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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

Projects approach vs. energy management

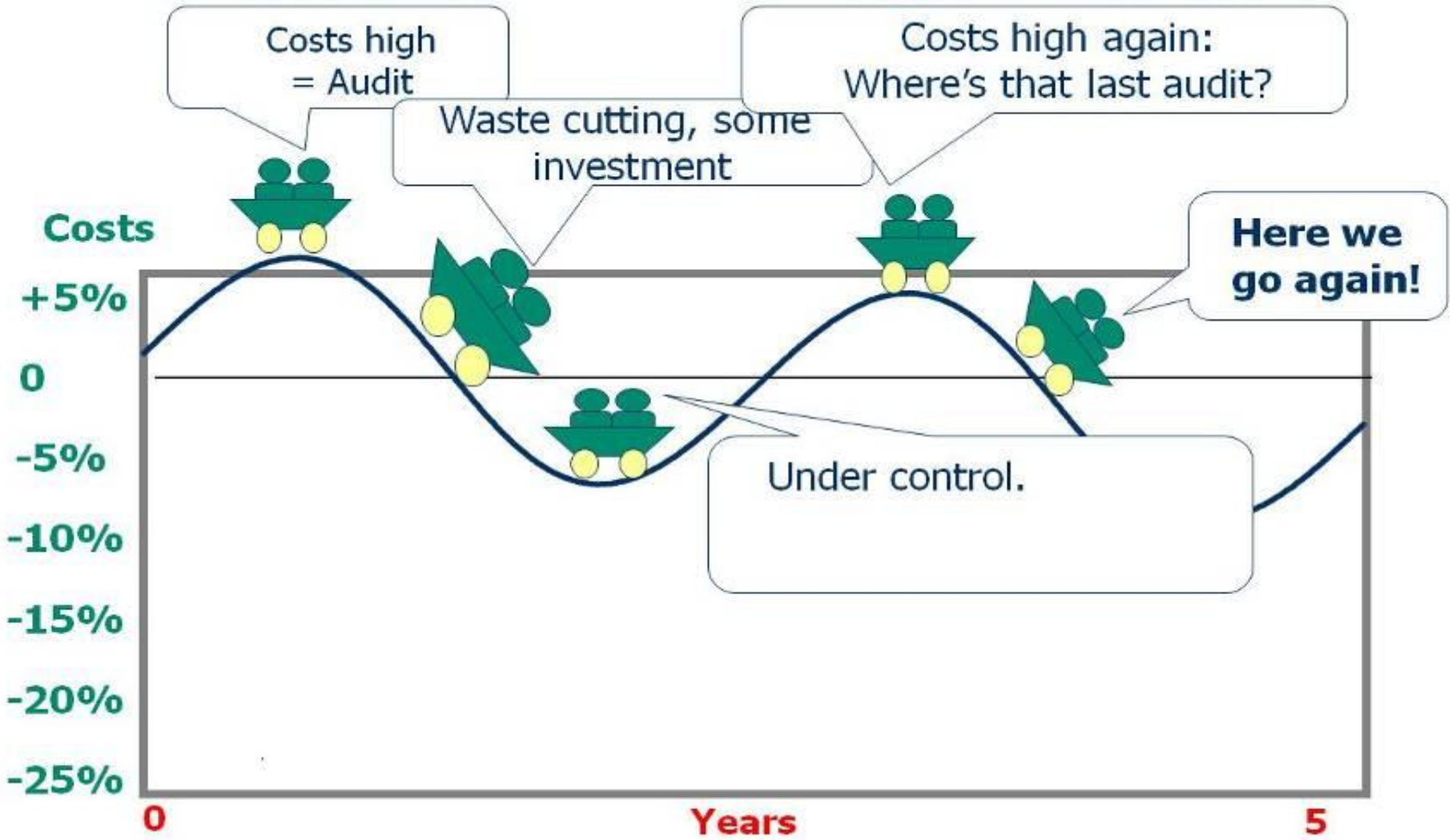
- Time and again, energy efficiency has been demonstrated to be *cost effective* while having a positive effect on productivity
- Despite this, energy efficiency improvements with very favorable payback periods often *do not get implemented*
- Even projects that are implemented may *not be sustained* 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



