ISO 50001 Overview

• What it is:
  – A **global standard** around managing energy based on expertise from 56 countries
  – A **management model** for continual improvement of energy performance
    • Manages energy efficiency, energy security, energy use and energy consumption
    • Similar to quality (ISO 9001) and environmental (ISO 14001) management system standards

• What it does:
  – Builds institutional knowledge throughout an organization
  – Engages all staff (executive, facility, procurement, communications, etc.), not just facility management.
  – Creates the market pull and business culture for industry to invest in advanced energy efficiency technologies
  – Reduces business risk associated with unpredictable energy costs and supply
  – Establishes an ingrained culture and practice around energy performance
  – Enables more cost-effective and rapid investment in advanced energy efficient technologies
<table>
<thead>
<tr>
<th>Current State: Project by Project</th>
<th>Desired Future State: ISO 50001</th>
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<tbody>
<tr>
<td><strong>Approach and Scope</strong></td>
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<tr>
<td>Project-based</td>
<td>System-wide</td>
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<tr>
<td>Equipment and physical systems.</td>
<td>Equipment, systems, personnel, processes → <em>culture change</em></td>
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<td><strong>Project prioritization</strong></td>
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<tr>
<td>Ad hoc and reactionary, often budget-driven</td>
<td>Structured prioritization of significant energy uses</td>
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<tr>
<td>Often no established process for new projects</td>
<td>Established process for energy consideration in new facilities, systems, equipment and processes</td>
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<td><strong>Management buy-in</strong></td>
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<td>Ad hoc or none</td>
<td>Executive decision-maker involvement</td>
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<td>Top management commitment</td>
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<td><strong>Resilience to staff turnover</strong></td>
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<td>Dependent on energy champion or individuals</td>
<td>Cross-organizational involvement.</td>
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<td><strong>Self-sustaining</strong></td>
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<tr>
<td>No – based on individual projects</td>
<td>Yes – Plan-Do-Check-Act management cycle</td>
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<tr>
<td>Individual-dependent</td>
<td>Individual-independent</td>
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<td><strong>Outcomes</strong></td>
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<tr>
<td>Reliant on continuous streams of capital to support EE upgrades and sustained improvement</td>
<td>Establishes operational control procedures and organizational structure designed for continual improvement</td>
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<td><strong>Current adoption levels</strong></td>
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<tr>
<td>Increasingly commonplace: 46% of U.S. manufacturing facilities have set goals for improving energy efficiency</td>
<td>Minimal: &lt;0.1% of U.S. manufacturing facilities have adopted ISO 50001</td>
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</table>
ISO 50001 Energy Management Systems (EnMS)

Planning
1. Scope and Boundaries
2. Energy Policy
3. Management Commitment
4. Energy Team
5. Legal Requirements

Energy Review
6. Data Collection
7. Data Analysis
8. Performance Indicators (EnPIs)
9. Significant Energy Uses (SEUs)
10. Relevant Variables
11. Baselines, Objectives and Targets
12. Improvement Opportunities
13. Improvement Projects

Continual Improvement
14. Monitoring
15. Measurement
16. Operational Controls
17. Corrective Actions
18. Energy Consideration in Design

System Management
19. Documentation and Records
20. Communications
21. Training
22. Procurement
23. Internal Audit
24. Calculate Energy Savings
25. Management Review

- Translates ISO 50001’s “shall” requirements into actionable tasks
- Tasks do not need to be completed linearly or chronologically
Systematic Energy Management Results in Continuous Improvement

Executive management commits to EnMS

Initial savings from low-cost investments

Additional savings from capital improvements

Becomes company culture

A structured EnMS paves the way to increase energy efficiency and optimize plant performance by implementing operational improvements that prepare facilities for the effective implementation of new technologies.

Business as usual

Identify, prioritize, and implement systematic, no/low-cost energy savings

Strategically invest to maximize energy savings

Saving energy becomes part of the company business operations

Company Decision on implementation of an energy management system

Capital Investment in advanced energy efficient technologies

Continuous Improvement

Adapted from: Kahlenborn et al. (2012), based on Lackner & Holanek (2007)
The Value of a Structured Approach

Based on DOE findings, a structured EnMS yields greater, more cost-effective, and more sustainable energy savings than a more traditional, project-based energy efficiency program.

