

---

AABC Commissioning Group

AIA Provider Number 50111116



## How is Energy Resiliency Dependent Upon Commissioning?

Course Number: CXENERGY1825



*J. Woody Thompson, PE, CxA, CEM, LEED AP*



April 26, 2018

---

Credit(s) earned on completion of this course will be reported to **AIA CES** for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

**CES** for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

---

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

This course is registered with **AIA**



# Course Description

---

The need for energy resilience at the facility level was illustrated by the devastating hurricanes that affected the Texas Gulf Coast, Houston, Florida, Puerto Rico, and multiple earthquakes in Mexico. Existing Building Commissioning is one method to determine facility energy resilience. Ensuring that facility systems maintain reliability and support energy resiliency is the ultimate focus and goal of successful Existing Building Commissioning (EBCx). This presentation will convey the importance and dependence of facility Cx/EBCx as a critical, if not the most important aspect, of energy resiliency.

# Learning Objectives

---



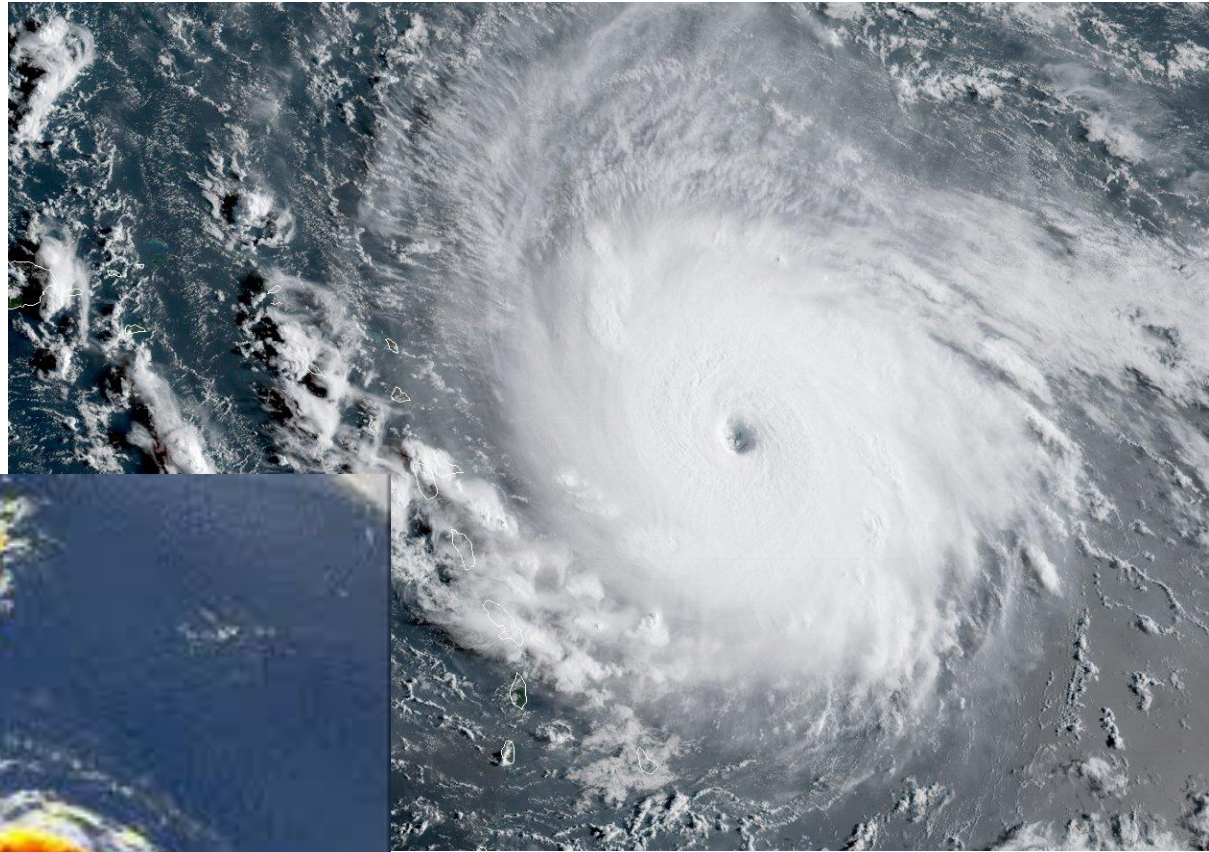
At the end of the this course, participants will be able to:

