Existing building commissioning

EA2.2 | Possible point

Glossary

Intent

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

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.

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.

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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.

Verify that fundamental building systems and assemblies are performing as intended to meet current needs and sustainability requirements.

Support appropriate operations and maintenance of buildings and building systems so that they continue to deliver target building performance goals over the long term.

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To use the existing building commissioning process to improve building operations, energy, and resource efficiency.

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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.

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

Alternative Compliance Paths (ACPs)

LEED 2009 EBOM reference guide supplement with India ACPs

Credit substitution available
You may use the LEED v4 version of this credit on v2009 projects. For more information check out this article.

Pilot Alternative Compliance Path Available
This credit has an alternative compliance path available for the use of ISO 50001: Energy Management Systems. For more information see Pilot ACP 86: LEED 2009 EBOM ACPs for ISO 50001.

LEED 2009 EBOM Supplement with ISO 50001 ACPs

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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.

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

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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.

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LEED 2009 EBOM Supplement with ISO 50001 ACPs

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, but not limited to, 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.

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

Conduct one of the following:

Option A. 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.

Option B. ASHRAE level II energy audit

Conduct an energy audit that meets the requirements of 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.

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

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.

Verify and ensure that fundamental building elements and systems are installed, calibrated and operating as intended so they can deliver functional and efficient performance. Carry out a comprehensive existing building commissioning including the following procedures:

1. Develop a comprehensive building operation plan that meets the requirements of current building usage, and addresses the heating system, cooling system, humidity control system, lighting system, safety systems and the building automation controls.
2. Prepare a commissioning plan for carrying out the testing of all building systems to verify that they are working according to the specifications of the building operation plan.
3. Implement the commissioning plan documenting all the results.
4. Repair or upgrade all systems components that are found to be not working according to the specifications of the building operation plan.
5. Re-test all building components that required repairs or upgrades to verify that they are working according to the specifications of the building operation plan.

OR

Submit a 1- to 5-Year Plan for continuous improvement of these aspects of commissioning requirements 1-5 until all aspects are completed. During the implementation of the continuous improvement plan, demonstrate continuous improvement on a yearly basis until all aspects are completed. All low-cost and no-cost measures must be implemented in the first two years of the implementation program.

Have in place over the performance period a building operations and maintenance staff education program that provides each staff person primarily working on building maintenance with at least 24 hours of education each year over the performance period. The education program should provide information on building and building systems operation, maintenance and achieving sustainable building performance. Training must be of high quality and relevant to building operations and maintenance.

Have in place over the performance period a comprehensive Best Practices Equipment Preventative Maintenance Program that provides in-house resources or contractual services to deliver post-warranty maintenance.

Have in place over the performance period a system for continuous tracking and optimization of systems that regulate indoor comfort and the conditions (temperature, humidity and CO_2) delivered in occupied spaces.

The system must include:

- Continuous monitoring of system equipment performance and of the indoor environmental conditions delivered in the building.
- Alarms for performance or conditions that require repair.
- A system in place that delivers prompt repairs to problems identified.

Establishment

Conduct an energy audit that meets both the requirements of the ASHRAE preliminary energy use analysis and an ASHRAE Level 1 walk-through assessment identified in the ASHRAE Procedures for Commercial Building Energy Audits or equivalent.

Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the building efficiently. The plan must include the following:

- a current sequence of operations for the building
- the building occupancy schedule;
- equipment run-time schedules;
- setpoints for all HVAC equipment;
- setpoints for lighting levels throughout the building;
- minimum outside air requirements;
- any changes in schedules or setpoints for different seasons, days of the week, and times of day;
- a systems narrative describing the mechanical and electrical systems and equipment in the building; and
- a preventive maintenance plan for building equipment described in the systems narrative.

Performance

None.

Establishment

Conduct an energy audit that meets both the requirements of the ASHRAE preliminary energy use analysis and an ASHRAE Level 1 walk-through assessment identified in the ASHRAE Procedures for Commercial Building Energy Audits or equivalent.

Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the building efficiently. The plan must include the following:

- a current sequence of operations for the building
- the building occupancy schedule;
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- setpoints for all HVAC equipment;
- setpoints for lighting levels throughout the building;
- minimum outside air requirements;
- any changes in schedules or setpoints for different seasons, days of the week, and times of day;
- a systems narrative describing the mechanical and electrical systems and equipment in the building; and
- a preventive maintenance plan for building equipment described in the systems narrative.

Use the U.S. Department of Energy's DC PRO Profiling Tool to perform a preliminary assessment of energy consumption in data center spaces for critical systems.

Performance

None.

Establishment

Evaluate the current performance of the project building against the performance specifications in the current facilities requirements and the operations and maintenance plan.

Identify the systems and components in the facility to be investigated and analyzed as part of the existing building commissioning or energy auditing process. Provide a breakdown of estimated resource use for each of these systems.

