



FEMP Existing Building Commissioning Decision Tool

How to Use this Resource

The purpose of this tool is to guide users (Energy Management Team and O&M staff) through the process of identifying the requirements for Existing Building Commissioning (EBCx) and the approaches to consider for their buildings. This process should be applied on a building-by-building basis. There are three distinct approaches to EBCx compliance with EA2020 requirements: 1) Retrocommissioning (RCx); 2) Recommissioning (ReCx); 3) Ongoing Commissioning (OCx). Refer to page 2 for definitions, including a fourth option, Re-Tuning, not formally defined in the federal EBCx requirements. Agencies are encouraged to tailor this resource to best fit priorities and facility management goals.

There are three main activities when using the FEMP EBCx Decision Tool

1. Identify whether the facility meets all exceptions of EA2020 EBCx requirements.
2. Gather facility data to understand existing conditions to determine the best type of EBCx options that could be meet the defined activities or exemptions in EA2020.

When is EBCx Required or Recommended?

42 U.S.C 8253(f)(3)(A) requires energy managers to implement measures identified in the comprehensive energy and water evaluations and ReCx or RCx for approximately 25 percent of covered facilities not less than every 4 years. Past FEMP guidance discussed the evaluation requirement with respect to larger buildings. New and existing building commissioning may include the building envelope; heating, ventilation, and air conditioning (HVAC) systems; controls; electrical; elevators; plumbing fixtures; life safety; security; or any combinations of these systems and others. For this summary and regarding 42 U.S.C. 8253 commissioning requirements, EBCx in federal buildings focuses on the building systems that drive building energy and water use (e.g., HVAC systems and controls and other building energy and water consuming systems such as boilers and chillers).

Acronyms and Abbreviations:

AC: Air Conditioning
AFD: Automatic Fault Detection
BAS: Building Automation System
Cx: Commissioning
CBECS: Commercial Baseline Energy
Consumption Survey
DOAS: Dedicated Outside Air System
EA2020: Energy Act 2020

EBCx: Existing Building Commissioning
EMS: Energy Management System
MBCx: Monitoring Based Commissioning
OCx: Ongoing Commissioning
RCx: Retrocommissioning
ReCx: Recommissioning
VAV: Variable Air Volume
VRF: Variable Refrigerant Flow

Definitions per 42 U.S.C. 8253(f)(1)



Cx

- (A) The term “commissioning”, with respect to a facility, means a systematic process -
- ii. of ensuring, using appropriate verification and documentation, during the period beginning on the initial day of the design phase of the facility and ending not earlier than 1 year after the date of completion of construction of the facility, that all facility systems perform interactively in accordance with -
 - the design documentation and intent of the facility; and
 - the operational needs of the owner of the facility, including preparation of operation personnel; and
 - iii. the primary goal of which is to ensure fully functional systems that can be properly operated and maintained during the useful life of the facility.



OCx

- (E) The term ‘Ongoing Commissioning’ means an ongoing process of commissioning using monitored data, the primary goal of which is to ensure continuous optimum performance of a facility, in accordance with design or operating needs, over the useful life of the facility, while meeting facility occupancy requirements.



ReCx

- (G) Recommissioning means a process –
- i. of commissioning a facility or system beyond the project development and warranty phases of the facility or system; and
 - ii. the primary goal of which is to ensure optimum performance of a facility, in accordance with design or current operating needs, over the useful life of the facility, while meeting building occupancy requirements.



RCx

- (H) Retrocommissioning means “a process of commissioning a facility or system that was not commissioned at the time of construction of the facility or system.”



Re-Tuning

Re-tuning is NOT defined by 42 U.S.C. 8253(f)(1). It is a systematic process to minimize energy consumption by identifying and correcting operational no-cost or low-cost measures. Re-tuning relies on building automation system (BAS) data to identify and implement control improvements at no cost other than the time to program the changes. These low-cost or no-cost operational improvements ultimately improve the buildings’ energy efficiency, reduce operating costs, and improve occupant comfort. The re-tuning methodology is based on two basic principles: first, if equipment is not needed, turn it off; second, if equipment is not needed at full power, turn it down. Re-tuning can be applied to any building size, with the data-driven approach applying to larger buildings with BAS (e.g., greater than 50,000 square feet). The re-tuning methodology can also be applied to small buildings (less than 50,000 square feet) that lack a BAS; however, the process becomes more prescriptive in nature.

A General

Date Agency Name

Point of Contact Name POC Role


Facility Name

 Gross floor area (sq.ft.)

