Pepco C&I Energy Savings Program

Full Retro-Commissioning (RCx) & Continuous Energy Improvements Commissioning (CEIC)

Program Manual

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1.0 INTRODUCTION & PROGRAM DESCRIPTION

The Full Retro-Commissioning (RCx) program is designed to promote energy efficiency, reduce electrical consumption and usage in the existing buildings. The program offers technical and financial assistance to identify and implement low cost measures, tune-ups and adjustments that improve the efficiency of buildings operating systems, with a focus on building controls and HVAC systems. The goal is to bring them to the intended operation or design specification.

Continuous Commissioning (CEIC) is an ongoing process to resolve operating problems, improve comfort, and optimize energy use in existing buildings.

2.0 PARTICIPATION REQUIREMENTS & TRADE ALLIES

The Pepco Commercial & Industrial (C&I) Energy Savings Program is for all Pepco commercial and industrial customers in Maryland. Pepco has approved a number of RCx Trade Allies (aka Service Providers) to assist Pepco customers in fulfilling the requirements for the Retro-Commissioning (RCx) Incentives. RCx Trade Allies can act as the customer’s authorized provider and therefore can submit applications on the customer’s behalf. The customer is the responsible party to the Pepco C&I Energy Savings Program. Customers wishing to use a Service Provider who is not currently recognized by the program must ensure that the Service Provider successfully completes the Pepco RCx Trade Ally Application and is approved by the Pepco Commercial & Industrial (C&I) Energy Savings Program before starting any work. CEIC Service Providers are not required to be RCx Trade Allies.

3.0 RETRO-COMMISSIONING (RCx)

A. WHAT IS RETRO-COMMISSIONING?

Retro-Commissioning (RCx) is a systematic process that optimizes energy use and overall energy efficiency in an existing building over a sustained period of time. In addition to reducing operational inefficiencies which yield energy savings, the RCx process also provides non-energy related benefits such as improved comfort, enhanced air quality, and reduced occupant complaints. The RCx incentive is designed to encourage a comprehensive review and implementation of as many improvements as possible. Retro-Commissioning consists of:

- Full Retro-Commissioning
- Continuous Energy Improvement Commissioning (CEIC)
B. OBJECTIVES OF THE RETRO-COMMISSIONING INCENTIVES

- Development and implementation of a comprehensive operation and maintenance plan that meets the business objectives and constraints of the facility owners or managers.
- To develop a comprehensive and Pepco C&I Energy Savings Program acceptable facility energy efficiency plan that includes:
  - A prioritized list of low-cost/no-cost measures that would lead to electricity savings.
  - A prioritized list of potential future capital investment projects that could lead to substantial electricity savings.
  - An education and training component for building operations personnel on how to operate the building efficiently, focusing particularly on O&M changes implemented during the Retro-Commissioning project.
  - Identification of peak load shaving options that can be implemented during peak periods.
  - Reduction of customer operating costs during peak and off-peak periods.
  - Development of a plan to educate and train the building personnel how to operate the building efficiently.
  - Documentation of findings and develop an action plan to implement recommended measures that reduce electricity usage.

C. BENEFITS OF RETRO-COMMISSIONING

The Retro-Commissioning Incentive helps Pepco’s commercial and industrial (C&I) customers:

- Determine energy usage in their facilities, identify energy-saving opportunities, and optimize the existing systems in the facility.
- Helps approved RCx Trade Allies examine all of the building’s major energy-using systems for cost-effective savings opportunities, with the primary focus on existing HVAC and control systems.

D. CUSTOMER ELIGIBILITY / TARGET MARKET

The criteria for participation in the Retro-Commissioning program are:

- High electric use intensity (per the EPA Portfolio Manager\(^1\)).
- A minimum of 75,000 sq. ft. of conditioned space.
- Building is over 2 years old (this requirement recognizes that buildings less than 2 years old may not have the requisite full year of utility data that reflect a “fully occupied” building and consistent operating pattern).
- Building has an Energy Management System (EMS).

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1 EPA Portfolio Manager: http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager#rate;
• Mechanical equipment in relatively good condition (i.e. not near end of life).
• Demonstrated management commitment to implement low-/no-cost measures.

NOTE: While all non-residential buildings are eligible for RCx, the incentive targets office buildings, hotels, hospitals, schools and universities, malls, and large retail stores.

E. ELIGIBLE MEASURES

RCx typically involves reviewing and enhancing the performance of existing energy related equipment. Examples of measures are:

• **Control System**
  Modifying a control system’s programming and perhaps adding one or more sensors and/or circuit-control devices.

