Ph 206.615.0817
Fx 206.684.3013

Energy Audits and Retro-commissioning – Background Report

An energy audit is a comprehensive assessment of a building's physical and operational characteristics, along with its energy profile, that also identifies opportunities for improving its energy performance. Audits may identify both capital and operational improvements. Many owners and operators may be simply unaware of existing opportunities to upgrade their building's energy performance. Audits can provide this information, along with cost estimates and projected utility savings. Owners then opt whether or not to make the recommended changes.

Retro-commissioning activities ensure that existing building systems are functioning to their optimum potential, returning their performance to optimal settings for energy efficiency, safety, reliability, and comfort. They typically focus on energy-intensive equipment (like HVAC or lighting systems) that degrades in efficiency over time, fine-tuning where defects or original design variances are discovered.

Energy audits and retro-commissioning are similar, but distinct, measures. Audits provide a more comprehensive assessment of building energy use and recommend improvements, but improvements are not generally made at the time of audit. Retro-commissioning tunes up major building systems, but may not address capital measures impacting energy usage. There is overlap between energy audits and retro-commissioning, with audits typically identifying the need for retro-commissioning activities. Similarly, during retro-commissioning, recommendations may be made for more capital intensive improvements.

The term "retro-commissioning" may not be fully understood by all building owners and managers. Furthermore, it may possess a negative connotation that implies a highly technical, arduous, and expensive process. Therefore, retro-commissioning may often be referred to as simply a "building tune-up."
In the United States, five jurisdictions (Atlanta, Austin, Boston, New York City, and San Francisco) require some form of energy audits or retro-commissioning for their commercial and/or multifamily building stock, in conjunction with their energy benchmarking and disclosure programs. Case studies of these programs are described in Attachment A.

While the City of Seattle does not currently require audits or retro-commissioning for the private market, the City is actively engaged in auditing and tune-ups on its own facilities. In the past two years, the City has performed energy audits on 45 of its own buildings as part of the Resource Conservation Management Plan, finding that nearly all had significant energy savings potential. Seattle City Light provides an Energy Assessment incentive for larger customers. The Community Power Works program also currently incentivizes professional energy audits for single-family homes. As of the end of March 2015, almost 6,700 homes in Seattle had been audited through the Community Power Works Programs; about 1/3 of those performed at least some of the upgrades recommended by the audit.

Audits and retro-commissioning achieve several benefits:

- **Provide owners and operators with information on specific opportunities to improve building performance**: Even engaged building managers may not be aware of all the intricacies of their buildings'

energy use. Using audits to make such information more readily available would allow for rapid uptake of the most cost-effective improvements.

- **Reduce operating costs for owners and tenants:** Keeping building systems optimized through retro-commissioning can prevent a more expensive overhaul or repair down the road and yield ongoing savings from increased efficiency.
- **Increased comfort for building occupants:** Retro-commissioning can identify and fix issues with indoor air quality and temperature control, ensuring a comfortable indoor environment for occupants.
- **Create green jobs locally:** Energy audits and retro-commissioning activities would be conducted by qualified and credentialed professionals drawn from a local workforce.

Currently, most cities rely on the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) "Procedures for Commercial Building Energy Audits" publication, which delineates three levels of energy surveys based on the complexity of the assessment performed. The US Green Building Council also references the ASHRAE standards for buildings seeking LEED certifications. Retro-commissioning, on the other hand, is used to describe a range of procedures and the requirements vary by city. Most cities that currently have an energy audit requirement allow retro-commissioning in lieu of audits to fulfill the requirement. Cities with both a benchmarking requirement and an energy audit or retro-commissioning requirement generally use the same building thresholds for both policies, though Atlanta uses different thresholds for public buildings for each policy. Boston and San Francisco require audits every five years; while Atlanta, Austin, and New York require audits every ten.

Many cities exempt high performers, like ENERGY STAR and LEED certified buildings. Boston also exempts buildings that generate all their own power and buildings that are completely powered by renewables. New York and Boston also offer temporary exemptions for buildings experiencing financial distress. Unoccupied (or mostly unoccupied) buildings and buildings slated for demolition in the immediate future are also generally exempted.

Unlike retro-commissioning activities, energy audits do not obligate building owners to improve the energy efficiency. Currently, only Austin has some form of audit-triggered mandatory improvements: multifamily buildings that use more than 150% of the average energy use for similar properties must reduce energy use by 20%. Boston gives building owners the option of completing an energy audit or performing an "energy action" that reduces the building's annual energy use by 15% (the energy action requirement can also be satisfied several other ways, like reducing greenhouse gas emissions 15%). Separate from its audit and retro-commissioning requirements, New York City requires all buildings larger than 50,000 ft^2 to upgrade their lighting systems to meet current City code at least once by 2025.