1. Understand the commonalities between what is often referred to as “energy resiliency” and existing building commissioning (EBCx).
2. Understand how EBCx and Current Facility Requirements (CFR) relates to metrics of reducing energy use, lowering costs and mitigating greenhouse gas emissions in buildings.
3. Learn how, over the past decade, a series of Federal laws, executive orders and other regulations have resulted in requirements for commissioning and retro-commissioning in certain Federal buildings.
4. Learn how recent natural disasters have challenged the definition of resiliency and how commissioning and/or retro-commissioning is and could be positioned to better meet these challenges.









# What is Energy Resilience?

*"The term '**resilience**' refers to the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies. Whether it is resilience towards **acts of terrorism, cyber attacks, pandemics, and catastrophic natural disasters**, our national preparedness is the shared responsibility of all levels of government, the private and nonprofit sectors, and individual citizens."*

-- US Department of Homeland Security





# Resiliency Components

- Utilities: Elec, Gas, Water
- Security: Physical, Communications, Cyber
- Facility: HVAC, Lights, Power, Life Safety, Plumbing



# Foundations of Resilience

- 2010 National Security Strategy
  - Prepare, Withstand, Rapidly Recover
- 2014 Quadrennial Homeland Security Review
  - Focus: Critical Infrastructure
  - Mission 5: Strengthening National Preparedness & Resilience
- 2011 FEMA National Preparedness Goals
  - Prevention, Protection, Mitigation, Response & Recovery



# Resiliency Standards



- Energy Policy Act 2005
- Federal Energy Regulatory Commission (FERC)
  - Order 693: Reliability Standards
  - Order 706: Critical Infrastructure Protection (CIP) Standards
- North American Electric Reliability Corporation (NERC)
  - Numerous CIP Standards

FOCUS: RELIABILITY & SECURITY OF NORTH AMERICAN  
BULK POWER SYSTEMS

# SOMETHING'S MISSING...



# Building Construction / Renovation Goals

- High Performing & Functional
- Sustainable
- Easy to Maintain
- Efficient
- Healthy
- Affordable – Build, Operate & Maintain
- Enhances Reputation of Owner, A/E, Contractors





# The Commissioning Process

*"The Commissioning Process is a **quality-focused process** for enhancing the delivery of a project by verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to **meet the Owner's Project Requirements**."*

-- ASHRAE Guideline 202-2013:  
The Commissioning Process



# What is EBCx? RCx? ReCx?



- **Existing Building Commissioning** is performed specifically to ensure that an existing building's systems and assemblies are operated and maintained to meet **CURRENT FACILITY REQUIREMENTS (CFR)**.
- **Retro-Commissioning** is the commissioning process as applied to an existing facility that has never been commissioned. Focus is on building performance and how to improve utility/energy consumption.
- **Re-Commissioning** is the commissioning process as applied to an existing building that had been commissioned but no longer meets owner's current operational need.

# Cx / RCx References

- ASHRAE Standard 202-2013
- ASHRAE Guideline 0-2013 (replaced 0-2005)
- ASHRAE Guideline 1.1-2007 (replaced 1-1996)
- ANSI / ASHRAE Standard 189.1-2011
- IECC 2015
- EISA 2007 & EPACT 2005
- EO's 13423, 13514, 13693
- Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings
- UFC 1-200-2 High Performance & Sustainable Building Rqts.