• **Lighting**
  Installing a Timer Switch on Intermittent Usage Lights
  On/Off Switching with Rewiring

• **Ventilation**
  Clean/Replace Filters
  Reduce Ventilation and Exhaust Fan Operating Hours
  Tighten/Replace Belt Drives on Fans
  Interlock Exhaust Fans with Machine Operations.
  Repair/Replace/Add Insulations on Ducts
  Eliminate Duct Leakage

• **Space Cooling**
  Lower Condenser Water Supply Temperatures
  Adjust Chilled Water Supply Temperatures
  Eliminate Simultaneous Heating & Cooling
  Increase Thermostat Set-Point during Unoccupied Periods
  Repair or Addition of Chilled-Water Pipe Insulation
  HVAC Tune-Ups
  Upgrade to Enthalpy Economizer Control
  Repair Air-Side Economizer
  Service DX Units (Ensure DX Unit is fully charged with Refrigerant)
  Outdoor Air Damper Adjustment or Modification

• **Space Heating** (to the extent that electricity use is affected)
  Reduce Thermostat Set Points for Unoccupied Periods
  Adjust Discharge Air Temperature/Minimize Reheat
  Repair and/or Modify Controls on Electric Space Heater
  Repair/Replace/Add Insulation on Steam or Hot-Water Piping
  Repair/Replace Steam Valves and Steam Traps
Reduce Stem Leaks

- **Water Heating** (to the extent that electricity use is affected)
  Reduce Thermostat Set-Point
  Repair/Replace/Add Insulation on Storage Tank and Hot-Water Piping
  Configure Supply Piping to Maximize Free Pre-Heating

- **Compressed Air**
  Reduce Compressed Air System Leaks
  Install No-Loss Condensate Drains on Compressed Air System
  Install Solenoid Valves on Compressed Air Drops and Interlock with Machines
  Provide Compressed Air Storage and Lower System Pressure/ Replace Regulator Valves in Compressed Air System

- **Multiple End-Uses**
  Modify Time Clock or EMS Scheduling, Assign New Points as Necessary
  Calibrate/Replace Sensors

### 4.0 FULL RETRO-COMMISSIONING TRACK

The Full RCx track consists of four phases for a total incentive amount of $30,000 or $0.15 per square foot of building conditioned space, whichever is less. The incentive phases are:

- **Phase I - Development of a Full Retro-Commissioning Plan**
  A maximum of $4,000 or $0.02 per square foot of building conditioned space, whichever is less, not to exceed 50% of the RCx Development Plan costs. This incentive will be held in reserve for the customer until Phase II is completed.

- **Phase II - Executing the Full Retro-Commissioning Plan**
  A maximum of $12,000 or $0.06 per square foot of building conditioned space, whichever is less, not to exceed 50% of the RCx Execution Plan costs.

- **Phase III - Implementation of Full Retro-Commissioning Recommended Measures**
  A maximum of $10,000 or $0.05 per square foot of building conditioned space, whichever is less, not to exceed 50% of the RCx Implementation costs.

- **Phase IV – Continuous Commissioning**
  A maximum of $4,000 or $0.02 per square foot of building conditioned space, whichever is less, not to exceed 50% of the Continuous Commissioning costs, to ensure that measures are performing as they should.

To participate in the Full RCx program, the customer must submit an application to the Program Office for pre-approval. Pepco reviews all applications and approves or denies participation by customer at Pepco C&I Energy Savings Program sole discretion.

If the requirements of any given phase have been completed without pre-approval, the customer is not eligible for an incentive for that phase. The customer is still able to participate in a subsequent incentive phase as long as the prerequisites of the prior phase
have been met. The customer must submit the required documentation for all completed phases and apply for incentive for the subsequent phase not yet begun.

For example, if the customer has already completed a Full RCx Development Plan that meets all of Phase I requirements of the Program, the customer can submit the documentation required for Phase I for pre-approval of Phase II. Once Phase II has been pre-approved, the customer can proceed with all other remaining incentive phases.

At the end of each phase, the customer must prepare and submit a report for review and approval by the Program before an incentive payment is made.

4.1 Phase I – Development of a Full Retro-Commissioning Plan

Phase I of Full RCx requires preparation of a report that includes a preliminary audit, development of the RCx plan and the scope of work and budget for Phase II.

A. Pre-Approval Process

To receive pre-approval to begin Phase I, the customer must submit an RCx application, a copy of the Phase I proposed scope of work and projected cost for the development of the Full Retro-Commissioning Plan.

