Energy Management: DOE tools and resources

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Outline

• New DOE focus: Strategic Energy Management
• ISO 50001 Energy Management System Standard
• DOE resources for Government and Utility Support
• Industrial Superior Energy Performance
• Implementing your Energy Management program
New DOE focus: Strategic Energy Management
Time and again, energy efficiency has been demonstrated to be cost effective while having a positive effect on productivity.

Despite this, energy efficiency improvements with very favorable payback periods often do not get implemented.

Even projects that are implemented may not be sustained due to lack of supportive operational and maintenance practices.

**Problem:** Energy efficiency is not integrated into daily management practices.

**Solution:** Staff at all levels within an organization need to be engaged in the management of energy on an ongoing basis.

Energy management requires an organization to shift from a project-by-project approach to one of continual improvement in energy performance.
Ad hoc Approach to Energy Management

Costs high = Audit
Waste cutting, some investment

Costs high again: Where’s that last audit?

Here we go again!

Under control.

Source: UNIDO 2010
The Opportunity

- Energy management is an opportunity for all sectors – large savings if strategically implemented … > 15%

- DOE energy management resources are focused on supporting varied types of organizations:
  - Size
  - Maturity of energy management program
  - Sector

- eGuide tool helps organizations implement energy management regardless of where they are in the energy management journey
Structured Approach to Energy Management

Continuous cost reduction from energy management systems

- Senior management commit to program
- Initial savings sustained
- Low cost operational improvements first – then investment
- Becomes company culture

Energy Management

- Can increase energy efficiency by 15% or more in a facility or organization via operational changes; new technologies offer further improvements.
- Requires an organizational change in culture
- Requires that top management be engaged in the management of energy on an ongoing basis.

Scope of Energy Management

- Facilities
- Equipment
- Personnel
- Systems
- Processes
Strategic Energy Management Continuum

Superior Energy Performance
Implement ISO 50001 EnMS and establish a robust energy data tracking and measurement system

ISO 50001
Implement structured EnMS following ISO plan-do-check-act approach

Continual Energy Improvement
Systematic approach in preparation for ISO 50001 implementation

Project Focus
Loosely organized project-by-project approach

Entry point for plants:
- In energy-intensive industries
- Prior ISO system or energy management experience

Provides value beyond ISO 50001:
- M&V protocol
- ANSI-accredited 3rd party verification

Entry point for medium/large plants:
- Prior energy management activities
- No prior ISO system experience

Entry point for facilities of any size
- No energy management experience
ISO 50001 Energy Management System Standard
ISO 50001: PLAN-DO-CHECK-ACT

4.1 General requirements
4.2 Management responsibility
4.3 Energy policy
4.4 Energy planning
  - Energy review
  - Energy baseline
  - EnPI
  - Objectives, targets & action plans

4.5 Implementation and operation
  - Training
  - Documents
  - Communication
  - Design
  - Operational control
  - Procurement

4.6 Checking
  - Measuring and monitoring
  - Legal requirements
    - Internal auditing
    - Nonconformance, corrective, preventive
  - Records

4.7 Management review
New international best practice in energy management leading to:

• **continual improvement** of energy performance;
• **greater reliability** of sustained energy savings;
• **better utilization** of energy data in making decisions;
• more **strategic deployment** of energy efficient technologies (e.g. advanced monitoring systems), and
• integration of **energy efficiency practices** into daily organizational operations.

- Published in 2011, with input from 56 countries
- Global impact: many countries are adopting ISO 50001 as national standard.
- Over 1500 organizations worldwide have adopted the standard

ISO 50001 Can Benefit States, Utilities, ESCOs

• **State Agencies and Local Governments**
  – Build local energy management expertise through new Certified Practitioner in Energy Management System
  – Achieve deeper and more persistent energy savings in government buildings

• **Utilities**
  – Empowers a facility-wide, systems-oriented approach
  – Helps justify industrial and commercial energy efficiency program investments, including permanent operational changes, to public utility commissions

• **ESCOs**
  – Builds greater credibility with industrial and commercial customers and a stronger business case for providing third-party energy efficiency services and off-balance sheet capital investments
Drivers for ISO 50001 Uptake

• Unlike ISO 9001 and ISO 14001, ISO 50001 provides measureable cost savings and a framework to capture energy savings and return on investment.

