

# BUILDING OPERATIONS AND MAINTENANCE

WITH ALTERNATIVE COMPLIANCE PATHS FOR  
ISO 50001:2011 ENERGY MANAGEMENT SYSTEMS

LEED Reference Guide for Green Building Operations and Maintenance  
For the Operations and Maintenance of Commercial and  
Institutional Buildings  
2009 Edition





# PREFACE FROM USGBC

The built environment has a profound impact on our natural environment, economy, health, and productivity. Breakthroughs in building science, technology, and operations are now available to designers, builders, operators, and owners who want to build green and maximize both economic and environmental performance.

Through the LEED® green building certification program, the U.S. Green Building Council (USGBC) is transforming the built environment. The green building movement offers an unprecedented opportunity to respond to the most important challenges of our time, including global climate change, dependence on non sustainable and expensive sources of energy, and threats to human health. The work of innovative building professionals is a fundamental driving force in the green building moment. Such leadership is a critical component to achieving USGBC's mission of a sustainable built environment for all within a generation.

## USGBC MEMBERSHIP

USGBC's greatest strength is the diversity of our membership. USGBC is a balanced, consensus-based nonprofit with more than 18,000 member companies and organizations representing the entire building industry. Since its inception in 1993, USGBC has played a vital role in providing a leadership forum and a unique, integrating force for the building industry. USGBC's programs have three distinguishing characteristics:

### Committee-based

The heart of this effective coalition is our committee structure, in which volunteer members design strategies that are implemented by staff and expert consultants. Our committees provide a forum for members to resolve differences, build alliances, and forge cooperative solutions for influencing change in all sectors of the building industry.

### Member-driven

Membership is open and balanced and provides a comprehensive platform for carrying out important programs and activities. We target the issues identified by our members as the highest priority. We conduct an annual review of achievements that allows us to set policy, revise strategies, and devise work plans based on members' needs.

### Consensus-focused

We work together to promote green buildings, and in doing so, we help foster greater economic vitality and environmental health at lower costs. We work to bridge ideological gaps between industry segments and develop balanced policies that benefit the entire industry.

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ISBN # 978-1-932444-31-5

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## LEED 2009 FOR EXISTING BUILDINGS: OPERATIONS & MAINTENANCE

100 base points; 6 possible innovation in Design and 4 Regional Priority points

Certified	40–49 points
Silver	50–59 points
Gold	60–79 points
Platinum	80 points and above



# INTRODUCTION

## I. WHY MAKE YOUR BUILDING GREEN?

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## II. LEED® GREEN BUILDING RATING SYSTEM

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## III. OVERVIEW AND PROCESS

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional guidance related to the Overview and Process section.

### When to Use LEED 2009 Alternative Compliance Paths

Alternative compliance paths (ACPs) to LEED credits provide additional options or approaches that address unique circumstances and accommodate advancements in science and technology. ACPs allow LEED to be more flexible and applicable to a wider range of projects. ISO 50001 ACPs are integrated into this guidance document. The LEED 2009 EB: O&M ACPs for ISO 50001 were developed for sustainable ongoing operations of existing commercial and institutional buildings. The ISO 50001 ACPs can be used in any location and can be used by projects pursuing LEED 2009 EB: O&M certification and ISO 50001 certification jointly. ACPs can be applied at the discretion of the project team, based on applicability; they are not mandatory for any project. Projects may choose to use none, some or all of the LEED 2009 EB: O&M ACPs for ISO 50001 and do not need to apply them consistently across credits unless noted in the credit language.

The ISO 50001 ACPs are recognized in LEED as pilot credits. Pilot credits are a rating system development tool designed to test new and revised LEED credit language, alternative compliance paths, and new or innovative green building technologies and concepts. Projects must register to use pilot credits by providing the Project ID and Project Name. Visit the USGBC website for information regarding pilot credits and register to use pilot credits.

Following the pilot stage, the ISO 50001 ACPs and supplementary guidance material will be integrated into the LEED 2009 Green Building Operations and Maintenance with Global ACPs Reference Guide supplement.=

For specific guidance on which rating system to use, see the LEED 2009 Green Building Operations and Maintenance Reference Guide.

## IV. CERTIFICATION STRATEGY

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## V. INITIAL CERTIFICATION VS. RECERTIFICATION

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **VI. PERFORMANCE PERIOD**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **VII. LEED ONLINE DOCUMENTATION REQUIREMENTS**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **VIII. MULTITENANT BUILDINGS**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **IX. FACILITY ALTERATIONS AND ADDITIONS**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **X. EXEMPLARY PERFORMANCE STRATEGIES**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **XI. REGIONAL PRIORITY CREDITS**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **XII. POLICY MODEL**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **XIII. TOOLS FOR REGISTERED PROJECTS**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for this section of the Introduction.

## **XIV. HOW TO USE THIS REFERENCE GUIDE**

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional guidance.



The LEED 2009 EB: O&M ACPs for ISO 50001:2011 Reference Guide Supplement is a supporting document to the LEED ISO 50001 ACPs. This guide helps project teams understand the criteria, the reasons behind them, strategies for implementation, and documentation requirements. It includes examples of strategies that can be used in each category and additional resources. It does not provide an exhaustive list of strategies for meeting the criteria or all the information that a project team needs to determine the applicability of a credit to the project.

LEED 2009 EB: O&M ACPs for ISO 50001:2011 Reference Guide Supplement should be consulted in conjunction with the LEED 2009 Green Building Operations and Maintenance Reference Guide. Information in the reference guide is not repeated in this supplement, which focuses instead on the following:

- Information specific to projects pursuing ISO 50001 ACPs.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.







# ENERGY AND ATMOSPHERE

## EA OVERVIEW

### Overview

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional guidance.