B. Full RCx Plan Development

Upon review and approval from the Program Office, the RCx Plan development begins. Elements that must be included in the Retro-Commissioning Plan are:

- Title Page and Table of Contents.
- Executive Summary of the findings.
- Introduction section, including names and contact information for the Building Owner, Building Manager, and RCx Trade Ally.
- Building and Energy Systems Description, including an equipment list and equipment capacities (e.g., tons, horsepower, amps, volts, gpm, cfm).
- Energy Baseline, Energy Star Rating, including at least 1 year (3 years preferred) of actual monthly electricity and fuel usage data.
- Operations and Maintenance Review.
- Operational Scheduling of major systems.
- Documented evidence of any energy use reductions resulting from immediate changes made in Phase I.
- A list of systems and equipment, and possible Energy Efficiency Measures (EEMs), to be investigated in Phase II. Follow ASHRAE guidelines for a Level I energy audit.
- Scope of work and budget for Phase II - Detailed Investigative Stage.
C. Final Approval for Incentive

After the plan is completed, the customer submits:

- The Final RCx Development Plan
- The invoice for the work performed,
- The signed statement that the work was completed.

Once the Program Office has received this documentation, an incentive payment is awarded and held until confirmation that Phase II requirements have been met. If the customer completes Phase I, but does not proceed to complete Phase II, the incentive award may be forfeited, at the Program’s sole discretion.

4.2 Phase II - Executing the Full RCx Plan – Detailed Investigative Stage

Phase II of Full RCx requires preparation of a report that includes the findings from an ASHRAE\(^2\) Level II energy audit\(^3\).

A. Pre-Approval Process

The approval of the Final RCx Plan from Phase I will serve as the pre-approval for Phase II. During Phase II, the scope of work identified in Phase I must be implemented. This will include extensive monitoring of the equipment parameters and engineering calculations of expected energy reductions.

B. Deliverable: Full RCx Investigation Report

Elements that must be included in the Retro-Commissioning Investigation Report are:

- Title Page and Table of Contents.
- Executive Summary of the findings.
- Introduction section, including names and contact information for the Building Owner, Building Manager, and RCx Trade Ally.
- Detailed building and energy systems description, including more accurate estimates (relative to Phase I) of the equipment usage profiles.
- Detailed operations and maintenance review.
- Documentation of O&M refresher training for facility O&M staff.
- Detailed operational scheduling of the major systems.

\(^2\) http://www.ashrae.org
\(^3\) http://mwe2.com/p-651-energy-audits.html
• Documented evidence of any energy use reductions resulting from immediate changes made in Phase II.
• A list of EEMs identified for implementation. Follow ASHRAE guidelines for a Level II energy audit:\footnote{American Society of Heating, Refrigeration and Air Conditioning Engineers - Procedures for Commercial Building Energy Audits}
  • Description.
  • Projected Costs.
  • Projected Savings.
  • Simple Payback.
  • Total of Low-Cost/No-Cost Items.
  • Total of Major Capital Items.
• Assessment of the Existing Equipment Over-Sizing and Recommendations for Right-Sizing when HVAC equipment needs replacement, including, but not limited to recommended capital items.
• Scope of work and budget for Phase III – Implementation Stage.

C. Final Approval For Incentive

To qualify for an incentive, the customer submits the completed RCx Investigation Report, an invoice for the services provided, and a signed statement that the work was completed.

4.3 PHASE III – IMPLEMENTATION OF RCx RECOMMENDED MEASURES

The approval of the Final RCx Investigation Report from Phase II will serve as the pre-approval for Phase III.

Phase III of Full RCx requires preparation of an \textbf{Implementation Plan} documenting EEMs to be implemented. Following Program pre-approval of the Plan, the findings of the Phase II study are implemented, including all low cost/no-cost measures. Finally, an \textbf{RCx Implementation Report} is prepared that documents savings expected to accrue from all the work performed.

Note: Phase III does not pay an incentive for capital measures; however other Program incentives may be available for capital project implementation.
A. Responsibilities and Deliverable: RCX Implementation Report

In Phase III, the customer must:

- Implement the findings of the Phase II study, including all low-cost/no-cost items that meet the customer’s financial criteria.
- Evaluate major capital items for future implementation, and implement those that meet the customer’s financial criteria, taking advantage of other Program Incentives, where possible.
- Prepare an RCx Implementation Report on the projects completed. Report elements must include:
  - Title Page and Table of Contents.
  - Executive Summary of the findings.
  - Introduction section, including names and contact information for the Building Owner, Building Manager, and RCx Trade Ally.
  - List of EEMs implemented, providing copies of invoices for the work performed. For each EEM implemented, provide:
    - Cost of implementation.
    - Estimated annual electricity savings and demand reductions
    - Results/documentation of training of O&M staff associated with each EEM.
  - A plan for future capital energy efficiency projects and/or an accounting of projects completed.
  - Contract with a Program approved RCx Trade Ally for commissioning of the improvements to ensure that the implementation stage has been completed properly and the energy savings continue.

