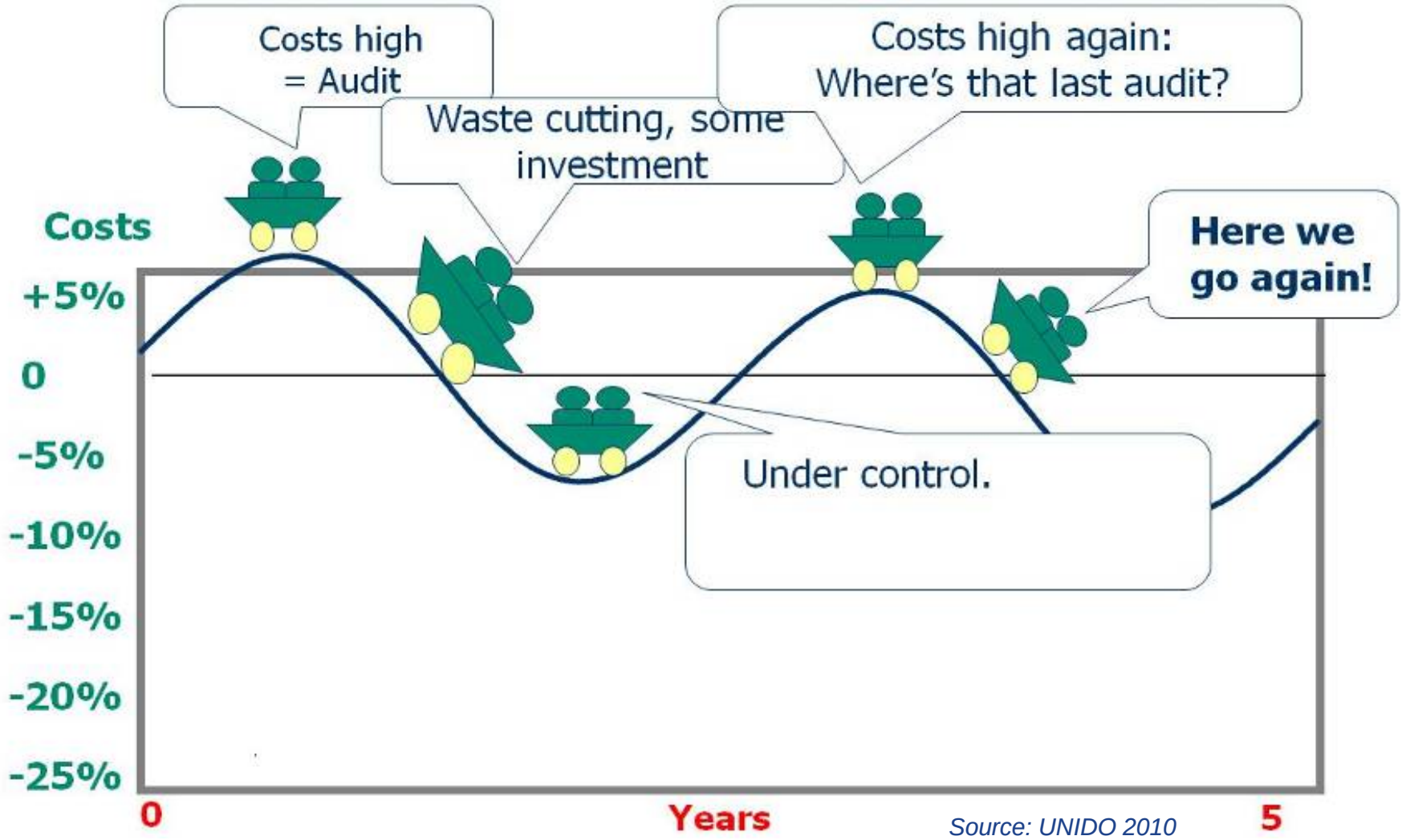
“50001 Ready” & Superior Energy Performance®: Opportunities for ANAB Certification Bodies

Paul Scheihing
U.S. Department of Energy Advanced Manufacturing Office

October 25, 2017

Importance of Energy Management and ISO 50001

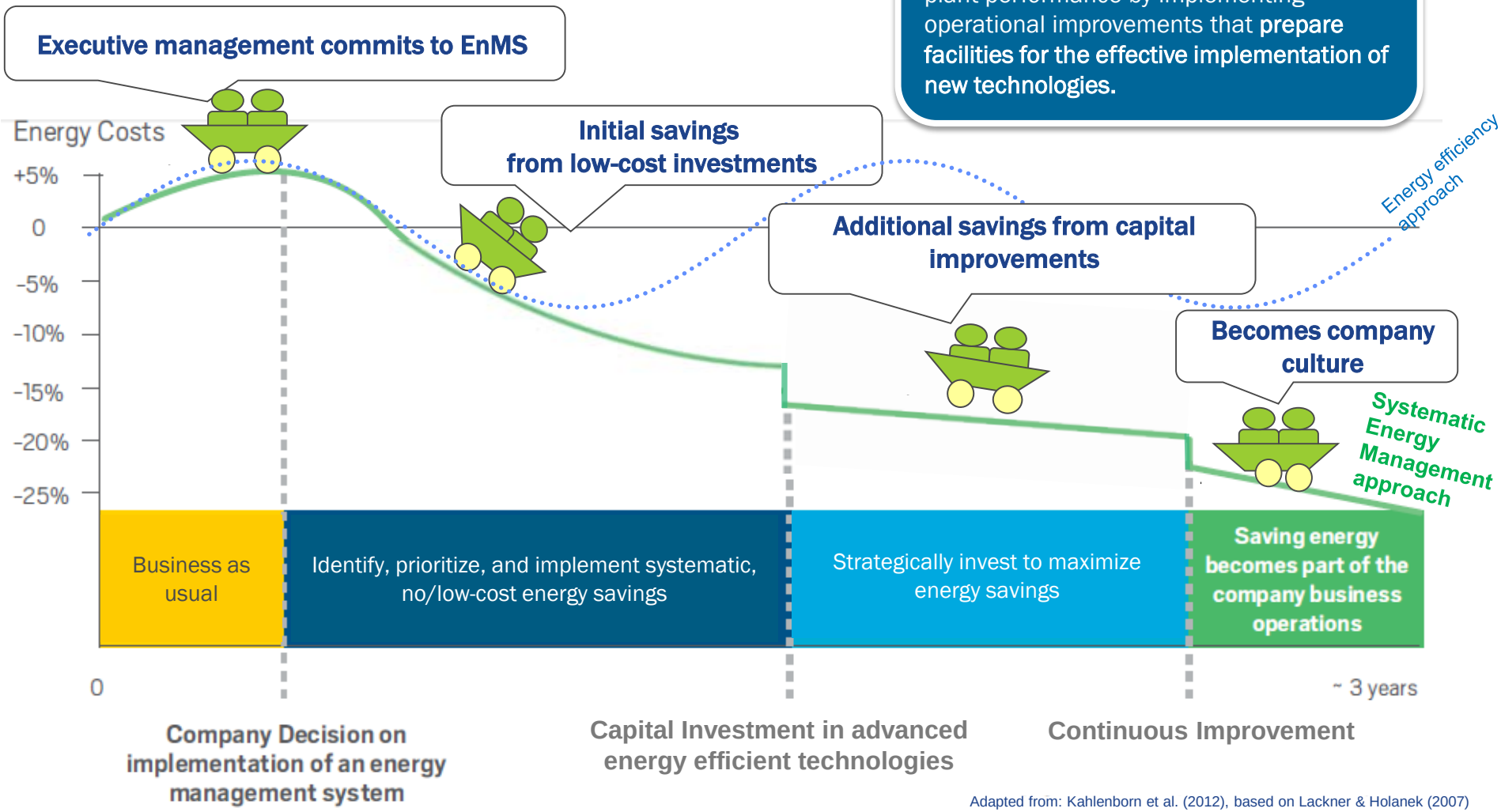
Typical Project-Based Approach to Energy



