

# White Paper: Retrocommissioning Your Building for Savings



Retrocommissioning Services &  
Incentives Program

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## Why Retrocommissioning?

Commercial buildings frequently undergo operational and occupancy changes that challenge the mechanical, electrical, and controls systems and the building staff. Additionally, today's complex buildings have highly interactive systems with sophisticated controls. Increased need for system integration results in a trickle-down effect on building operations – small problems can have big impacts on performance and costs.

To better manage these issues, building owners and managers need a customized process to assess building energy costs and tenant comfort – going beyond a set of prescriptive operational tune-up or maintenance measures.

Retrocommissioning does just this by looking at *how* and *why* a building's systems are operated and maintained as they are, and then identifying ways to improve overall building performance. Retrocommissioning also helps owners maintain their competitive advantage in the marketplace by reducing costs, enhancing property value, helping promote tenant satisfaction, and by helping owners promote a more sustainable facility through their reduced energy usage and reduced greenhouse gas emissions.

## Goals of Retrocommissioning

By definition, retrocommissioning (RCx) is a systematic process that focuses on the *operation* of mechanical equipment, lighting, and related controls and it is intended to optimize how equipment operates as an integrated system. Retrocommissioning is increasingly recognized as a fast and cost-effective way to identify operational improvements, achieve energy savings, and improve occupant comfort in existing buildings.

Common reasons for building owners and managers to undertake retrocommissioning projects are to:

- **Reduce operating costs.** Retrocommissioning projects can produce savings of 5-20% of total building energy costs, with a simple payback from energy savings alone averaging less than 2 years.
- **Protect or enhance property value.** Reducing operating costs can increase net operating income (NOI) and increase a property's asset value. Even where cost reductions primarily benefit tenants, the process helps maintain high occupancy rates and reduce tenant turnover, and enables an owner to maintain more aggressive lease rates.
- **Improve occupant comfort and protect against future liability.** Building owners can use retrocommissioning to identify and address problems that may lead to future liability. A building's indoor environmental quality affects the health, comfort, and productivity of its occupants.
- **Reduce repair and replacement cost.** Retrocommissioning improves system performance and often results in equipment that lasts longer, requires fewer repairs, and uses less energy.

## Benefits of Retrocommissioning

### *Take Control of Costs and Improve Your Bottom Line*

Often, the payback on an investment in retrocommissioning is under one year, the process secures better and longer performance of existing equipment, and the benefits reach far beyond energy savings. If this is true, why aren't all building owners adopting a retrocommissioning strategy?

The answer may be that in many business environments, putting money into a building to increase operating efficiencies is not a high priority because energy expenses are often considered an unavoidable cost of doing business, or owners do not realize that their energy bills are higher than they should be. However, the reality is that the majority of buildings can operate at the same or improved levels of comfort and function for less money. Retrocommissioning addresses this inefficiency by reducing operating costs through low cost investments with high rates of return.

### Reduced Utility Costs

Significant direct cost savings in electricity and natural gas expenses often result from a retrocommissioning process. A 2004 study aggregated retrocommissioning results from 100 buildings and found electricity savings ranging from 5-15% with payback periods ranging from three months to just over two years. Median energy savings were approximately \$45,000 per building (\$2003), and ranged as high as \$1.8 million.<sup>1</sup>

One of the most attractive aspects of retrocommissioning is the short-term payback typically associated with these projects. Significant reductions in energy and utility bills are often achieved through minimal investment and often by making relatively simple changes in the control system.

### Increasing NOI and Asset Value of Income-Producing Properties

Energy-focused improvements that decrease expenses and increase revenues can raise a property's asset value, even in cases where property turnover is quick. Savvy real estate investors understand that increasing their net operating income (NOI) through retrocommissioning is a cost-effective way to raise asset value. Operating expense savings captured by the owner will drive NOI higher, which in turn supports a higher appraised value of the building. Appraisal value is not only important when a building is sold; it is also important for owners wishing to leverage the property's accumulated equity<sup>2</sup>.

