

BEYOND

SMART CITIES





ENERGY & ATMOSPHERE /COMMISSIONING

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ENERGY & ATMOSPHERE AND CXA





Energy and Atmosphere Pre-Requisite

Energy and Atmosphere Sites

Energy and Atmosphere and Commissioning



LEED SCORECARD

 LOCATION AND TRANSPORTATION (0PR/7C/16P)

 SUSTAINABLE SITES (1PR/6C/10P)

 WATER EFFICIENCY (3PR/4C/11P)

 ENERGY AND ATMOSPHERE (4PR/6C/33P)

 MATERIALS AND RESOURCES (1PR/5C/13P)

 INDOOR ENVIRONMENTAL QUALITY (2PR/9C/16P)

 INTEGRATIVE PROCESS(0PR/1C/1P)

 INNOVATION (0PR/2C/6P)

 REGIONAL PRIORITY (0PR/1C/4P)

 TOTAL (11 PRE REQUISITE / 44 CREDIT /110 POINT)



 **ENERGY AND ATMOSPHERE (4PR/6C/33P)**

FUNDAMENTAL COMMISSIONING AND VERIFICATION

MINIMUM ENERGY PERFORMANCE

BUILDING-LEVEL ENERGY METERING

FUNDAMENTAL REFRIGERANT MANAGEMENT

ENHANCED COMMISSIONING

OPTIMIZE ENERGY PERFORMANCE

ADVANCED ENERGY METERING

GRID HARMONIZATION

RENEWABLE ENERGY

ENHANCED REFRIGERANT MANAGEMENT

 PRE REQUISITE : FUNDAMENTAL COMMISSIONING AND VERIFICATION
MINIMUM ENERGY PERFORMANCE
BUILDING-LEVEL ENERGY METERING
FUNDAMENTAL REFRIGERANT MANAGEMENT



ENERGY AND ATMOSPHERE & COMMISSIONING(CX)



☒ **Focuses on**

☒ Reducing the use of non-renewable energy

☒ Reducing environmental effects of mechanical HVAC systems

☒ Providing high performance buildings

☒ **Includes Cx Prerequisite**

☒ **Credits Related to Commissioning**

☒ Additional Commissioning

☒ Measurement & Verification

☒ Renewable Energy

☒ Ozone Depletion







**LEED EA PREREQUISITE
FUNDAMENTAL COMMISSIONING
& VERIFICATION**

INTENT
To support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.

REQUIREMENTS
Implement or have a contract in place to implement the following fundamental best practice commissioning procedures

☒ Document the Owner's Project Requirements (OPR) and the basis of design documentation.

☒ Incorporate commissioning requirements into the construction documents.

☒ Develop and utilize a commissioning plan.

☒ Verify installation, functional performance, training, and operating and maintenance documentation.

☒ Complete a commissioning report.

LEED EA CREDIT: POSSIBLE 6 POINTS ENHANCED COMMISSIONING

INTENT

To further support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.

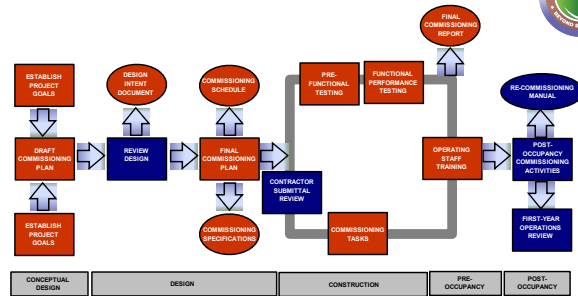
REQUIREMENTS

In addition to the Fundamental Building Commissioning prerequisite, implement or have a contract in place to implement the following additional commissioning tasks:

- ☒ A commissioning authority independent of the design team shall conduct a review of the design prior to the construction documents phase.
- ☒ An independent commissioning authority shall conduct a review of the construction documents near completion of the construction document development and prior to issuing the contract documents for construction.
- ☒ An independent commissioning authority shall review the contractor submittals relative to systems being commissioned.
- ☒ Provide the owner with a single manual that contains the information required for re-commissioning building systems.
- ☒ Have a contract in place to review building operation with O&M staff, including a plan for resolution of outstanding commissioning-related issues within one year after construction completion date



FULL COMMISSIONING PROCESS



LEED CX VS. OTHER STANDARDS



☒ LEED Fundamental + Additional Cx includes

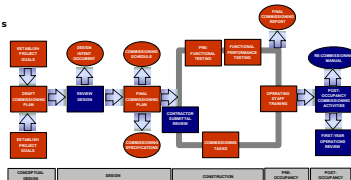
- ☒ Re-commissioning Manual
- ☒ Post-occupancy Review

☒ Other standards do not include these tasks

- ☒ ASHRAE Guideline 1
- ☒ PECI and DOE
- ☒ AABC, NEBB Commissioning Processes

☒ New ASHRAE Guideline 0 will include these tasks

- ☒ ASHRAE Guideline 0 will be released in 2019





**LEED PRE-REQUISITE : REQUIRED
BUILDING-LEVEL ENERGY METERING**



INTENT

To support energy management and identify opportunities for additional energy savings by tracking building-level energy use.