Source: UNIDO 2010

Systematic Energy Management Results in Continuous Improvement

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.**



Adapted from: Kahlenborn et al. (2012), based on Lackner & Holanek (2007)

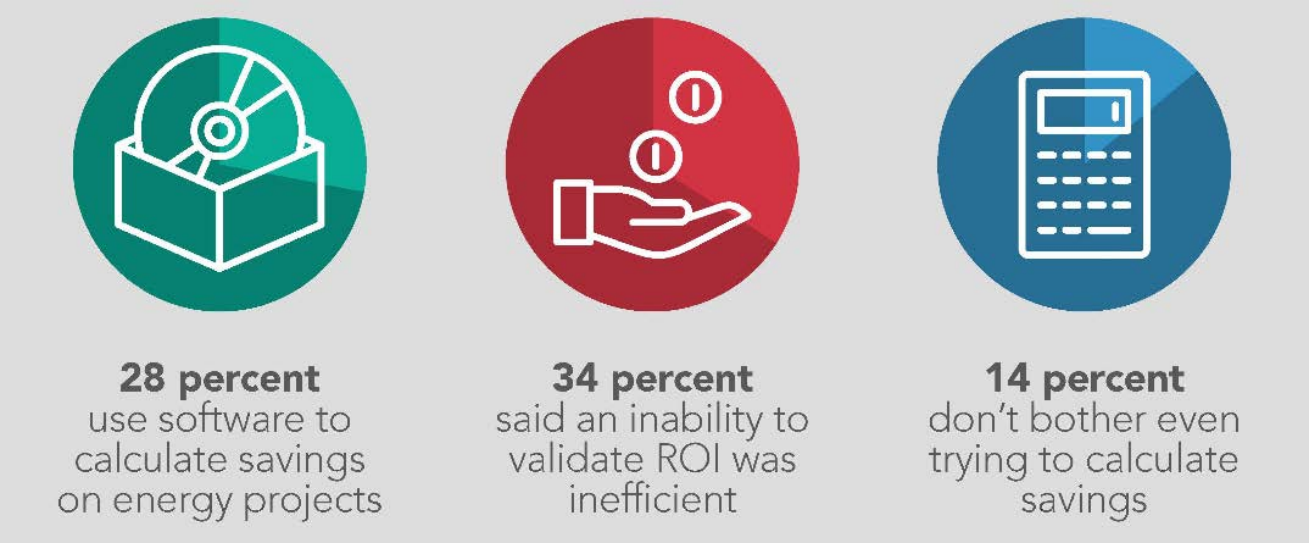
Energy Management = Customer Engagement Opportunity

Many companies are committed to sustainability and energy efficiency projects…

Source: Urjanet (2016). [Energy Executives Are Committed to Sustainability Projects, But Many Companies Are Lacking the Resources and Tools to Achieve Their Goals] [Infographic].

Retrieved from: http://urjanet.com/resources/infographic-energy-executives-are-committed-to-sustainability-projects-but-many-companies-are-lacking-the-resources-and-tools-to-achieve-their-goals/?portfolioID=97

…But they lack resources and tools to achieve their goals and assess project outcomes



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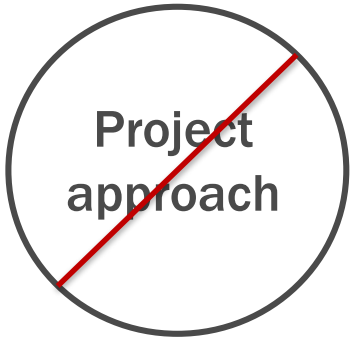
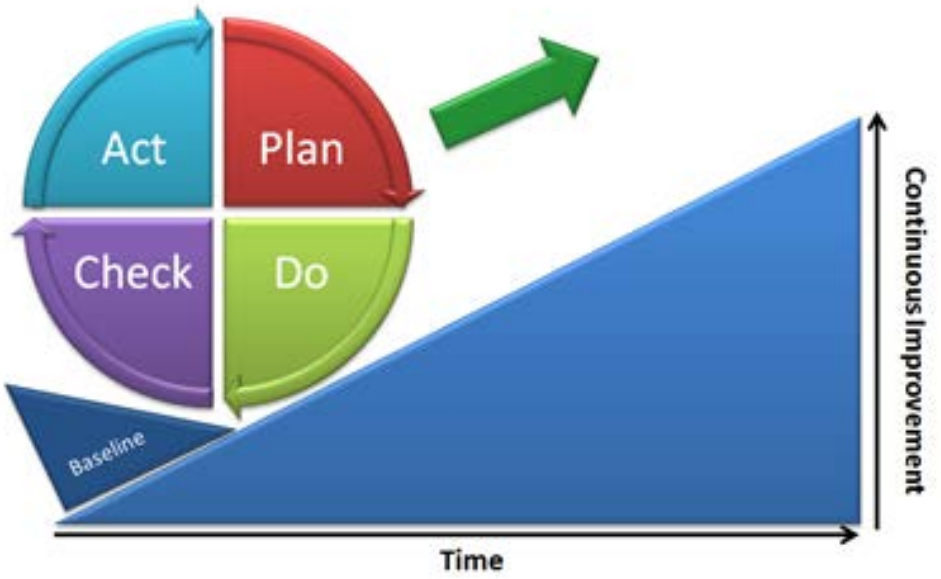
Energy Management Systems (EnMS)