Source: UNIDO 2010

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The Opportunity

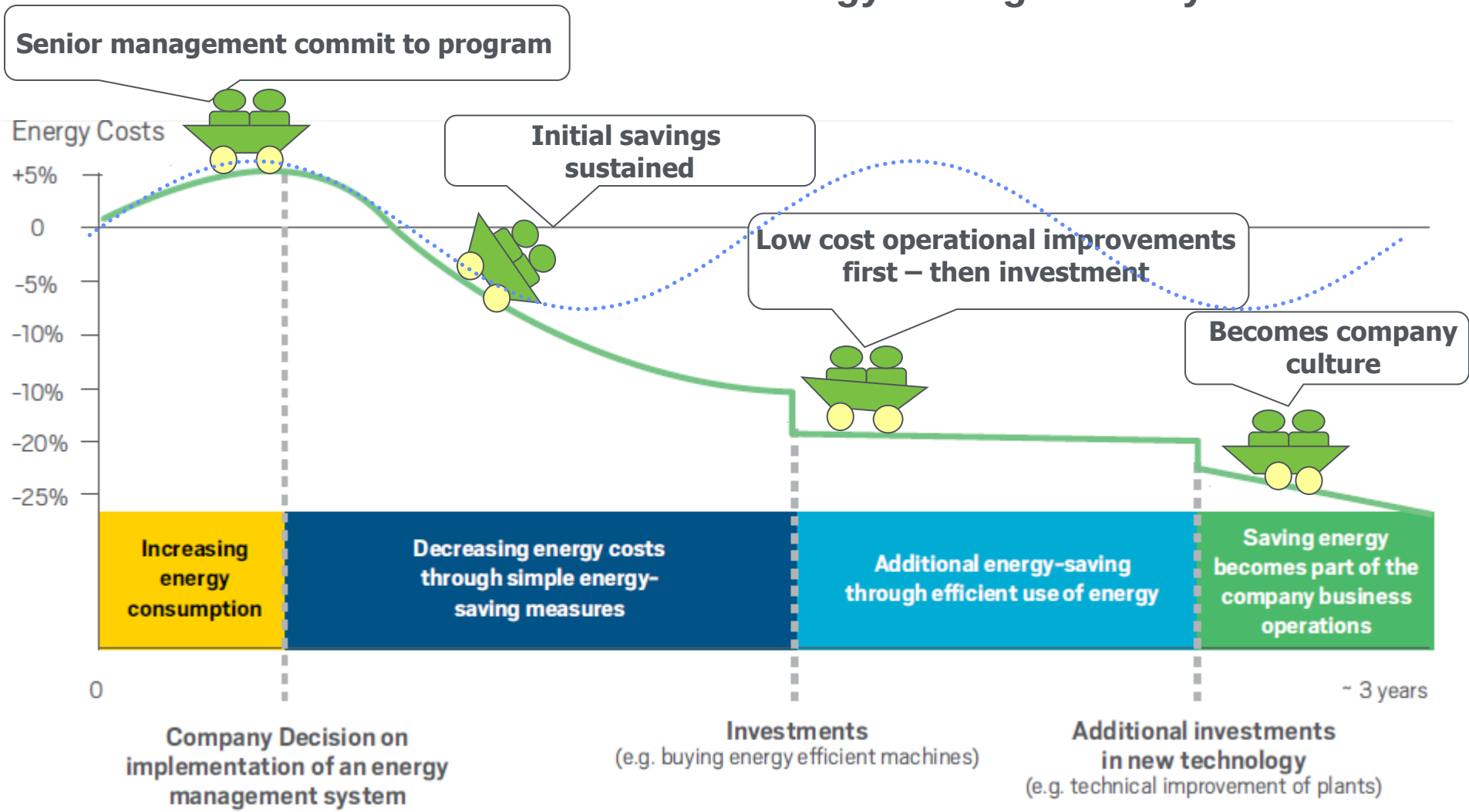
- Energy management is an opportunity for all sectors –large savings if strategically implemented … > 15%

