



**BERKELEY LAB**

LAWRENCE BERKELEY NATIONAL LABORATORY



U.S. DEPARTMENT OF  
**ENERGY**

# Energy Management Systems in North America -- Policies and Impacts

**Paul Sheaffer**

**Lawrence Berkeley National Laboratory**

**December 12, 2017**

# Overview



- **The government policies and incentives that are encouraging take-up of EnMS, particularly the Superior Energy Performance and 50001 Ready Programs**
- **The impacts (e.g. energy and cost savings) from the implementation of energy management systems in North America**
  - United States
  - Mexico
  - Canada

- **US Department of Energy**
  - 50001 Ready
  - Superior Energy Performance
- **Energy Management Systems in Sustainability Standards**

**Overall theme – robust measurement and verification is important!**

# US DOE ISO 50001-based offerings



**50001 Ready recognition:** Self-attestation prepares organizations for certification options—*recommended but not required!*



**ISO 50001 certification:**

1. Confirm completeness of system management and review cycles
2. Third-party audit to verify conformance to ISO 50001 standard



**SEP certification:** ISO 50001 certification, plus demonstrate energy performance improvement:

1. Top-down regression analysis
2. Bottom-up sanity check
3. Third-party audit to verify energy performance improvement



# 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.



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 Achievement	<ol style="list-style-type: none"> <li>1. Complete 25 steps in 50001 Ready Navigator</li> <li>2. Self-attest to completion</li> <li>3. Report energy performance</li> </ol>	<ol style="list-style-type: none"> <li>1. ISO 50001 certification</li> <li>2. 3<sup>rd</sup> party SEP Performance Verification audit</li> </ol>

# 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 reductions

**Adopt Valid Tool to Present Energy Performance**

- ✓ DOE offers the EnPI Lite calculator for 50001 Ready.
- ✓ EPA's Portfolio Manager can also be used
- ✓ Other tools can be approved by DOE

### STEP 3

File for 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

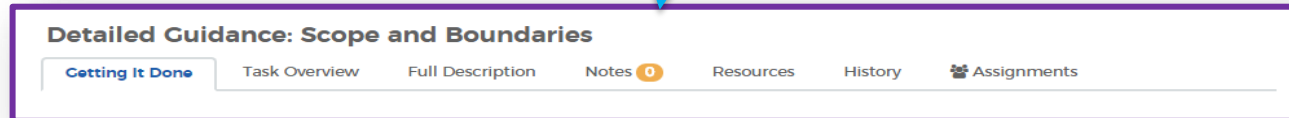
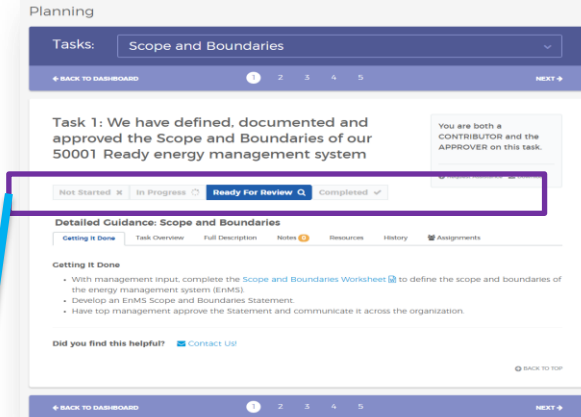


**50001 Ready**  
U.S. DEPARTMENT OF ENERGY

DOE recognizes  
50001 Ready  
achievement

# 50001 Ready Navigator – Online ISO 50001 based guide to EnMS implementation

- Online step-by-step approach towards ISO 50001 based energy management system standard implementation
- Guidance broken into straight forward sections, including:
  - Getting It Done – what specifically needs to be accomplished
  - Task Overview – how does this task connect with ISO 50001
  - Full Guidance – comprehensive guidance about the task
  - Transition Tips – from other ISO management systems
- Form teams and assign tasks to team members
- Access over 100 related resources



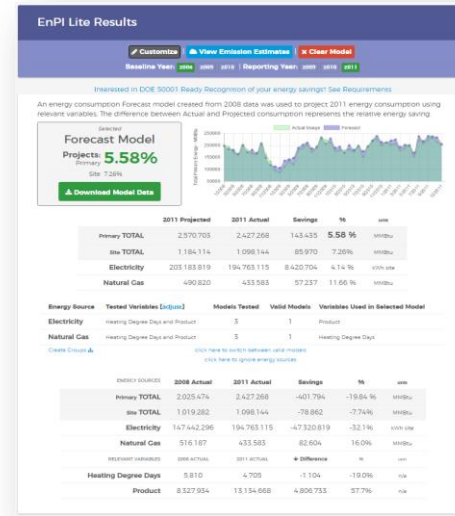
<https://navigator.industrialenergytools.com/>

