Superior Energy Performance™
Presentation to the
Independent Association of Accredited Registrars (IAAR) committee meeting

November 9, 2016
What is Superior Energy Performance?
Structured Approach to Energy Management

Senior management commit to program

Initial savings sustained

Low cost operational improvements first – then investment

Becomes company culture

Source: Kahlenborn et al. (2012), based on Lackner & Holanek (2007)
Energy efficiency is a convening force to solve business challenges…

- Savings go straight to the bottom line
- Strong contributor to sustainability
- Reduces carbon footprint
- Hedge against energy price escalation
ISO 50001
Components in place:
• Top Management
• Energy Team
• Policy
• Planning
• Baseline
• Performance Metrics

SEP IS BASED on ISO 50001

SEP requires plants to meet the ISO 50001 energy management standard and verify the savings they achieve.

Superior Energy Performance
Single facility ISO 50001 conformance with verified energy performance improvement

“External verification and validation is critical. Certification adds to the confidence in calculations and savings.”

Nissan, Smyrna, TN
ISO 50001—Energy Management Systems (EnMS)

An International consensus based standard that draws from **best practices around the world**.

ISO 50001 specifies requirements for establishing, implementing, maintaining and improving an EnMS.

*It does not prescribe specific energy performance improvement criteria.*

Light blue text represents new data-driven sections in ISO 50001
Strategic Energy Management (SEM) Continuum

Superior Energy Performance (SEP):
- Rigorous third-party measurement and verification
- Marginal effort beyond ISO 50001

ISO 50001:
- ISO standard for EnMS
- Similar framework to ISO 9001 & ISO 14001
- Third-party certification

Foundational Energy Management:
- Systematic approach
- Operation of many utility SEM programs at this level

- SEP: Verified energy performance and ISO 50001
- ISO 50001: Standard Energy Management System (EnMS) framework for global operations
- Foundational Energy Management: (e.g., ENERGY STAR For Buildings & Plants)
SEP Certification Process - Overview

1. Enroll
   Gain access to SEP resources such as program updates, tips, and phone support. No fees or commitment required, enroll today!

2. Prepare
   Implement an EnMS in your facility and work towards meeting SEP requirements; see DOE tools, such as the eGuide

3. Apply
   Submit an application to the SEP Administrator, no fees. Once approved, the application will be sent to your selected SEP Verification Body.

4. Verify
   The SEP Verification Body uses certified auditors to verify conformance to SEP requirements and issues SEP and ISO 50001 certificates.

Recognize Achievement and Maintain Momentum
Your facility will receive recognition from the SEP Administrator, currently the U.S. DOE. SEP certification is valid for three years, as long as your facility completes the annual surveillance audits to confirm continued EnMS maintenance (an ISO 50001 requirement).

Standards Used for SEP

Requirements
- ISO 50001
- ANSI/MSE 50021

Support
- M&V Protocol
- Scorecard
- SEP Certification Protocol

AUDITS
- ISO 50003
- ISO/IEC 17021-1
- ANS/MSE 50028
- ISO/IEC 17029
A NEW View Point for Auditors

- Improvement in Energy Performance is required in ISO 50003
  - Report to include statement of improvement and evidence

- Effective personnel
  - Not head count

- Calculation of number of audit days
  - Formula – fewer days than ISO 9001

- Definition of Energy Management Major
The *Verified* Results ISO 50001 Conformance

Through DOE’s Superior Energy Performance…

- Achieving up to $1 million in annual savings
- 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
ISO 50001 Benefits Facilities of All Sizes

Even a small facility saved $50K+ a year from operational energy cost savings
Less than 2.5-yr payback

Source: HARBEC case study

Those with an annual energy spend < $2 million
Less than 2-year payback


Some sites may have the strongest business case

Annual energy spend > $2 million
Less than 1.5-year payback

www.energy.gov/eere/amo/business-case-sep
Nissan: >$900K Savings, 4 month payback

“SEP adds rigor, analysis, and gives good guidance. It’s one thing to have a target and objective, but SEP gives tools that empower you to be more disciplined and prove the impact certain activities have.”

