An Introduction to the EMA Energy Management Guideline

A Comprehensive Process for Energy Management & Enhanced Building Performance

ENERGY MANAGEMENT ASSOCIATION

I INTRODUCTION

This abridged version of the *EMA Energy Management Guideline* is intended for building and facility managers, or others looking for an overview of the Energy Management Process. This rigorous, highly detailed and effective process combines sophisticated analysis of building energy usage and potential energy conservation measures with the proven methodology of commissioning.

According to the U.S. Department of Energy, residential and commercial buildings in this country account for approximately 40% of primary energy use and 70% of electricity use. Buildings use more energy than any other major sector, including the industrial or transportation sectors. Therefore, expanding and improving energy efficiency in existing buildings represents one of the most cost-effective ways to reduce energy use in the United States.

Effective energy management involves identifying and understanding where and why energy is used in a facility and using that information to measure, manage, and minimize energy consumption while meeting performance standards. The *EMA Energy Management Program* provides the steps for an energy management professional (EMP) to work closely with a client, and other members of the project team, to develop strategies to achieve energy-related goals, improve energy efficiency, and optimize building performance.

The EMA Energy Management Program is unique within the industry. The program applies energy management skills and knowledge to the commissioning methodology. The commissioning-based process follows a data-driven approach, provides all-inclusive service, and leverages the independence of the EMP to improve energy efficiency while optimizing performance.

EMA Energy Management Program

The EMA Energy Management Program is facilitated by certified EMPs who have been recognized for their technical, management, and interpersonal skills. Certified EMPs will have demonstrated these skills through both experience and education. EMPs possess a comprehensive knowledge base and the professionalism to guide a client and project team towards efficient building operations and related performance and sustainability goals. The components of the EMA Energy Management Program are tied together by four core principles:

- **Commissioning-Based Process**
  The program is unique within the industry because of its emphasis on energy management within a commissioning framework. Elements of both existing building commissioning (EBCx) and testing, adjusting, and balancing (TAB) are referenced within virtually all steps of the EMA Energy Management Process. The EMP will be involved to some extent in all of these areas during the course of a project.

- **Data-Driven Approach**
  The program specifies a commitment to raw data collection and focuses on field testing and detailed analysis rather than theoretical assumptions or general suggestions. When opportunities for building improvement are discovered, all options are considered. The EMP will only recommend those options that will help achieve the client's stated efficiency and performance goals.

- **Optimum Performance + Efficiency**
  The program addresses building energy efficiency and operations comprehensively. Most traditional approaches tend to rely on limited solutions that do not address overall building performance. The scope of the EMA Energy Management Process is broader than energy audit programs and protocols and incorporates the implementation and validation of energy efficiency and performance improvement measures. The EMP will provide services that satisfy all levels of energy audit requirements.

- **Independence**
  The program requires independence with respect to manufacturers, vendors, contractors, and other parties that could create potential conflicts of interest. The objective is to serve in the client's best interest by delivering energy savings while advancing overall system performance. The EMP will not be compensated according to performance contracting models that link service fees to energy savings, and will not sell equipment, installation, or maintenance.

  In short, building owners can have confidence that an energy management project led by a certified EMP will deliver positive results. The EMA Energy Management Process is client-driven and focused on producing energy-efficient, high-performance buildings.

EMA Energy Management Process

The EMA Energy Management Process describes the series steps and of phases supporting the EMA Energy Management Program. During this process, the EMP works closely with the client and other members of the project team to develop strategies to achieve energy-related goals, improve energy efficiency, and optimize building performance. On behalf of the client, the EMP is responsible for continually moving the project forward from one phase to the next.

The EMA Energy Management Process includes the following seven phases, each of which is explored in the following pages.