Retrocommissioning can also increase NOI and rental revenues when:

- Improved tenant comfort allows the building owner to raise rents (or stabilizes rents during a down cycle in the leasing market).
- Occupancy improves (or is maintained in a very competitive leasing environment).

Combined with the operating cost savings realized from optimizing the building's mechanical systems, one can easily appreciate the impact that a higher NOI has on higher asset value.

### *Increase Your Competitive Advantage*

More and more building owners are strategically pursuing the business opportunities of energy efficiency. Consumer demand for energy-saving products and services is on the rise, and early actors are increasingly recognized and rewarded for their efforts. Optimizing building performance through retrocommissioning can thus be seen as part of a larger business strategy as the owner seeks to lower their greenhouse gas emissions and leverage their sustainability as a competitive advantage in the growing green marketplace. Retrocommissioning is directly linked to several sustainable building initiatives, as described in detail below.

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<sup>1</sup> Mills, E., H. Friedman, T. Powell, N. Bourassa, D. Claridge, T. Haasl, and M.A. Piette. 2004. The Cost-effectiveness of Commercial-buildings Commissioning. Lawrence Berkeley National Laboratory. <http://eetd.lbl.gov/emills/PUBS/PDF/Cx-Costs-Benefits.pdf>. (Figures are in 2003 dollars.)

<sup>2</sup> Jewell, Mark. 2004. Understanding the Value of Commissioning in Income-Producing Office Buildings. Proceedings of National Conference on Building Commissioning, Portland Energy Conservation, Inc.

## Retrocommissioning and U.S. EPA's ENERGY STAR®

The U.S. Environmental Protection Agency (EPA) ENERGY STAR Commercial program is built around the principle that effective energy management is good for business as well as the environment. Over 7,000 organizations are ENERGY STAR partners and are working with EPA to improve whole building performance.

Retrocommissioning is an important part of addressing the main focus of ENERGY STAR's concept of *whole building performance*. Buildings earning the ENERGY STAR have been benchmarked with the EPA's Energy Performance Rating System and been shown to perform in the top 25<sup>th</sup> percentile when compared to similar buildings. By determining pre- and post-retrocommissioning project ENERGY STAR benchmarks, an ENERGY STAR benchmark can be used as an indicator of success and may help the building earn an ENERGY STAR.

As of early 2006, more than 2,500 buildings, totaling 482 million square feet of commercial space, had earned an ENERGY STAR. The EPA estimates that these high-performing buildings – offices, schools, hospitals, and public buildings – are saving \$349 million dollars annually through lower energy bills<sup>3</sup>.

## Retrocommissioning and Leadership in Energy and Environmental Design (LEED™)

Retrocommissioning and the ENERGY STAR rating are both a part of LEED, which goes beyond energy performance and addresses a larger strategic opportunity for businesses. LEED is a series of green building rating systems developed by the U.S. Green Building Council (USGBC). LEED for Existing Buildings (LEED-EB) is applicable to building operations, processes, system upgrades, and minor space changes, and can be used by buildings new to LEED certification, or as a recertification vehicle for buildings that have previously achieved a LEED rating.

Existing buildings seeking LEED-EB certification are required to provide documentation that a retrocommissioning process (meeting the LEED-EB Rating System guidelines) has been completed at the facility, or provide a five-year plan for completing the process. Buildings seeking LEED-EB certification must also demonstrate that the building has achieved an EPA Energy Performance Rating of at least 60 or the ENERGY STAR's energy performance equivalent. The LEED-EB guidelines also contain several retrocommissioning related credits that may be incorporated to earn "additional certification points," such as credits for monitoring energy performance and reducing overall energy use, and supporting operations and maintenance plans and providing staff education.<sup>4</sup>

## Retrocommissioning for Leaders in Energy Efficiency

Several industry trade groups have identified the important role that energy efficiency plays in the competitive marketplace for office buildings, hotels, hospitals, and other commercial facilities:

- The Building Owners and Managers Association (BOMA) has partnered with the ENERGY STAR program to create BOMA Energy Efficiency Program (BEEP), an operational excellence program. BEEP is an initiative designed to educate the commercial real estate industry about low-cost energy saving opportunities, set an industry standard, and establish best practices for operational excellence. It does this through a strategic approach to energy management that optimizes financial performance. BEEP also seeks to recognize the successes of program participants by documenting energy-saving efforts and communicating with the industry and stakeholders<sup>5</sup>.

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<sup>3</sup> More details on eligibility are available on the ENERGY STAR® website at <http://www.energystar.gov>.

<sup>4</sup> More information about the LEED Rating Systems can be found on the U.S. Green Building Council's Web site at <http://www.usgbc.org>.

<sup>5</sup> More information about BEEP can be found on the BOMA Web site at <http://www.boma.org>.

- One of the industry's largest commercial real estate research organizations, the CoStar Group, will begin adding the EPA ENERGY STAR rating to its listings in 2007, providing another venue for owners seeking to leverage their properties' energy and environmental performance. The CoStar group already highlights LEED-certified commercial properties, of which there are more than 200 properties in the CoStar database<sup>6</sup>.
- The American Hospitality and Lodging Association, in partnership with the EPA, recently hosted a series of "Energy Innovation" web-based seminars (webinars) that focused on steps a property can take to improve its efficiency and financial performance<sup>7</sup>.
- The American Society for Healthcare Engineering (ASHE) of the American Hospital Association (AHA) has also partnered with EPA to create the ASHE Energy Efficiency Commitment (E<sup>2</sup>C). E<sup>2</sup>C provides a forum for members to share ideas, data, strategies, tools, and success stories to help each other improve operations<sup>8</sup>.

As with ENERGY STAR and LEED programs, participation and involvement in industry-recognized programs can help building owners position themselves as business leaders and distinguish themselves in a competitive business environment. Resources for building owners and operators wishing to make an investment in energy efficiency are only increasing, and there has never been a better time or better reason to learn more about what role retrocommissioning can play in your team's energy management strategy.

### *Improve Tenant Comfort and Satisfaction*

Other benefits beyond reduced energy costs can be realized through a retrocommissioning process. In an analysis of commissioning project results, more than half of building owners reported benefits that went beyond energy savings<sup>9</sup>. Extended equipment lifetime and improved indoor thermal comfort were the most prevalent. Other retrocommissioning benefits included improved indoor air quality, first-cost reductions, labor savings, improved productivity/safety, fewer change orders and warranty claims, and liability reduction.

Attracting and retaining tenants is one of the most important goals of building owners, and their satisfaction is of prime importance. In certain specific industry sectors, such as health care and hospitality, identifying and solving indoor air quality (IAQ) and occupant comfort problems are critical issues. These issues affect high priority health care, quality patient care, and other patient and hospitality comfort concerns.

Retrocommissioning can help reduce risk to the building owner in these cases by improving and/or mitigating indoor environmental quality problems upfront, leading to improved tenant and occupant comfort while addressing critical industry-specific concerns. Retrocommissioning can identify root causes, provide adequate fresh air where and when it is needed, and give building staff sufficient training and documentation to effectively manage the indoor environment. In addition, lighting can be controlled to an appropriate level, temperatures that can be consistently maintained in work spaces, and adequate air flow and pressurization can be delivered to each zone.

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<sup>6</sup> CoStar Group. 2007. CoStar Group promotes energy efficient, sustainable green buildings by adding EPA's ENERGY STAR® rating to commercial properties in its database. 2007.

[http://www.costar.com/Corporate/Press/Release.aspx?c=2620&ekmense=8\\_submenu\\_76\\_link\\_2](http://www.costar.com/Corporate/Press/Release.aspx?c=2620&ekmense=8_submenu_76_link_2).