# EnPI Lite – Online facility boundaries M&V tool

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

## EnPI Lite Steps:

1. Input Energy Consumption and Relevant Variable Data
2. Regression Analysis (*automatic*)
3. Adjust Data / Models as needed
4. Download Results





# 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 is an ANAB-accredited certification (follows ANSI/MSE 50028).
- SEP certification based upon third-party verification of:
  - Energy management system (ISO 50001) and
  - Energy performance improvement (ANSI/MSE 50021)



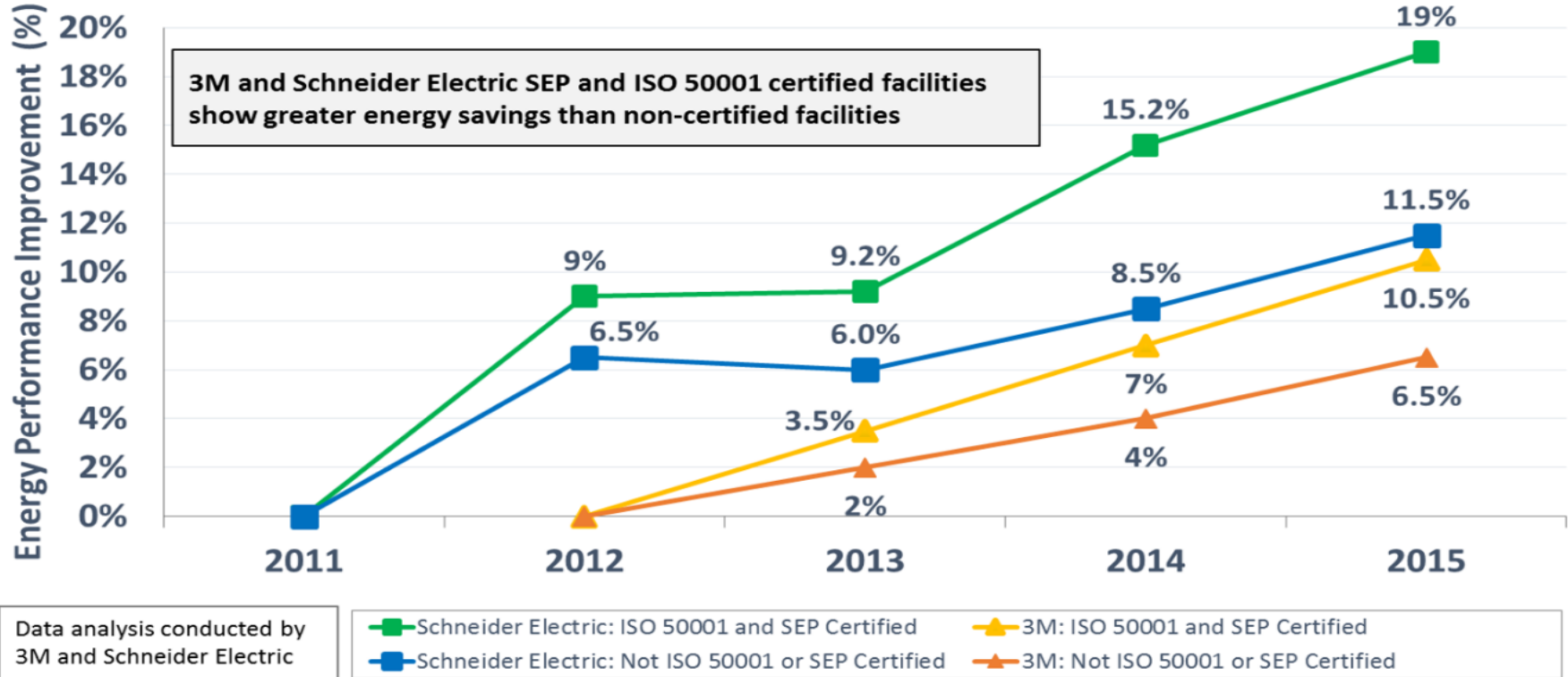
**SEP Measurement & Verification Protocol is consistent with ISO  
50006 and 50015**

