

ISO 50001 Portfolio

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FY 2018 status**

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This presentation does not contain any proprietary, confidential, or otherwise restricted information.

Overview

Timeline

- 2008-2011, ISO 50001 was developed with AMO/DOE guidance
- 2011, ISO 50001 officially published
- 2012, AMO launched SEP pilot
- 2016, AMO revised SEP 2017
- 2016, AMO develops 50001 Ready
- 2017, AMO recognizes 1st 50001 Ready facility
- 2018, AMO revises SEP 2018
- 2018, Smart Tech + 50001 Accelerator in Fall 2018

Budget

	FY 17 Costs	FY 18 Costs	Total Planned Funding (FY 19-FY20)
DOE Funded	\$4.5M	\$4.0M	\$12.0M

Barriers

- Incumbent facility thinking is project-based and bottom up (missing O&M savings opportunities)
- Overall market adoption of ISO 50001 given a lack of 'known' business value
- Need for data validation on cost, energy savings persistence & level of effort
- Lack of regulatory drivers or financial incentives (as done EU/globally)

Partners

- End users: Industrial, commercial and public facilities
- Accreditation and standard bodies
- Certification and Verification Bodies
- Third parties: Utilities, NGOs, associations, municipalities, foreign governments
- Energy Professionals

Problem Statement

- Most manufacturing and commercial facilities do not have a comprehensive energy management system with a long-term continuous improvement POV
- Most energy management programs are implemented through a series of one-off energy reduction projects
- The “**project approach**” is not systematic; energy savings achieved through technology investments often do not realize savings potential

	Current State: Project by Project
Approach and Scope	Project-based Equipment and physical systems
Project prioritization	Ad hoc and reactionary, often budget-driven Often no established process for new projects
Management buy-in	Ad hoc or none
Resilience to staff turnover	Dependent on energy champion or individuals
Self-sustaining	No – based on individual projects Individual-dependent
Outcomes	Reliant on continuous streams of capital to support EE upgrades and sustained improvement
Current adoption levels	Increasingly commonplace: 46% of U.S. manufacturing facilities have set goals for improving energy efficiency

Top-Down versus Bottom-Up Energy Management



Top-Down

- Energy Management System (EnMS)
- Top management commitment with resourced energy team
- Cultural empowerment



- Project engineering approach
- Reliant on continual capital investment
- Individual champion dependent



Bottom-Up

Project Solution: ISO 50001

ISO 50001 encompasses:

- Structured, comprehensive energy management system
 - Emphasis on continual energy performance improvement
 - Assisting facilities to better assess the more optimal investment of advanced energy efficiency technologies
 - Framework for instituting energy management as part of the culture of the organization/facility
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- Relevant AMO Strategic Goals: Improve the productivity and energy efficiency of U.S. Manufacturing, reduce lifecycle energy and resource impacts of manufactured goods
 - AMO MYPP Goal: Catalyze a 3x increase (from a 4,000 facility baseline) in the number of ISO 50001 certified or conformant facilities
 - Solution: Implementing an energy management system using the ISO 50001 structure provides a framework for those facilities that are ready to embed energy management into their culture and move beyond the one-off project energy improvement mindset