Buildings are a major consumer of energy and electricity across the globe and lowering energy consumption in buildings is a significant goal of LEED. ISO 50001:2011 is an international standard for energy management, providing an auditable framework of requirements for organizations to develop policies for the more efficient use of energy, fix targets and objectives to meet energy goals, use data to better understand and make decisions about energy use, measure results and continually improve energy management. This Plan-Do-Check-Act framework aligns to the intent of many credits throughout the EA credit category. Project teams pursuing both ISO 50001 certification and LEED 2009 EB: O&M certification can leverage documentation from the ISO 50001 process to pursue LEED certification.

Credit	Title	ACP
EA Prerequisite 1	Energy Efficiency Best Management Practices—Planning, Documentation, and Opportunity Assessment	
EA Prerequisite 2	Minimum Energy Efficiency Performance	
EA Prerequisite 3	Fundamental Refrigerant Management	
EA Credit 1	Optimize Energy Efficiency Performance	
EA Credit 2.1	Existing Building Commissioning—Investigation and Analysis	
EA Credit 2.2	Existing Building Commissioning—Implementation	
EA Credit 2.3	Existing Building Commissioning—Ongoing Commissioning	
EA Credit 3.1	Performance Measurement—Building Automation System	
EA Credit 3.2	Performance Measurement—System-Level Metering	
EA Credit 4	On-site and Off-site Renewable Energy	
EA Credit 5	Enhanced Refrigerant Management	
EA Credit 6	Emissions Reduction Reporting	

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

## ENERGY EFFICIENCY BEST MANAGEMENT PRACTICES— PLANNING, DOCUMENTATION AND OPPORTUNITY ASSESSMENT

EB: O&M	
Prerequisite	EA Prerequisite 1
Points	Required

### Intent

To promote continuity of information to ensure that energy-efficient operating strategies are maintained and provide a foundation for training and system analysis.

### Requirements

Document the current sequence of operations for the building.

Develop a building operating plan that provides details on how the building is to be operated and maintained. The operating plan must include, at a minimum, an occupancy schedule, equipment run-time schedule, design set points for all HVAC equipment, and design lighting levels throughout the building. Identify any changes in schedules or set points for different seasons, days of the week and times of day. Validate that the operating plan has been met during the performance period.

Develop a systems narrative that briefly describes the mechanical and electrical systems and equipment in the building. The systems narrative must include all the systems used to meet the operating conditions stated in the operating plan, including at a minimum, heating, cooling, ventilation, lighting and any building controls systems.

Create a narrative of the preventive maintenance plan for equipment described in the systems narrative and document the preventive maintenance schedule during the performance period and meet one of the following options:

#### OPTION 1. ASHRAE Level I Walk Through

Conduct an energy audit that meets the requirements of the ASHRAE Level I walk-through assessment.

OR

#### OPTION 2. ISO 50001 Certification

Certify the whole building under ISO 50001:2011 Energy Management Systems. Provide an ISO 50001 audit report received from an audit within the last 12 months and complete the following additional actions:

- Provide documentation related to ISO 50001:2011
  - 4.4.6 Energy objectives, energy targets and energy management action plans
  - 4.4.3 Energy Review
  - 4.5.5 Operational Control

## EA PREREQUISITE 1

- During the energy review process, review the mechanical and electrical systems and equipment in the building.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
EB: O&M	Prerequisite 1

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information on environmental and economic issues related to this prerequisite.

## 2. Related Credits

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for a list of credits related to this prerequisite.

## 3. Summary of Referenced Standards

### ISO 50001: 2011 - Energy Management Systems

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies. ISO 50001:2011 specifies energy management system (EnMS) requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use. The standard is based on the Plan-Do-Check-Act continual improvement framework and incorporates energy management into everyday practices to improve energy performance.

## 4. Implementation

For a building to operate successfully, the building operations staff must understand the building's performance, critical metrics and energy goals must be established, and steps to improve performance must be developed. This process requires regular analysis of building performance and effective communication of the data, patterns, and characteristics derived from the analysis. EA Prerequisite 1 requires comprehensive documentation of building operating practices and procedures to ensure that consistency is maintained, critical information is tracked and recorded, and staffing turnovers do not compromise the program. For major systems, thorough documentation of design features, mechanical components, set-points, operational sequences, and preventative maintenance practices will result in easy tracking and effective operation over time.

The following sections describe documentation and procedures required to comply with EA prerequisite 1 using the ISO 50001:2011 certification process as an alternative compliance path to existing requirements. To achieve EA prerequisite 1, have the ISO 50001 auditor check the requirements, documents, and actions listed below in addition to the typical ISO 50001: 2011 certification audit requirements.

### 1. Building Operating Plan

ISO 50001: 2011- 4.4.5: Operational Control; 4.4.6 Energy Objectives, Energy Targets and Energy Management Action Plans.

During the ISO 50001 audit, have the auditor check the owner's operating requirements- defined as the delivered conditions required by building management and occupants for the successful operation of a building. The auditor should check the installed energy consuming systems, how they operate, and that the systems are meeting any environmental building requirements.

## 2. Systems Narrative

### ISO 50001: 2011 - 4.4.3 Energy Review; 4.4.5 Operational Control

During the ISO 50001 audit have the auditor review the mechanical and electrical systems and equipment in the building. The following outlines systems that should be checked:

- Air distribution systems
- Chilled water systems
- Domestic Hot Water Systems
- Heating, ventilating, and air condition (HVAC) Controls
- Operations maintenance HVAC controls
- Garage and shop HVAC systems
- Lighting Controls

## 3. Sequence of Operations

### ISO 50001: 2011 - 4.4.5: Operational Control

During the ISO 50001 audit, have the auditor review data and information related to the sequence of operations documentation. See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional guidance related to Sequence of Operations.

