

Building Analytics Success Story

Commonwealth of Kentucky



Since a state-wide Executive Order in 2009 requiring utility data reporting, the Commonwealth of Kentucky has made energy management and the use of building data analytics the cornerstones of a comprehensive energy management program. Kentucky developed the Commonwealth Energy Management & Control System (CEMCS), a centralized repository of building data for analysis, which not only helps identify energy savings but also improves how each facility runs. In 2016 Kentucky connected 2.5 million sq. ft. of buildings to the CEMCS, which now covers over a thousand buildings totaling 20 million sq. ft.



If something goes wrong, we have the data to make the case to get it fixed and verify the result.

- Andrew Carter, CEMCS Program Manager

CEMCS Features and Benefits

The CEMCS incorporates over 188,000 trends captured from building automation systems (BAS), as well as data from 1,350 meters. Kentucky uses a combination of automated CEMCS analysis and engineer review to evaluate central plant HVAC, air handler, and individual zone data. Online reports rank energy performance at each facility by applying a score of 1–10 based on space temperatures, scheduling, and damper/valve operation. Hyperlinks connect to individual system trends for further diagnostics. Mechanical and control drawings are also loaded into the CEMCS platform.

What is MBCx?

Monitoring-based commissioning (MBCx) is an ongoing commissioning process that focuses on analyzing large amounts of data on a continuous basis to improve and maintain building energy performance and comfort.

With this comprehensive aggregation of data, Kentucky's CEMCS Program Manager can prioritize efforts and track performance parameters across the state's buildings. The CEMCS also incorporates regression-based energy models for meter data, to help track weather-normalized energy savings.

Quick Facts

Location: Kentucky (statewide)

Building types: Office, Higher Education, Healthcare, and Food Service

Gross floor area covered by EMIS: 20 million sq. ft.

Buildings with EMIS: 1,145 buildings connected to an energy information system (EIS) and 118 buildings with fault detection & diagnostics (FDD)

Energy savings: 8% savings (based on data from 136 buildings)

MBCx Service Provider:
Interval Data Systems, Inc. (IDS)

EMIS Tool: Commonwealth Energy Management and Control System (CEMCS), built on IDS's EnergyWitness platform with custom modules.

Smart Energy Analytics Campaign: Recognition for Expansion of EMIS

The Commonwealth of Kentucky was recognized by campaign partners during Smart Cities Week in October 2017, acknowledging its exemplary work to save energy through the use of an expanded EMIS.

Kentucky Energy Savings Dashboard

Welcome to the Commonwealth Energy Management and Control System (CEMCS) public dashboard. This dashboard tracks the progress of energy and cost savings initiatives for buildings throughout Kentucky.

The CEMCS is an innovative software application which is integrated to utility company billing, building automation systems and statewide accounting systems.

The data collected from these sources enables the identification of energy-saving opportunities and verification of corrective actions that reduce energy use, and thus allows the Commonwealth to operate as much as 25% more efficiently in integrated facilities.



Utility Savings

9.4%

On track to meet 2025 goal of 25%

Current energy consumption compared to historic baseline, normalized for variations in weather.



Annual Utility Cost Savings

\$4,805,265

All utilities (energy + water) compared to historic baseline, weather normalized.

Total Buildings

624

Total Square Footage

14,218,805

Total Occupants

25,571

Total Annual Utility Cost

\$27,050,829

Kentucky's EIS dashboard is used to engage the public, compare building benchmarks, and track energy and cost savings.

Key Management Practices

Kentucky uses the CEMCS to drive three key approaches to energy management:

- **Routine data review:** CEMCS analytics are reviewed weekly, with the MBCx service provider supplying recommendations for improvements.
- **Work order management:** Connection of the CEMCS to the state's work order management system supports follow-up and implementation of findings.
- **Savings tracking:** Implemented projects are displayed in the CEMCS to correlate completion with savings.

Beyond the internal management approach, Kentucky also provides a comprehensive public dashboard displaying energy consumption, costs, and savings.

Systems-Based Approach

Kentucky's analytics approach is to monitor system summary metrics, then drill down to equipment details as problems are uncovered. This approach helps avoid the overload that can happen when tracking multiple fault types across all systems in over a thousand buildings. While some buildings will need new equipment, the first goal is to optimize existing equipment and controls by improving sequences of operation and automation, and upgrading equipment when retrofits are cost-effective.

Bringing CEMCS to New Construction

Kentucky brings new construction projects into the CEMCS as early as possible, to get detailed information on how the building is running so corrective actions can be taken during the warranty period. They have also established a standard for data collection for all new BAS installation work to ensure that CEMCS data input needs are met. The standard addresses BAS points that must be trended, point naming conventions, and data collection frequency. The goal is to have a better specification leading to streamlined controls delivery, recognizing the first year of operation will shake out the problems which are identified quickly using the CEMCS.

The entire CEMCS effort has changed how Kentucky handles construction and controls implementation.

-Andrew Carter, CEMCS Program Manager

Developing a comprehensive EMIS incorporating BAS trends, meter data, a public dashboard, and connection to a work order system is a significant achievement. Now that the 2016 expansion is fully operational, Kentucky is planning further expansion of the CEMCS.

The Smart Energy Analytics Campaign is a public-private sector partnership program focused on commercially available Energy Management and Information Systems (EMIS) and monitoring-based commissioning practices.

The campaign couples technical assistance with qualitative and quantitative data collection to inform research, development, and field study priorities. Partnering participants are encouraged to share their progress and may receive national recognition for implementations that demonstrate exemplary practices.