1. **Project Assessment Phase**
2. **Energy Use Exploration Phase**
3. **Site Investigation Phase**
4. **ECM/FIM and EBCx Analysis Phase**
5. **Implementation Phase**
6. **Final Acceptance Phase**
7. **Continuous Energy Management Phase**

1 PROJECT ASSESSMENT

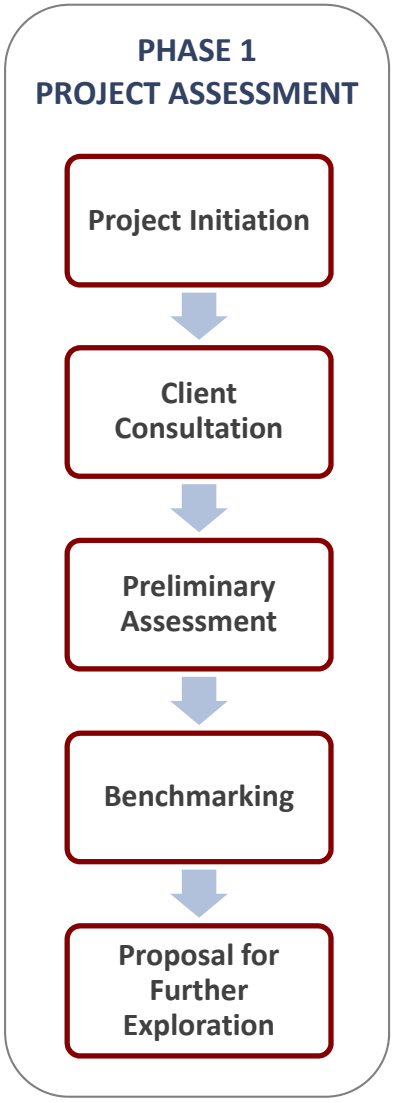
The first phase of an energy management project is Project Assessment. During this phase, the Energy Management Professional (EMP) gains valuable insight into the client's motivations for undertaking the project and works with the client to articulate goals and develop funding strategies. In addition, the EMP gathers basic information about building systems and operations, and begins to analyze energy performance relative to that of similar facilities. Benchmarking strategies are developed so that the EMP can gauge the project's savings potential and track progress towards the client's goals. This information will form the basis for more detailed analysis and investigation as the project develops.

The mission of the Project Assessment phase is:

- Launch the energy management project for a building or set of buildings.
- Hold productive meetings with the client and other team members to outline goals and instill confidence in the project.
- Conduct an initial site visit and capture preliminary data.
- Benchmark building energy performance.

The client can expect to see:

- Development of basic Project goals, objectives and performance metrics.
- Discussion of potential Project funding options.
- Overview of the observed conditions of the building and its systems, including energy benchmark with similar facilities.
- Preliminary list of potential Energy Conservation Measures (ECMs) and Facility Improvement Measures (FIMs).
- Preliminary scope for Existing Building Commissioning (EBCx).
- Proposal for Energy Use Exploration.