## 4. Preventative Maintenance Plan

### ISO 50001: 2011 - 4.4.5: Operational Control

Create a preventative maintenance plan or demonstrate that preventative measures are put in place. See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional guidance related to a Preventative Maintenance Plan. During the ISO 50001 audit, have the auditor check the preventative maintenance plan or ensure that preventative measures are put in place.

## 5. Energy Audit and Walk-Through Analysis

### ISO 50001: 2011 - 4.4.3 Energy Review

Complying with ISO 50001:2011 4.4.3 Energy Review and undergoing an ISO 50001 audit satisfies this documentation requirement.

## 5. Timeline and Team

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for guidance related to this prerequisite.

## 6. Calculations

There are no additional calculations associated with this credit. See the LEED 2009 Green Building Operations and Maintenance Reference Guide for calculations associated with this prerequisite.

## 7. Documentation Guidance

- Provide the ISO 50001 audit report from an audit received within the last 12 months.
- The auditor must certify that the LEED requirements for Building Operating Plan, Systems Narrative, Sequence of Operations, and Preventative Maintenance Plan have been met according to the requirements outlined in the implementation section above.

## 8. Examples

EA	
EB: O&M	Prerequisite 1

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
EB: O&M	Prerequisite 1

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for an example associated with this prerequisite.

## 9. Exemplary Performance

This prerequisite is not eligible for exemplary performance under the Innovation in Operations Section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for regional variations associated with this prerequisite.

## 11. Resources

Websites

### Enerit

<http://enerit.com>

Enerit is a systematic energy management software, which provides complete coverage of ISO 50001 for project teams.

### International Organization for Standardization (ISO)

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies.

## 12. Definitions

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for definitions of terms identified in this prerequisite







## MINIMUM ENERGY EFFICIENCY PERFORMANCE

## EA PREREQUISITE 2

EB: O&M	
Prerequisite	EA Prerequisite 2
Points	Required

### Intent

To establish the minimum level of operating energy efficiency performance relative to typical buildings of similar type to reduce environmental and economic impacts associated with excessive energy use.

### Requirements

#### CASE 1. Projects Eligible for Energy Star Rating

For buildings eligible to receive an energy performance rating using the EPA's ENERGY STAR® Portfolio Manager tool, achieve an energy performance rating of at least 69. If the building is eligible for an energy performance rating using Portfolio Manager, Option 1 must be used.

Have energy meters that measure all energy use throughout the performance period of all buildings to be certified. Each building's energy performance must be based on actual metered energy consumption for the LEED project building(s). A full 12 months of continuous measured energy data is required.

Calibrate meters within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

#### CASE 2. Projects Not Eligible for Energy Star Rating

For buildings with a primary space type not eligible to receive an energy performance rating using Portfolio Manager, comply with 1 of the following:

##### OPTION 1. Adjusted Benchmark Score

Demonstrate energy efficiency performance that is better than 69% of similar buildings (69<sup>th</sup> percentile or better) by benchmarking against national source energy data provided in the Portfolio Manager tool as an alternative to energy performance ratings. Projects outside the U.S. may use a local benchmark based on source energy from their country's national or regional energy agency. Follow the detailed instructions in the LEED Reference Guide for Green Building Operations & Maintenance, 2009 Edition.

OR

##### OPTION 2. Alternative Score

Demonstrate energy efficiency performance by determining an alternative rating score using the Portfolio Manager tool to report the building's energy use data from the performance period. Follow the detailed instructions in the LEED Reference Guide for Green Building Operations & Maintenance, 2009 Edition.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

## EA PREREQUISITE 2

### OPTION 2a. Streamlined Baseline (EAp2 only – 0 points)

Enter energy use data during the performance period for at least 1 year into Portfolio Manager to determine the “weather-normalized source energy intensity”. Use this value in the offline calculator to determine the percent reduction from the streamlined baseline.

### OPTION 2b. Energy Baseline Including Historical Data (up to 9 points in EAc1)

Enter at least 3 consecutive years of historical energy use data into Portfolio Manager in addition to the current year’s data to determine the “weather-normalized source energy intensity” for each year. Use these values in the offline calculator to determine a baseline using the historical energy use data of the project building.

### OPTION 2c. Energy Baseline Including Historical Data plus Comparable Buildings (up to 18 points in EAc1)

In addition to the historical data used in Option 2b, provide energy use data for at least 3 other buildings with similar uses over at least a 2-year period to determine the “average energy performance of a similar building” in Portfolio Manager. Enter this data into the offline calculator.

#### AND

Have energy meters that measure all energy use throughout the performance period of all buildings to be certified. Each building’s energy performance must be based on actual metered energy consumption for both the LEED project building(s) and all comparable buildings used for the benchmark. A full 12 months of continuous measured energy data is required.

Calibrate meters within the manufacturer’s recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

Use the Portfolio Manager tool available on the ENERGY STAR website to benchmark the project even if it is not eligible for an EPA rating: <http://www.energystar.gov/benchmark>

## 1. Benefits and Issues to Consider

Refer to the Benefits and Issues section of EA Credit 1 in this supplement.

## 2. Related Credits

See the Related Credits section in EA Credit 1 in this supplement.

## 3. Summary of Referenced Standards

Refer to the Referenced Standards section in EA Credit 1 in this supplement.

## 4. Implementation

Refer to the Implementation section in EA Credit 1 in this supplement.

## 5. Timeline and Team

Refer to the Timeline and Team section in EA Credit 1 in this supplement.

## 6. Calculations

Refer to the Calculations section in EA Credit 1 in this supplement.