- Nissan North America Energy Team

- SEP Silver Certified: Smyrna, TN vehicle assembly plant
- 7.2% improvement in energy performance over 3 years
- $928,000 total annual energy savings
- 4 month payback
- Used the DOE EnPI Tool to measure and track improvements

![Monthly SEP Percent Energy Performance Improvement Chart]

**SEP Silver =>5%**

**Base Year CY 2008 EnPI =0**
Recertified Facilities Show Continual Energy Performance Improvement

![Graph showing normalized facility energy consumption improvement between 2009 and 2015 for Nissan – Smyrna, TN facility.](image)

- Baseline Period (12 months)
- 1st Certification: 2009
- 2nd Certification: 2012
- 2nd Certification: 2015

Normalized Facility Energy Consumption (source energy)
ISO 50001 and SEP Certified Facilities Outperform Company Peers

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

- **3M**: 62% greater over 3 years: 18 ISO 50001 certified 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 certified in North America; 16 US SEP certified; 30 non-ISO 50001
### Annual Cost Savings

<table>
<thead>
<tr>
<th>Company</th>
<th>Facility</th>
<th>Annual Savings</th>
<th>Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cummins</td>
<td>Rocky Mount Engine Plant, Whitakers, NC facility</td>
<td>$716,000</td>
<td>11 months</td>
</tr>
<tr>
<td>General Dynamics</td>
<td>Scranton, PA facility</td>
<td>$956,000</td>
<td>6 months</td>
</tr>
<tr>
<td>Nissan</td>
<td>Smyrna, TN facility — initial certification</td>
<td>$938,000</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Nissan</td>
<td>Smyrna, TN facility — recertification</td>
<td>$748,000</td>
<td>5 weeks</td>
</tr>
<tr>
<td>Volvo Trucks</td>
<td>Dublin, VA facility — initial certification</td>
<td>$866,000</td>
<td>4 months</td>
</tr>
</tbody>
</table>

“SEP verification provides the ability to have proven performance metrics to quantify actual savings, giving both internal and external credibility to savings claims.”

