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## TECHNOLOGY INFORMATION SHEET

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# ENERGY MANAGEMENT IN COMMERCIAL BUILDINGS AN OVERVIEW

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### 1. Background

Energy management ensures that energy is being used effectively in a building or business. By using energy-saving technologies, design principles, and maintenance practices many building owners can save over 40 percent of their electrical costs and 20 percent of their natural gas costs, often with paybacks of less than three years. Even greater savings can be achieved with longer paybacks. With today's innovative financing and leasing options, these improvements can be made with minimal up-front capital and paid for out of savings over a period of up to six years.

### 2. Implementing an Energy Management Program

Energy management is not a one-time process, it is ongoing. Thus, the first step in implementing an energy management program is gaining commitment within the company for a continuing effort to control energy use in the building. Demonstrating the value of energy management to senior management, in particular, is vital to the successful implementation of an energy management program.

The second step in an energy management program is conducting an energy audit. The energy audit identifies where money for

energy is currently being spent, estimates where and how it could be saved, and develops a multi-year plan for implementing and financing these changes. First, energy bills are examined to determine the monthly energy consumption for the building or company overall. Second, an inventory of all devices that consume energy in the facility is taken to identify opportunities for technology retrofits, redesign, or improved maintenance practices. Where necessary, taking inventory may include monitoring the electrical draw and consumption for the building to track the amount of electricity being used throughout each day. Third, implementation plans are drawn up detailing the proposed immediate, short-term, and long-term measures. Fourth, financing options are analyzed and the new equipment, designs, or practices are implemented.

The other steps in energy management are on-going. Staff want to know, and need to know, about energy management initiatives in the workplace. They want feedback information on the results and how to assist with the energy management program. On a regular basis, feedback reinforces the staff's commitment towards energy management and leads to successful energy management practices. Education and training familiarize staff with the new energy-saving measures and reinforce the importance of each staff member's role in the energy management

program; staff evaluations obtain feedback from the staff; energy use monitoring identifies new opportunities for energy savings; and benchmarking establishes milestones to track the program's success.

### 3. Technology Options

New energy-efficient technology offers many energy-saving retrofit possibilities for much of the equipment being used in commercial buildings. Significant energy saving options are available for lighting, ventilation, heating and cooling, office equipment, motors, and building automation and control systems.

### 4. Financing Options

A number of innovative options have been developed to finance energy management programs using the resulting energy savings, with little or no up-front capital. Financing options include self-financing, savings reinvestment, internal energy banks, third party financing, and ESCO's.

Technology Information Sheets that provide detailed information on technology and financing options for energy management programs are available on the EMTF web page.

### 5. Energy Management Checklist

**Step 1.** Gain commitment

**Step 2.** Conduct energy audit

- Obtain past energy bills
- Take inventory of energy-using equipment
- Monitor electricity use (if required)
- Plan immediate, short-term, and long-term EM measures and implementation strategies
- Analyze financing options

**Step 3.** Implement energy management measures

**Step 4.** Staff education and training

**Step 5.** Program monitoring

**Step 6.** Program evaluation

### 6. Energy Efficient Technology Options

#### Lighting

- Delamping and Reduced Wattage Lamps
- T8 Fluorescent Lamps
- Efficient Fluorescent Fixtures (Reflectors and Lenses)
- Efficient High Intensity Discharge Lamps
- Automated Lighting Controls
- Electronic Ballasts
- Compact Fluorescents

#### Air Handling and Pumping

- Premium Efficiency Motors
- Adjustable Speed Drives
- Electronically Commutated Permanent Magnet and Switched Reluctance Motors
- High-Efficiency Fans and Pumps
- Variable Air Volume Ventilation
- Displacement Ventilation
- System Optimization

#### Space Heating and Cooling

- High-Efficiency Boilers
- High-Efficiency Furnaces
- Gas-fired Baseboard Heaters
- High-Efficiency Compressors
- Economizers
- Absorption Chillers
- Evaporative Cooling Systems
- Radiative Cooling Systems
- Thermal Storage Systems
- Ozone Treatment for Cooling Water
- Heat Pumps
- Heat Recovery Units
- Energy Management Systems

- System Optimization

**Domestic Hot Water Heating**

- High-Efficiency Water Heaters
- Combined Space and Water Heater Units
- Solar Water Heaters
- Computerized Controllers
- Water-Efficient End-Use Devices (e.g. showerheads, faucets, etc.)
- Desuperheater Heat Recovery