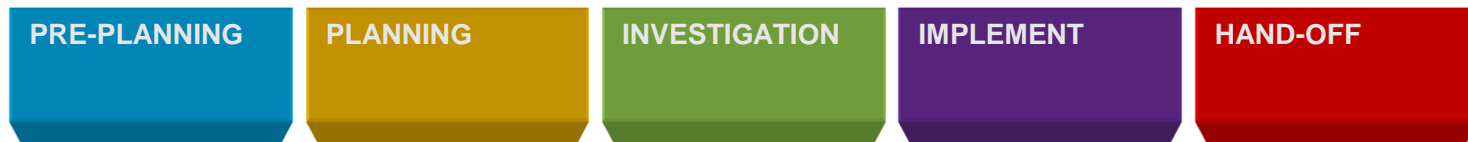
# Cx / RCx References (Cont.)

- NIBS Guideline 3-2012 (envelope)
- IES DG-29-11 (lighting)
- Whole Building Design Guide
- ACG Commissioning Guideline
- NEBB Procedural Standards for Building Systems Commissioning & Retro-Commissioning
- SMACNA HVAC Commissioning Guideline
- Portland Energy Conservation, Inc. (PECI)
- **\*NUMEROUS OTHERS!**

# The Existing Building Commissioning (EBCx) Process

Process applied to a building that was either NEVER COMMISSIONED or MISSION CHANGED.

The process involves activities that are integrated into every phase of the project . . .





# EBCx: Planning / Pre-Site Investigation Phase

PRE-PLANNING

PLANNING

INVESTIGATION

IMPLEMENT

HAND-OFF

➤ Collect All Available Documentation

➤ Review

- Plans, Specs, O&M Docs
- Utility Bills
- Work Orders
- Maintenance Lists
- Controls Trend & Alarm Logs
- Contractor Service Invoices



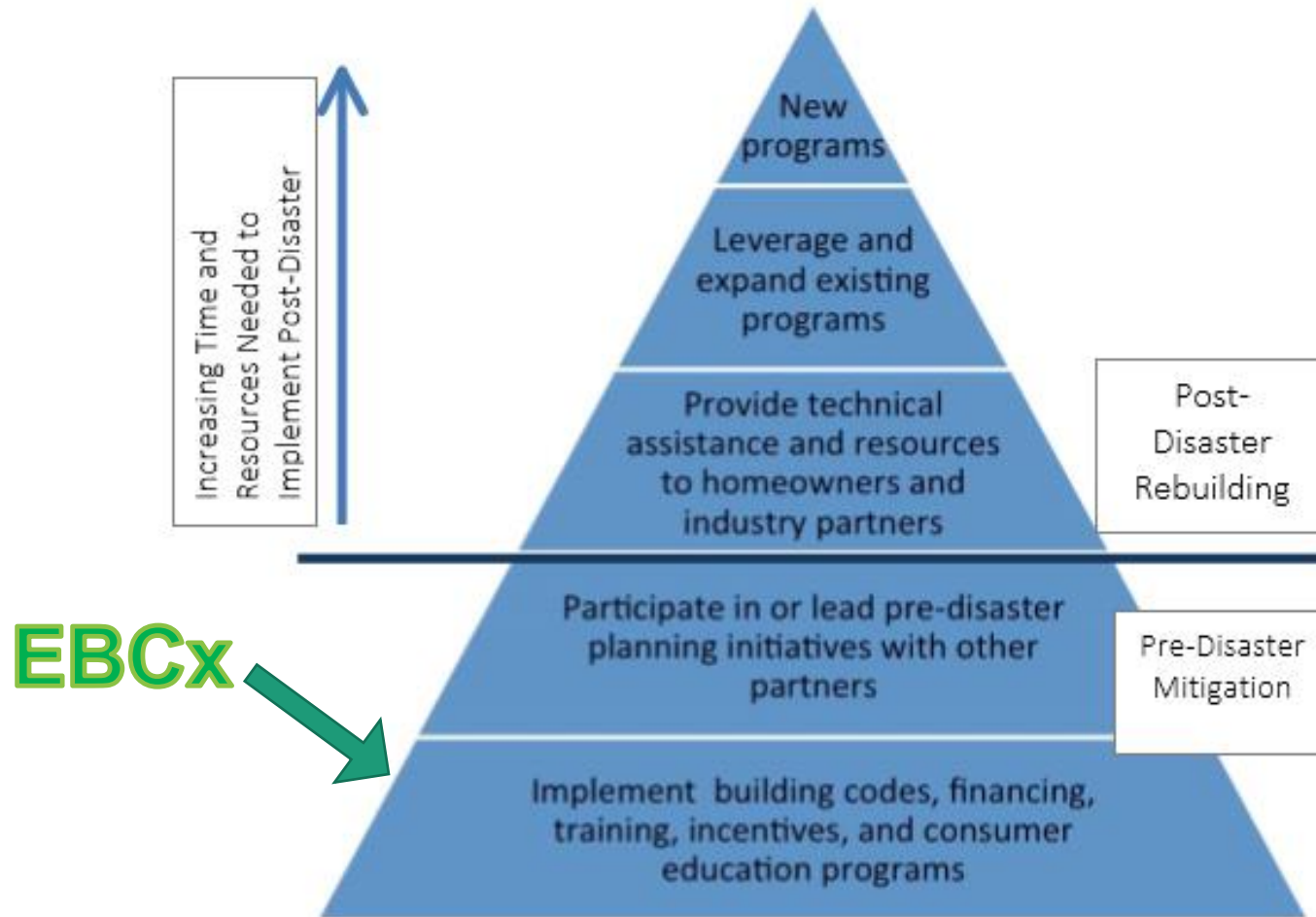
➤ ***Understand Current Facility Requirements (CFR)***