2 ENERGY USE EXPLORATION

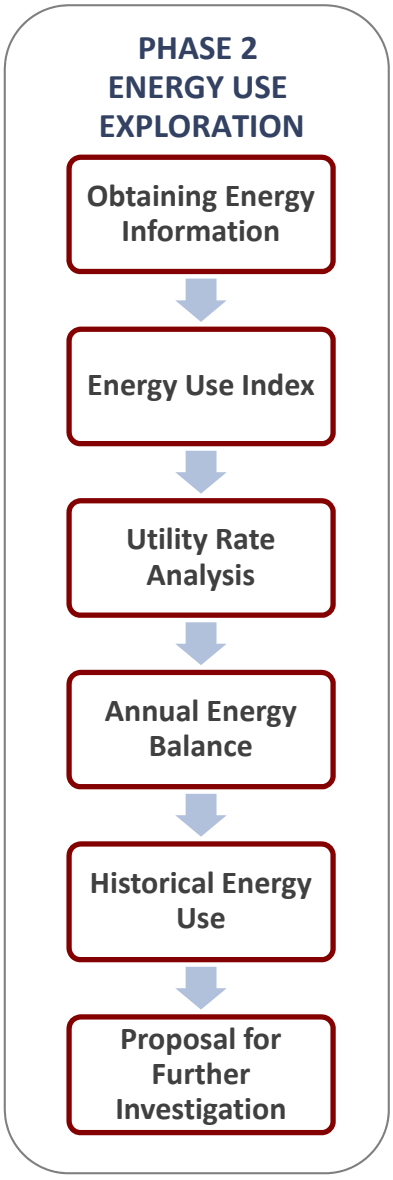
In the Energy Use Exploration Phase, the EMP combines field experience and preliminary building information with detailed data analysis and calculations. The EMP begins **energy consumption analysis**, a framework for gathering information and performing detailed analysis of the facility's historical energy consumption data. When performing ECA, the EMP uses energy use and cost data to determine utility rates for the project and create a building energy profile. The examination of historical energy consumption and costs will help the EMP further refine potential ECMs/FIMs, understand building performance, and anticipate savings potential.

The mission of the Energy Use Exploration Phase is to:

- Use energy data to determine current and historical energy consumption characteristics.
- Analyze building energy use by fuel source and building system.
- Ensure that energy usage metrics accurately account for weather, time, and changes in building operations and occupancy.

The client can expect to see:

- Overview of the historic energy use of the facility, including:
  - Calculated energy use index (EUI).
  - Utility rate analysis.
  - Balance of annual energy use for major building systems.
  - Normalized annual energy use profile.
- Updated preliminary list of potential ECMs/FIMs.
- Updated preliminary scope for (EBCx).
- Proposal for Energy Use Exploration.



3 SITE INVESTIGATION

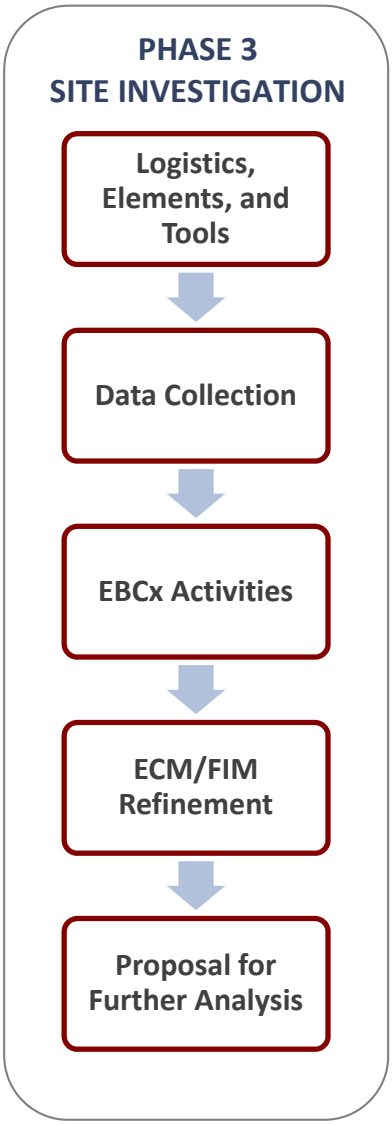
During the Site Investigation Phase, the EMP conducts one or more site visits, takes series of measurements, and strives to gain as much knowledge as possible about the project building. This new data, combined with earlier energy consumption analyses, provides the EMP with the information necessary to carefully identify ECMs and FIMS. Together with the energy analyses performed in Phase 2, this data will inform further development of ECMs/FIMs and the EBCx in the form of an Energy Plan Outline and Investment Proposal which makes a case for continuing to fund and move forward with the energy management project.

The mission of the Site Investigation Phase is to:

- Gather more detailed information about how and when building systems operate.
- Capture data regarding building occupancy and scheduling.
- Draft and refine ECM and FIM narratives.