## 7. Documentation Guidance

Refer to the Documentation Guidance section in EA Credit 1 in this supplement.

## 8. Examples

Refer to the Examples section in EA Credit 1 in this supplement.

## 9. Exemplary Performance

This prerequisite is not eligible for exemplary performance under the Innovation in Operations section of the LEED 2009 rating system.

## 10. Regional Variations

Refer to the Regional Variations section in EA Credit 1 in this supplement.

## 11. Resources

Refer to the Resources section in EA Credit 1 in this supplement.

## 12. Definitions

Refer to the definitions section EA Credit 1 in this supplement.

EA	
EB: O&M	Prerequisite 2

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.



## OPTIMIZE ENERGY EFFICIENCY PERFORMANCE

## EA CREDIT 1

EB: O&M	
Credit	EA Credit 1
Points	1-18 points

### Intent

To achieve increasing levels of operating energy performance relative to typical buildings of similar type to reduce environmental and economic impacts associated with excessive energy use.

### Requirements

#### CASE 1. Projects Eligible for Energy Star Rating

For buildings eligible to receive an energy performance rating using the EPA's ENERGY STAR's Portfolio Manager tool, achieve an energy performance rating of at least 71. If the building is eligible for an energy performance rating using Portfolio Manager, Option 1 must be used.

Achieve energy efficiency performance better than the minimum requirements listed above; points are awarded according to the table below.

The minimum energy cost savings percentage for each ENERGY STAR threshold is as follows:

EPA ENERGY STAR Energy Performance Rating	Points
71	1
73	2
74	3
75	4
76	5
77	6
78	7
79	8
80	9
81	10
82	11
83	12
85	13
87	14
89	15
91	16
93	17
95	18

Have energy meters that measure all energy use throughout the performance period of buildings to be certified. Each building's energy performance must be based on actual metered energy consumption for the LEED project. A full 12 months of continuous measured energy data is required.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

## EA CREDIT 1

Calibrate meters within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

### CASE 2. Projects Not Eligible for Energy Star Rating

For buildings with a primary space type not eligible to receive an energy performance rating using Portfolio Manager, comply with 1 of the following:

#### OPTION 1

Demonstrate energy efficiency performance that is better than 71% of similar buildings (71st percentile or better) by benchmarking against national source energy data provided in the Portfolio Manager tool as an alternative to energy performance ratings. Projects outside the U.S. may use a local benchmark based on source energy from their country's national or regional energy agency. Follow the detailed instructions in the LEED Reference Guide for Green Building Operations & Maintenance, 2009 Edition.

OR

#### OPTION 2

For buildings not suited for Case 2, Option 1, Demonstrate energy efficiency performance by determining an alternative rating score using the Portfolio Manager tool to report the building's energy use data from the performance period. Follow the detailed instructions in the LEED Reference Guide for Green Building Operations & Maintenance, 2009 Edition.

##### OPTION 2a. Streamlined Baseline (EAp2 only – 0 points)

This option is only available through EAp2. Enter energy use data during the performance period for at least 1 year into Portfolio Manager to determine the "weather-normalized source energy intensity". Use this value in the offline calculator to determine the percent reduction from the streamlined baseline.

##### OPTION 2b. Energy Baseline Including Historical Data (up to 9 points)

Enter at least 3 consecutive years of historical energy use data into Portfolio Manager in addition to the current year's data to determine the "weather-normalized source energy intensity" for each year. Use these values in the offline calculator to determine a baseline using the historical energy use data of the project building.

##### OPTION 2c. Energy Baseline Including Historical Data plus Comparable Buildings (up to 18 points)

In addition to the historical data used in Option 2b, provide energy use data for at least 3 other buildings with similar uses over at least a 2-year period to determine the "average energy performance of a similar building" in Portfolio Manager. Enter this data into the offline calculator.

AND

Achieve energy efficiency performance better than the minimum requirements listed above; points are awarded according to the table below.



## EA CREDIT 1

Have energy meters that measure all energy use throughout the performance period of all buildings to be certified. Each building's energy performance must be based on actual metered energy consumption for both the LEED project and all comparable buildings used for the benchmark. A full 12 months of continuous measured energy data is required.

Calibrate meters within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

Use the Portfolio Manager tool available on the ENERGY STAR website to benchmark the project even if it is not eligible for an EPA rating: <http://www.energystar.gov/benchmark>.

Percentile level above the national median (for buildings not eligible for ENERGY STAR energy performance rating)	Points
21	1
23	2
24	3
25	4
26	5
27	6
28	7
29	8
30	9
31	10
32	11
33	12
35	13
37	14
39	15
41	16
43	17
45	18

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
EB: O&M	Credit 1

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

### ISO 50001: 2011 - Energy Management Systems

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies. ISO 50001:2011 specifies energy management system (EnMS) requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use. The standard is based on the Plan-Do-Check-Act continual improvement framework and incorporates energy management into everyday practices to improve energy performance.

## 4. Implementation

### 1. Metering

ISO 50001:2011 - 4.6.1 Monitoring, Measurement and Analysis; 4.4.3 Energy Review.

To earn points for this credit, buildings must have dedicated energy meters that measure all energy use throughout each building's performance period. The energy performance rating must be based on actual metered energy consumption for a minimum of 12 consecutive months. Meters owned by the building owner, management organization, or tenant must be calibrated within the manufacturer's recommended interval; meters owned by third parties such as utilities or governments are exempt from this requirement. The requirements for system level sub-metering in ISO 50001:2011 - 4.6.1 Monitoring, Measurement and Analysis can be used for compliance with this credit, as this section pertains to calibration. Collection of energy data in ISO 50001: 2011 - 4.4.3 Energy Review is done through the energy planning process, which satisfies this part of the documentation requirement.