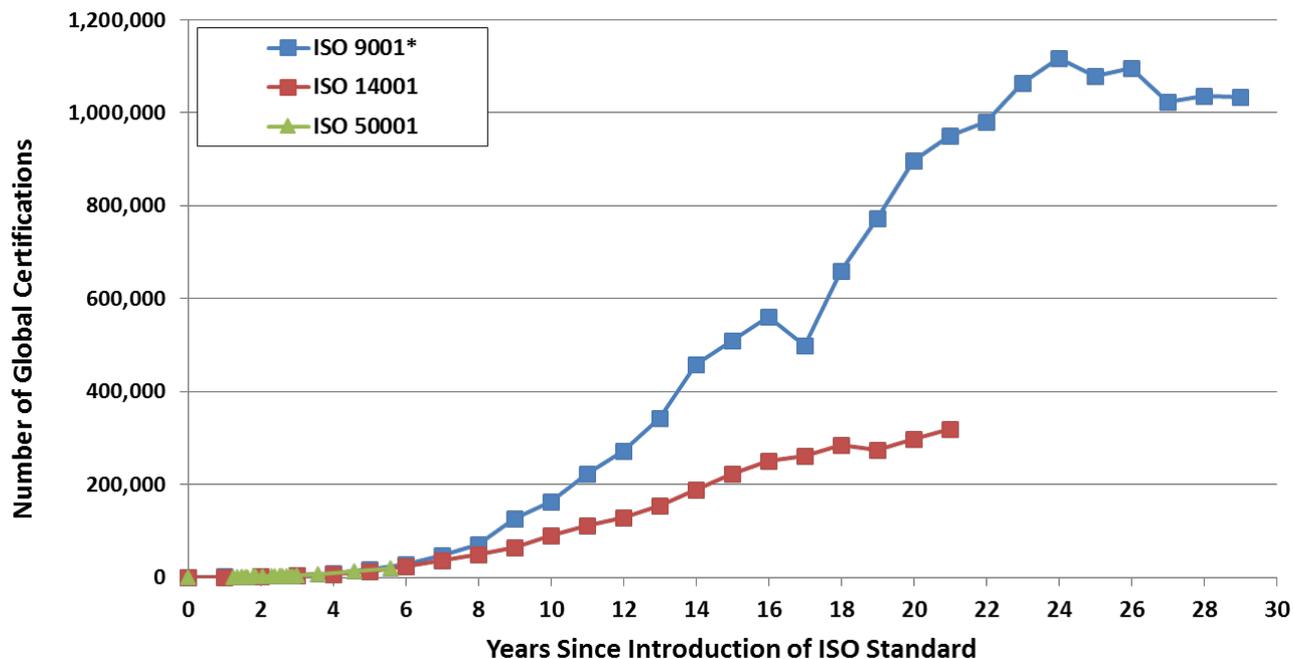
Technical Challenge: Low Adoption of ISO 50001

2014 MECS (EIA data) survey on ISO 50001 awareness showed:

- In US, only 43,048 sites out of 162,785 were aware of ISO 50001 [26%]
- In US, only 4365 were implementing ISO 50001 [2.7%]
- When factoring in non-manufacturers, the numbers are drastically smaller

DOE research & field validation includes:

- Needed resources for US adoption in industrial, commercial and institutional
- Analyze the energy performance improvement vs baseline
- Role of ISO 50001 in smart manufacturing/smart buildings



US DOE Partners in 50001

Industrial

- 3M
- Arcelor Mittal Steel
- Bridgestone
- Cummins
- Detroit Diesel
- General Motors
- HARBEC Inc.
- Intertape Polymer Group
- Johnson Controls
- Mack Trucks
- MedImmune
- NewGold
- Nissan North America
- Schneider Electric
- Titan America
- Volvo

Other Sectors

- Des Moines Wastewater
- Hilton Worldwide
- Marriott International, Inc.
- Tinker Air Force Base

Other Partners

- American Chemistry Council
- American Forestry and Paper Association
- Council for Industrial Boiler Owners

Verification of Energy Performance through 50001 SEP®

Goal: a program for DOE to quantify and validate the savings from ISO 50001 adoption in industrial, commercial and institutional facilities

- 50001 Superior Energy Performance is a DOE program recognizing excellence in organizational energy management system practices.
- 50001 SEP is an ANAB-accredited certification (follows ANSI/MSE 50028)
- 50001 SEP certification based upon third-party verification of:
 - Energy management system (ISO 50001) and
 - Energy performance improvement (ANSI/MSE 50021 and SEP M&V protocol)