• Drivers for ISO 50001 include
  – Commercial benefits through deeper and more sustained energy cost savings;
  – Globally-recognized instrument to demonstrate corporate management due-diligence as it relates to climate change;
  – Structured approach for major original equipment manufacturers (OEMs) and retailers to request participation from their supply chain
  – Alignment of existing and planned energy-related product and services by major market players (e.g.- Schneider Electric, Rockwell Automation, Siemens)

• US Department of Defense
  – Drove adoption of both ISO 9001 and ISO 14001
  – Now examining ISO 50001 as a tool to support sustainability practice requirements for their suppliers (encouraged by early success in SEP demonstration by General Dynamics)
DOE resources for Government & Utility Support
DOE programs and resources drive measurable energy savings.

**Better Plants Challenge and Program**
*Corporate Level*

**Superior Energy Performance Program**
*Facility Level*

**AMO Energy Resources Center:** eGuide tool
*Corporate- and Facility-Level Tools and Training*

**DOE Resources for Companies**

**DOE Resources for Facilities**

**Results**
- CEO commitment
- Corporate energy goals and management plans
- Resources dedicated for facilities
- Established energy management programs
- Continual energy performance improvements
- SEP-certified facilities
- Dollar savings
- Replicated best practices
DOE eGuide for ISO 50001 (Industrial)

• For organizations with some experience in energy management.
• Toolkit helps organizations improve their current energy management approach and prepares them to become ISO 50001 certified.
  – Variety of DOE and EPA resources available (e.g., forms, checklists, templates, examples, and guidance)
• Six steps take the user through implementation of an energy management system including system maintenance.
• Uses ISO 50001 and a proven process for continual improvement.
Six Steps for DOE eGuide

1. Getting Started
2. Conduct Energy Review
3. Plan for Energy Management
4. Implement Energy Management
5. Measure Projects and Results
6. Review for Continual Improvement
EERE would like to convert the current eGuide for ISO 50001 implementation into a sector-agnostic, broadly applicable “plain language” product.

The purpose is to offer a product that builds upon the ISO 50001 steps but provides more basic steps for organizations establishing their energy management program.

This eGuide tool aims to provide the rigor yet flexibility needed for mobility in the energy management framework, especially for the commercial and public sectors.
Upcoming Revised DOE eGuide

Three progressive steps following the EERE’s Strategic Energy Management Continuum

1. Foundational continuous energy improvement (CEI) level,
2. ISO 50001, and
3. Superior Energy Performance
Industrial (Superior Energy Performance)
US Implementation: Superior Energy Performance for Industrial

ISO 50001 EnMS

- Fosters organizational culture to continuously improve energy efficiency
- Aligns with business systems through Plan-Do-Check-Act process

Provides a powerful energy management system

Superior Energy Performance

Applies ISO 50001 to create real value.

- Set performance target
- Verify improved energy performance

- Industry-designed (U.S. CEEM)
- Transparent & robust M&V of energy savings
- Aligned with business operations
- Scalable to thousands of manufacturing plants

Facilitates and verifies rigorous use of ISO50001 EnMS
Superior Energy Performance: Pilots & Demonstrations

States, regions, and utilities are partnering with U.S. DOE to support Superior Energy Performance demonstrations in companies across the country.