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional implementation guidance related to this credit.

## 5. Timeline and Team

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for guidance related to this credit.

## 6. Calculations

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information related to Calculations.

## 7. Documentation Guidance

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for

documentation guidance related to this credit.

## 8. Examples

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for an example detailing Portfolio Manager.

## 9. Exemplary Performance

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for exemplary performance related to this credit.

## 10. Regional Variations

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for regional variations associated with this credit.

## 11. Resources

Websites

### Enerit

<http://enerit.com>

Enerit is a systematic energy management software, which provides complete coverage of ISO 50001 for project teams.

### International Organization for Standardization (ISO)

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies.

## 12. Definitions

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional definitions of terms identified in this credit.

EA	
EB: O&M	Credit 1

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

## EA CREDIT 2.1

### EXISTING BUILDING COMMISSIONING—INVESTIGATION AND ANALYSIS

EB: O&M	
Credit	EA Credit 2.1
Points	2 points

#### Intent

Through a systematic process, to develop an understanding of the operation of the building's major energy-using systems, options for optimizing energy performance and a plan to achieve energy savings.

#### Requirements

##### OPTION 1. Commissioning Process

- Develop a retrocommissioning, recommissioning or ongoing commissioning plan for the building's major energy-using systems.
- Conduct the investigation and analysis phase.
- Document the breakdown of energy use in the building.
- List the operating problems that affect occupants' comfort and energy use, and develop potential operational changes that will solve them.
- List the identified capital improvements that will provide cost-effective energy savings and document the cost-benefit analysis associated with each.

To comply with this credit using ISO 50001:2011 Energy Management Systems, certify the whole building under ISO 50001, provide an ISO 50001 audit report from an audit received within the last 12 months and complete the following additional actions::

- Provide documentation related to ISO 50001:
  - 4.4.3 Energy Review
  - 4.5.5 Operational Control
  - 4.4.6 Energy management action plans
- Develop a retro-commissioning, recommissioning or ongoing commissioning plan for the building's major energy-using systems.

#### OR

##### OPTION 2. ASHRAE Level II Energy Audit

- Conduct an energy audit that meets the requirements of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Level II, Energy Survey and Analysis.
- Document the breakdown of energy use in the building.
- Perform a savings and cost analysis of all practical measures that meet the owner's constraints and economic criteria, along with a discussion of any effect on operations and maintenance procedures.

## EA CREDIT 2.1

- List the identified capital improvements that will provide cost-effective energy savings and document the cost-benefit analysis associated with each.

To comply with this credit using ISO 50001, certify the whole building under ISO 50001:2011 Energy Management Systems, provide an ISO 50001 audit report from an audit received within the last 12 months, and complete the following additional actions:

- Provide documentation related to ISO 50001: 4.4.3 Energy Review, ensuring that the Energy Review is completed to the requirements listed in an ASHRAE Level II audit.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
EB: O&M	Credit 2.1

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

### ISO 50001:2011 - Energy Management Systems

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies. ISO 50001:2011 specifies energy management system (EnMS) requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use. The standard is based on the Plan-Do-Check-Act continual improvement framework and incorporates energy management into everyday practices to improve energy performance.

## 4. Implementation

Commissioning of an existing building provides a systematic assessment of the building's function and performance by direct observation, reviewing building documents, and examining operations and maintenance practices. The investigation and analysis process is intended to make sure that all major systems and equipment are operating as intended by the facility manager and as designed by the manufacturer. This process facilitates the cooperative, efficient, and effective performance of building equipment and helps extend equipment lifetime. Commissioning also plays a critical role in maintaining energy performance and occupant comfort over the life of a building.

The following sections describe documentation and procedures required to comply with EA credit 2.1 using the ISO 50001: 2011 certification process as an alternative compliance path to existing requirements. To achieve EA credit 2.1, have the ISO 50001 auditor check the requirements, documents, and actions listed below in addition to the typical ISO 50001 certification audit requirements.

### OPTION 1

#### 1. Retro-commissioning, Recommissioning, or Ongoing Commissioning Plan

Develop a retro-commissioning, recommissioning, or ongoing commissioning plan for the building's major energy-using systems. See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information related to commissioning plans.

During the ISO 50001 audit, have the auditor review the commissioning plan.

#### 2. List of Capital/Efficiency Improvements with Returns

##### ISO 50001:2011 - 4.4.6 Energy Management Action Plans

A list of capital and efficiency improvements with returns may not be available during

the first year of ISO 50001 certification, as organizations will have just begun to identify energy improvements. However, by year two, there should be a list of monitored and measured energy efficiency improvements with performance information available through the ISO 50001 audit process. Complying with ISO 50001:2011 - 4.4.6 Energy Management Action Plans and undergoing an ISO 50001 audit satisfies this documentation requirement.

EA	
EB: O&M	Credit 2.1

### 3. Energy Use Breakdown ISO 50001:2011 - 4.4.3 Energy Review

An energy use breakdown is a component of the energy review process during the ISO 50001 audit. The energy review should be conducted in enough detail to understand the relative portion of total energy use consumed by individual systems and processes. Complying with ISO 50001:2011 - 4.4.3 Energy Review and undergoing an ISO 50001 audit satisfies this documentation requirement.

### 4. Master List of Findings-Operating Problems related to Comfort and Solutions ISO 50001:2011 - 4.5.5 Operational Control

Operating problems are addressed as part of ISO 50001 operational control, and solutions are identified as part of corrective action related to significant deviation. Project teams should conduct a cost-benefit analysis to understand the potential costs and savings associated with each proposed change and to ensure the changes are appropriate for the building and its occupants. Complying with ISO 50001:2011 - 4.5.5 Operational Control and undergoing an ISO 50001 audit satisfies this documentation requirement.