2015 study of 10 SEP-certified facilities:
- Average 12% reduction in energy costs within 15 months of starting to implement SEP
- Saved over $430,000/year on average from low/no cost operational improvements
<table>
<thead>
<tr>
<th>Facility</th>
<th>Improvement</th>
<th>Yrs/ Mo's</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saanichton, BC Canada</td>
<td>30.6%</td>
<td></td>
</tr>
<tr>
<td>Smyrna, TN</td>
<td>23.1%</td>
<td></td>
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<tr>
<td>Clovis, CA</td>
<td>16.7%</td>
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<tr>
<td>Seneca, SC</td>
<td>15.6%</td>
<td></td>
</tr>
<tr>
<td>Peru, IN</td>
<td>24.9% / 10 yrs</td>
<td></td>
</tr>
<tr>
<td>Costa Mesa, CA</td>
<td>23.4% / 15 mo's</td>
<td></td>
</tr>
<tr>
<td>West Kingston, RI</td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>Columbia, MO</td>
<td>13.3% / 1 yr</td>
<td></td>
</tr>
<tr>
<td>Apodaca, Mexico (Monterrey 2)</td>
<td>11.3%</td>
<td></td>
</tr>
<tr>
<td>Hopkins, SC</td>
<td>10.2%</td>
<td></td>
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<tr>
<td>Tijuana, Mexico</td>
<td>10.2%</td>
<td></td>
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<tr>
<td>Cedar Rapids, IA</td>
<td>8.8%</td>
<td></td>
</tr>
<tr>
<td>Apodaca, Mexico (Monterrey 3)</td>
<td>7.8%</td>
<td></td>
</tr>
<tr>
<td>Lexington, KY</td>
<td>6.9%</td>
<td></td>
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<tr>
<td>Lincoln, NE</td>
<td>6.5%</td>
<td></td>
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<tr>
<td>Rojo Gomez, Mexico</td>
<td>5.9%</td>
<td></td>
</tr>
<tr>
<td>Washington, DC</td>
<td>15.9%</td>
<td></td>
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<tr>
<td>Honolulu, HI</td>
<td>8.4%</td>
<td></td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>6.3%</td>
<td></td>
</tr>
<tr>
<td>Mack Trucks, Macungie, PA</td>
<td>41.9% / 10 yrs</td>
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<tr>
<td>Dublin, VA</td>
<td>28.4% / 10 yrs</td>
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<tr>
<td>Hagerstown, MD</td>
<td>20.9%</td>
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<tr>
<td>Brockville, Ontario Canada</td>
<td>21.4% / 7 yrs</td>
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<tr>
<td>Aberdeen, SD</td>
<td>11.0%</td>
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<tr>
<td>Hutchinson, MN</td>
<td>10.7%</td>
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<tr>
<td>Cynthiana, KY</td>
<td>6.9%</td>
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<tr>
<td>Cordova, IL</td>
<td>5.7%</td>
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<tr>
<td>Decatur, AL</td>
<td>5.2%</td>
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<tr>
<td>Prairie du Chien, WI</td>
<td>5.2%</td>
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</tr>
<tr>
<td>Columbus, IN</td>
<td>16.8%</td>
<td></td>
</tr>
<tr>
<td>Whitakers, NC</td>
<td>12.6% / 2 yrs</td>
<td></td>
</tr>
<tr>
<td>Detroit, MI</td>
<td>32.5% / 10 yrs</td>
<td></td>
</tr>
<tr>
<td>Smyrna, TN</td>
<td>17.7%</td>
<td></td>
</tr>
<tr>
<td>Bethlehem, PA</td>
<td>17.0%</td>
<td></td>
</tr>
<tr>
<td>Washington, DC</td>
<td>16.5%</td>
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<tr>
<td>Ontario, NY</td>
<td>16.5%</td>
<td></td>
</tr>
<tr>
<td>Dunedin, FL</td>
<td>12.2% / 2 yrs</td>
<td></td>
</tr>
<tr>
<td>Wilson, NC</td>
<td>15.1% / 10 yrs</td>
<td></td>
</tr>
<tr>
<td>Gaithersburg, MD</td>
<td>8.5%</td>
<td></td>
</tr>
<tr>
<td>Cheswick, PA</td>
<td>7.6%</td>
<td></td>
</tr>
<tr>
<td>Carlisle, PA</td>
<td>5.7%</td>
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</tbody>
</table>
A single facility can participate in SEP. Also, companies can implement SEP across multiple facilities to benefit from economies of scale, see below.

Central office works with facility staff - reduce level of effort & auditing costs per facility

- ISO 50001 certification audit at enterprise-wide level
- ISO 50001 EnMS conformance sampled at facility level
- SEP energy performance improvement verified at each facility

- 28 participating facilities from 5 companies:
  - 3M Company
  - Cummins
  - General Dynamics
  - Nissan North America
  - Schneider Electric
  - Participating sites in U.S., Canada, and Mexico

http://betterbuildingssolutioncenter.energy.gov/accelerators/industrial-superior-energy-performance
Clean Energy Ministerial (CEM) Energy Management Campaign: “Drive to 50001”

- Worldwide goal of 50,001 facilities certified to ISO 50001 by 2020 (up from ~12,000 currently)
- The US is among the 9 governments and 10 private sector companies and partners that pledged concrete actions to use ISO 50001 as a transparent mechanism to make progress toward climate and energy goals.

North American Climate, Clean Energy, and Environmental Partnership

- US, Canada and Mexico to set a regional common target by 2017 for ISO 50001 uptake contribution to “Drive to 50001”

US-China dialogue on ISO 50001

- Cooperation of ISO 50001 implementation approach and sharing of measurement and verification protocol
DOE offers a toolkit to help utilities and Program Administrators (PAs) develop SEP offerings. The toolkit provides SEP program information, cost-effectiveness tools, and guidance and tools for program plans and reports.