Building Age < 5 yrs 5-15 yrs >15 yrs

 Was the building commissioned at construction? Yes No Unknown

Is the building currently implementing one of the following?

 Ongoing Commissioning Yes No


Re-Tuning? Yes No

EMS or AFD? Yes No

50001 Ready Program? Yes No

Date of last completed effort for Comprehensive energy and water evaluation

Date of last completed effort for ReCx, RCx, or OCx

 Is a demolition or major renovation of the facility currently in progress or scheduled (e.g. funded) within the next four (4) years? Yes No

General

Exemptions

Operations

Occupancy

Energy | Systems

Controls | Special Considerations

B Exemptions per 42 U.S.C. 8253(f)(3)(B)

General

Exemptions

Operations


Occupancy



Energy

Systems

Controls

Special Considerations

-  (i) Has the building undergone a comprehensive energy and water evaluation in the past eight (8) years? Yes No
- (ii)(I) Has the building undergone Cx, RCx or ReCx in the last ten (10) years? Yes No

OR
- (ii)(II) Is the building currently under RCx, ReCx or OCx? Yes No
- (iii) Has the building had a major change in function or use change since the previous evaluation and RCx or ReCx? Yes No
-  (iv) Has the building been benchmarked with public disclosure during the preceding calendar year? Yes No
-  (v)(I) Has the building achieved 30% reduction targets compared to:

 - (aa) The date of previous comprehensive Energy and Water evaluation? or Yes No

OR
 - (bb)(AA) The date of most recent Cx, RCx, or ReCx? or Yes No

OR
 - (bb)(BB) The date on which OCx began? or Yes No

OR
- (v)(II) Does the building have a long-term contract in place guaranteeing energy savings of at least 30% since the most recent Cx, RCx or ReCx? Yes No

C Occupancy

What are is percentage of conditioned and unconditioned spaces, respectively?

What's the total number of occupants?

Has the number of occupants changed over the past 4 years?

 Yes No

? Have there been recurring occupant comfort complaints associated with certain building systems?

 Yes No

Do you plan on occupying the building for at least the next 5 years?

 Yes No

D Operations

? Are there recent long-term changes to building operations that may lead to changes in operating needs?

 Yes No

Are building staff available to participate in the EBCx process?

 Yes No

Can building staff provide commissioning?

 Yes No

Will a third party provider be required?

 Yes No

Does the building include any of the following occupancy types?

▪ Office, Education, Healthcare

 Yes No

▪ Warehouse, Storage

 Yes No

E Energy

? Has the building energy use been trending upward without a known cause? Yes No

EnergyStar Score <75 75-90 >90

? Does the facility have a higher than average EUI than buildings of similar age and function within the agency or CBECS? Yes No

F Systems

Does the building include the following HVAC systems?

- VAV, DOAS, heat recovery, central heating and/or cooling plant Yes No
- Packaged heat pumps, packaged gas/AC units, split heat pumps/AC Yes No
- VRF, makeup air systems, exhaust fans unit heaters, residential furnace, residential AC, mini-splits, window AC Yes No

Has equipment for the following building systems been replaced or updated since the last Cx, ReCx, or RCx effort?

- HVAC Yes No
- Lighting Yes No
- Controls Yes No

General

Exemptions

Operations

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Systems

Controls


Special Considerations

 Hover over the tool tip for more info

G Controls

Is a BAS or EMS present?

Yes No

 How long has the BAS or EMS been installed (years)?

1-5 5-15 15+


Is metered data available?

Yes No


Is there capability for fault detection?

Yes No

H Special Considerations

 Does the building house critical missions or critical functions?

Yes No

 Are there Spaces with special HVAC requirements

Yes No

General

Exemptions

Operations

Occupancy

Energy

Systems

Controls

Special Considerations

FEMP Existing Building Commissioning (EBCx) Decision Tool

Checklist Date:
Agency:
POC Name: Role:
Building Name: Building Age:
Building Size: EnergyStar:
Date of last Comprehensive Energy
& Water evaluation:
Date of last ReCx, RCx or OCx effort:

Recommendations

Based on your answers, the following EBCx options are applicable to your facility.

Facility meets all five EA20 Exemptions?

Primary Recommendation:

Secondary Recommendation:

Existing Building Commissioning Resources

Please note that official Energy Act 2020 Guidance is in progress and these recommendations and resources are intended to serve as starting point for documentation compliance.

FEMP Commissioning Guidance

Commissioning is a quality-assurance process used to verify that a building performs according to the original design and intent and meets the needs of the owners and occupants. Federal agencies are required to make sure building systems and equipment are commissioned in new construction and existing buildings.