## OPTION2

### 1. Using ISO 50001: 2011 to Complete an ASHRAE Level II, Energy Audit ISO 50001:2011 - 4.4.3 Energy Review

In using the ISO 50001 certification process to comply with this option, ensure the energy review follows the ASHRAE Level II audit requirements. See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information related to ASHRAE Level II audits.

During the ISO 50001 audit, the auditor must certify that the Energy Review was completed to the requirements of an ASHRAE level II audit.

## 5. Timeline and Team

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for guidance related to this credit.

## 6. Calculations

There are no additional calculations associated with this credit. See the LEED 2009 Green Building Operations and Maintenance Reference Guide for calculations associated with this credit.

## 7. Documentation Guidance

- Provide an ISO 50001 audit report resulting from audit within the last 12 months.

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EA	
EB: O&M	Credit 2.1

AND

- OPTION 1. The auditor must certify that the LEED requirements for a Commissioning Plan have been met according to the requirements outlined in the implementation section above.

OR

- OPTION 2. The auditor must certify that the LEED requirements for an ASHRAE Level II audit have been met according to the requirements outlined in the implementation section above.

## 8. Examples

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for an example detailing findings from an ASHRAE Level II audit analysis report for this credit.

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Operations Section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for regional variations associated with this credit.

## 11. Resources

Websites

### Enerit

<http://enerit.com>

Enerit is a systematic energy management software, which provides complete coverage of ISO 50001 for project teams.

### International Organization for Standardization (ISO)

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies.

## 12. Definitions

**Retro-commissioning** is a systematic process to improve an existing building's performance. Using a whole-building systems approach, retro-commissioning seeks to identify operational improvements that will increase occupant comfort and save energy (Building Operating Management.)

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional definitions of terms identified in this credit.



## EXISTING BUILDING COMMISSIONING—IMPLEMENTATION

EB: O&M	
Credit	EA Credit 2.2
Points	2 points

### Intent

To implement minor improvements and identify planned capital projects to ensure that the building's major energy-using systems are repaired, operated and maintained effectively to optimize energy performance.

### Requirements

Implement no- or low-cost operational improvements and create a capital plan for major retrofits or upgrades.

Provide training for management staff that builds awareness and skills in a broad range of sustainable building operations topics. This could include energy efficiency and building, equipment and systems operations and maintenance.

Demonstrate the observed and/or anticipated financial costs and benefits of measures that have been implemented.

Update the building operating plan as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design set points and lighting levels.

To comply with this credit using ISO 50001:2011 Energy Management Systems, certify the whole building under ISO 50001, provide an ISO 50001 audit report from an audit received within the last 12 months, and complete the following additional actions:

Provide documentation related to ISO 50001:

- 4.4.3 Energy Review
- 4.5.2 Competence, Training and Awareness
- 4.5.6 Design
- 4.5.7 Procurement

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
EB: O&M	Credit 2.2

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

### ISO 50001:2011 - Energy Management Systems

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies. ISO 50001:2011 specifies energy management system (EnMS) requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use. The standard is based on the Plan-Do-Check-Act continual improvement framework and incorporates energy management into everyday practices to improve energy performance.

## 4. Implementation

This credit promotes the implementation of immediate, cost-effective measures to improve operations, efficiency, and occupants' comfort; it is also intended to support the development of a formal capital plan for major upgrades to enhance building efficiency in the longer term. It rewards provisions for regular, high-quality training of management staff with the goal of building expertise in areas directly related to sustainable building operations.

The following sections describe documentation and procedures required to comply with EA credit 2.2 using the ISO 50001: 2011 certification process as an alternative compliance path to existing requirements. To achieve EA credit 2.2, have the ISO 50001 auditor check the requirements, documents, and actions listed below in addition to the typical ISO 50001 certification audit requirements.

### 1. Training Records

#### ISO 50001:2011 - 4.5.2 Competence, Training and Awareness

Complying with ISO 50001: 2011 - 4.5.2 Competence, Training and Awareness and undergoing an ISO 50001 audit satisfies this documentation requirement.

### 2. Building Operating Plan

#### ISO 50001:2011 - 4.4.5: Operational Control; 4.4.6 Energy Objectives, Energy Targets and Energy Management Action Plans.

During the ISO 50001 audit, have the auditor check the owner's operating requirements-defined as the delivered conditions required by building management and occupants for the successful operation of a building. The auditor should check the installed energy

consuming systems, how they operate, and that the systems are meeting any environmental building requirements.

EA	
EB: O&M	Credit 2.2

### 3. Capital Plan for Improvements and Upgrades ISO 50001: 2011 - 4.5.6 Design; 4.5.7 Procurement

Capital planning for energy is addressed by the Design and Procurement sections ISO 50001. Project teams must plan and implement low or no cost energy efficiency measures to qualify for this credit. The project team is responsible for determining the reasonable upper cost limit for “low-cost” improvements based on facility resources and operating budgets.

Comply with ISO 50001: 2011 - 4.5.6 Design and 4.5.7 Procurement. During the ISO 50001 audit, have the auditor certify that the low or no cost energy efficiency measures are implemented to the requirements listed above.

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional guidance related to Implementation for this credit.

## 5. Timeline and Team

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for guidance related to this credit.

## 6. Calculations

There are no additional calculations associated with this credit. See the LEED 2009 Green Building Operations and Maintenance Reference Guide for calculations associated with this credit.

## 7. Documentation Guidance

- Provide an ISO 50001 audit report resulting from audit within the last 12 months.
- The auditor must certify that the LEED requirements for the Building Operating Plan and Capital Plan for Improvements and Upgrades have been met according to the requirements outlined in the implementation section above.