**Industrial Ratepayer-Funded SEP Toolkit:**
- SEP Program Planning Template
- Cost Effectiveness Screening Tool to estimate SEP benefits & costs
- Program Transition Tables for info on level of effort moving between SEM, ISO 50001 and SEP, from perspectives of PA and customer
- SEP Presentations: general, for PAs, and for customers
- Utility EM&V Resources

[www.energy.gov/eere/amo/utilities](http://www.energy.gov/eere/amo/utilities)
SEP Expansion

Organizations beyond industrial are using SEP to achieve energy and savings goals.

- **Commercial building pilots**
  - Hospitality sector
  - University campus

- **International**
  - North American Energy Management Pilot Program (NAEMPP)
    - [www.cec.org/energy_program](http://www.cec.org/energy_program)
  - ISO 50001 Lead Auditor Certification
    - [www.epicertified.org](http://www.epicertified.org)
  - Clean Energy Ministerial—Energy Management Working Group (EMWG)

- **Water/wastewater**
  - Delta Diablo, Antioch, CA
  - Victor Valley, Victorville, CA
  - Alexandria Renew Corporation, Alexandria, VA
  - Des Moines Water, Des Moines, IA
  - Kent County Water/WWT, Dover, DE
  - City of Laredo, Laredo, TX
  - Utilities, Inc., Charlotte, NC

- **Federal**
  - DOD contractors
  - DOE national labs

Last updated: February 10, 2016
What is the value of ISO 50001?

https://www.youtube.com/watch?v=6tXoa8IoSds&feature=youtu.be

What is the value of SEP?

https://www.youtube.com/watch?v=Q-0K5gEsgME
SEP Requirements

SEP certification requires industrial facilities and commercial buildings to meet the ISO 50001 standard and improve energy performance.

### Superior Energy Performance

<table>
<thead>
<tr>
<th>Certification</th>
<th>Silver</th>
<th>Gold</th>
<th>Platinum</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 50001 certification</td>
<td>5% energy performance improvement over 3 years -or- 15% energy performance improvement over 10 years + 30 Best Practice Scorecard points</td>
<td>10% energy performance improvement over 3 years -or- 15% energy performance improvement over 10 years + 61 Best Practice Scorecard points</td>
<td>15% energy performance improvement over 3 years -or- 15% energy performance improvement over 10 years + 81 Best Practice Scorecard points</td>
</tr>
</tbody>
</table>

Shorter time frames than 3 or 10 years may be allowed, see M&V Protocol for details.

SEP requirements are undergoing an update. See next slides for a preview of the updated program.
DOE is refining SEP to improve and simplify the program based on experiences and feedback to date. Improvements include:

- **Single, unified scoring system and qualification pathway** combines best features of the Energy Performance and Mature Energy Pathways
- Provide **flexibility in setting facility baseline year to align with corporate or enterprise**; enable companies to more easily expand SEP participation across facilities
- **Motivate facilities to enhance energy management programs** though use of the Scorecard at Gold and Platinum levels
- **For recertification, provide practical and flexible energy performance improvement requirement** that is sustainable over multiple certification cycles

Certification to updated program design anticipated Fall 2016
- SEP standards and protocols to be updated and peer reviewed
- Current program will continue to be available during a transition period
## SEP Program Update – Preview Initial Certification

### SEP - **Initial Certification**

#### ISO 50001 certification

- Verified energy performance improvement

Certification to this updated program design anticipated by Fall 2016.

Current program will continue to be available during a transition period.

