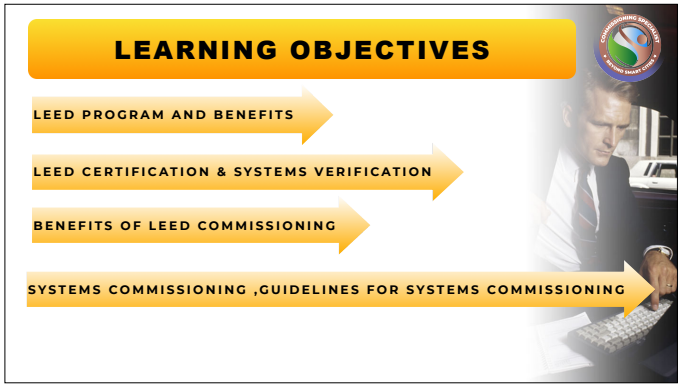

BEYOND
SMART CITIES
CERTIFIED COMMISSIONING AUTHORITY
CXA EXAM PREP
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COMMISSIONING SPECIALIST CURRICULUM
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GREEN BUILDING COMMISSIONING
HIGH PERFORMANCE GREEN BUILDINGS
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LEARNING OBJECTIVES
LEED PROGRAM AND BENEFITS
LEED CERTIFICATION & SYSTEMS VERIFICATION
BENEFITS OF LEED COMMISSIONING
SYSTEMS COMMISSIONING ,GUIDELINES FOR SYSTEMS COMMISSIONING

LEED PROGRAM AND BENEFITS



LEED provides a framework for healthy, efficient, carbon and cost-saving green buildings. LEED certification is a globally recognized symbol of sustainability achievement and leadership.

LEED certified buildings save money, improve efficiency, lower carbon emissions and create healthier places for people. They are a critical part of addressing climate change and meeting ESG goals, enhancing resilience, and supporting more equitable communities.

To achieve LEED certification, a project earns points by adhering to prerequisites and credits that address carbon, energy, water, waste, transportation, materials, health and indoor environmental quality.

Projects go through a verification and review process by GBCI and are awarded points that correspond to a level of LEED certification: Certified (40-49 points), Silver (50-59 points), Gold (60-79 points) and Platinum (80+ points).

LEED RATING SYSTEM GOALS



LEED is a holistic system that doesn't simply focus on one element of a building such as energy, water or health, rather it looks at the big picture factoring in all of the critical elements that work together to create the best building possible.

In fact, 35% of the credits in LEED are related to climate change, 20% of the credits directly impact human health, 15% of the credits impact water resources, 10% of the credits affect biodiversity, 10% of the credits relate to the green economy, 5% of the credits impact community and 5% of the credits impact natural resources. In LEED v4.1, a majority of the LEED credits are related to operational and embodied carbon.

LEED RATING SYSTEM GOALS +



- Reduce contribution to global climate change
- Enhance individual human health
- Protect and restore water resources
- Protect and enhance biodiversity and ecosystem
- Promote sustainable and regenerative material cycles
- Enhance community quality of life

ENERGY AND ATMOSPHERE



The Energy and Atmosphere (EA) category approaches energy from a holistic perspective, addressing energy use reduction, energy-efficient design strategies, and renewable energy sources

CRITERIA IN THIS CATEGORY

- EA PR FUNDAMENTAL COMMISSIONING AND VERIFICATION
- EA PR MINIMUM ENERGY PERFORMANCE
- EA PR BUILDING-LEVEL ENERGY METERING
- EA PR FUNDAMENTAL REFRIGERANT MANAGEMENT
- EA CR ENHANCED COMMISSIONING/EA CR OPTIMIZE ENERGY PERFORMANCE
- EA CR ADVANCED ENERGY METERING / EA CR DEMAND RESPONSE
- EA CR RENEWABLE ENERGY PRODUCTION / ENHANCED REFRIGERANT MANAGEMENT

MAXIMUM POSSIBLE CREDITS : 4 P / 33 C

EA - PR- CONSTRUCTION

FUNDAMENTAL COMMISSIONING AND 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.

Potential Technologies & Strategies

☑ The qualified commissioning authority (CA) chosen to represent the owner's needs should be brought in early in the design process. As a third party, the CXA can verify early on that the architects' and engineers' designs meet the owner's project requirements. During the construction phase, the commissioning team, led by the CXA, will verify that contractors install and program the systems correctly according to the design.

Requirements

Complete the following commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies, in accordance with ASHRAE Guideline 0-2013 and ASHRAE Guideline 1.1-2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability.
Develop the OPR.
Develop a BOD.