## 8. Examples

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for an example detailing low cost or no cost energy efficiency measures for this credit.

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Operations Section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for regional variations associated with this credit.

## 11. Resources

Websites

**Enerit**

<http://enerit.com>

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
EB: O&M	Credit 2.2

Enerit is a systematic energy management software, which provides complete coverage of ISO 50001 for project teams.

**International Organization for Standardization (ISO)**

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies.

## 12. Definitions

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for definitions of terms identified in this credit.

## EXISTING BUILDING COMMISSIONING—ONGOING COMMISSIONING

EB: O&M	
Credit	EA Credit 2.3
Points	2 points

### Intent

To use commissioning to address changes in facility occupancy, use, maintenance and repair. Make periodic adjustments and reviews of building operating systems and procedures essential for optimal energy efficiency and service provision.

### Requirements

Implement an ongoing commissioning program that includes elements of planning, system testing, performance verification, corrective action response, ongoing measurement and documentation to proactively address operating problems.

Create a written plan that summarizes the overall commissioning cycle for the building by equipment or building system group. The ongoing commissioning cycle must not exceed 24 months. This plan must include a building equipment list, performance measurement frequency for each equipment item and steps to respond to deviation from expected performance parameters.

Complete at least half of the scope of work in the first commissioning cycle (as indicated by the percentage of the plan's total budget) prior to the date of application for LEED 2009 for Existing Buildings: Operations & Maintenance. Only work completed within 2 years prior to application may be included to show progress in the ongoing commissioning cycle.

Update the building operating plan and/or systems narrative as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design set points, lighting levels or system specifications.

To comply with this credit using ISO 50001, certify the whole building under ISO 50001, provide an ISO 50001 audit report from an audit received within the last 12 months, and complete the following additional actions:

- Provide documentation related to ISO 50001:
  - 4.4.3 Energy Review

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 ISO 50001 ACPs. Use this supplement alongside the LEED Reference Guide for Green Building Operations and Maintenance for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
EB: O&M	Credit 2.3

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information on environmental and economic issues related to this prerequisite/credit.

## 2. Related Credits

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

### ISO 50001: 2011- Energy Management Systems

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies. ISO 50001:2011 specifies energy management system (EnMS) requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use. The standard is based on the Plan-Do-Check-Act continual improvement framework and incorporates energy management into everyday practices to improve energy performance.

## 4. Implementation

Ongoing commissioning is a continuous, dynamic process intended to facilitate the effective operation of previously retro-commissioned buildings. Whereas the ongoing commissioning process repeats many elements of the standard retro-commissioning process over a long period, the intervals between operation and equipment reviews should be frequent. Ongoing commissioning incorporates the monitoring and analysis of building performance data generated by the building automation system, or other permanently installed metering equipment, to verify high-level building performance, occupant satisfaction, and the financial outcomes of capital investments.

The following sections describe documentation and procedures required to comply with EA credit 2.3 using the ISO 50001: 2011 certification process as an alternative compliance path to existing requirements. To achieve EA credit 2.3, have the ISO 50001 auditor check the requirements, documents, and actions listed below in addition to the typical ISO 50001 certification audit requirements.

### 1. Ongoing Commissioning Program

ISO 50001: 2011 represents an ongoing commissioning process with third-party oversight and a commitment to continual improvement. Undergoing an ISO 50001 audit satisfies this documentation requirement.

### 2. Building Equipment List

#### ISO 50001:2011 - 4.4.3 Energy Review

A building equipment list is required as part of the energy review process in ISO 50001: 2011. Complying with ISO 50001:2011 - 4.4.3 Energy Review and undergoing an ISO 50001 audit satisfies this documentation requirement.

## 5. Timeline and Team

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for guidance related to this credit.

## 6. Calculations

There are no calculations required for this credit.

## 7. Documentation Guidance

- Provide an ISO 50001 audit report resulting from audit within the last 12 months.

## 8. Examples

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for an example detailing ongoing commissioning for this credit.

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Operations Section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for regional variations associated with this credit.

## 11. Resources

Websites

### Enerit

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### International Organization for Standardization (ISO)

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies.

## 12. Definitions

**Retro-commissioning** is a systematic process to improve an existing building's performance. Using a whole-building systems approach, retro-commissioning seeks to identify operational improvements that will increase occupant comfort and save energy (Building Operating Management.)

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional definitions of terms identified in this credit.

EA	
EB: O&M	Credit 2.3

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PERFORMANCE MEASUREMENT —SYSTEM-LEVEL METERING

EB: O&M	
Credit	EA Credit 3.2
Points	1-2 points

Intent

To provide accurate energy-use information to support energy management and identify opportunities for additional energy-saving improvements.

Requirements

Develop a breakdown of energy use in the building, either through EA Credits 2.1 and 2.2 or by using energy bills, spot metering or other metering to determine the energy consumption of major mechanical systems and other end-use applications. This analysis of major energy-use categories must have been conducted within 2 years prior to the date of application for LEED 2009 for Existing Buildings: Operations & Maintenance certification.

Based on the energy-use breakdown, employ system-level metering covering at least 40% or 80% of the total expected annual energy consumption of the building. Permanent metering and recording are required. All types of submetering are permitted.

Demonstrate that system-level metering is in place covering the percentage of total expected annual energy consumption of the building as outlined in the table below.

Demonstrate that the number of the largest energy-use categories from the breakdown report outlined in the table are covered by at least 80% (i.e., if energy use in the 2 or 3 largest categories is each 100 Btus/year, at least 80 Btu/year in 1 or 2 of them must be metered).

