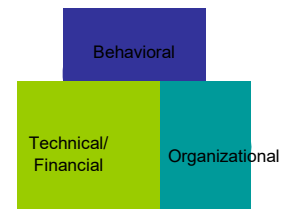


Dimensions in O&M Management



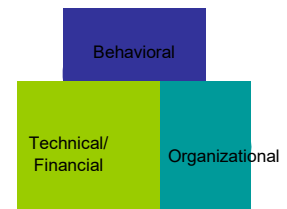
Organizational

- Become an effective energy managing organization
- Provide leadership through identifying a group of committed staff
- Develop an energy policy
- Incorporate energy management into overall management structure
- Communicate the benefits of energy management inside and outside the district



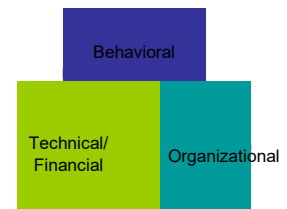
Technical / Financial

- Baseline utility consumption and cost
- Evaluate operating and maintenance budgets
- Learn how, when and where energy is used
- Learn how energy is purchased (utility rate structures)
- Report and share results with the district and Board



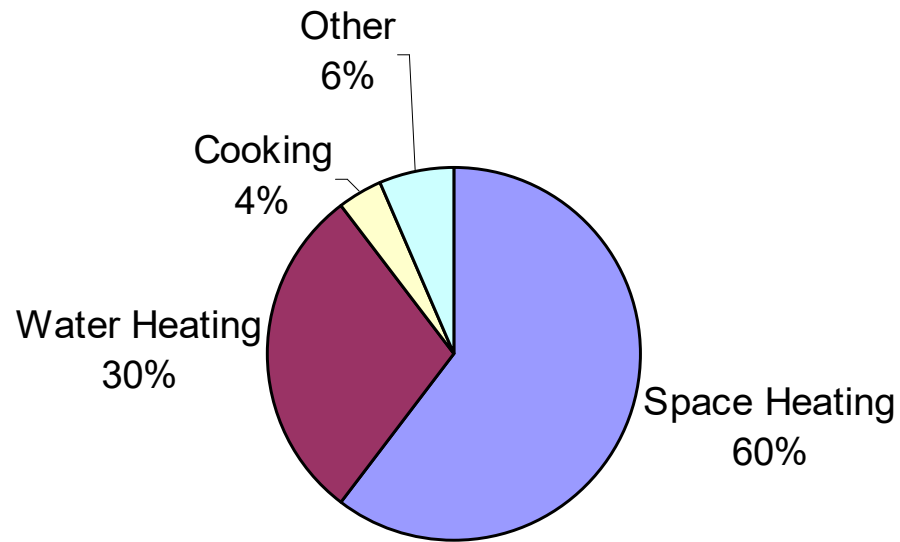
Behavioral

- Get training at all levels of district
- Increase awareness of resources available to the district
- Promote the conservation ethic
- Put information into action and achieve results
- Reward participants for their efforts



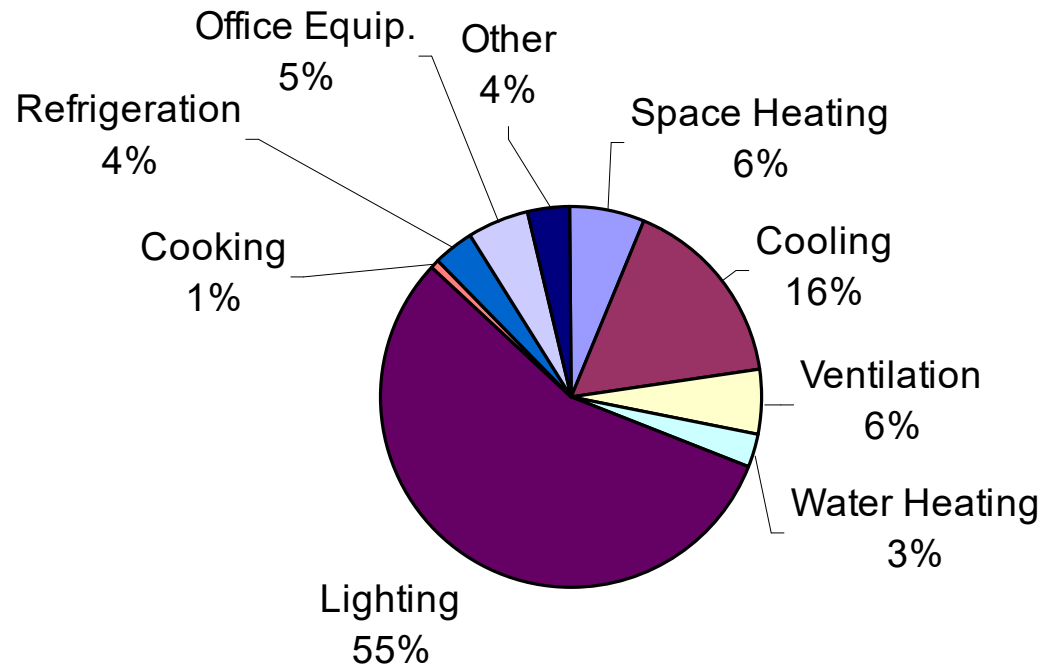
Opportunity

Typical Energy End-Use for Gas Educational Facilities



Opportunity

**Typical Energy End-Use for Electricity
Educational Facilities**



School District O&M Guidelines

- Management Strategies
- District Energy Management Policy
- Common Misconceptions regarding Energy Use
- Custodians
- Kitchen Staff
- Teachers and Staff
- Groundskeeping
- HVAC Operating Schedules
- Lighting
- Computers & Equipment
- Preventative Maintenance
- Equipment Purchasing

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