<sup>7</sup> More information on energy webinars through the AH&LA can be found on the AH&LA website at <http://www.ahla.com>.

<sup>8</sup> More information on ASHE and E<sup>2</sup>C can be found on the ASHE website at <http://www.ashe.org>.

<sup>9</sup> California Energy Commission. 2007. Commercial commissioning research & development summary of interview results. California Commissioning Collaborative by Portland Energy Conservation, Inc.

[http://resources.cacx.org/library/holdings/Summary\\_Interview\\_Results\\_FINAL\\_04.27.07.pdf](http://resources.cacx.org/library/holdings/Summary_Interview_Results_FINAL_04.27.07.pdf).

## *Get to Know Your Building Better*

A recent study shows that facility managers desire greater understanding of their systems and assurance they are operating optimally<sup>10</sup>. Facility managers want more precise control over equipment, faster response times, greater ease of operations, improved efficiency of operations, and improved monitoring capabilities. Retrocommissioning can help facility managers and owners do just this. Because retrocommissioning provides a comprehensive analysis of how a building is operating and identifies its potential for improved performance, it gives owners and their building staff the knowledge and understanding they need to take action.

Involvement of facility staff in retrocommissioning can also save time and money because the project can leverage their first-hand knowledge of the building – saving the retrocommissioning engineering team (the provider) time spent on uncovering many of its inefficiencies. Assisting with various parts of the investigation and implementation of retrocommissioning recommendations also has the added benefits of exposing staff to different approaches for troubleshooting problems and improving staff understanding of equipment and control strategies. This knowledge will enable staff to retest or recommission systems periodically as part of their ongoing Operations and Maintenance program. A knowledgeable and trained staff will also support the continued high performance of the building – and the impact of the owner’s investment.

Retrocommissioning can also result in early detection of equipment issues. Early detection and resolution improves system performance and means building equipment may last longer, require fewer repairs, and use less energy. And because properly operating equipment also demands less “crisis maintenance” and fewer quick fixes from onsite staff and outside contractors, it allows staff to concentrate on their primary duties.

## Retrocommissioning Your Building for Savings: Getting Started

Retrocommissioning can help building owners, operators, and facility engineers to:

- Take control of energy costs and improve the bottom line
- Increase the owner’s competitive advantage in the growing sustainability marketplace,
- Improve tenant’s comfort and satisfaction
- Help the building staff get to know their building better.

Just as importantly, retrocommissioning can be easy to implement, especially when technical assistance and financial incentives are available through utility-sponsored programs. These programs can significantly reduce the cost of retrocommissioning, and are often targeted to those measures which pay back in less than one year.

One such program available to Pacific Gas & Electric Company (PG&E) commercial customers is the Retrocommissioning Services & Incentives Program (RCx Program). The RCx Program provides:

- A free building *screening* to determine eligibility for the Program

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<sup>10</sup> California Energy Commission. 2007. Commercial commissioning research & development summary of interview results. California Commissioning Collaborative by Portland Energy Conservation, Inc. [Http://resources.cacx.org/library/holdings/Summary\\_Interview\\_Results\\_FINAL\\_04.27.07.pdf](http://resources.cacx.org/library/holdings/Summary_Interview_Results_FINAL_04.27.07.pdf).

- A customized *investigation* of building operations and complete list of potential RCx measures
- Implementation *incentives* for energy saving improvements that pay back in > 1 year
- Free *documentation and training* on implemented RCx measures
- Free pre- and post-project *ENERGY STAR* Performance Ratings
- Project support services from start to finish

To learn more about what to expect as a participant in the RCx Program, and how the program incentives are structured and paid, please visit the program website at [www.RCx-Program.com](http://www.RCx-Program.com).

With so many reasons to retrocommission, and the variety of case studies, programs, and other resources available to start the retrocommissioning process, building owners and operators can confidently make the case for an investment in retrocommissioning *today*.