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Energy Management System

+



Verified Energy Performance Improvement over time

Field Validating the Value of ISO 50001

Based on DOE findings, a structured energy management system (EnMS) yields greater, more cost-effective, and more sustainable energy savings than a more traditional, project-based energy efficiency program. Energy savings, **validated by third party verifiers**, shows the following results:

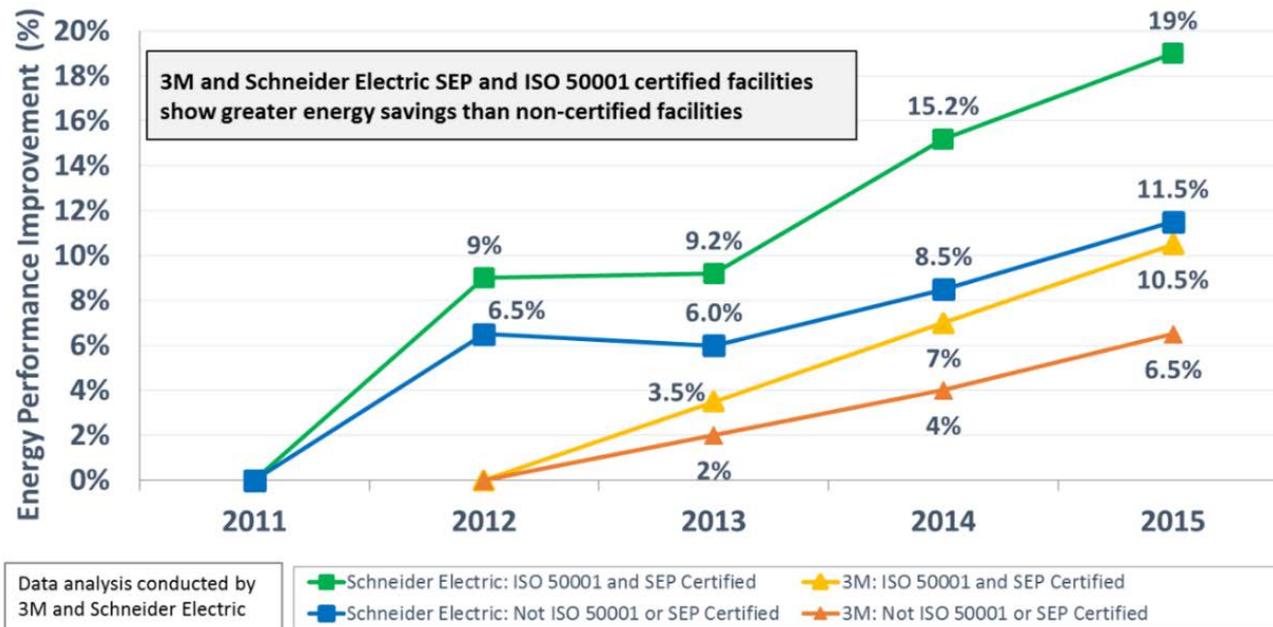
- US manufacturing Business-as-Usual ~1% per year
- US manufacturing Industry Leaders ~ 2.5% per year
- **ISO 50001 certified plants** ~4% per year
- **Enterprise-Wide SEP Approach** ~5% per year

Simple payback periods of less than 2 years for most facilities, with majority (~70%) of energy savings from adopting an ISO 50001 structured EnMS coming from no/low cost operational improvements

DOE Validates Competitiveness Improvement

DOE field validated the energy savings potential of ISO 50001

- With manufacturers, findings of ISO 50001 implementation ~4-5%/year
- With commercial facilities (hotels) findings were also ~4.5%/year
- Multi-sites in 3M & Schneider-Electric showed a 2x improvement vs internal BAU



“ISO 50001 is a standard that drives results directly to the bottom line. ISO 50001 systematically drives down energy costs and improves competitiveness through the assignment of responsibilities and raising the visibility of energy management within the organization.”