An EnMS establishes a framework for industrial plants; commercial, institutional, and governmental facilities; and entire organizations to manage energy

- **Elevates and integrates energy into normal business systems**, as has happened for safety & quality
- **Involves staff from the Board room to the facilities staff**: Organizational change in culture
- Systematic energy management leads to **continual improvements** in energy and cost performance





Energy & cost savings over time

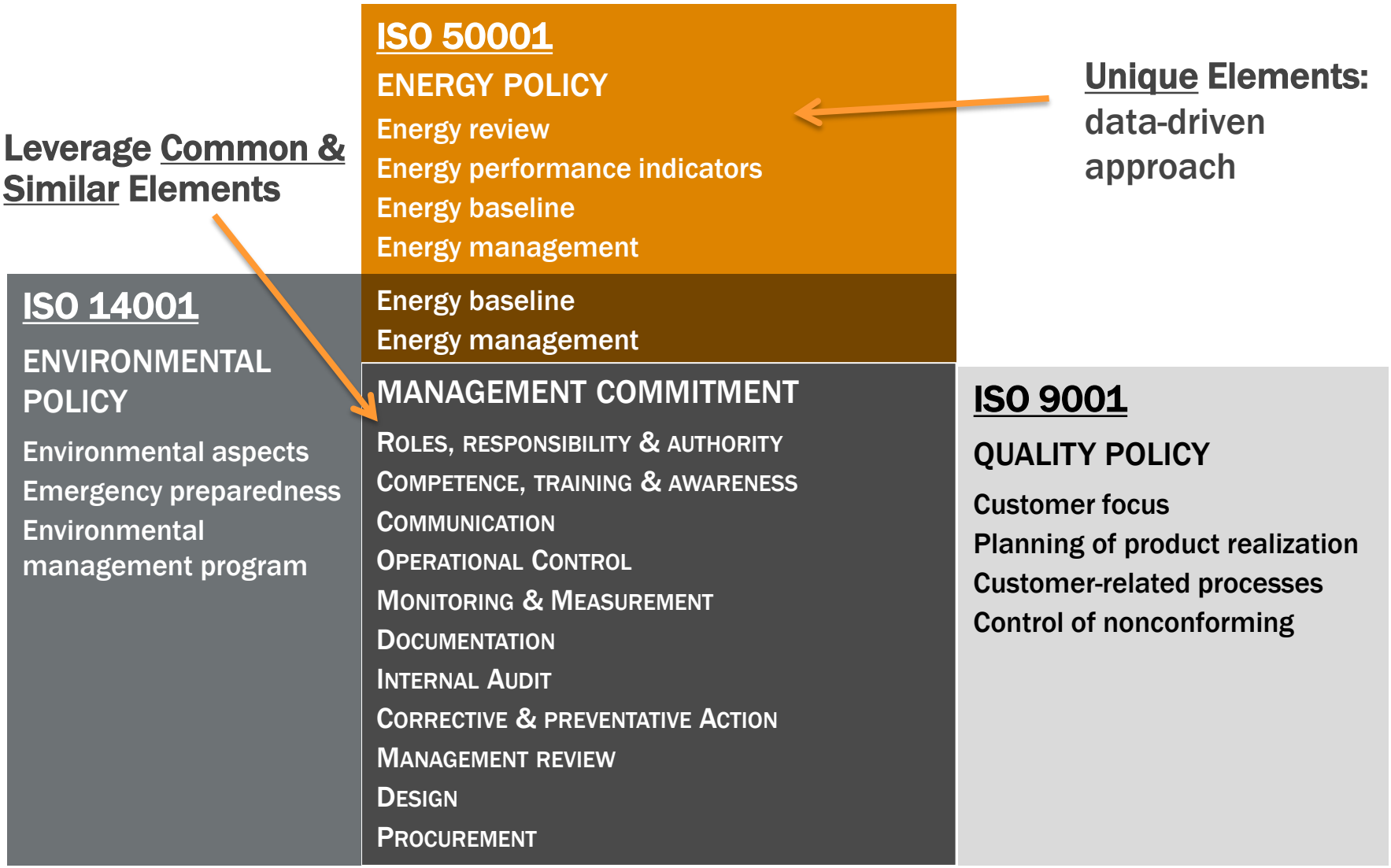
ISO 50001 Overview

- 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
    - **Compatible with quality (ISO 9001) and environmental (ISO 14001) management system standards**

A management system is:
- ✓ Say what you do
- ✓ Do what you say
- ✓ Prove it
- ✓ Improve it