IMPLEMENTATION

REQUIRED DOCUMENTATION

Documentation	All projects
C	X
	X
List of systems to be commissioned	X
Verification of CxA activities and reviews	X
Cx plan	X
Documentation of testing and verification	X
OPR, O&M plan	X
Cx report	X

EA- CR(6) - DESIGN

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.

Potential Technologies & Strategies

Enhanced commissioning is a natural extension of the fundamental commissioning (Cx) process. It provides owners, via the commissioning authority (CxA), further oversight and verification that the building will meet their expectations and requirements beyond the first day of occupancy. Enhanced commissioning gives the CxA the power to act as the owner's advocate by conducting in-depth reviews of the basis of design, design documents, and construction submittals. Training and a postconstruction verification visit are some of the enhancements that contribute to ongoing quality building control and operations

Requirements

Implement, or have in place a contract to implement, the following commissioning process activities in addition to those required under EA Prerequisite Fundamental Commissioning and Verification.

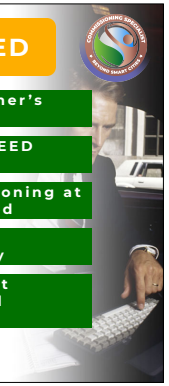
The commissioning authority must do the following:
☑ Review contractor submittals.
☑ Verify inclusion of systems manual requirements in construction documents.
☑ Verify inclusion of operator and occupant training requirements in construction documents.
☑ Verify systems manual updates and delivery.
☑ Verify operator and occupant training delivery and effectiveness.
☑ Verify seasonal testing.
☑ Review building operations 10 months after substantial completion.
☑ Develop an on-going commissioning plan. Include all enhanced commissioning tasks in the OPR and BOD.

IMPLEMENTATION

REQUIRED DOCUMENTATION

Documentation	Option 1, Path 1	Option 1, Path 2	Option 2
List of all tasks completed as part of Cx activities	X	X	X
Training outline and participation list	X	X	X
Confirmation of systems manual delivery	X	X	X
Ongoing Cx plan	X	X	X
Inclusion of monitoring and tracking in Cx plan		X	
Inclusion of envelope in Cx plan			X
Verification of additional reviews per Data Center requirements (data centers only)	X	X	

HOW DO CXA AGENTS USE LEED



- Reviewing design plans to ensure they meet owner's objectives and LEED Certification requirements
- Providing commissioning services required by LEED Certification requirements
- Ensuring that equipment and systems are functioning at the efficiency level for which they were designed
- Scheduling site visits and tests throughout the construction cycle to ensure on-going efficiency
- Modifying control programs to enhance occupant comfort while reducing energy consumption and increasing operational efficiency

BENEFITS OF LEED COMMISSIONING



- Identifying Energy Conservation Measures (ECMs)
- Evaluating potential rebates
- Tenant/Occupant Comfort
- Identifying possible future operational issues
- Promote sustainable and regenerative material cycles
- Enhance community quality of life

QCS- MANDATORY

INTENT

To develop and implement a commissioning process that ensures the delivery and performance of the systems within the development.

POTENTIAL TECHNOLOGIES & STRATEGIES

1. Confirm the provision of a commissioning report or plan that outlines the scope of works and process adopted for commissioning.
2. Determine the systems to be commissioned.

MO.1 SYSTEMS COMMISSIONING

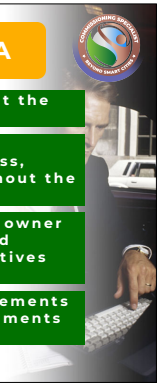
REQUIREMENTS

1. The Project will assess the testing, adjusting, balancing, and commissioning in addition to training requirements associated with the Project systems.
2. The Project will prepare relevant commissioning plan or report to establish the criterion level.

BSAS ONLINE SUBMITTALS

Final Certification Stage (CDA)	
Types	**Descriptions**
Document	A narrative explaining any updates or changes in the criterion assessment.
	Updated Commissioning Specification, when applicable.
Plan	For levels 2 and 3, Updated Commissioning Plan, when applicable.
Report	For level 1, Commissioning Report
	Relevant T&C and TAB Reports of the results of the system commissioning.

GUIDELINES FOR SYSTEMS CXA



- Consider introducing a commissioning program at the commencement of the project.
- Appoint a qualified commissioning party to be responsible for leading the commissioning process, coordinating with the development team throughout the design and construction phases to ensure proper
- Develop the OPR in conjunction with the project owner and ensure the requirements are quantifiable and measurable to verify that the development objectives will be achieved.
- Review and verify that the commissioning requirements have been included within the construction documents and development specifications.