- US manufacturing Business-as-Usual ~1% per year
- US manufacturing Industry Leaders ~ 2.5% per year
- SEP/ISO 50001 certified plants ~4% per year
- Enterprise-Wide SEP Approach ~5% per year

A 2017 review of 43 US-based facilities found:

- ISO 50001 resulted in 12.9% average reduction in energy consumption over 3-year period, equivalent to 3.71 trillion BTU source energy.
- SEP facilities saved over $430,000/year on average from low- and no-cost operational improvements
- An enterprise-wide approach saved over $600,000/year.
- Paybacks of less than 2 years for most facilities
ISO 50001: Performance Data

The most effective way for U.S. manufacturing facilities and buildings to achieve their fullest potential in energy efficiency is to adopt programs & policies that improve energy performance on a continuing basis.

Savings at certified facilities greater on average compared to non-certified facilities:

- **3M:** 62% greater over 3 years: 18 ISO 50001 sites across 7 countries; 2 US SEP, 1 Korea SEP certified; 257 non-ISO 50001
- **Schneider Electric:** 65% greater over 4 years: 20 ISO 50001 in North America; 16 US SEP certified; 30 non-ISO 50001
Demonstrating leadership in energy management

Adoption of management system standards have typically seen an inflection point ~10 years after introduction. Demonstrate leadership in responsible manufacturing by driving adoption of 50001, and help overcome market barriers to unlock wide-ranging energy savings potential.
## Approaches to ISO 50001 Adoption

DOE supports a continuum that begins with business culture and culminates in verified savings.

<table>
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<tr>
<th>Purpose &amp; Recognition</th>
<th>SELF ATTEST</th>
<th>CERTIFY</th>
<th>VERIFY</th>
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<tbody>
<tr>
<td>Implement and self-attest to ISO 50001</td>
<td>Establish a rigorous energy management system, audited by a 3rd party certification body</td>
<td>Verify energy savings from ISO 50001, using 3rd party SEP verification body</td>
<td>Earn recognition from DOE for ISO 50001 certification and verified energy performance improvement</td>
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<td>Benefit from its cultural value</td>
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<tr>
<td>Earn recognition from DOE for ISO 50001 conformance</td>
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<tr>
<td>1. Complete 25 steps in Navigator</td>
<td>1. ANAB-accredited audit</td>
<td>1. ISO 50001 certification</td>
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<tr>
<td>2. Self-attest to completion</td>
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<td>2. 3rd party SEP Performance Verification audit</td>
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<td>3. Report energy performance</td>
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<tr>
<td>Good approach for any organization, particularly for facilities with a moderate energy bill</td>
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<td>Ideal for organizations with prior ISO management system experience</td>
<td>Ideal for facilities seeking deep, sustained energy savings</td>
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<td><strong>Target Facilities</strong></td>
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### Tools & References

- **ISO 50001 Standard**
- **50001 Ready M&V Protocol**
- **SEP M&V Protocol**
- **50001 Ready Navigator** – Developed for 50001 Ready, provides full guidance in line with ISO 50001 and SEP
- **Energy Performance Indicator (EnPI) Tools** – Lite version designed for 50001 Ready; Full version designed for SEP
Three Steps to Becoming 50001 Ready

STEP 1
Start Implementation of ISO 50001 principles

- Use the 50001 Ready Navigator Online Tool
  - The Navigator walks you through the process of implementing an energy management system and prepares you to be 50001 Ready.

STEP 2
Analysis of energy and emissions reductions

- Adopt Valid Tool to Present Energy Performance
  - DOE offers the EnPI Lite tool for 50001 Ready.
  - EPA’s Portfolio Manager can also be used
  - Other tools can be approved by DOE

STEP 3
Request 50001 Ready recognition

- Submit information to DOE for Review
  - Self-attestation of completion of Navigator, executed by team leader and executive
  - Submit energy performance data

DOE or Utility recognizes 50001 Ready achievement
50001 Ready Navigator

- Developed and maintained by DOE
- Resource to provide free training and information to the market
- Online tool with simple, step-by-step approach to ISO 50001 implementation
- Guidance broken into straightforward sections, including:
  - Getting It Done - what specifically needs to be accomplished
  - Task Overview - how does this task connect with ISO50001
  - Full Guidance - comprehensive guidance about the task
  - Transition Tips - from other ISO management systems or ENERGY STAR
- Track and update task progress
- Ability to assign tasks to team members to facilitate team collaboration
- Access over 100 related resources
Designed for Varied Audiences

• 50001 Ready Navigator is designed for a range of technical abilities:
  • Staff ranging from engineers to energy managers to sustainability champions.
  • Facilities with varying levels of familiarity with energy management.