# SEP Energy Performance Improvement Calculation and Verification

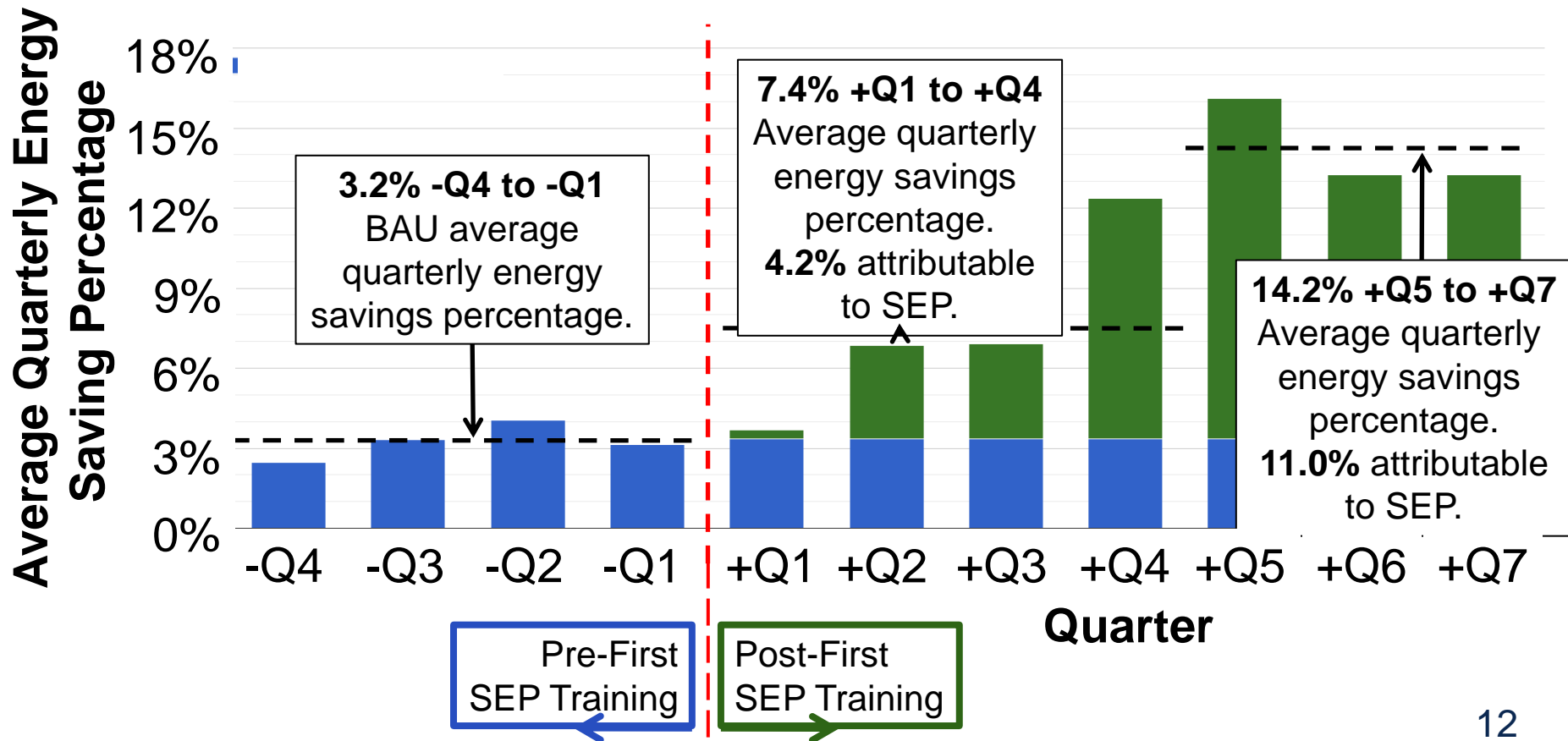


- **Gather energy data: all fuels**
- **Determine relevant variables (e.g., production, occupancy, weather, etc.)**
- **Create top-down regression model to normalize energy consumption to relevant variables**
- **Determine energy performance improvement**
- **Check top-down result against results of energy-saving projects (bottom-up comparison)**

# ISO 50001: Initial Performance Data



# Verified Facility Wide Energy Savings Attributable to SEP



# Enterprise Wide 50001 and SEP



- Enterprise-wide adoption of 50001 saves money
- SEP 2018 will allow for enterprise-wide adoption of SEP

