

## Including Retro-Commissioning In Federal Energy Saving Performance Contracts

Retro-commissioning generally reduces operating and maintenance costs, improves building occupant comfort, and meets changing operational needs. When retro-commissioning (retro-Cx) is partnered with an energy saving performance contract such as Super ESPC, which focuses on equipment replacement and other capital improvements, a facility can greatly improve overall operations and dramatically reduce operating costs.

Including retro-commissioning in Federal performance contracting projects can provide substantial benefits. Retro-Cx can shorten the contract length of an ESPC by maximizing the project's cost savings. Retro-Cx activities commonly discover low-cost energy saving measures that may have otherwise been overlooked. Generally, retro-commissioning requires data logging of equipment operations, which provides additional documentation of the pre-retrofit baseline conditions and contributes to more robust M&V.

A project implemented at a large Federal facility in Atlanta is one retro-commissioning success story. A retro-commissioning project implemented for a total cost of about \$120,000 will generate annual cost savings of approximately \$250,000. Had this measure been included in the average Federal ESPC project (\$3.1 million initial investment, 14 year contract) it would effectively shortened the project's overall simple payback by more than 5 years.

When including retro-commissioning with other facility retrofits a graded approach should be used to determine the appropriate scope of retro-commissioning activities. An example scope of work for retro-commissioning has been developed for use in Federal ESPC projects. This *Example Retro-Commissioning Scope of Work* provides a comprehensive scope of work that can be modified for use in individual projects, and is available through <http://ateam.lbl.gov/mv/>.

### ESPC

#### *Energy Saving Performance Contract*

Examples of Federal ESPC contract mechanisms include the Department of Energy's Super ESPC and UESC contracts. The Air Force and Army also have similar contract mechanisms.

### ESCO

#### *Energy Services Company*

### Commissioning

Commissioning is a process for achieving and verifying performance of building systems. Typically, commissioning is a part of any new or retrofit construction project. The purpose of commissioning is to ensure systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in compliance with the design intent. More information on commissioning is available at <http://www.eere.energy.gov/femp/techassist/bldgcomgd.html>.

### Retro-Commissioning

Retro-Commissioning (Retro-Cx) is the commissioning of existing building systems to meet current building operating criteria. The retro-Cx process systematically reviews the condition of building systems and returns equipment that has fallen out of desired operating parameters back into appropriate tolerances. Retro-commissioning is the process of optimizing an existing building's operation and maintenance through the implementation of low-cost and no-cost improvements, and does not involve equipment replacement.

Retro-Cx focuses on energy using equipment such as mechanical systems, controls, and sometimes lighting. These systems are functionally tested and adjusted to meet the current needs of the building. In addition to adjusting for changing building criteria or operational goals, retro-Cx can also provide updated maintenance requirements for building systems. For additional information see "A Practical Guide for Commissioning Existing Buildings" by PECE and ORNL available through <http://eber.ed.ornl.gov/commercialproducts/retrocx.htm>.

## Timing of Retro-Cx within the ESPC Process

Conducting retro-commissioning as part of a Federal ESPC process can be accomplished in a variety of ways, depending on the conditions present at the facility, the availability of funding, and the preferences of the Agency. The most likely scenario for incorporating retro-Cx into the FEMP Super ESPC process is outlined below. Comprehensive explanations of the steps for implementing retro-Cx in a Super ESPC are included in the *Example Retro-Commissioning Scope of Work*. Although the Super ESCP process is detailed, a similar procedure will apply to other Federal performance contracting mechanisms.

### Initial Proposal (IP) Phase

The Agency should inform the ESCo of their interest in retro-commissioning at the initial project kick-off meeting prior to beginning the preliminary site survey for the Initial Proposal. The ESCo would then gauge the level of retro-commissioning opportunities at the site and report these in the Initial Proposal. The Agency should consider providing the *Example Retro-Commissioning Scope of Work* to the ESCo for modification and inclusion in the Initial Proposal.

### Detailed Energy Survey (DES) Phase

The most effective way to determine retro-Cx opportunities is to identify opportunities in conjunction with building system measurements for baseline determination. Intent to proceed with the DES from the Agency should include clear instructions to the ESCO to include retro-Cx activities (see *Example Retro-Commissioning Scope of Work*). This will ensure audit costs associated with the identification of retro-Cx projects will be recoverable as a part of the project development costs, even if the energy conservation measure (ECM) is not implemented. After scoping, the cost savings and implementation costs for viable retro-Cx measures are included as an ECM.

### **ECM Implementation**

Energy saving retro-Cx measures identified can be established as an ECM. The project baseline would be unaffected by the retro-Cx activities. Savings from the retro-Cx measures are attributed to the project, and implementation costs are included in the total contract cost.

### **Performance Period**

Measurement and verification activities should include provisions to ensure the permanence of the savings during the performance period. Inclusion of ongoing retro-Cx services or periodic system check-ups as part of M&V activities will help ensure the persistence of the savings generated, and can be funded by the annual savings of the ECM bundle.

### **Measurement & Verification of Retro-Cx**

Measurement and verification strategies for retro-Cx projects must be developed on a project-by-project basis. In general, the energy savings from retro-commissioning measures can be determined using typical M&V strategies, such as developing calibrated engineering models of the affected systems. Accounting for savings generated from retro-Cx will be dependent on the scope of the retro-Cx work, as well as the M&V strategies chosen for other ECMs.

In some cases, the modifications made during retro-Cx activities may be reversed over time by building occupants and maintenance staff. The persistence of the changes can be addressed through checking performance benchmarks, conducting periodic tune-ups, or a more aggressive commissioning approach. This ongoing commissioning effort will improve building performance by optimizing building systems through ongoing tracking and adjustment of systems rather than a one-time fix. Typically, systems are benchmarked through measurements, and continuous monitoring is used to ensure the systems continue to operate as expected.

### **Pricing & Payment for Retro-Cx**

The cost of retro-Cx is dependent on the scope of work and must be negotiated on a project-by-project basis. Including retro-Cx activities as part of the detailed energy survey (DES) will increase the cost of the survey. Developing a detailed scope of work and a fixed price for this work is important to eliminate risk to the Agency and the ESCo. Including a detailed scope of work in the Initial Proposal eliminates ambiguity in the retro-Cx work to be performed. Establishing a fixed price for the entire DES ensures that the incremental cost for these retro-Cx services will be covered as a part of the development costs for the overall project, whether or not viable measures are identified and ultimately implemented.

### **Other Key Issues**

Other important items to consider, discuss, and agree upon when including retro-Cx with a Federal performance contract are outlined below.

- Determine the level of retro-commissioning services desired and identify the systems / equipment to be included in retro-Cx.
- Establish the level of involvement of facility staff and other contractors in initial retro-Cx scoping activities.
- Develop appropriate M&V strategies, including assessing the need for periodic tune-ups or a continuous commissioning approach.
- Ascertain the level of occupant and staff training needed.
- Assign on going service responsibilities.