



**SEE Action**  
STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

## Retro-Commissioning for Regulators of Ratepayer-Funded Programs

### What is Retro-Commissioning?

Retro-commissioning (RCx) is a systematic process for identifying and improving less-than-optimal energy performance in an existing building's equipment and control systems. The intent is for existing systems to work as efficiently as designed. This evaluation and fine-tuning process can be implemented as a one-time intervention, frequent "re-tuning,"<sup>1</sup> or ongoing "continuous commissioning"<sup>2</sup> to ensure that the energy savings persist. Utility regulators can require electric and gas utilities to include RCx as a cost-effective element of their energy efficiency program portfolios.

### Why Encourage Retro-Commissioning?

The energy consumption of commercial buildings comprises nearly half of total building energy use and roughly 20% of total energy consumption and greenhouse gas emissions in the United States.<sup>3,4</sup> At a cost far less than \$1 per square foot (ft<sup>2</sup>) (normalized median cost of \$0.30 per square foot, according to a 2009 study)<sup>5</sup> and typical payback in slightly more than 1 year,<sup>5,6</sup> RCx can be a highly cost-effective energy- and emissions-reduction strategy. Its applicability spans many building types (e.g., offices, schools, hospitals), project-level energy savings are 10% to 20%,<sup>5,6</sup> and the benefit-cost ratio is about 4.5.<sup>5,6</sup> Retro-commissioning can improve the cost-effectiveness of energy efficiency program portfolios. If utility programs treat RCx as a cost-effective initial step, then customers that participate in RCx programs later could consider equipment-replacement projects, continuous improvement programs, and other elements of a well-rounded energy-management program.

### Who is Affected?

Retro-commissioning policies and programs can affect key stakeholders:

- Public and private building owners can practice RCx.
- Interest groups that represent property owners and managers, tenants, and energy service providers can help educate customers.
- Utility companies can provide customers access to their energy-usage data and can provide technical and financial assistance for customer RCx projects.
- Organizations serving energy professionals can provide training, certification, and other credentialing services.
- State and local governments can implement RCx in public buildings and create policies that encourage RCx in the private sector.

### How Does It Work?

Utility regulators can require utilities to offer RCx programs along with other customer efficiency programs to support cost-effective energy performance improvement over time. Regulators must understand the program model in which RCx is carried out so that energy savings can be effectively attributed to the program and the regulatory body can feel confident in approving such programs.

### Key Points

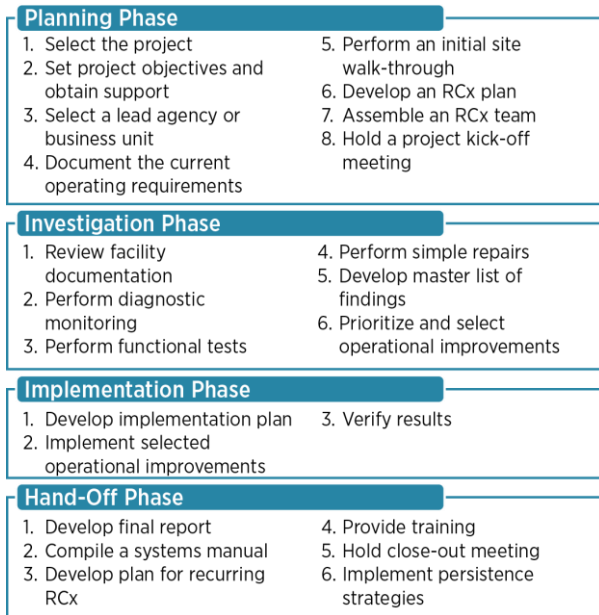
- Retro-commissioning is a process for "tuning up" a building's equipment, making it work as efficiently as possible. It can be a highly cost-effective energy-reduction strategy.
- Utility regulators can require utilities to offer retro-commissioning programs along with other customer efficiency programs to support cost-effective energy performance improvement over time.
- Key implementation issues regulators can resolve include measurement and verification of savings, lifetime of savings estimates, and linking retro-commissioning to other programs.

### About SEE Action

*The State and Local Energy Efficiency Action Network (SEE Action) is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020.*

### About the Working Group

*The working group is comprised of representatives from a diverse set of stakeholders; its members are provided at [www.seeaction.energy.gov](http://www.seeaction.energy.gov).*



**Figure 1. Overview of a typical RCx process**

Source: Adapted from

California Department of General Services,  
California Commissioning Guide, 2006

## Implementing Retro-Commissioning Programs

Key issues to be resolved by utility regulators include:

- Measurement and verification of savings
- Lifetime of savings estimates
- Linkage of RCx to other utility programs.