—Andrew Hejnar, 3M

50001 SEP Enterprise data demonstrated enhanced cost savings

- Four pilot companies reduced their external certification costs by an average of \$19,000 per site using the Enterprise approach, in addition to lowering their staff time needed

	Number of Sites	Average Percent Performance Improvement per year (per site)	Average Percent of Energy Cost Savings from Operational Changes	Annual Energy Cost Savings (per site)	SEP External Cost excluding Metering (per site)	SEP Internal Labor (per site, FTE-yr)
3M	6	2.4%	77%	\$0.6M	\$21K	1.7
Cummins	3*	3.9%	N/A	\$2.1M	\$33K	1.2
Nissan	3	6.2%	66%	\$3.1M	\$34K	0.4
Schneider	19**	5.8%	N/A	\$92K	\$18K	0.3
Total	31	-	-	\$18.9M	-	-
Average	-	5.0%	74%	\$0.6M	\$23K**	0.9**
Min (site)	-	1.7%	41%	\$13K	\$14K	0.2
Max (site)	-	19.5%	89%	\$4.8M	\$42K	2.3

Reference: ISO 50001 and SEP Faster and Cheaper - Exploring the Enterprise-Wide Approach, Jijnjing Liu, et al; August, 2017, ACEEE Summer Study for Industry

*One site is ISO 50001 certified and seeking SEP certification. Energy performance improvement and annual energy cost savings are not reported.

**ISO 50001/SEP implementation cost and labor data is only available for seven of the 19 Schneider Electric sites.

50001 SEP Results and Accomplishments

- 61 facilities have achieved SEP certification since 2010
- Average savings 4.6% per year for current certified facilities
- 75% of energy savings from operational improvement
 - compared to ~40% operation savings from “project approach” (DOE Save Energy Now data)
- Structured ISO 50001 is expected to enable persistence of energy savings
 - **LBNL and DOE are beginning to analyze the data to discover persistence of 50001**
- ISO 50001 enables systematic integration of advanced/smart energy efficiency technologies
 - **Coordinating with the Smart Manufacturing Institute**

DOE's Spectrum Approach to ISO 50001 Adoption

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



- Self attested
- Top down energy data results
- No cost and no audit required
- DOE recognition, not certification, for established 50001 EnMS in place



- ISO 50001 certification required
- Top down and bottom up energy calculations
- Audit required at cost
- Provides 3rd party verification of savings from 50001

50001 Ready Recognition Program

1. Implement ISO 50001 principles

Complete 25 Tasks in US DOE's 50001 Ready Navigator free, self-guided online tool

2. Present energy performance

Submit energy performance data. May use EPA's Portfolio Manager or DOE's EnPI Lite

3. Self-attest to 50001 Ready

Sign-off by management of 50001 Ready implementation and commitment

energy.gov/50001Ready

The screenshot shows the 50001 Ready Navigator website. At the top left is the logo for 50001 Ready, U.S. DEPARTMENT OF ENERGY. Below the logo is the text "Welcome to the 50001 Ready Navigator!" followed by a paragraph: "The 50001 Ready Navigator is an online application that provides step-by-step guidance for implementing and maintaining an energy management system in conformance with the ISO 50001 Energy Management System Standard. Join the 12,000+ facilities worldwide benefiting from an energy management system!"

Below the welcome message are three main sections:

- About the Navigator:** A section with a heading "Get My Home" and a sub-heading "What is Energy Management?". It contains several paragraphs of text.
- Explore the Navigator:** A section with a heading "Dashboard" and a sub-heading "Energy Performance". It features a dashboard with four circular progress indicators and a table of "Task Assignments".
- Create an Account or Log-in to Get Started:** A section with a heading "EMAIL ADDRESS" and a text input field, followed by "ENTER PASSWORD" and another text input field, and a blue "Log In" button. Below the button is a link "Forgot password?".