The client can expect to see:

- Energy Plan Outline, including:
  - Summary of findings developed from data collection and investigation.
  - Refined and prioritized list of ECMs/FIMs.
  - Confidence Matrix of all potential ECMs/FIMs considered during all phases of the project assessment.
  - Refined scope for (EBCx) analysis.
  - Summary of additional Project elements.
  - Process, tools and methodology to be used for the next steps of site investigation and development of the final selected ECMs/FIMs.
- Investment Proposal for analysis and development of each selected ECM/FIM, as wells as the selected EBCx scope.



4 ECM/FIM AND EBCx ANALYSIS

After returning to the office with a variety of information collected at the project building, the EMP begins the ECM/FIM and EBCx Analysis Phase. The EMP examines in greater detail those ECMs and FIMs that are most likely to be installed, with discussion of energy savings calculations, construction costs, and the consideration of financial return. Planned EBCx tasks are also evaluated, with consideration taken for the impact EBCs will have on building operations and performance. The EMP will develop reports and metrics to help the client evaluate ECMs, FIMS, and EBCx, and the project as a whole. This final analysis sets the stage for the implementation of recommended measures.

The mission of the ECM/FIM and EBCx Analysis Phase is to:

- Produce accurate costs and savings estimates for all potential measures.
- Thoroughly assess all ECMs, FIMs, and EBCx.
- Articulate financial metrics and goals for the project.
- Provide the necessary detailed analysis for the client to make decisions regarding EBCx and ECM/FIM implementation.

The client can expect to see:

- Saving Statement.
- Implementation Schedule.
- Detailed ECM/FIM Report.
- ECM Matrix.
- Detailed EBCx Scope.
- Project Level Financial Analysis.

5 IMPLEMENTATION

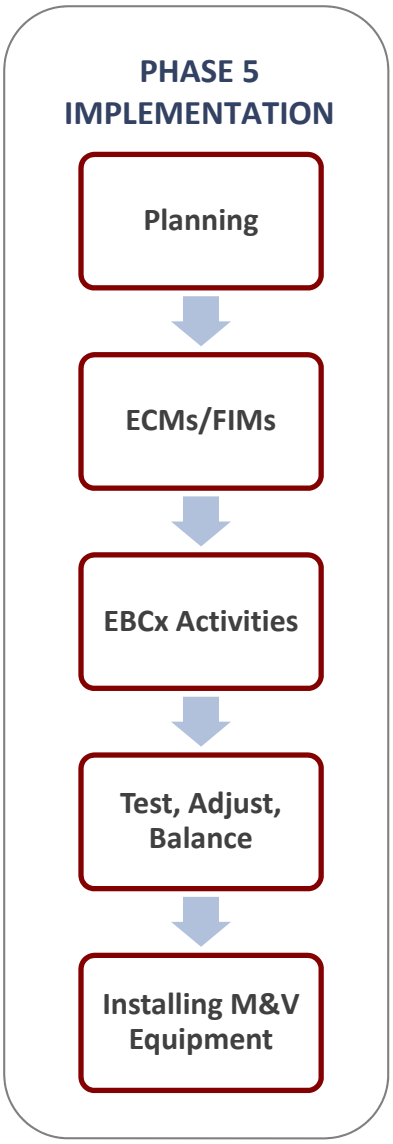
The Implementation Phase starts with final planning of ECMs/FIMs and EBCx, measurement and verification, and other initiatives. Installation follows in accordance with the plans. The EMP works closely with the client, building staff, and construction team to implement ECMs and FIMs. Following TAB activities, implementation concludes with the installation of measurement and verification (M&V) equipment, which will help ensure the installation of measures and persistence of energy savings. Additionally, the EMP must demonstrate to the client and/or building owner that ECM/FIM and EBCx implementation was effective.

The mission of the Implementation Phase is to:

- Develop effective plans that guide the installation of ECMs and FIMs.
- Implement final set of measures.
- Plan and execute commissioning activities for new and existing systems.
- Ensure that ECMs, FIMs, and EBCx are successful and satisfy the client's goals.