# What is a CFR?

- May be Created from the Original Design or OPR
- Must Reflect Current Facility / Mission Needs
- Developed by Owner and EBCxA (like an OPR)
- Functional Requirements of Existing Building:
  - Building Use & Occupancy
  - Sustainability
  - Physical & Cyber Security
  - Energy & Efficiency
  - Life Safety
  - Envelope
  - HVAC&R
  - Power / Lighting
  - Water Usage: Plumbing & Landscape
  - O&M



# Resiliency Planning & EBCx



# Facility Expectations:



- Fully Mission Critical
- Partially Functional
- Remain Dormant

# Goals Meet Expectation?

- Prioritize Facility Resilient Goals Using CFR.
  - All Systems Necessary? Which are Critical?
  - Timeframe for Facility Use? Dormant for 1 Day, 1 Week, etc?
  - Does Functional Testing Reflect Disruption of Services?
  - Does Emergency Action / Disaster Preparedness Plan Reflect Contingencies?



# Test Expectations

- EBCx Process for Resiliency:
  - Functional Performance Testing of Critical Systems
  - Primary, Secondary & Tertiary Modes of Operation
  - Incorporate Procedures into Emergency Action Plan & TRAIN!!
  - Understand Everyone's Roles & Responsibilities

**SAFETY IS PARAMOUNT!**

# Lessons Learned = *SUCCESS*



- Everyone is a Stake-Holder (Owner, DoR, GC, Subs & CxA)
- Knowing Roles & Responsibility is *MANDATORY*
- Ambiguity is THE ENEMY
- Top-Down Instructions (CFR & EAP)
- Universal Communication
- Sustaining Mission Capability is Important

## *SAFETY!!*

# Why Existing Building Commissioning?

- Enhances Resilience Plans
- Contributes to Overall Facility Planning
- Distinct Part of Training for O&M Staff
- Reduces System “Down-Time”
- Maintains Facility Mission Readiness



# *Open Discussion & Questions*



## *THANK YOU!*

J. Woody Thompson  
woody.thompson@rsandh.com  
210-301-4819

This concludes The American Institute of Architects  
Continuing Education Systems Course

---

acg

