



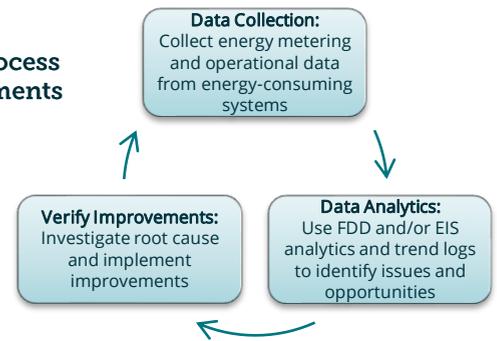
What you need to know about MBCx

What is monitoring-based commissioning (MBCx)?

Monitoring-based commissioning (MBCx) is a way to maintain and continuously improve building performance over time. MBCx can reduce building energy waste by up to 15%, improve occupant comfort, and extend mechanical equipment life, by identifying and implementing low-cost operational improvements. Through the MBCx process, operators get to know their building systems on a continuous basis using energy and performance data. The process is usually focused on HVAC and lighting system performance but can also be applied to other systems.

MBCx may be used during and after an existing building commissioning (EBCx) project to be sure that energy savings last and to look for additional opportunities. The tools that support MBCx include fault detection & diagnostics (FDD), energy information systems (EIS), and building automation system (BAS) trend logs – these tools are types of energy management and information systems, or EMIS. The graphic to the right illustrates the three main elements of MBCx, showing how tools like FDD and EIS are incorporated into MBCx.

MBCx Process Core Elements



Where do I start?

Recognizing that MBCx is not yet an everyday practice, LBNL developed an [MBCx Plan Template](#) to guide the project planning phase. The MBCx Plan Template is designed for use by building staff, e.g., an energy manager or third-party commissioning provider. Once created, the MBCx Plan drives a thorough, step-by-step MBCx process and helps internal and external team members to be fully aware of the plan and their responsibilities.

The MBCx Plan Template includes background information and key guidance around best practice concepts, with more detail in the appendices, such as the Monitoring Action Plan (excerpt below). It can be tailored to the unique needs and scope of each MBCx program.

What are the benefits of MBCx?

Existing Building Commissioning (EBCx) is a proven strategy to cut energy waste by 5-15%, and operators should repeat the EBCx process every 3-5 years to rectify performance degradation that happens over time. MBCx can prevent that performance degradation and offers two major benefits:

- Analytics software rapidly analyzes thousands of HVAC system components, enabling identification of deeper savings opportunities in a way that would not be cost-effective with manual analysis.
- When system performance drifts from optimal, analytics software catches the issue so it can be resolved before turning into problems that impact occupant comfort.

How do I implement an MBCx process?

MBCx may be managed completely in-house or with outside support. The table below illustrates options for implementing the three core elements of MBCx.

Analytics	<ul style="list-style-type: none"> • Use software from a vendor; or • Develop own EMIS by programming FDD rules and adding metering into BAS
Stay on top of your data	<ul style="list-style-type: none"> • In-house review of analytics software dashboard, KPIs & reports; or • EMIS service provider remote analysis; or • Third party commissioning authority (onsite and/or remote)
Fix issues & verify performance	<ul style="list-style-type: none"> • In-house team implements, fixes, and verifies performance improvements; or • MBCx service provider implements and verifies performance improvements

FAULT DETECTION AND DIAGNOSTICS	
Faults	FDD Tool Analysis
General Faults	
Schedules (air handling units, terminal units, chillers, boilers, pumps, cooling towers, plug and process loads, and garage exhaust fans)	Check if equipment is operating out of hours.
Manual override (air handling units, terminal units, chillers, boilers, pumps, and cooling towers)	Identify overrides that should not be in place.
Air Handler Faults	
Ventilation	Ensure that the ventilation rate is adequate. Detects if the RTU/AHU is bringing in too much outside air when not in economizer mode.
Simultaneous heating and cooling	Detect if unnecessary heating, economizer cooling, and/or mechanical cooling happen at the same time.

Who is doing MBCx?

MBCx is becoming more popular as the availability and capabilities of analytics software increases. LBNL has recognized over 20 organizations for their success with MBCx and energy management and information systems (EMIS). For example, Kaiser Permanente was recognized for using MBCx and fault detection and diagnostics (FDD) to reduce energy use by an average of 12% at seven locations. Kaiser implemented MBCx by identifying a champion for each medical campus to create a distributed team that coordinated on fault review each month. Visit the [Smart Energy Analytics Campaign Toolkit](#) to learn more about 24 MBCx success stories.