Site Name	SEP Implementation Cost (\$) <sup>1</sup>	SEP Implementation Labor (FTE-yr.) <sup>2</sup>	Annual Energy Cost Savings (\$) <sup>3</sup>	Perf. Improvement (%) <sup>4</sup>
Site 1	\$18,000	0.2	\$46,000	13.3%
Site 2	\$18,000	0.2	\$64,000	10.2%
Site 3	\$18,000	0.3	\$103,000	20.0%
Site 4	\$18,000	0.2	\$193,000	24.9%
Site 5	\$18,000	0.4	\$23,000	11.3%
Site 6	\$18,000	0.4	\$34,000	7.8%
Site 7	\$18,000	0.5	\$44,000	10.2%
Site 8	\$18,000	N/A	\$13,000	14.8%
Site 9	\$18,000	N/A	\$80,000	6.7%
Site 10	\$18,000	N/A	\$15,000	13.7%
Site 11	\$18,000	N/A	\$22,000	15.0%
Site 12	\$18,000	N/A	\$117,000	23.4%
Site 13	\$18,000	N/A	\$225,000	16.7%
Site 14	\$18,000	N/A	\$63,000	5.9%
Site 15	\$18,000	N/A	\$50,000	30.6%

# What Industry says about the Value of SEP Certification



*“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**

*“We are wary of statements of intent, but third-party verification under SEP provides evidence of proven energy savings. Without verification, stated savings are just a nice statement.”*

**- Bob Bechtold, President, Harbec**

*“At first, we didn’t appreciate the value of third party verification, but our facility has evolved to value third party verification as critical. Any facility can claim energy savings, but a third party verification proves the savings to be real.”*

**- Schneider Electric, Smyrna, TN**

# Energy Management Systems in Sustainability Standards



- **Over 40% of a manufacturer's carbon footprint can be attributable to their supply chain**
- **Production can account for up to 80% of a product's lifecycle emissions**
- **Product sustainability standards offer an opportunity to significantly reduce emissions and respond to demands for greater sustainability**
- **Voluntary uptake of these purchasing criteria through EPEAT and others establishes a market-driven demand for more responsible manufacturing, products, and supply chains.**

Standard	Scope	Criteria	Status
IEEE 1680.1 Computers	Manufacturers and Suppliers	Optional—ISO 50001 certification or verified energy improvement	Pending publication
NSF 426 / IEEE 1680.4 Servers	Suppliers	Optional—ISO 50001 or SEP certification	NSF 426: Published IEEE 1680.4: Pending publication
UL 110 Mobile Phones	Suppliers	(Proposed) Optional—50001 Ready, ISO 50001, or SEP certification	Published, revisions pending

# EnMS Activities in Mexico

---



- **For more than 15 years, the National Commission for the Efficient Use of Energy (CONUEE) has led the implementation of energy programs for industrial facilities of the public and private sectors.**
- **These programs were designed and operated with the main elements of energy management systems (EnMS)**



- **In 2013, under a new federal administration and as part of the process of improvement of its programs, Conuee started promoting EnMS under the ISO-50001 protocols**
- **In 2015, Conuee formally established the National Program for Energy Management Systems (Pronasgen)**
  - **Objective is to promote the improvement of energy performance among energy users, through the implementation of an EnMS that establishes technical and managerial measures to raise competitiveness**

# EnMS Activities in Mexico



- **GlZ: Learning networks with large energy users and public sector institutions**
- **PTB: Pilot project on EE and EnMS in small and medium enterprises**
- **DEA: Audits in large food and petroleum companies**
- ***Currently, there are more than 60 companies that are implementing an EnMS, through learning networks in Mexico***
- ***CEC activities***

# Key EnMS Accomplishments in Mexico



- **It has demonstrated the value of EnMS for relevant energy intensive companies**
  - As demonstrated by some specific results and the continuous involvement in the process and beyond
- **It has established a local model of international practices that can be replicable**
  - Learning networks
- **It has shown the value of a social, “community oriented” approach**
  - Establishing a sense of common cause
  - Operating in an open/sharing environment of cooperation

Teodora Flor de María Chávez Sandoval  
Dirección General Adjunta de Políticas y Programas  
(55) 3000-1000 Ext. 1250 flor.chavez@conuee.gob.mx