Option 1. Existing building commissioning

Develop an existing building commissioning plan to effectively inventory and evaluate specific opportunities within the systems being analyzed. The commissioning plan must include the following:

- updated current facilities requirements;
- the commissioning team members and their roles and responsibilities during the commissioning process;
- a description of the approach for identifying and analyzing facility improvement opportunities;
- the process for reviewing and prioritizing identified opportunities with the owner and developing an implementation plan;
- the format and content of the eventual deliverables from the commissioning process; and
- the proposed schedule.

Option 2. Energy audit

Develop an energy audit plan following the requirements of ASHRAE Level 2, Energy Survey and Analysis, to evaluate efficiency opportunities. The audit plan must include the following:

- the audit team members and their roles and responsibilities during the audit process;

- a description of the approach for identifying and analyzing facility improvement opportunities;
- the process for reviewing and prioritizing identified opportunities with the owner and developing an implementation plan;
- the format and content of the eventual deliverables from the audit process; and
- the proposed schedule.

Performance

Apply the requirements below to all direct energy-consuming or energy-producing systems, including lighting, process loads, HVAC&R, domestic water heating, and renewable energy.

Update the systems and components to be addressed as part of the existing building commissioning or energy auditing process. Provide a breakdown of estimated resource use for each of these systems.

Option 1. Existing building commissioning

Update and execute the existing building commissioning plan.

Option 2. Energy audit

Update and execute the energy audit plan following the requirements of ASHRAE Level 2, Energy Survey and Analysis.

For each opportunity, describe the potential improvement, estimated implementation costs, and anticipated savings.

Establishment

Evaluate the current performance of the project building against the performance specifications in the current facilities requirements and the operations and maintenance plan.

Identify the systems and components in the facility to be investigated and analyzed as part of the existing building commissioning or energy auditing process. Provide a breakdown of estimated resource use for each of these systems.

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- the audit team members and their roles and responsibilities during the audit process;
- a description of the approach for identifying and analyzing facility improvement opportunities;
- the process for reviewing and prioritizing identified opportunities with the owner and developing an implementation plan;
- the format and content of the eventual deliverables from the audit process; and
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Performance

Apply the requirements below to all direct energy-consuming or energy-producing systems, including lighting, process loads, HVAC&R, domestic water heating, and renewable energy.

Update the systems and components to be addressed as part of the existing building commissioning or energy auditing process. Provide a breakdown of estimated resource use for each of these systems.

Option 1. Existing building commissioning

Update and execute the existing building commissioning plan.

Option 2. Energy audit

Update and execute the energy audit plan following the requirements of ASHRAE Level 2, Energy Survey and Analysis.

For each opportunity, describe the potential improvement, estimated implementation costs, and anticipated savings.

In addition to the requirements above, data centers must use the Department of Energy's Save Energy Now Program's on-line DC Pro Energy Assessment Tools for data center critical systems.

Establishment

Meet the requirements of EA Credit Existing Building Commissioning—Analysis.

Performance

Apply the requirements below to all direct energy-consuming or energy-producing systems, including lighting, process loads, HVAC&R, domestic water heating, and renewable energy.

Implement no- or low-cost operational improvements and develop a five-year plan for

equipment replacement and major modifications or upgrades based on the analysis phase.

Confirm training of building operations staff so that they can efficiently operate all new or substantially altered building equipment or systems.

Develop a formal tracking and verification program for all projects implemented as part of the existing building commissioning process. Include verification of effectiveness, documentation of the observed financial costs and benefits, and observed or estimated environmental and human health and comfort benefits.

Update the operations and maintenance plan and the current facilities requirements to incorporate the newly implemented improvements.

Establishment

Meet the requirements of EA Credit Existing Building Commissioning–Analysis and EA Credit Existing Building Commissioning–Implementation.

Establish an ongoing commissioning process that includes planning, point monitoring, system testing, performance verification, corrective action response, ongoing measurement, and documentation to proactively address operating problems in the systems being commissioned.

Develop an on-going commissioning plan that defines the following:

- roles and responsibilities;
- measurement requirements (meters, points, metering systems, data access);
- the points to be tracked, with frequency and duration for trend monitoring;
- the limits of acceptable values for tracked points and metered values;
- the review process that will be used to evaluate performance;
- an action plan for identifying and correcting operational errors and deficiencies
- planning for repairs needed to maintain performance;
- the frequency of analyses in the first year (at least quarterly); and
- the subsequent analysis cycle (at least every 24 months).

Performance

Apply the requirements below to all direct energy-consuming or energy-producing systems, including lighting, process loads, HVAC&R, domestic water heating, and renewable energy.

- Update the systems manual with any modifications or new settings, and give the reason for any modifications from the original design. Define methods for improving operations and maintenance.
- Include quarterly reports during the first year of implementation and annual reports on the performance of building systems.

Continue to update the facility's operating and maintenance plan and current facilities requirements to reflect actual conditions and issue annual revisions of these documents.

Only activities associated with ongoing commissioning completed within two years of the LEED application may be included to show progress.