### Performance Levels

<table>
<thead>
<tr>
<th>Achievement period</th>
<th>Bronze</th>
<th>Silver</th>
<th>Gold</th>
<th>Platinum</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-36 months (1-3 yrs)</td>
<td>1%</td>
<td>N/A</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>37-48 months (~3-4 yrs)</td>
<td>N/A</td>
<td>7%</td>
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<tr>
<td>49-60 months (~4-5 yrs)</td>
<td>N/A</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61-72 months (~5-6 yrs)</td>
<td>N/A</td>
<td>10%</td>
<td></td>
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</tr>
<tr>
<td>73-84 months (~6-7 yrs)</td>
<td>N/A</td>
<td>12%</td>
<td></td>
<td></td>
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<tr>
<td>85-96 months (~7-8 yrs)</td>
<td>N/A</td>
<td>13%</td>
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<td></td>
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<tr>
<td>97-108 months (~8-9 yrs)</td>
<td>N/A</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>109-120 months (~9-10 yrs)</td>
<td>N/A</td>
<td>16%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Energy Performance Improvement**

\[ \text{Performance Levels} \]

- **ISO 50001** certification
- **Verified energy performance improvement**

- Certification to this updated program design anticipated by Fall 2016.
- Current program will continue to be available during a transition period.

#### Additional Energy Performance Achievement

- **Bronze**
- **Silver**
- **Gold**
- **Platinum**

- **Scorecard credits**
  - **Bronze**: 20 points for Energy Management System
  - **Silver**: 35 points for Energy Management System
  - **Gold**: 40 points for Energy Management System
  - **Platinum**: 60 points for Energy Management System

- **Advanced Practices and Additional Energy Performance Credits**
  - **Bronze**: 35 points for Energy Management System
  - **Silver**: 40 points for Energy Management System
  - **Gold**: 60 points for Energy Management System
  - **Platinum**: 90 points for Energy Management System

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**U.S. DEPARTMENT OF ENERGY**

- **Superior Energy Performance**
- **Energy Efficiency and Renewable Energy**
## SEP Program Update – Preview Recertification

### SEP - Recertification

#### Performance Levels

<table>
<thead>
<tr>
<th>Achievement period</th>
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</thead>
<tbody>
<tr>
<td>12-36 months (1-3 yrs)</td>
<td>1%</td>
<td></td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>37-48 months (~3-4 yrs)</td>
<td>1% over most recent 3 years</td>
<td>3% over most recent 3 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49-60 months (~4-5 yrs)</td>
<td>1% over most recent 3 years</td>
<td>3% over most recent 3 years</td>
<td></td>
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<td>3% over most recent 3 years</td>
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<td>1% over most recent 3 years</td>
<td>3% over most recent 3 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85-96 months (~7-8 yrs)</td>
<td>1% over most recent 3 years</td>
<td>3% over most recent 3 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>97-108 months (~8-9 yrs)</td>
<td>1% over most recent 3 years</td>
<td>3% over most recent 3 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>109-120 months (~9-10 yrs)</td>
<td>1% over most recent 3 years</td>
<td>3% over most recent 3 years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Energy Performance Improvement

- 1% over most recent 3 years
- 3% over most recent 3 years

### ISO 50001 Certification

- Verified energy performance improvement

Certification to this updated program design anticipated by Fall 2016. Current program will continue to be available during a transition period.

- + 40 SEP Scorecard credits, including:
  - 35 points for Energy Management System
  - 20 points for Advanced Practices
  - 10 points for Additional Energy Performance

- + 60 SEP Scorecard credits, including:
SEP energy performance is demonstrated by:

1. Top-down, whole facility SEP EnPI (“SEnPI”)

\[
SEnPI = \frac{BTU_{Tot\;actual}}{BTU_{Tot\;expected}}
\]

Where \( BTU_{Tot\;expected} = f(X1, X2, \ldots Xn) \)

2. Bottom-up sanity check

Project-specific energy saving estimates based on engineering calculations give confidence in top-down result

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Enterprise Innovation Institute
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+1 770-605-4474

Learn more: energy.gov/isodep

Enroll today to gain access to resources, such as program updates, tips, and phone support

Subscribe on the SEP website to receive the latest SEP news & program updates

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