- 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

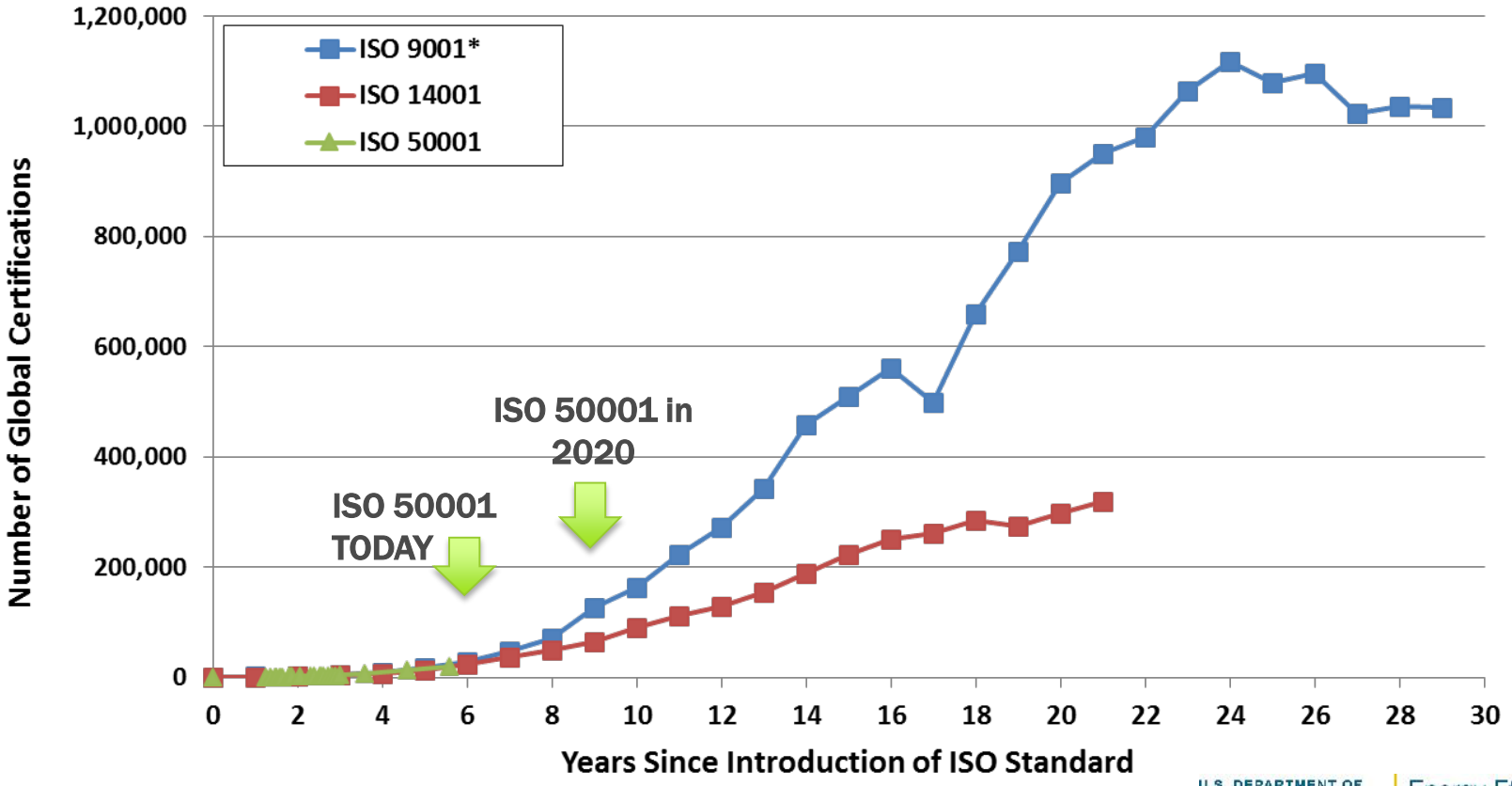
Compatibility with other ISO management system standards



Tremendous Growth Potential of ISO 50001

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

Global – Initial 30 Years



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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.

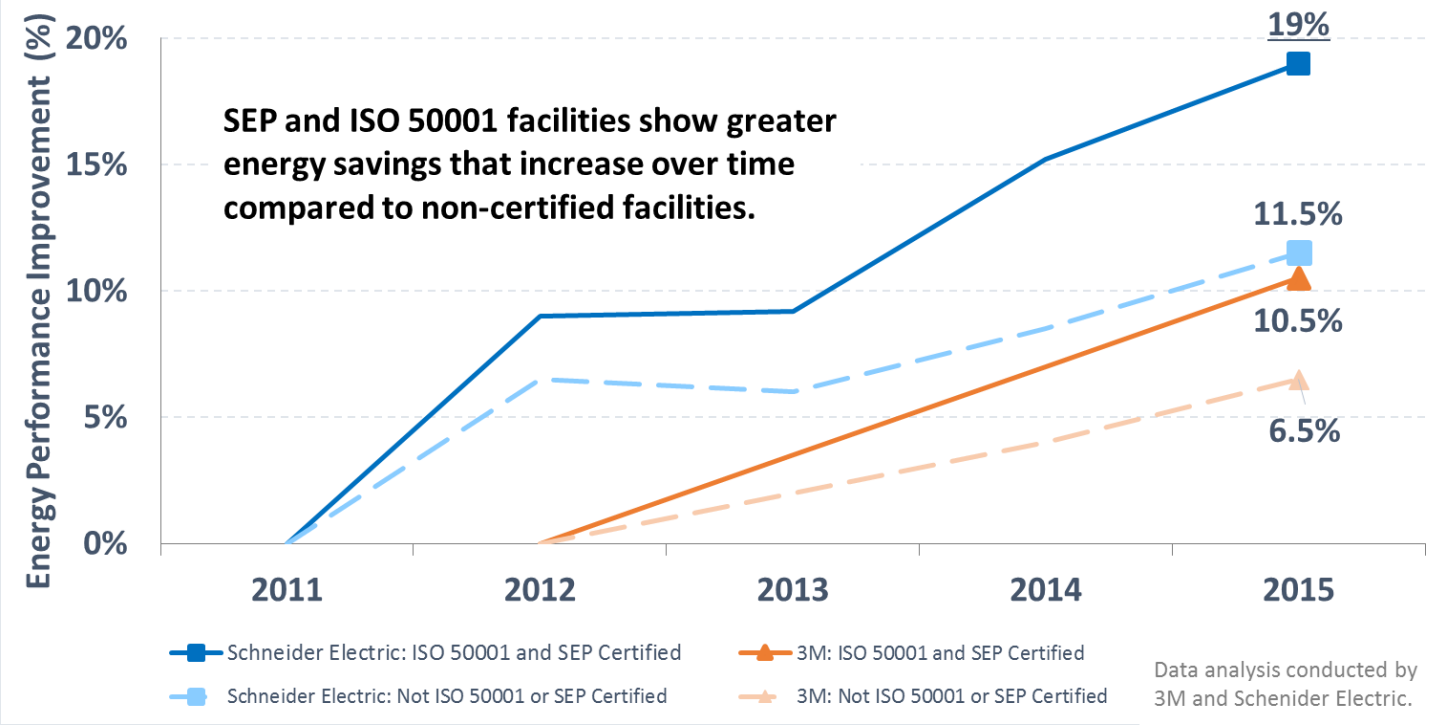
- US manufacturing Business-as-Usual ~1% per year
- US manufacturing Industry Leaders ~ 2.5% per year
- **SEP/ISO 50001 certified plants ~4% per year**
- **Enterprise-Wide SEP Approach ~5% per year**