DOE recognizes
50001 Ready achievement



Company Name

Is recognized for instituting global best practices in continuous energy improvement

Recognized by the U.S. Department of Energy

Dr. Kathleen Hogan
Deputy Assistant Secretary for Energy Efficiency

U.S. DEPARTMENT OF ENERGY

50001 Ready Navigator

The screenshot shows the login page for the 50001 Ready Navigator. At the top left is the logo for the U.S. Department of Energy's 50001 Ready program. Below the logo, the text reads "Welcome to the 50001 Ready Navigator!" followed by a brief description of the tool. The page is divided into three main sections: "Tell Me More" with a "Get the Story" button, "Explore the Navigator" with a "Dashboard" button, and "Create an account or Log-in to Get Started" with input fields for "EMAIL ADDRESS" and "ENTER PASSWORD", a "Log In" button, and a "Forgot password?" link.

- Online tool, with simple, step-by-step approach to ISO 50001 implementation
- 25 tasks divided into 4 sections
- Ability to assign tasks to team members
- Extensive guidance available in each module

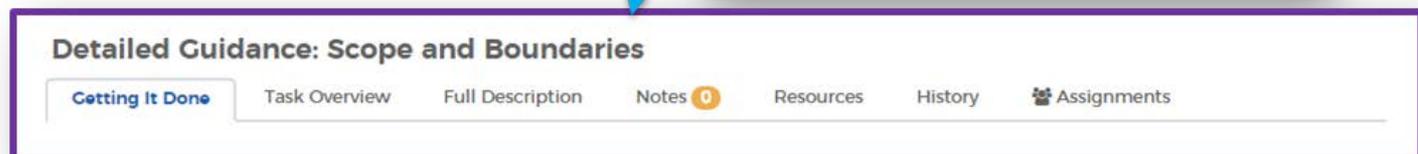
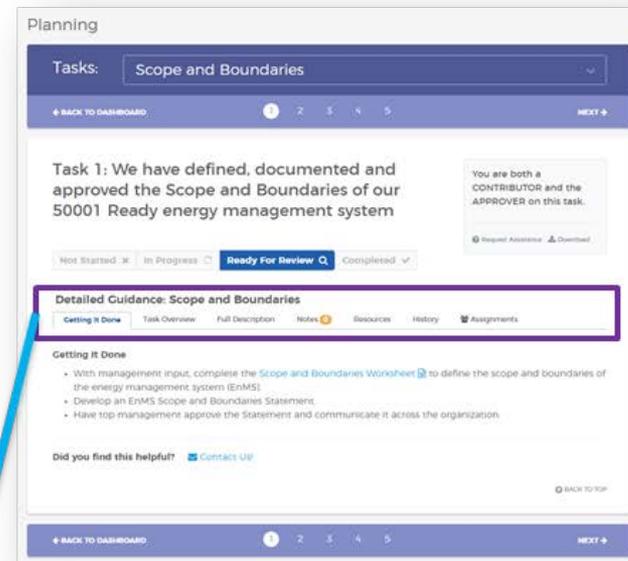
The screenshot shows the "Dashboard" of the 50001 Ready Navigator. At the top, there is a navigation bar with "2nd test project" and tabs for "Dashboard", "Planning", "Energy Review", "Continual Improvement", and "System Management". Below the navigation bar, the "Dashboard" title is followed by "Getting Started" and "Status Report" buttons. A progress bar indicates "OVERALL PROGRESS: 40% Completed". Below this are four circular progress indicators for different sections: "PLANNING" (60%), "ENERGY REVIEW" (25%), "CONTINUAL IMPROVEMENT" (0%), and "SYSTEM MANAGEMENT" (71%). A "Task Assignments" section is visible below the progress indicators, with tabs for "Planning", "Energy Review", "Continual Improvement", and "System Management". The "Planning" tab is active, showing a table of tasks.