- 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



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

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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

Provides value beyond ISO 50001:

- M&V protocol
- ANSI-accredited 3rd party verification

Entry point for plants:

- In energy-intensive industries
- Prior ISO system or energy management experience

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

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ISO 50001 Energy Management System Standard

ISO 50001: PLAN-DO-CHECK-ACT

4.7 Management review

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

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

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

ISO 50001- Energy management systems

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.

International Organization for Standardization

- **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**

http://www.iso.org/iso/home/standards/management-standards/iso50001.htm

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 persistant 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

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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

Industrial Energy Efficiency Programs and Resources

DOE programs and resources drive measureable 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

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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

Upcoming DOE eGuide for ISO 50001 Commercial

- 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

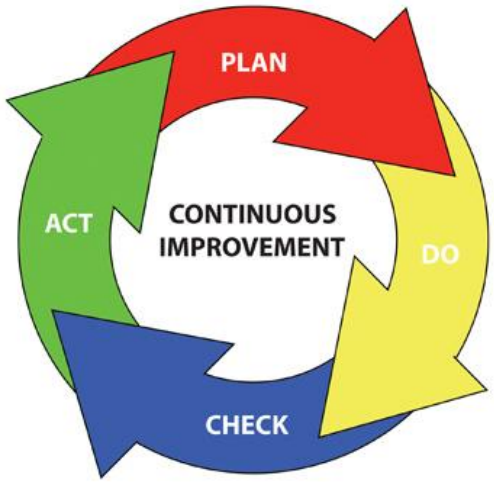
Three progressive steps following the EERE's Strategic Energy Management Continuum

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.

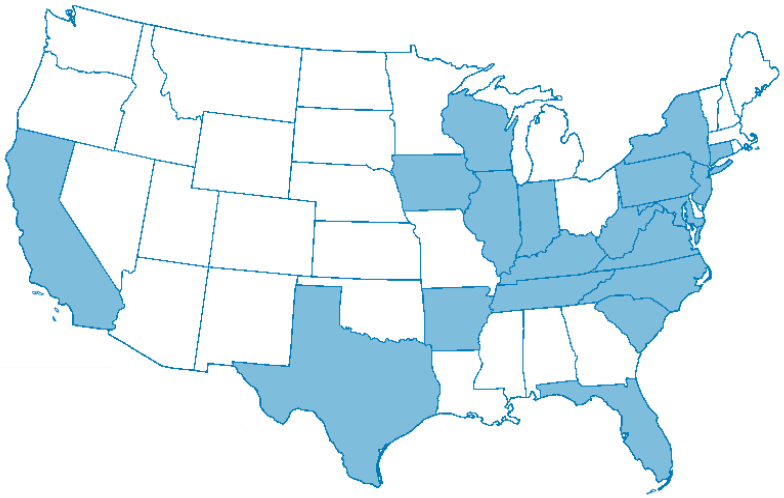
- Set performance target
- Verify improved energy performance

- 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
- NissanNorth American Höganäs
- 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

Facility	% Energy Performance Improvement
Volvo Trucks, NA | *Dublin, VA*	25.8
Dow Chemical Company | *Texas City, TX: Manufacturing facility*	17.1
3M Canada Company | *Brockville, Ontario, Canada*	15.2
Cook Composites and Polymers | *Houston, TX*	14.9
General Dynamics | *Scranton, PA*	11.9
Allsteel | *Muscatine, IA*	10.2
Cooper Tire | *Texarkana, AR*	10.1
Olam Spices | *Gilroy, CA*	9.8
Owens Corning | *Waxahachie, TX*	9.6
Dow Chemical Company | *Texas City, TX: Energy systems facility*	8.1
Nissan, NA | *Smyrna, TN*	7.2
Freescale Semiconductor, Inc. | *West Austin, TX*	6.5
3M Company| *Cordova, IL*	6.2
Bridgestone Americas Tire | *Wilson, NC*	16.8

