



TECHNOLOGY INFORMATION SHEET

INDUSTRIAL ENERGY MANAGEMENT

AN OVERVIEW

1. Background

Energy management ensures that energy is used effectively in carrying out all industrial operations and leads to a substantial reduction of overall energy costs. In addition, the use of energy saving technologies, design principles, and maintenance practices result in increased productivity, safety, environmental performance, and therefore, profitability. Improvements can often be made with minimal up-front capital and paid for through innovative financing schemes such as lease-purchase agreements with equipment suppliers.

2. Implementing an Energy Management Program

Energy management is an ongoing process. Thus, the first step in implementing an energy management program is gaining commitment within the company for a continuing effort to control energy use. The commitment of 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. From the energy audit, estimates of where and how energy can be saved can be determined, and a multi-year plan for implementing and financing these changes can be developed. First, energy bills are examined to determine the monthly energy consumption with special attention to distinguishing energy and demand charges. 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 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 dissemination of information is critical to the success of any energy management program. Staff want to know, and need to know, about energy management initiatives in the workplace. They want to know how they can contribute and want feedback on the results. Regular feedback reinforces staff commitment towards energy management and leads to successful energy management practices. Education and training familiarizes employees with the new energy-saving measures and reinforce the importance of each staff member's role in the energy management program. The use of energy monitoring identifies new opportunities for energy savings and benchmarking establishes milestones to track the program's success.

3. Technology Options

New energy-efficient technologies offer many energy-saving retrofit possibilities for much of the equipment used in older facility designs. Significant energy saving options are available for motors and drives, process equipment, lighting, ventilation, heating and cooling, building envelopes, and 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 energy service companies (ESCOs).

Technology Information Sheets that provide detailed information on technology and financing options for energy management programs are available from SECDA.

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
- Plan immediate, short-term, and long-term EM measures and implementation

- Analyze financing options

Step 3. Implement Energy Management Measures

Step 4. Staff education and training

Step 5. Staff feedback and evaluations

Step 6. Program monitoring

Step 7. Program evaluation

ENERGY-EFFICIENT TECHNOLOGY OPTIONS

LIGHTING & ELECTRICAL

- * Efficient Fluorescent Lamps and Fixtures
- * Electronic Ballasts
- * High Intensity Discharge Lamps
- * Automated Lighting Controls
- * Daylighting
- * Power Factor Correction
- * Peak Demand Control

HVAC

- * Variable Air Volume
- * Absorption Chillers
- * Infrared Heating
- * Atmospheric Free Cooling

- * Evaporative Cooling
- * Radiative Cooling
- * Thermal Storage
- * Desuperheater Heat Recovery for DHW
- * Energy Management System

ELECTRIC MOTORS

- * Premium Efficiency
- * DC Permanent Magnet
- * Synchronous
- * Adjustable Speed Drives
- * Power Factor Controller

BOILER PLANT SYSTEMS

- * Economizers
- * Flue Gas Analyzers
- * Automated Blowdown & Blowdown Heat Recovery
- * Flue Dampers
- * Feedwater Handling & Treatment
- * Modulating Burners
- * Recuperative Air Preheaters
- * Condensing Heat Recovery

PLANT PROCESS

- * High Efficiency Fans and Pumps
- * Pinch Technology for optimum energy transfer
- * Drying Systems - Infrared, Microwave, Impulse
- * Waste Heat Recovery Systems
- * Condensing Heat Recovery Systems
- * Insulation Systems
- * Ultrasonic/Infrared Material Sensing Conveying Systems
- * Cogeneration - Electricity plus Process Heat
- * Steam Trap Maintenance Program

FINANCING OPTIONS

1. Self Financing - Savings from little or no-cost energy management measures are used to finance future more capital-intensive measures.

2. Capital Pool or Revolving Fund - A dedicated revolving fund is used to finance the energy management program and is paid back from the achieved savings.

3. Energy Performance Contracting - Energy service companies (ESCOs) provide the capital needed to upgrade a building's lighting, HVAC systems, windows, controls, etc., and are paid

back by sharing in the energy savings with the building owner over an agreed number of years.

4. Supplier Financing - Equipment suppliers provide or arrange financing for the client to fund particular retrofit options using their equipment and/or expertise. Often a payback scheme is devised where the energy savings pay for most or all of the financing charges.