Understanding these fundamentals and knowing how other states and utilities have approached RCx provides a stronger basis for confidently including RCx in utility program portfolios.

Regulators can take steps as they consider ratepayer-funded RCx programs:

1. **Consult stakeholders.** In states where RCx is an emerging topic, regulatory bodies can create stakeholder working groups and hold informal hearings or workshops. These forums can provide a quick way to get stakeholder input, begin forming consensus around program design principles, and gain support from key parties. Key stakeholders can include the following.
  - **Real estate owners and managers.** Most states have an association or other network representing these key stakeholders.
  - **Tenant organizations.** As a primary beneficiary of RCx, tenants can build support for the program and ensure that the program design serves user needs.

- **Energy service experts.** Engineers, consultants, contractors, and building service firms are key stakeholders in performing RCx studies and efficiency upgrade projects. They can provide support for policy and can help educate clients.

- **State and local governments.** Agencies might have enacted RCx or similar policies that can benefit from ratepayer-funded technical and financial-assistance programs.

2. **Develop and design evaluation criteria.** Utilities might need guidance from regulators on the key elements—such as definitions, technical protocols, and professional accreditation methods—that should be included in RCx program design. Evaluation methods also should be clarified before any programs are designed. This enables program planners to create programs that permit the preferred evaluation approach to work.

One of the key issues related to savings attribution, for example, is the number of years over which energy savings will be recognized. Because the building is “tuned up” rather than having equipment replaced, future savings sometimes are discounted based on the assumption that building operations could revert to previous less-efficient operating practices. As a working approach, some states use annual verified savings methods for attributing program impacts, although this can add to costs.

3. **Coordinate retro-commissioning with other programs and policies.** If, for example, a state or local government is considering benchmarking, then coordinating RCx programs with the appropriate agencies can help both programs work better. Retro-commissioning can be an effective way to identify energy savings opportunities for building owners and managers when benchmarking identifies underperforming buildings.
4. **Support training and workforce development.** Although program administrators might take the lead in designing and managing RCx programs, regulators can help by requiring training and accreditation efforts to be included as key parts of the program design. In some cases, the tendency is to limit program costs to only those items that directly provide customer benefits. Workforce development, however, is a key “infrastructure” issue that can make or break such programs, and directly impacts their success. Consider requiring that RCx be performed by a qualified commissioning authority with the knowledge,

skills, and abilities described in the national Job/Task Analysis for Commissioning Authorities, currently under development.<sup>7</sup>

5. **Oversee implementation and learn from evaluation.** Regulators are encouraged to review existing evaluation reports during the program approval phase. As with many program innovations, gaining the full benefits could involve a learning curve. Regulators should expect improved results over time, even if startup issues limit immediate impacts. Multiyear program funding approvals can help address this issue.

### Example Policies and Programs

#### Pacific Gas and Electric<sup>8</sup>

**Affected Property Types:** Nonresidential buildings with 100,000 ft<sup>2</sup> or more of conditioned space that consume 2 million kilowatt-hours (kWh) or 50,000 therms or more per year.

**Key Requirements:** Provides customer incentives based on annual energy savings achieved and peak demand reduction for efficiency measures identified through RCx. Uses the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® measurement and tracking tool—Portfolio Manager—to screen projects with the most cost-effective energy-savings potential and to monitor progress over time.

Requires customers to complete identified measures with a simple payback of 1 year or less or \$25,000 (whichever is less). Targets specific sectors (e.g., healthcare, school districts) with customized information and support.

#### CenterPoint Energy<sup>9</sup>

**Affected Property Types:** Nonresidential buildings with 150,000 ft<sup>2</sup> or more of conditioned space and that have greater than average energy consumption.

**Key Requirements:** Provides customer incentives based on annual energy savings achieved and peak demand reduction for efficiency measures identified through RCx. Offers a “fast-track” option for customers with smaller buildings.

Requires customers to join the Houston Green Office Challenge ([www.houstongoc.org](http://www.houstongoc.org)) and commit to participating in Houston's Energy Efficiency Incentive Program. Requires customers to complete identified measures totaling at least \$10,000 and that include a simple payback of 3 years or less.

### Complementary Policies/Programs

Retro-commissioning is one part of an effective suite of building energy efficiency policies, and utility program regulators should look at RCx in this broader context. Regulators can consider requiring utilities to include benchmarking services, energy audits, technical assistance, and financial incentives so that RCx provides maximum leverage not only for directly saving energy, but also for encouraging other building upgrades over a longer period. For access to SEE Action resources on related topics, such as energy audit programs, strategic energy management programs, and benchmarking and disclosure programs, visit [www.seeaction.energy.gov/existing\\_commercial.html](http://www.seeaction.energy.gov/existing_commercial.html).