The client can expect to see:

- Updated/refined ECM/FIM Report.
- EBCx Plan with checklists and functional test procedures.
- Cx Plan for any new systems to be installed.
- M&V Plan.
- Design/Construction documents for ECM/FIM.
- Strategic Energy Plan.



6 FINAL ACCEPTANCE

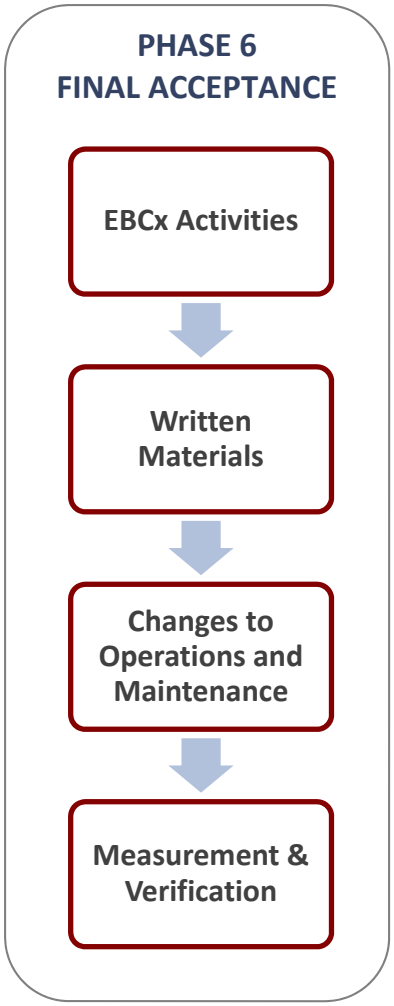
During the Final Acceptance Phase, the EMP facilitates final testing and report development for systems commissioning, develops resources for building staff, and works with the client to optimize building operations and maintenance practices. The EMP finalizes and documents commissioning activities and all changes made to building systems. The EMP works with the client to develop effective strategies for identifying issues related to building O&M and suggest staff training resources. The EMP also executes measurement and verification to ensure that ECMs and FIMs were installed properly and are operating as intended.

The mission of the Final Acceptance Phase is to:

- Complete and document commissioning activities.
- Produce useful summaries of completed retrofits and manuals describing the building in its new state.
- Update O&M procedures to reflect energy management best practices.
- Confirm through M&V that ECMs and FIMs were installed and are functioning correctly.

The client can expect to see:

- EBCx and Cx Final Reports.
- As-Built Documentation.
- O&M Manuals.
- O&M Plan.
- Systems Manual.
- M&V Implementation.
- Updated Energy Model.



7 CONTINUOUS ENERGY MANAGEMENT

The final phase of the energy management process—Continuous Energy Management—ensures that the building maintains quality performance over time. Regardless of the measures implemented during the project, a facility's performance will degrade over time and new issues may arise. Phase 7 involves planning and execution of strategies to continually enhance building energy usage, efficiency, and operations and maintenance. The EMP develops an Ongoing Commissioning Plan to ensure that measures produce the expected level of energy savings, and to routinely monitor building operations to identify any new issues. The EMP's goal is to establish energy management as an ongoing practice at the building.

The mission of the Continuous Energy Management Phase is to:

- Develop and implement an Ongoing Commissioning (OGCx) Plan.
- Use OGCx to continuously monitor energy savings from ECMs and identify problems.
- Recommend practices that will further optimize operations and maintenance.
- Establish strategies for periodic benchmarking and regular updates to energy management plans and practices.

The client can expect to see:

- OGCx Plan.
- Updated Strategic Energy Plan.
- Continuous M&V Analysis and Reporting.
- Training of Building Occupants/Staff as well as ongoing training of O&M staff.
- Benchmarking.