Task	Assigned To	Status	Status Date	Action
1 Scope and Boundaries	Paul Sheaffer	Completed	03/14/2017	
2 Energy Policy	Paul Sheaffer	Completed	03/14/2017	
3 Management Commitment	Paul Sheaffer	Completed	03/14/2017	
4 Energy Team	Paul Sheaffer	Not Started		
5 Legal Requirements	Paul Sheaffer +1	Not Started		

The screenshot shows the "Continual Improvement" page in the 50001 Ready Navigator. At the top, there is a navigation bar with "2nd test project" and tabs for "Dashboard", "Planning", "Energy Review", "Continual Improvement", and "System Management". Below the navigation bar, the "Continual Improvement" title is followed by a "Tasks" dropdown menu set to "Corrective Actions". Below the dropdown are "PREVIOUS" and "NEXT" buttons, and a page indicator showing "14 15 16 18". The main content area displays "Task 17: We investigate and respond to significant deviations in energy performance and potential issues with the 50001 Ready system, taking corrective and preventative actions as needed". To the right of the task description, there is a message: "You are currently not assigned to this task." Below the task description, there is a "Current Status: Not Started" field. A "Detailed Guidance: Corrective Actions" section is visible below, with tabs for "Getting It Done", "Task Overview", "Full Description", "Notes", "Resources", "History", and "Assignments". The "Full Description" tab is active, showing a "Full Description" section with a heading "See and implement criteria for significant deviations" and a paragraph of text.

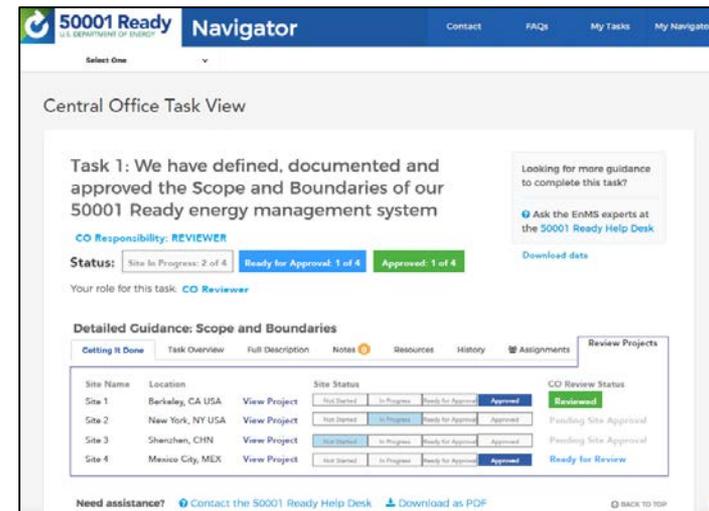
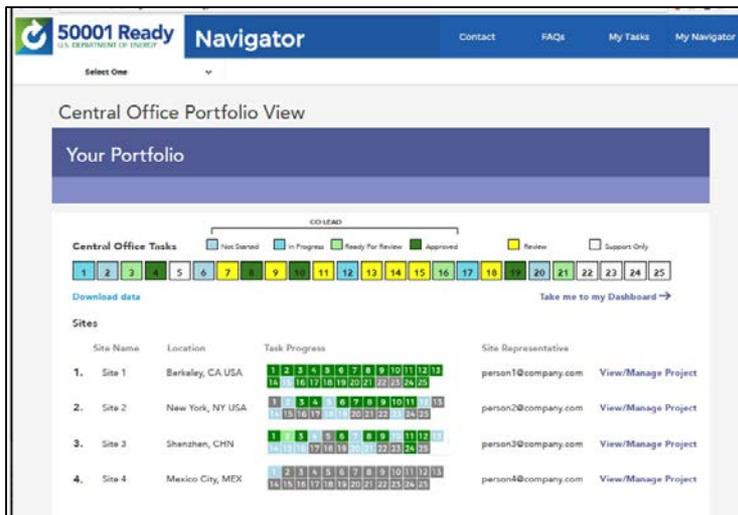
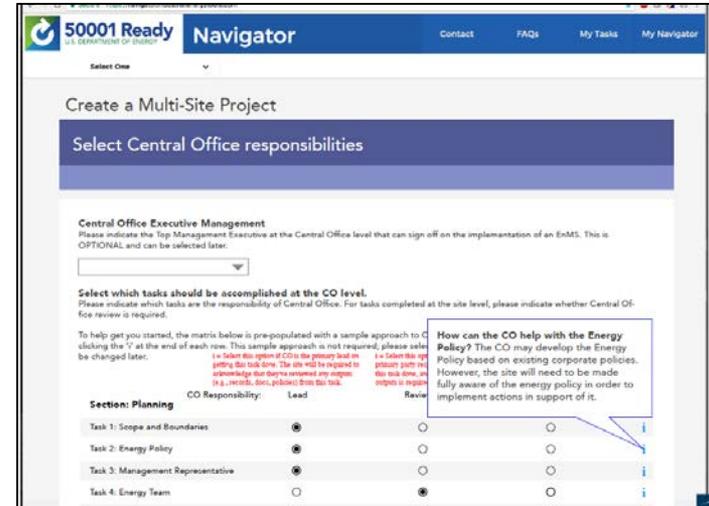
50001 Ready Navigator - Highlights