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; **75% of savings 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

Verified Results in using ISO 50001

Through DOE's Superior Energy Performance…

- Achieving up to $1 million in annual savings
- 50 SEP verified facilities
- Significant savings from operational improvements with no capital investment
- Reducing carbon emissions, with third-party verified energy performance improvement
- Savings found to be almost double corporate business as usual

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HILTON WORLDWIDE
NISSAN
3M
VOLVO
JW MARRIOTT.
Schneider Electric
LAND O'LAKES, INC.
DETROIT DEMAND PERFORMANCE
MedImmune
A member of the AstraZeneca Group
BRIDGESTONE
Your Journey, Our Passion
Coca-Cola
HARBEC
Technical Innovation with Environmental Responsibility
Rexroth
Bosch Group
CURTISS WRIGHT
Cummins

Verification of ISO 50001 through Superior Energy Performance® (SEP®) Certification

- A voluntary continual energy performance improvement certification program recognizing excellence in organizational energy management practices.
- SEP certification based upon third-party verification of:
  - Energy management system (ISO 50001)
  - Energy performance improvement (ANSI/MSE 50021)

Superior Energy Performance® U.S. DEPARTMENT OF ENERGY = ISO International Organization for Standardization Energy Management System +  Verified Energy Performance Improvement over time

Adding SEP to Existing ISO 50001 Certification

Use SEP to engage ISO 50001-certified customers

A key SEP 2017 update allows the certification audit for SEP to be conducted separately from the certification audit for ISO 50001:

- A facility may add SEP to an existing ISO 50001 certification via a scope extension, typically during a recertification audit.
- See SEP Certification Protocol for more details about the scope extension.

The SEP audit must be conducted by an SEP Verification Body.

To offer SEP certification, seek ANAB accreditation for SEP

ISO 50001 conformity assessment bodies can learn more at: www.energyaccreditation.org

Existing SEP Verification Bodies

- Advanced Waste Management Systems, Inc.
- DEKRA Certification, Inc.

Savings: Cost-effective, deeper, credible

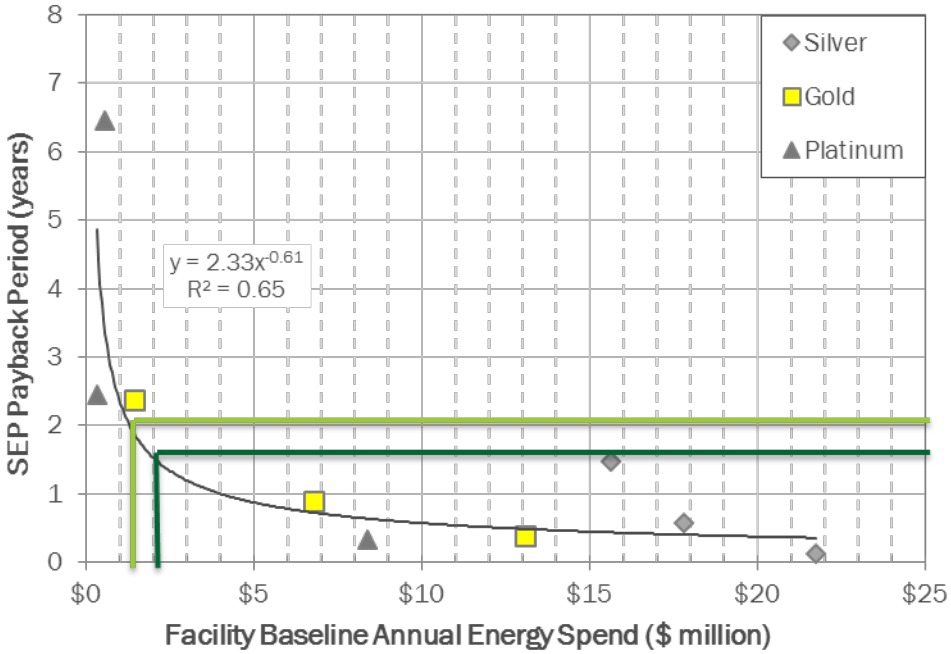
Credible, third-party verification

- Valuable data and analysis for **higher confidence in energy efficiency investments**

Payback:

Less than 2 year payback for a facility with a baseline annual energy spend greater than $1M

Less than 1.5 year payback for a facility with a baseline annual energy spend greater than $2M



www.energy.gov/eere/amo/downloads/sep-2015-cost-benefit-analysis-paper

Schneider Electric: $1.8 Million Savings with SEP Enterprise-wide Rollout

Following the success of Schneider Electric's SEP pilot site in Smyrna, TN, the company adopted an enterprise-wide approach to SEP:

- 20 sites achieved SEP certification
- $1.8 million in energy bill savings
- 75% reduction* in implementation labor to 0.3 FTE per site
- Reduced implementation period* from 13 months to 3-7 months

A Central Office administered the ISO 50001 EnMS and SEP and replicated best practices across sites.

** Compared to initial costs at the pilot site*

DOE Programs and Tools for ISO 50001

DOE Strategy for ISO 50001 Success

Workforce: Skilled Professionals

- Certified Practitioner in EnMS
- SEP Performance Verifier
- ISO 50001 Lead Auditor

Flexible Adoption

- Self-attestation

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- Certification

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Standards, Protocols, and Tools

- 50001 Ready Navigator and other tools
- SEP M&V Protocol
- SEP Scorecard

Market Partnerships

- Better Buildings, Better Plants
- Product sustainability standards
- Utility partnerships

DOE's Dual Approach to EnMS/ISO 50001 Adoption

DOE has developed an energy management continuum that begins with market-driven business culture and culminates in verified savings.