### Other Resources

These resources provide more information on implementation of RCx programs and policies.

*California Commissioning Guide: Existing Buildings.*  
[www.documents.dgs.ca.gov/green/commissioningguideexisting.pdf](http://www.documents.dgs.ca.gov/green/commissioningguideexisting.pdf)

*California Retro-Commissioning Fact Sheet.*  
[www.documents.dgs.ca.gov/green/eeproj/retrocommfactsheet.doc](http://www.documents.dgs.ca.gov/green/eeproj/retrocommfactsheet.doc)

CenterPoint Energy, Retro-Commissioning Program Website. [www.centerpointenergy.com/services/electricity/business/energyefficiencyprograms/retro-commissioning/](http://www.centerpointenergy.com/services/electricity/business/energyefficiencyprograms/retro-commissioning/)

Consortium for Energy, *Efficiency Summary of Commercial Whole Building Performance Programs.*  
[www.cee1.org/files/WBCEI&EMISProgSumm.pdf](http://www.cee1.org/files/WBCEI&EMISProgSumm.pdf)

New York State Energy Research and Development Authority, *Guideline to the Commissioning Process for Existing Buildings, or “Retro-Commissioning.”*  
[www.nysersda.org/programs/pdfs/retrocxhandbookfinal040704.pdf](http://www.nysersda.org/programs/pdfs/retrocxhandbookfinal040704.pdf)

Oregon, *Retrocommissioning Handbook for Facility Managers.* [www.oregon.gov/ENERGY/CONS/BUS/comm/docs/retrocx.pdf](http://www.oregon.gov/ENERGY/CONS/BUS/comm/docs/retrocx.pdf)

Pacific Gas and Electric, Retro-Commissioning Program Website. [www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/retrocommissioning/](http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/retrocommissioning/)

U.S. Environmental Protection Agency, ENERGY STAR Portfolio Manager.  
[www.energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)

U.S. Environmental Protection Agency, National Action Plan for Energy Efficiency.  
[www.epa.gov/cleanenergy/energy-programs/suca/resources.html](http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html)

U.S. Environmental Protection Agency, Rapid Deployment Energy Efficiency Toolkit.  
[www.epa.gov/cleanenergy/energy-programs/suca/rdeetoolkit.html](http://www.epa.gov/cleanenergy/energy-programs/suca/rdeetoolkit.html).

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[www.pnl.gov/buildingretuning](http://www.pnl.gov/buildingretuning).
- <sup>2</sup> Mills, E.; Mathew, P. *Monitoring-Based Commissioning: Benchmarking Analysis of 24 UC/CSU/IOU Projects*. LBNL-1972E. Berkley, CA: Lawrence Berkeley National Laboratory. June 2009.  
<http://cx.lbl.gov/MBCx.html>.
- <sup>3</sup> U.S. Department of Energy. *Buildings Energy Data Book*, Chapter 3. March 2011.  
<http://buildingsdatabook.eren.doe.gov/ChapterIntro3.aspx>.
- <sup>4</sup> U.S. Environmental Protection Agency. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2009*. Table ES-8. April 2011. [www.epa.gov/climatechange/emissions/usinventoryreport.html](http://www.epa.gov/climatechange/emissions/usinventoryreport.html).
- <sup>5</sup> Mills, E. *Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions*. Berkley, CA: Lawrence Berkeley National Laboratory. July 21, 2009.  
<http://cx.lbl.gov/documents/2009-assessment/LBNL-Cx-Cost-Benefit.pdf>.
- <sup>6</sup> “Commercial Building Retro-Commissioning Revenue Could Surpass \$1.8 Billion in the United States by 2014.” March 24, 2011. [www.pikeresearch.com/newsroom/commercial-building-retro-commissioning-revenue-could-surpass-1-8-billion-in-the-united-states-by-2014](http://www.pikeresearch.com/newsroom/commercial-building-retro-commissioning-revenue-could-surpass-1-8-billion-in-the-united-states-by-2014).
- <sup>7</sup> “National Workforce Guidance Overview  
[www.buildings.energy.gov/workforce.html](http://www.buildings.energy.gov/workforce.html).
- <sup>8</sup> Pacific Gas and Electric. 2011. [www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/retrocommissioning](http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/retrocommissioning).

<sup>9</sup> CenterPoint Energy. 2011.  
[www.centerpointenergy.com/services/electricity/business/energyefficiencyprograms/retro-commissioning](http://www.centerpointenergy.com/services/electricity/business/energyefficiencyprograms/retro-commissioning).

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