• Builds on existing expertise with ISO 14001, ISO 9001, and ENERGY STAR Guidelines for Energy Management
  • Specific tooltips enable transition between related standards and programs.
Collaborative, Team-Based Approach

Assign tasks to team members and track progress.

Tabs for action:

– Getting It Done provides links to worksheets, templates, and checklists to complete this task.
Assign tasks to team members and track progress.

Tabs for action:

- Getting It Done provides links to worksheets, templates, and checklists to complete this task.
- View tooltips from related standards and programs, e.g., ISO 14001, ISO 9001, and ENERGY STAR.
Assign tasks to team members and track progress.

Tabs for action:

- Getting It Done provides links to worksheets, templates, and checklists to complete this task.
- View tooltips from related standards and programs, e.g., ISO 14001, ISO 9001, and ENERGY STAR.
- Create notes to track progress and coordinate team members.
Enterprise-Level Tracking

Track facility-level performance across different locations.
Co-branding and Customization

• Navigator has been developed on open-source standards to enable co-branding and customization.
• Issue 50001 Ready recognition as a partner organization
• Add Tooltips, Resources and FAQs specific to your organizational or regulatory requirements
• Track overall process of ongoing projects
50001 Ready Recognition

50001 Ready recognition from DOE requires:

- Self-attestation to completion of all 25 tasks in the 50001 Ready Navigator
- Proof of energy performance calculations through EnPI Lite or related energy performance calculators.

Projects can be submitted for recognition directly through the 50001 Ready Navigator.
EnPI Lite

EnPI Lite is a web based calculator developed and maintained by DOE that estimates **energy savings** relative to relevant variables, like production levels and weather, using linear regression.

EnPI Lite provides a user-friendly way for the market to practice regression-based energy modeling.

**EnPI Lite Steps:**

1. Input Energy Consumption and Relevant Variables
   
   **Input Options:**
   - Energy Footprint Tool
   - ENERGY STAR Portfolio Manager

2. Regression Analysis (**automatic**)  
3. Adjust Data / Models as needed  
4. Download Results
50001 Ready Designee: Four Seasons Produce

- First US facility to receive recognition
- 266,000 square foot fruit and vegetable refrigerated warehouse
- Started project in May; recognized as 50001 Ready in June
  - 5 weeks engagement, approx 80 hours effort
- Drew from expertise from every department, including HR, accounting, packing, warehouse, and executive leadership
- “Great refresher” for reconfirming operations and lessons learned from utility Continuous Energy Improvement program
- Hope to use EnMS practices to improve ENERGY STAR score
50001 Ready Designee: Charter Steel

- First industrial plant and Better Plants partner to achieve recognition
- 900,000 square foot melting, rolling, and processing plant
- Engaged in 50001 Ready as interim step before certification. Found the Navigator to increase confidence in their EnMS implementation.
- The 50001 Ready EnMS has increased energy awareness at both upper and lower levels of the organization.
- Coordinated with environmental management software systems and communications methods to integrate with ISO 14001.
50001 Ready Designee: Comau

- First facility under a corporate ISO 50001 certification to achieve 50001 Ready.
- 75% of savings from the energy management system resulted from operational improvements.
- Improved energy monitoring enabled better quality control in utility costs and billing.
- Saw benefits beyond energy and cost savings: Replacing lighting resulted in better illumination in the shop, improving productivity.
Find Out More!

Visit the 50001 Ready website at energy.gov/50001Ready

• Download infosheets and FAQs
• Find links to the Navigator and EnPI Lite
• See 50001 Ready facilities
• Read case studies and additional resources
• Read more about ISO 50001 and related programs