50001 Ready: Recognition for ISO 50001 conformance using guidance in DOE's 50001 Ready Navigator tool

→ ISO 50001 Certification →

Superior Energy Performance (SEP): Recognition for ISO 50001 certification and 3rd party verification of energy performance improvements

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DOE Role	Providing tools and the market onramp	Providing verified results and outcomes
Market Purpose	DOE's 50001 Ready self-attestation program prepares organizations for certification	DOE's SEP program fills the gap in the market for verified energy performance improvements from ISO 50001 implementation
M&V Protocol	50001 Ready M&V Protocol	SEP M&V Protocol
Tools	50001 Ready Navigator EnPI Lite	50001 Ready Navigator Energy Performance Indicator (EnPI) Tool
Path to Achieve-ment	1. Complete 25 steps in 50001 Ready Navigator 2. Self-attest to completion 3. Report energy performance	1. ISO 50001 certification 2. 3rd party SEP Performance Verification audit

50001 Ready Recognition

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

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DOE recognizes 50001 Ready achievement

50001 Ready serves as on-ramp from ISO 14001

ISO 14001

ISO 50001

- Familiarity with ISO management system
- Some energy context and inclusion within ISO 14001
- Top management commitment to quality environmental practice

- Add robust energy data and analysis
- Determine significant energy uses
- Add energy objectives and targets
- Determine best energy saving opportunities
- Continually improve energy performance

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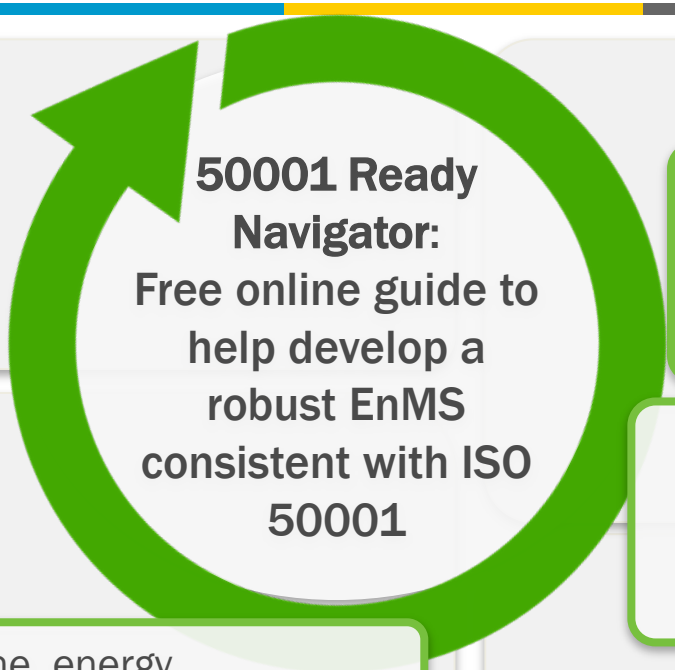
Key U.S. DOE Tools for ISO 50001



PLAN

Energy Footprint Tool:
Track energy consumption and determine significant energy end-uses

Automated Register of Implemented Actions:
Organize & track actions to implement an EnMS

DO

CHECK

M&V Tools:

Top-down regression:

- **EnPI Lite:** Establish baseline, energy performance indicators, track progress and savings
- **EnPI Tool:** Added functionality for accounting for variables and more robust regression analysis

Bottom-up check:

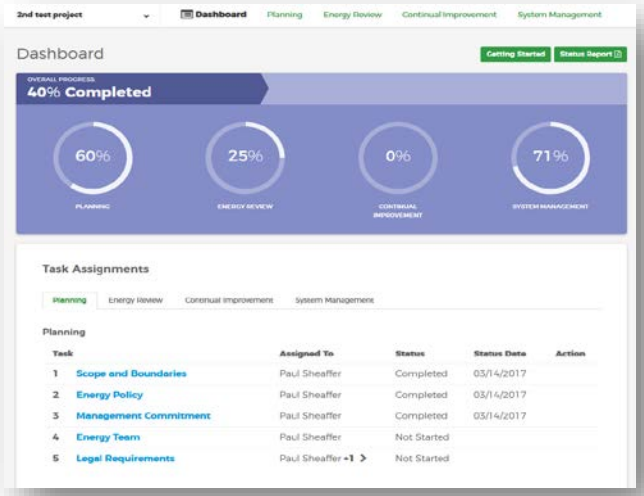
- Automated Register of Implemented Actions

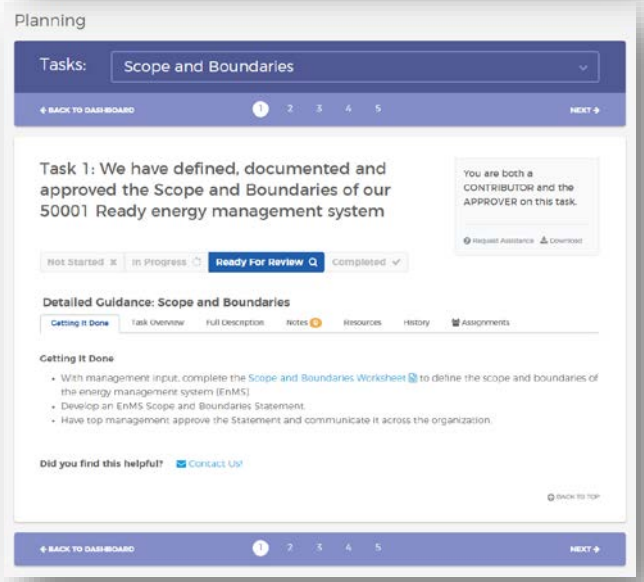
ACT

50001 Ready Navigator

- Developed and maintained by DOE
- Free resource for training and information
- Online tool with simple, step-by-step approach to ISO 50001 implementation
- Guidance broken into straightforward sections, including “Getting it Done” and “Transition Tips” from ISO 14001, ISO 9001, and ENERGY STAR.
- Track progress, collaborate with team members
- Access over 100 related resources