- Guidance broken into straight forward 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
 - Optional Transition Tips – from other ISO management systems or ENERGY STAR
- Track and update task progress
- Form teams and assign tasks
- Download guidance
- Create multiple projects
- Access over 100 related resources
- **DOE 50001 Ready Recognition!**



50001 Ready Navigator – Upgrade Coming

- Multi-site functionality – central office involvement to coordinate and support activities at multiple linked facilities
 - Corporate enterprise
 - School districts
 - Military commands
 - Municipalities



Smart Technology + 50001 Accelerator

Accelerator Target Problem

Two common paths to building energy management – Building Automation using Smart Technologies, and continual improvement energy management ‘culture’ systems such as ISO 50001 – are not often used in combination, and thus don’t leverage the integration for potentially greater savings

Addressing the Problem

Bring together technology providers and implementing facilities to pilot the integration of the two methodologies

Provide Smart Tech research (CESMII) to support partners with technology choices
50001 Ready Navigator as management system implementation platform

Desired Outcomes

Field validate the impact on combined new energy savings, plus validate the persistence of energy savings from existing implementations

Define a pathway for increased US adoption of Smart Technologies with ISO 50001

50001 Ready Results and Accomplishments

- 50001 Ready recognition program and Navigator software launched just before last year's peer review
- Now a little over a year later:
 - 8 recognized facilities, 5 more on the verge
 - 339 projects, 884 users in Navigator
 - Energy Manager Today "Product of the Year" award for Navigator
- Based on cadence of project initiation and progress, along with expansion of partnership activities, would expect number of recognized sites (and accompanying energy savings data) to increase by an order of magnitude each of the next two years
- Near-term program plans
 - Multi-site functionality in Navigator
 - Portal capability in Navigator for implementer referrals (i.e. utilities)
 - Smart Technology + 50001 Accelerator
 - International 50001 Ready recognition programs



ISO 50001 Transition Activities

50001 SEP

- SEP measurement and verification protocol integration with utility Strategic Energy Management programs and carbon reporting programs
- ISO 50001/"50001 SEP" top-down , facility-wide, systematic approach needs more acceptance by industry, utilities, enviro NGOs, carbon reporting programs
- Hand off of "50001 SEP" administration to third party in future

50001 Ready - Partnerships

- Utilities
 - 50001 Ready is an offering that can complement a utility's SEM program during the performance period, and as a customer engagement tool after "graduating" from a program
 - Cohorts at Focus on Energy (WI), Efficiency Vermont
 - Implementing Navigator portal concept with TVA
- Foreign governments
 - Multi-national corporations operating in the US have asked for recognition program that can encompass more than just US sites, as such we are working with Canada and Mexico to stand up separate 50001 Ready recognition programs to be administered by those governments, more countries possible in future

Questions?