Implementing Your Energy Management Program

Nissan Smyrna, TN Manufacturing Plant

Case Study: Nissan

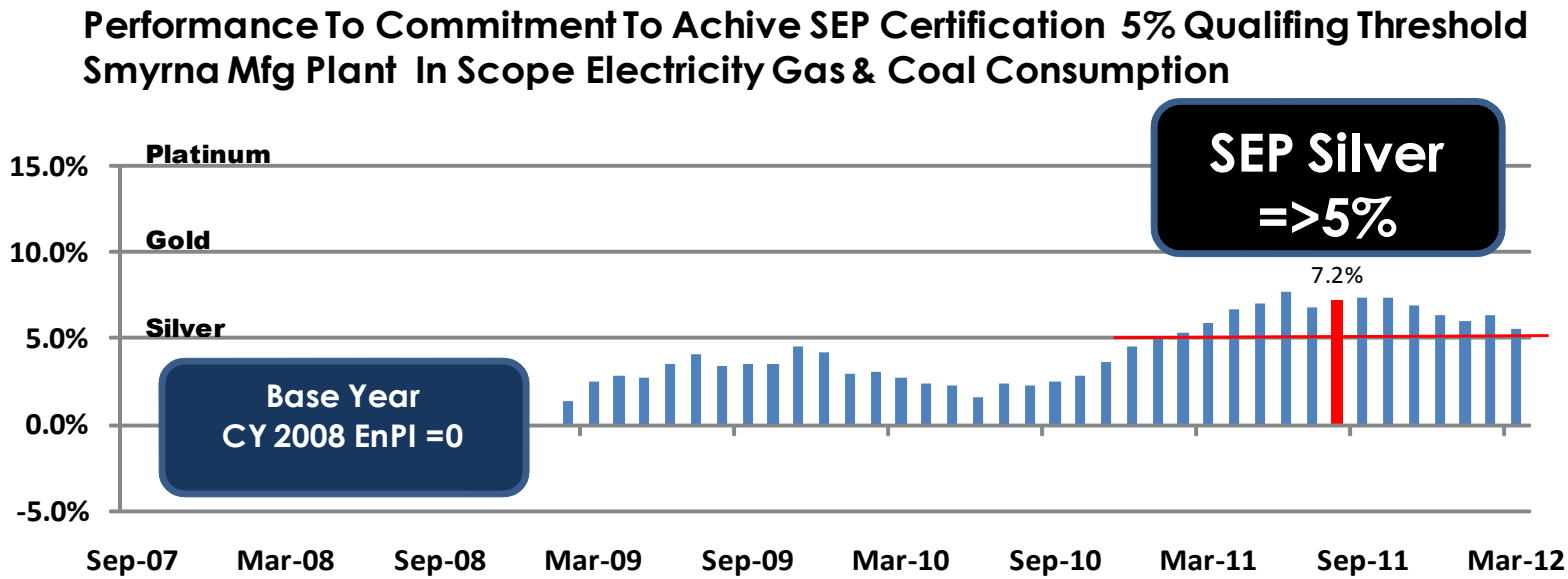
Base Period Energy Use: 3.38 TBTU (source) or 1.80 (Site)