Available at: navigator.industrialenergytools.com





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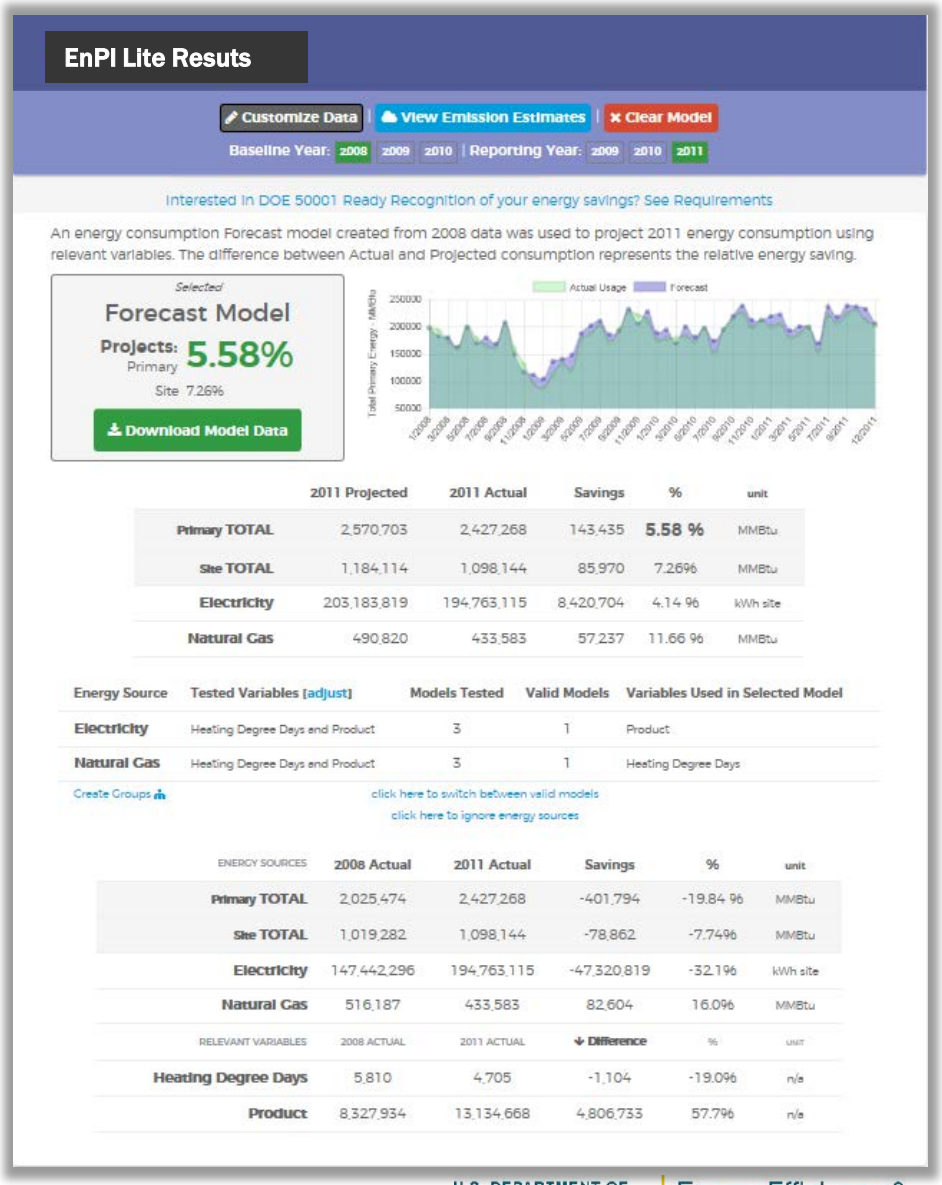
EnPI Lite Tool

EnPI Lite: Navigator's companion tool for facility-level energy performance

- Enter or upload energy use data and account for mitigating factors (e.g., production levels, occupancy changes, weather)
- Top-down regression analysis calculates energy change from baseline year
- Accepts input from DOE Energy Footprint tool and ENERGY STAR Portfolio Manager
- The EnPI Lite Output file is one option for reporting energy performance for DOE recognition

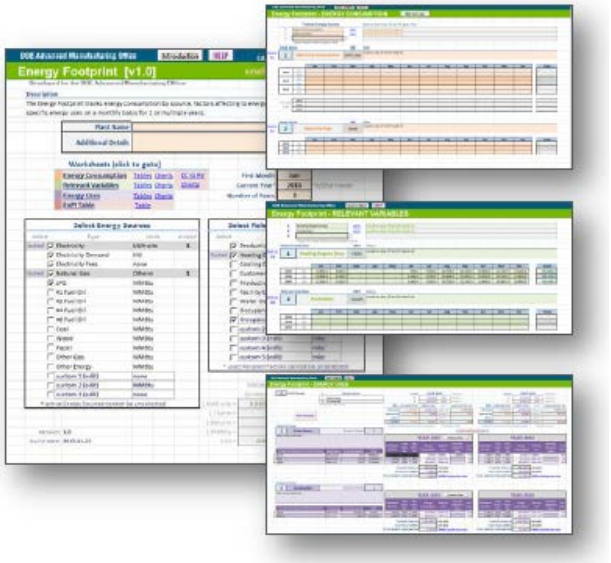
https://enpi.industrialenergytools.com/



DOE Energy Footprint Tool

Gather Data

Use the **DOE Energy Footprint Tool**



Easily track and analyze:

- Energy consumption
  Electricity, natural gas, etc.
- Relevant variables
  Production levels, degree days, operating hours, occupancy rates, etc.
- Energy Uses
  i.e., Application of energy
- Calculates energy-related greenhouse gas emissions

https://ecenter.ee.doe.gov/EM/tools/Pages/EnergyFootprint.aspx

Automated Register of Implemented Actions

- "The Register" assists with implementation of an EnMS including, but not limited to ISO50001 and/or SEP.
- Energy savings over the reporting period are reflected; typically, this will be annual savings.

- The Register summarizes key details of each EnMS action's implementation
  - Action description
  - Actual energy savings
  - Source of energy savings determination
  - Responsible party.