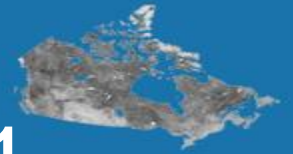
# EnMS Activities in Canada

---



**Sarah Stinson, Director, Buildings and Industry Division  
Office of Energy Efficiency Natural Resources Canada**

# IEA Workshop on Energy Management Systems and Digital Technologies – Session 1



## Canadian Experience: Energy Management Systems

Paris, France

December 12, 2017

Sarah Stinson, Director  
Buildings and Industry Division  
Office of Energy Efficiency Natural  
Resources Canada



Natural Resources  
Canada

Ressources naturelles  
Canada

Canada

# Outline - Today's Discussion

Policy

Programs

Impact



# Policy Context: The Pan-Canadian Framework

The Pan-Canadian framework on clean growth and climate change is Canada's plan to meet our emissions reduction target and grow the economy

- **Energy Efficiency**

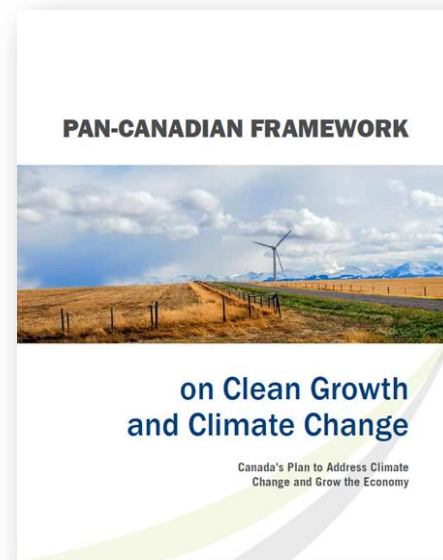
- Industry
- Commercial and Institutional Buildings
- Greening of Government Operations

- **Ambitious Deliverables**

- Meet or exceed Paris target (30% below 2030)

- **Industry Strategy**

- Accelerate the uptake of energy management systems



# Industrial Energy Management Program

Tailored approach to accommodate range of energy management capacities and available resources among companies

Promoting certification options for industrial energy management systems



ENERGY STAR for Industry – Launched Spring 2017

- Benchmarking tool
- Certification and Challenge components



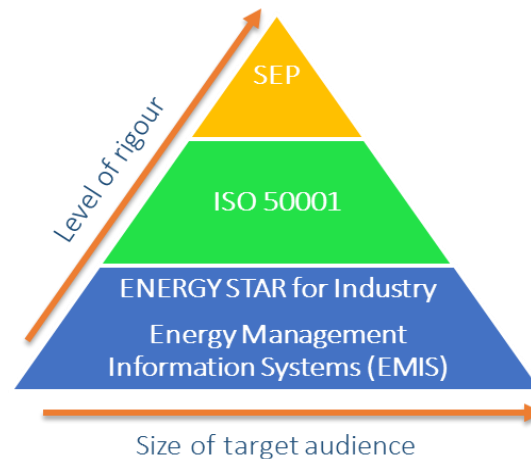
ISO 50001 Certification – Since 2012

- Rigorous approach
- Continuous improvement framework



Superior Energy Performance (SEP) – Launching Fall 2018

- Most rigorous energy management system





# Industrial Energy Management Program

- **Funding:** Up to \$40k (50% of eligible project cost) towards implementation of ISO 50001
- **Tools:**
  - Energy Savings Toolbox: An Energy Audit Manual and Tool
  - Energy Management Information Systems: Planning Manual and Tool
- **Collaborative networks:**
  - CIPEC, Energy Management Working Group
- **Standards Development**
  - ISO/TC301
- **Success Stories**
  - ISO 50001 – Canada's National Energy Management Standard
  - Joint program with British Columbia Ministry of Energy and Mines
  - New Gold wins first CEM Award of Excellence in Energy Management



# ISO 50001 – Impact

- 35 organizations ISO 50001 certified
- 10% cumulative energy intensity improvement within the two years.
- Annual energy cost savings for large Canadian companies of \$2 million
- ISO financial support extended to commercial buildings in 2018
- Federal, provincial and territorial governments collaboration



# Thank you





**BERKELEY LAB**  
LAWRENCE BERKELEY NATIONAL LABORATORY



# North American Energy Management Systems -- Policies and Impacts

## Contact Information

**Paul Sheaffer**  
**[psheaffer@lbl.gov](mailto:psheaffer@lbl.gov)**  
**+1 703 689-1202**