System Level Metering Requirements		
Percentage of Total Annual Energy Consumption to be Metered	Number of Largest Energy Use Categories to be Covered by 80% or more	Points
40%	1 of 2	1
80%	2 of 3	2

Metering must be continuous and data logged to allow for an analysis of time trends. The project team must compile monthly and annual summaries of results for each system covered. Meters must be calibrated within the manufacturer’s recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

To comply with this credit using ISO 50001, certify the whole building under ISO 50001:2011 Energy Management Systems, provide an ISO 50001 audit report from an audit received within the last 12 months, and complete the following additional actions:

- Provide documentation related to ISO 50001:
  - 4.4.3 Energy Review
  - 4.6.1 Monitoring, Measurement and Analysis:
- Teams must employ system-level metering covering at least 40% or 80% of the total expected annual energy consumption of the building and follow the requirements listed in the table above.



EA	
EB: O&M	Credit 3.2

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

### ISO 50001: 2011 - Energy Management Systems

<http://www.iso.org/iso/home.html>

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies. ISO 50001:2011 specifies energy management system (EnMS) requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use. The standard is based on the Plan-Do-Check-Act continual improvement framework and incorporates energy management into everyday practices to improve energy performance.

## 4. Implementation

Metering systems allow building operators to reduce maintenance costs, prevent breakdowns, optimize energy performance, and develop maintenance procedures based on actual operating conditions.

The following sections describe documentation and procedures required to comply with EA credit 3.2 using the ISO 50001: 2011 certification process as an alternative compliance path to existing requirements. To achieve EA credit 3.2, have the ISO 50001 auditor check the requirements, documents, and actions listed below in addition to the typical ISO 50001 certification audit requirements.

### 1. Energy Use Breakdown

#### ISO 50001:2011 - 4.4.3 Energy Review

An energy use breakdown is a component of the ISO 50001 audit energy review process. The energy review should be conducted in enough detail to understand the relative portion of the total energy use consumed by individual systems and processes. Complying with ISO 50001: 2-11 - 4.4.3 Energy Review and undergoing an ISO 50001 audit satisfies this documentation requirement.

### 2. System-Level Metering

#### ISO 50001: 2011 - 4.6.1 Monitoring, Measurement and Analysis; ISO 50001: 4.4.3 Energy Review.

If current levels of submetering do not meet the credit requirements, install additional metering systems.

System level sub-metering is addressed in ISO 50001: 2011 -4.6.1 Monitoring, Measurement and Analysis can be used for compliance with this credit, as this section pertains to calibration. Collection of energy data in ISO 50001: 2011 - 4.4.3 Energy Review is done through the energy planning process, which satisfies this part of the documentation

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EA	
EB: O&M	Credit 3.2

requirement.

During the ISO 50001 audit, have the auditor check that the levels of system-level submetering meet the credit requirements.

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for additional Implementation guidance related to this credit.

## 5. Timeline and Team

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for guidance related to this credit.

## 6. Calculations

There are no additional calculations associated with this credit. See the LEED 2009 Green Building Operations and Maintenance Reference Guide for calculations associated with this credit.

## 7. Documentation Guidance

- Provide an ISO 50001 audit report resulting from audit within the last 12 months.
- The auditor must certify that the LEED requirements for System-Level Submetering have been met according to the requirements outlined in the implementation section above.

## 8. Examples

There are no examples for this credit.

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Operations Section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for regional variations associated with this credit.

## 11. Resources

### Websites

#### Enerit

<http://enerit.com>

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#### International Organization for Standardization (ISO)

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national standards bodies.

EA	
EB: O&M	Credit 3.2

## 12. Definitions

See the LEED 2009 Green Building Operations and Maintenance Reference Guide for definitions of terms identified in this credit.

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**Air-change rate** is the air-leakage rate in volume per hour divided by the building space volume, expressed in identical volume units.

**Air-leakage rate** is the volume of air movement across the building envelope over a unit of time.

The EU organic farming logo is the European Community's certification for products that meet EU regulations for organically produced food products.

**Graywater** is untreated household waste water which has not come into contact with toilet waste. Graywater typically includes used water from bathtubs, showers, bathroom wash basins, and water from clothes-washer and laundry tubs, though definitions may vary. Some states and local authorities also allow kitchen sink wastewater to be included in graywater. Project teams should comply with the graywater definition established by the authority having jurisdiction in the project area.

An **Inland waterway** is a navigable body of water, such as a river, canal or lake that is deep, wide and slow enough for a vessel to pass.

**Low-Impact Development (LID)** is an approach to managing stormwater runoff that emphasizes onsite natural features to protect water quality by replicating the natural land cover hydrologic regime of watersheds and addressing runoff close to its source. Examples include better site design principles, such as minimizing land disturbance, preserving vegetation, and minimizing impervious cover, and design practices like rain gardens, vegetated swales and buffers, permeable pavement, rainwater harvesting, and soil amendments. These engineered practices may require specialized design assistance.

**Month with the highest irrigation demand** is the maximum monthly delta between evapotranspiration rate (ET<sub>o</sub>) and mean monthly rainfall.

**Rideshare** is a transit service that involves sharing a single vehicle with multiple people, excluding large-scale vehicles such as buses and trains. The rideshare transit facility must include a signed stop and a clearly defined waiting area. Additionally, the rideshare must include an enclosed passenger seating area, fixed route service, fixed fare structure, continuous daily operation, and the ability to pick up and drop off multiple riders. Rideshare vehicles must hold 4 or more passengers, except for human-powered conveyances, which must hold 2 or more passengers.

**Retro-commissioning** is a systematic process to improve an existing building's performance. Using a whole-building systems approach, retro-commissioning seeks to identify operational improvements that will increase occupant comfort and save energy (Building Operating Management.)

**Test pressure difference** is the measured pressure difference across the building envelope.