The following links provide more information on Cx, ReCx, RCx and OCx.

<https://www.energy.gov/eere/femp/commissioning-federal-buildings>

<https://www.energy.gov/eere/femp/articles/commissioning-federal-facilities>

<https://www.energy.gov/eere/femp/commissioning-process-federal-facilities>

<https://www.wbdg.org/continuing-education/femp-courses/femp01>

FEMP Re-Tuning™

Our researchers have developed a Building Re-Tuning™ approach to detect energy savings opportunities and implement improvements. To put this methodology into practice, we offer resources for both large (>100,000 sq. ft.) and small (<100,000 sq. ft.) buildings as well as an online interactive training curriculum. The training provides building operators and managers, as well as energy service providers, with the necessary skills to identify and correct no- and low-cost operational problems that plague commercial buildings.

Find out more at the Building Re-Tuning Portal: <https://buildingretuning.pnnl.gov/>

50001 Ready Program

The U.S. Department of Energy's 50001 Ready program recognizes facilities and organizations that attest to the implementation of an ISO 50001-based energy management system. The program is a self-paced, no-cost way for organizations to build a culture of structured energy improvement that leads to deeper and sustained savings that does not require any external audits or certifications. 50001 Ready partners with utilities and other organizations that support and facilitate the implementation of 50001 Ready energy management systems.

Find out more about the 50001 Ready program at the Better Buildings Solution Center

<https://betterbuildingsolutioncenter.energy.gov/iso-50001/50001Ready>

FEMP Metering Guidance

The U.S. Department of Energy is required by the Energy Policy Act of 2005 to establish guidelines for agencies to meter their federal buildings for energy (electricity, natural gas, and steam) and water use. To help agencies meet their metering requirements, the Federal Energy Management Program (FEMP) provides guidance, templates, best practices, and more.

<https://www.energy.gov/eere/femp/metering-federal-buildings>

Existing Building Commissioning Resources

WBDG Commissioning Resources

<https://www.wbdg.org/building-commissioning>

<https://www.wbdg.org/building-commissioning/existing-building-commissioning>

<https://www.wbdg.org/building-commissioning/ongoing-commissioning>

https://www.wbdg.org/FFC/GSA/gsa_commissioning_guide_2020.pdf

Healthy Building Initiative

The built environment plays a major role in American lives; it is where we spend 90 percent of our time and accounts for over 40 percent of U.S. energy consumption. Traditionally, building technologies, systems, programs, and design have focused on the economic benefits from reducing energy consumption. However, recent research and efforts have sought to leverage and integrate the capabilities of buildings (i.e., residential, commercial, and federal) to improve non-energy benefits to occupants and the broader economy. In collaboration with public and private sectors, PNNL is exploring energy and health research opportunities across the building sector. This effort aims to create a cross-cutting research paradigm that uses new research, technologies, and techniques. It also leverages emerging public- and private-sector investments in health and well-being to achieve energy efficiency, resilience, and affordability goals.

Download the Energy and Health Nexus white paper to learn more.

https://www.pnnl.gov/sites/default/files/media/file/EED_0831_BROCH_HealthyBuildings_v4.pdf

Better Buildings Initiative

Better Buildings is an initiative of the U.S. Department of Energy (DOE) designed to improve the lives of the American people by driving leadership in energy innovation. Through Better Buildings, DOE partners with leaders in the public and private sectors to make the nation's homes, commercial buildings, and industrial plants more energy-efficient by accelerating investment and sharing of successful best practices.

Find out more at the Better Buildings Initiative Portal: <https://betterbuildingsolutioncenter.energy.gov/>

GSA Sustainability Plan

GSA, the government's largest civilian landlord, leads the way in green building design, construction, retrofit and sustainable operations and maintenance. Through its commitment to sustainable design, GSA pledges to serve as a forward thinking and responsible steward of our nation's economic and natural resources.

GSA tracks and reports on sustainability metrics such as energy and water intensity, greenhouse gases, and sustainable buildings, as applicable based on the specific metric, for applicable GSA-managed buildings occupied by GSA employees and federal agency tenants. Thus, GSA effectively manages and reports on energy and sustainability goals for a large percentage of Federal civilian workspace.

Download the 2020 GSA Sustainability Report and Implementation Plan to learn more.

<https://www.sustainability.gov/pdfs/gsa-2020-sustainability-plan.pdf>

GSA SF tool: <https://sftool.gov/>