Industrial Participants:

- 3M
- Allsteel
- Ascend Performance Materials
- Bentley Prince Street
- Bridgestone Tire
- Coca-Cola
- CCP Composites
- Cooper Tire
- Cummins
- Curtiss-Wright Flow Control Company
- Didion Milling, Inc
- Dixie Chemical
- Dow Chemical
- Eaton
- Freescale Semiconductors
- General Dynamics
- Gerdau
- Harbec Inc.
- Haynes International
- Ingersoll Rand
- Land O’ Lakes
- Lockheed Martin
- MedImmune
- Neenah Foundry Company
- Nissan North American Höganas
- OLAM Spices
- Owens Corning
- Republic Conduit
- Schneider Electric
- Spirax Sarco
- UTC/Sikorsky
- United States Mint
- Volvo
- World Kitchen

www.eere.energy.gov/manufacturing/tech_deployment/sep_demonstrations.html
SEP Certified Industrial Facilities

- 28 industrial plants have completed SEP demonstration training (12 sectors represented)
- 14 plants SEP certified
- 25 additional plants pursuing certification

- Key SEP demonstration plant results (average)
  - Plants improving at ~4% per year
  - 77% of improvement from no/low cost operational improvement
  - 23% of improvement from capital projects

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<tr>
<th>Facility</th>
<th>% Energy Performance Improvement</th>
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<tr>
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<td>Bridgestone Americas Tire</td>
<td>Wilson, NC</td>
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Implementing Your Energy Management Program
Nissan Smyrna, TN Manufacturing Plant

Conditioned Space Area 5.5 MM Sqft
Production Capacity 550,000 Vehicles Per Year
Energy Sources                           Typical Annual Use
Electricity                                           220,000 MWH
Natural Gas                                       650,000 MCF
Coal                                                     12,000 Tons
Case Study: Nissan

Base Period Energy Use: 3.38 TBTU (source) or 1.80 (Site)

SEP Reporting Period: 12 Months Ending August 11

SEnPI Improvement: 7.2%

Annual Operational Improvement Savings: $940,000

SEP Implementation Costs: $330,000
Nissan SEP Implementation Costs

$330,000

- Plant Staff Time: 66%
- External Technical Assistance: 10%
- Monitoring & Metering Equipment: 13%
- Audit Preparation: 6%
- 3rd Party Auditor: 5%
1. ISO 50001 Certification Track
   - General Service Administration
     - Denver Federal Center (50+ bldgs)
     - Ronald Reagan Office Building (very large multi-function office building)
   - J.W. Marriott Hotel (upscale hotel)
   - Massachusetts Institute of Technology (entire campus)

2. Energy Management System Track
   - Aetna/NGKF (3rd party- managed office building)

3. Targeted Technical Assistance Track
   - Cleveland Clinic (hospital)
   - Target (2 stores)
   - Walmart
ISO 50001- Energy management system standard is already demonstrating that it can produce *deeper and more sustainable energy savings* in industrial facilities, even those with ongoing energy efficiency programs.¹

**Problem Statement:**

Determine whether existing commercial buildings:

1. Are likely to experience similar positive results from implementing ISO 50001
2. Can be expected to achieve full conformance to ISO 50001, or is a less rigorous approach needed
3. Find value in third-party certification of ISO 50001 conformance

¹ See US DOE’s [www.superiorenergyperformance.net](http://www.superiorenergyperformance.net)
Onsite Internal Audit Training

GSA Ronald Reagan Building

Massachusetts Institute of Technology
Lessons Learnt: ISO 50001 vs EnMS?

• Target market for ISO 50001 certification
  – Buildings >50,000 sq. ft.
  – Clusters of co-located buildings (e.g. campuses)
  – Many similar buildings, centrally managed (e.g. retail)

• Benefit from economies of scale for
  – Shared business processes for the EnMS (policy, planning, documentation, procurement & design, internal auditing)
  – Coordinated data collection and analysis
  – Tracking and improving energy performance

1 Analysis of Third-Party Certification Potential for Superior Energy Performance for Commercial Buildings, DOE Internal Report prepared by LBNL and DEKRA 2011
Future Plans for Commercial Building ISO 50001

• Finalize internal report summarizing lessons learned
• Apply findings to inform a nationally scalable approach including:
  – Modify / enhance eGuide and other technical assistance tools and resources for this market
  – Expand Certified Practitioner in Energy Management for professionals implementing ISO 50001 in commercial buildings
• Explore ways that ISO 50001 certification can
  – Align with LEED credits
  – Support utility incentives for broader range of EE actions
  – Be combined with verified energy performance improvement

http://www1.eere.energy.gov/energymanagement/