ACTIONS

#	ACTION (Use multiple rows for multiple energy types impacted by the same action.)	Type (Select from the List)	Date Initiated (DD/MM/YYYY)	Date Completed (DD/MM/YYYY)	Energy Types Impacted	Primary Energy Conversion Factor	Change in Energy Consumption During the Reporting Period (MMBtu) Use "+" for savings and "-" for increased consumption					
							Anticipated			Actual		
							Measurement Method	Site	Primary	Measurement Method	Site	Primary
1	Motor replacement (Example)	Equipment	1-Sep-2014	1-Oct-2014	Electricity	3	Engineering Assessment	154,000	462,000	Calculated	120,000	360,000
2	Repair steam leaks (Example)	Operations	11-Aug-2014	10-Sep-2014	Natural Gas	1	Engineering Assessment	90,000	90,000	Calculated	90,000	90,000
3	Switching electric steam boiler to waste heat & NG boiler (Example)	Processes	6-Jul-2014	1-Dec-2014	Electricity	3	Engineering Assessment	97,000	291,000	Calculated	97,000	291,000
					Natural Gas	1	Engineering Assessment	(79,000)	(79,000)	Metered	(81,000)	(81,000)
4	Eliminating Inappropriate Use of Compressed Air (Example)	Behavior	1-Jan-2014	1-May-2014	Electricity	3	Other (Please describe)	1,257	3,771	Calculated	943	2,829

energy.gov/eere/downloads/automated-register-implemented-actions

Professional Development Opportunities with ISO 50001

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- Certified Practitioner in EnMS
- SEP Performance Verifier
- ISO 50001 Lead Auditor

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ISO 50001 Professional Development Opportunities

Qualified ISO 50001 professionals maximize global impacts

- Organizations need access to reliable, skilled ISO 50001 professionals to maximize energy saving potential and return on investment
- ISO 50001 requires a new combination of knowledge and skills:
  - Management system expertise
  - Energy efficiency
- The effectiveness and impact of ISO 50001 requires skilled personnel:
  - **Consultants and implementation experts** that help companies identify opportunities to maximize the benefit of ISO 50001
  - **Auditors** that conduct robust ISO 50001 certification audits and provide confidence in ISO 50001 certification outcomes.
  - **Performance Verifiers** that can evaluate the quantitative impacts of EnMS implementation.

Certified Professionals for SEP

- DOE is building workforce capacity for energy management implementation and measurement & verification.
- Training and skill are required for appropriate application of the ISO 50001 and SEP standards, and to conduct the SEP certification audit.

ISO 50001 & SEP Implementation

- **Certified Practitioners in EnMS (CP EnMS):**
  Help facilities implement ISO 50001 and prepare to meet SEP requirements.
  - https://ienmp.org/certifications/cp-enms/

ISO 50001 & SEP Auditing

- **Certified Energy Professionals International (EPI) ISO 50001 Lead Auditor** with SEP qualification**:**
  Assess a facility's EnMS conformance to ISO 50001 and additional SEP requirements
  - https://ienmp.org/certifications/epi-iso-50001-lead-auditor/
- **SEP Performance Verifiers:**
  Assess a facility's conformance to the (1) measurement and verification protocol and (2) SEP energy performance improvement requirements.
  - https://ienmp.org/certifications/sep-performance-verifier/

EPI ISO 50001 Lead Auditor Certification

The **Energy Professionals International (EPI) ISO 50001 Lead Auditor Certification**

- Establishes a standardized and high level of knowledge and skills for ISO 50001 Lead Auditors globally and is consistent with ISO/IEC 17024 and ISO 50003.
  - **EPI Partners: Canada, Chile, Mexico, Republic of Korea, South Africa, United States, and UNIDO** through the international Clean Energy Ministerial (CEM) Energy Management Working Group (EMWG)
- Addresses the widespread variability in the skills and qualifications of ISO 50001 auditing personnel
- Reduces the burden on certification bodies to prove the competence of their auditors
- **No other ISO 50001 auditor credential combines the two fields of specialized expertise in (1) management system auditing and (2) energy efficiency and energy performance.** Most professionals have expertise in one field, but they need both.

Conclusions

DOE Offerings to ANAB Certification Bodies

DOE wants to work with ANAB Certification Bodies to market and communicate the value that the ISO 50001 Energy Management System adds to the CB's ISO management system clients.

- ISO 14001 certified facilities and organizations are the prime target for ISO 50001 adoption and implementation

DOE can help you engage your customers on ISO 50001

- DOE can present during webinars with your clients to promote DOE ISO 50001 programs and tools
- Basic technical assistance for 50001 Ready adoption is available from DOE
- DOE recognition for your customers
  - All 50001 Ready facilities and SEP-certified facilities receive DOE promotions
  - DOE will work with ANAB Certification Bodies to identify potential recognition opportunities for ISO 50001-certified facilities and organizations.

Tracking the uptake of ISO 50001 certification will help DOE programs be responsive to the market.

Summary

- ISO 50001 is a business-friendly strategy that complements existing management systems and yields persistent energy and cost savings
- ANAB Certification Bodies can develop business opportunities using DOE ISO 50001 recognition programs and tools
  - Promote 50001 Ready to your customers and build the pipeline for future ISO 50001 certifications
  - Become an SEP Verification Body and promote SEP to your ISO 50001-certified customers
- ISO 50001-certified facilities can apply for Energy Management Leadership Awards for global recognition
- Advance your ISO 50001 skill set through credentialed certification programs
  - Certified Practitioner in EnMS
  - Energy Professionals International ISO 50001 Lead Auditor
  - SEP Performance Verifier

More Information

Online resources:

energy.gov/50001Ready

energy.gov/ISOSEP

energy.gov/ISO50001

- Download infosheets and FAQs
- Find links to the Navigator and EnPI Lite
- Read case studies about certified facilities
- Find M&V guides
- Find reports and studies on energy impact of certification

Contacts:

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Global Recognition for ISO 50001 Certification & Accomplishments

2018 Energy Management Leadership Awards

Submission deadline:

24 January 2018

Early submission strongly encouraged

Organized by the Clean Energy Ministerial's Energy Management Working Group

Promote this prestigious global award to your ISO 50001-certified customers

ISO 50001-certified facilities submit a case study for recognition, entries describe ISO 50001 implementation and benefits

Juried selection process by committee of experts from around the world

Top winners to be honored at the ninth Clean Energy Ministerial (CEM9) in Copenhagen, Denmark and Malmö, Sweden in May 2018.

Benefits:

- Recognition on a global scale from program in high level forum with support from energy ministers
- Demonstrate commitment and leadership to customers, investors, employees, etc.
- Affirmation of leadership by trusted third parties on their behalf: governments, press, international organizations, etc.
- Each organization receives award for contributing a quality case study

Eligibility:

- Organizations around the world with an ISO 50001 certificate, issued by an accredited third-party certification body

www.cleanenergyministerial.org/EWAwards

Overview of SEP Standards & Normative References

SEP was updated in 2017 and will be updated in 2018 to align with the forthcoming ISO 50001 revision and expand applicability of SEP to more sectors.