B. Final Approval For Incentive

To qualify for the incentive, the customer must submit the **RCx Implementation Report**, an invoice for the services provided, and a signed statement indicating that the scope of work has been completed. Incentives in this Phase are available only for measures that reduce electricity usage and demand.
4.4 PHASE IV – CONTINUOUS COMMISSIONING

Continuous commissioning, which occurs after the initial commissioning process, helps ensure that the equipment performs at optimum levels over an extended period of time.

A. Pre-Approval Process

The approval of the Final RCx Investigation Report from Phase III will serve as the pre-approval for Phase IV.

The customer must submit:

- A copy of the continuous commissioning contract (or other methods of achieving continuous commissioning). The continuous commissioning contract must include, at minimum, two walkthrough reviews scheduled at 3 months and 6 months after the final commissioning of the implementation phase (Phase III). A report shall be provided after each review is completed, noting the observed conditions and energy performance of the improvements over time (provide trend data). The contract shall also include additional training of the Operations and Maintenance staff on the energy systems wherever electricity savings have been compromised by staff actions.

- A plan for continuous commissioning (If the customer participated in Phase III, reapplication will not be necessary, although the contract and Continuous Commissioning Plan will be required to be provided).

- One alternative method to meet the continuous commissioning requirements is participation in the Continuous energy Improvement Commissioning (CEIC) Track.
B. Deliverable: Continuous Commissioning Report

Elements that must be included in the Continuous Commissioning Report are:

- Title Page and Table of Contents.
- Executive Summary of the findings.
- Introduction section, including names and contact information for the Building Owner, Building Manager, and RCx Trade Ally.
- A detailed description of the continuous commissioning activities
- Description of training performed.
- A copy of the contract.
- Electricity savings resulting from corrective actions taken during continuous commissioning.

C. Final Approval for Incentive

To qualify for an incentive, the customer must submit the Continuous Commissioning Report and an invoice for continuous commissioning services performed.
5.0 CONTINUOUS ENERGY IMPROVEMENT COMMISSIONING (CEIC) TRACK

Continuous Commissioning is an ongoing process to resolve operating problems, improve comfort, and optimize energy use in existing buildings.

The CEIC Track consists of three (3) phases:
- Phase I – Comprehensive Energy Savings Study submission and installation of automated remote monitoring and diagnostic equipment.
- Phase II – Long-term monitoring and continuous commissioning, including recommendation of additional operation & maintenance measures.
- Phase III – Operation & maintenance measure implementation.

The CEIC application form is submitted to the Program prior to starting the CEIC Track of Retro-Commissioning. Upon pre-approval by the Program, the CEIC track can proceed.

Funding is available for the Comprehensive Energy Savings Study, which must be in accordance with ASHRAE guidelines for a Level II Energy Audit. Pre-approval is required. Visit the website for details: https://cienergyefficiency.pepco.com/EnergySavingsStudy.aspx

5.1 PHASE I - COMPREHENSIVE ENERGY SAVINGS STUDY SUBMISSION AND INSTALLATION OF AUTOMATED REMOTE MONITORING AND DIAGNOSTIC EQUIPMENT

Phase I of the CEIC Track requires submission of a Comprehensive Energy Savings Study and the use and/or installation of automated remote monitoring diagnostic equipment and controls which connect to an Energy Management System (EMS).

Customer Responsibilities and Deliverables:
- Comprehensive Energy Savings Study Requirements:
  - Title Page and Table of Contents.
  - Executive Summary of the findings.
  - Introduction section, including names and contact information for the Building Owner, Building Manager, and CEIC Service Provider.
  - Detailed building and energy systems description, including accurate estimates of the equipment usage profiles.
  - Detailed operations and maintenance review.
  - Detailed operational scheduling of the major systems.

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5 American Society of Heating, Refrigeration and Air Conditioning Engineers - Procedures for Commercial Building Energy Audits
• A listing of EEMs (including low-cost/no-cost items) identified for implementation. For each EEM provide description, projected equipment and installation costs, projected energy and utility cost savings for electricity, fuel and water, and project simple payback.

• Automated Remote Monitoring and Diagnostic Equipment Report documenting the scope of work, budget, actual costs, equipment, location(s), manufacturer, model number(s) and technical specifications.