REQUIREMENTS

- ☒ Install new or use existing building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc).
- ☒ Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification.
- ☒ At a minimum, energy consumption must be tracked at one-month intervals. This commitment must carry forward for five years or until the building changes ownership or lessee.

BUILDING-LEVEL ENERGY METERING & COMMISSIONING(CX)

- ☒ **Commissioning (Cx)**
 - ☒ Ensures that the building systems work
 - ☒ Tests initial performance criteria
- ☒ **Building level energy metering**
 - ☒ Requires permanent installation of energy & water monitoring equipment
 - ☒ Allows for year long verification of performance
 - ☒ Requires increased level of Cx to
 - ☒ Verify that metering equipment is installed correctly
 - ☒ Energy monitoring Plan can proceed
- ☒ **Continuous Commissioning**





**LEED CREDIT : 1 POINT
ADVANCED ENERGY METERING**



INTENT

To support energy management and identify opportunities for additional energy savings by tracking building-level and system-level energy use.

REQUIREMENTS

- ☒ Install advanced energy metering for the following:
 - ☒ All whole-building energy sources used by the building; and
 - ☒ Any individual energy end uses that represent 10% or more of the total annual consumption of the building.
- ☒ Meters must be permanently installed, record at intervals of one hour or less, and transmit data to a remote location.
- ☒ Electricity meters must record both consumption and demand. Whole-building electricity meters should record the power factor, if appropriate.
- ☒ The system must be capable of storing all meter data for at least 36 months.
- ☒ All meters in the system must be capable of reporting hourly, daily, monthly, and annual energy use.

ADVANCED ENERGY METERING & COMMISSIONING(CX)

☑ Commissioning (Cx)

- ☑ Ensures that the building systems work
- ☑ Tests initial performance criteria

☑ Building level energy metering

- ☑ Requires permanent installation of energy & water monitoring equipment
- ☑ Allows for year long verification of performance
- ☑ Requires increased level of Cx to
 - ☑ Verify that metering equipment is installed correctly
 - ☑ Energy monitoring Plan can proceed

☑ Continuous Commissioning



LEED CREDIT : 5 POINT RENEWABLE ENERGY INTENT

To reduce the environmental and economic harms associated with fossil fuel energy and reduce greenhouse gas emissions by increasing the supply of renewable energy projects and foster a just transition to a green economy.

REQUIREMENTS

Use on-site renewable energy systems or procure renewable energy from offsite sources for all or a portion of the building's annual building energy use.



RENEWABLE ENERGY & COMMISSIONING(CX)

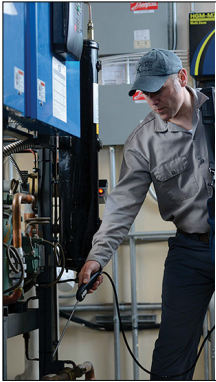
☑ Often includes solar-powered technologies

- ☑ Photovoltaics panels
- ☑ Solar-powered water heating for Domestic water and HVAC system

☑ Systems should be Commissioned

- ☑ Complex systems
- ☑ Requires coordination between two or more contractors





LEED CREDIT : 1 POINT
ENHANCED REFRIGERANT
MANAGEMENT



INTENT

To eliminate ozone depletion and global warming potential and support early compliance with the Montreal Protocol, including the Kigali Amendment, while minimizing direct contributions to climate change.

REQUIREMENTS

Comply with ASHRAE Standard 15-2019: Safety Standard for Refrigeration Systems, or USGBC-approved equivalent, as applicable to the project scope.

OZONE DEPLETION &
COMMISSIONING(CX)



- ☒ Impacts type of HVAC system selection
- ☒ Cx process may evaluate
 - ☒ Maintainability of non-HCFC equipment
 - ☒ Project Lifetime of non HCFC equipment
- ☒ Example
 - ☒ Residential-duty HVAC units are proposed to be installed to cool a computer room
 - ☒ Units are not designed for continuous operation



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