SEP Reporting Period: 12 Months Ending August 11

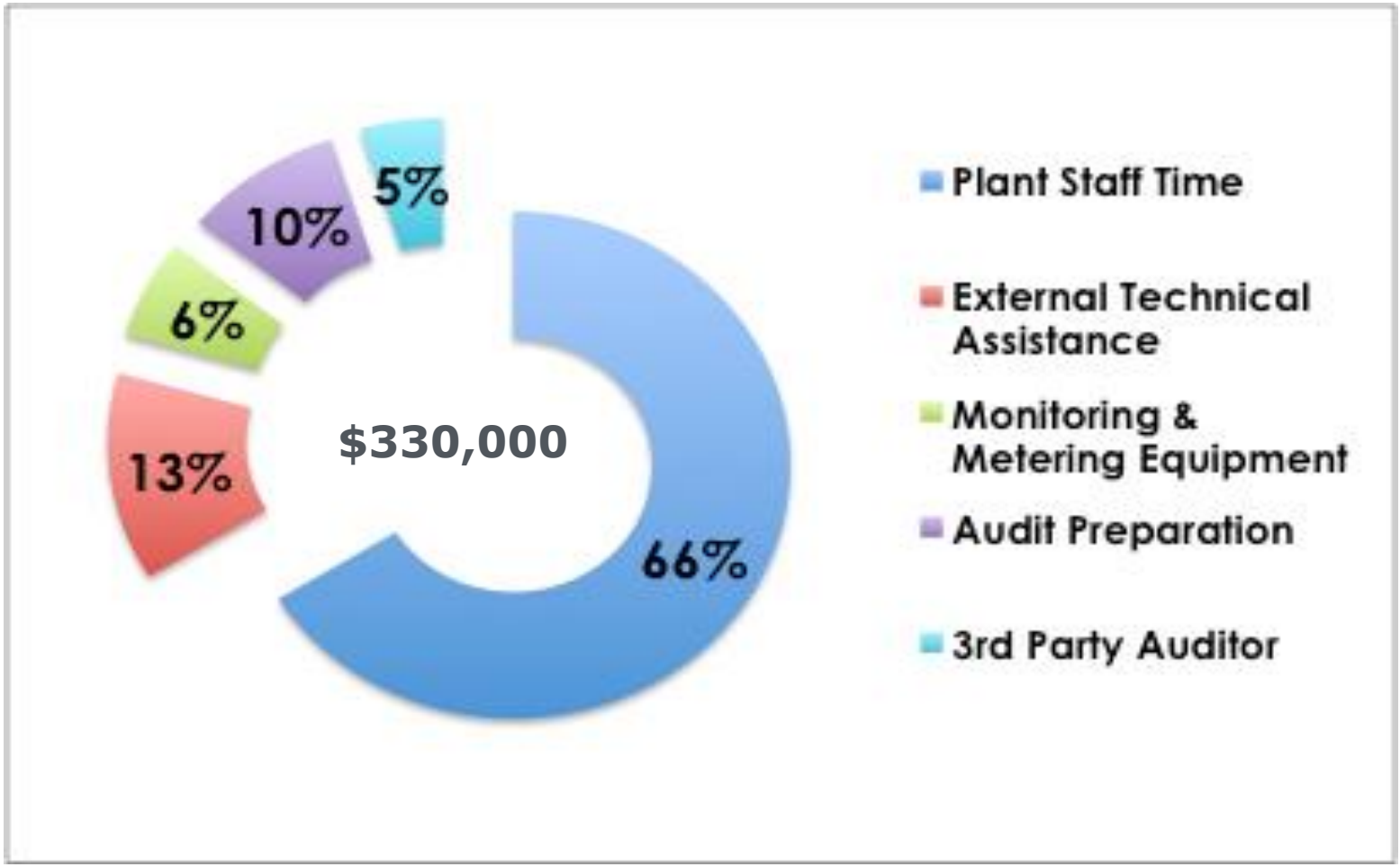
SEnPI Improvement: 7.2%

Annual Operational Improvement Savings: $940,000

SEP Implementation Costs: $ 330,000



Nissan SEP Implementation Costs



DOE Commercial Building Energy Management Pilots

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

Pilot Project Purpose

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

Onsite Internal Audit Training

GSA Ronald Reagan Building

Massachusetts Institute of Technology

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Lessons Learnt: ISO 50001 vs EnMS?

- Target market for ISO 50001 certification[1]
  - Buildings >50,000 sq. ft.
  - Clusters of co-located buildings (e.g - campuses)
  - Many similar buildings, centrally managed (e.g- retail)

Target Sectors[1]

Education – college campuses
Food sales
Retail – excluding malls
Inpatient health care
Lodging
Office buildings

- 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