For EEMs, it is recommended that Standard, Alternative and/or Custom Program Applications be submitted for incentive pre-approval. Visit the website for application details: https://cienergyefficiency.pepco.com/EnergySaveEB.aspx

5.2 PHASE II - LONG-TERM MONITORING AND CONTINUOUS COMMISSIONING, INCLUDING RECOMMENDATION OF ADDITIONAL OPERATION & MAINTENANCE MEASURES

Phase II of the CEIC Track requires monthly monitoring activity reporting, documentation on operation and maintenance (O&M) measures implemented. Long-term monitoring and continuous commissioning helps ensure that the equipment performs at optimum levels over an extended period of time. Identification, recommendation and implementation of additional measures will also qualify for an incentive.

Customer Responsibilities and Deliverables:

• CEIC Monthly Equipment Monitoring Report requirements:
  • Title Page and Table of Contents.
  • Executive Summary of the findings.
  • Introduction section, including names and contact information for the Building Owner, Building Manager, and CEIC Service provider.
  • Monitored Equipment Listing.
  • O&M measures identified for implementation, including type of measure, cost of implementation and annual projected savings (kW, kWh, fuel and water).
  • O&M measures implemented, including type of measure, date of implementation, cost of implementation and estimated annual savings (kW, kWh, fuel and water).
  • Cumulative listing of O&M measures recommended.
  • Cumulative listing of O&M measures implemented.
5.3 PHASE III – OPERATION & MAINTENANCE MEASURE IMPLEMENTATION

Phase III of the CEIC Track provides detailed savings calculations and costs associated with implemented O&M measures, and incentive payment. Program incentive payment requests are to be submitted quarterly.

Customer Responsibilities and Deliverables:

- CEIC Measure Implementation Report for projects completed. Report elements must include:
  - Title Page and Table of Contents.
  - Executive Summary of the findings.
  - Introduction section, including names and contact information for the Building Owner, Building Manager, and CEIC Service Provider.
  - List of O&M measures implemented, including providing copies of invoices for the work performed. For each EEM implemented, provide type of measure, date of implementation, cost of implementation (including invoicing), estimated savings (kW, kWh, fuel and water) including detailed calculation methodology and results/documentation of training of O&M staff for each measure.
  - Summary O&M measure invoice.
  - Signed CEIC workbook completion form.

NOTE: Incentives in this Phase are available only for measures that reduce electric usage or demand. The one-time incentive for each measure will be paid at a rate of $0.20 per kWh saved annually.
APPENDIX A: COMMISSIONING CERTIFICATION ORGANIZATIONS

For both the Full Retro-Commissioning for Existing Buildings Incentive and the Continuous Energy Improvements Commissioning (CEIC), the customer’s commissioning Trade Allies must be certified by one of the organizations listed below. When a customer wishes to use a non-certified Trade Ally to perform the Full Retro-Commissioning or the Continuous Energy Improvements Commissioning project, an exception to the rule may be granted *only* if (1) the proposed Trade Ally provides evidence of having completed similar commissioning projects for two or more buildings of at least 100,000 square feet (conditioned space) each, and (2) the Trade Ally submits at least two verifiable and satisfactory references from customers or clients who used the Trade Ally to complete the similar projects.

RESOURCES: Commissioning Certification
The following five organizations currently certify commissioning providers. Visit the organizations’ web sites for more information on their certification incentives and to obtain lists of certified commissioning provider

- “Certified Commissioning Professional (CCP)”: Building Commissioning Association (BCA), [www.bcxa.org/certification/index.htm](http://www.bcxa.org/certification/index.htm)
- “Certified Commissioning Provider”: Associated Air Balancing Council Commissioning Group (ACG), [www.acgcommissioning.com/membershipcertification](http://www.acgcommissioning.com/membershipcertification)
- “Accredited Commissioning Process Provider”: University of Wisconsin at Madison (UWM), [http://epdweb.engr.wisc.edu/courses/index.lasso](http://epdweb.engr.wisc.edu/courses/index.lasso) (use link to Building Systems and Construction to find certification training)
- “Systems Commissioning Administrator”: National Environmental Balancing Bureau (NEBB), [www.nebb.org/bsccertif.htm](http://www.nebb.org/bsccertif.htm)
- “Certified Building Commissioning Professional (CBCP®)”: Association of Energy Engineers (AEE), [www.aeecenter.org/certification](http://www.aeecenter.org/certification)

Source: the EPA website:
HTTP://WWW.ENERGYSTAR.GOV/INDEX.CFM?c=BUSINESS.EPA_BUM_CH5_RETROCOMM#S5_S_5_2_3