While not specifically an audit or tune-up requirement, Boulder's "SmartRegs" requires all rental housing to meet a basic energy efficiency standard by 2019, either through performance measured by Residential Energy Services Network's Home Energy Rating System, or through a checklist of prescriptive upgrade measures determined by the City of Boulder.

Attachment A: Case Studies

ATLANTA, GA

Policy Title	**Commercial Buildings Energy Efficiency Ordinance**
Policy Description	As part of an ordinance that includes benchmarking and disclosure of building performance data, Atlanta requires public buildings and private commercial or multifamily buildings to perform energy audits on base building systems every ten years. Audits are required on a schedule according to a building's Atlanta ID number. Audits must be performed by professionals possessing at least one certification from a list included in the ordinance. The minimum requirements for the audit itself (including a list of all reasonable measures that would reduce energy use if implemented and their costs/paybacks) are also specified in the ordinance. The ordinance also includes detailed specifications for retro-commissioning, though currently makes compliance with that section optional.
First year of compliance	2016 (public buildings >25K ft^2, commercial/multifamily buildings >50K ft^2) 2017 (commercial/multifamily buildings >25K ft^2)
Frequency	Every 10 years

AUSTIN, TX

Policy Title	**Energy Conservation Audit and Disclosure Ordinance**
Policy Description	Austin's ordinance requires energy audits and disclosure of results for all homes and multifamily buildings which are served by Austin Energy and located within Austin city limits. Owners of 1-4 unit residential properties (10 years old and greater) must have an energy audit conducted by a professional certified by the City of Austin prior to selling their property. The audit must meet minimum standards specified by Austin Energy and the results of the audit must be disclosed to potential buyers. Owners of multifamily buildings must have an energy audit conducted by a professional certified by the City of Austin every 10 years, and make the results available to current and prospective residents. Multifamily buildings using over 150% of average energy use (for similar properties) must implement upgrades sufficient to reduce their EUI by 20% and provide a "High Energy Use Report" to current and prospective residents.
First year of compliance	2011 (multifamily buildings and residential properties)
Frequency	Before sale (1-4 unit homes) Every 10 years (multifamily buildings)

BOSTON, MA

Policy Title	**Building Energy Reporting and Disclosure Regulations**
Policy Description	Boston's ordinance requires buildings greater than 35,000 ft^2 to perform either an "energy assessment" or an "energy action" every five years. Energy audits for buildings >50,000 ft^2 must meet the ASHRAE Level 2 standard.. An "energy action" must be some efficiency upgrade or renewable electricity project that reduces annual energy assumption or greenhouse gas emissions by at least 15 percent. The action must be accompanied by an "Energy Action Report" that documents the required reduction. ENERGY STAR rated buildings, LEED certified buildings, and some others are exempt from the audit requirement. Boston is currently in conversations with remote audit providers (Retroefficiency) to discuss how they might satisfy the requirement. Specific audit requirements are still to be determined for buildings under 50,000 ft^2
First year of compliance	2019 (non-residential buildings >50K) 2020 (residential buildings >50K or 50 units) 2021 (non-residential buildings >35K) 2022 (residential buildings >35K or 35 units)
Frequency	Every 5 years
Impact	Since the first year for required audits isn't until 2019, owners have yet to take action. However, at least one building owner reached out to the city prior to purchasing a large tower to check if an audit had already been completed on that building, evidence they are factoring in the energy assessment into real estate transactions..

NEW YORK, NY

Policy Title	**Energy Conservation Audit and Disclosure Ordinance**
Policy Description	New York's ordinance requires energy audits and retro-commissioning for base building systems of commercial and multifamily buildings greater than 50,000 ft^2 every ten years. The audit process must be at least as stringent as the ASHRAE Level 2 specifications. Retro-commissioning must meet minimum protocols established in the ordinance, and be conducted by a certified retro-commissioning agent. The audit and retro-commissioning activities must be summarized in an "energy efficiency report" filed with the City of New York. The energy audit requirement is waived for buildings that meet ENERGY STAR, LEED for Existing Buildings, or similar certification for at least two of the three years leading up to their audit deadline. No retro-commissioning is required for buildings certified by LEED for Existing Buildings which earned points for Existing Building Commissioning analysis and implementation.
First year of compliance	2013
Frequency	Every 10 years
Impact	Survey/anecdotal reports suggest around 80% of large commercial buildings (and 3% of multifamily buildings) that conducted an audit performed some of the audit recommendations. New York notes that by opting to allow a wide range of certifications to perform audits in order to ensure sufficient labor supply in the local market, it may have compromised data quality to some degree. Some building owners have objected to

	the cost of the audits – which can range from \$0.25-0.50/ft^2 – as well as the redundancy of the retro-commissioning completing similar tasks as a level 1 ASHRAE audit.

SAN FRANCISCO, CA

Policy Title	**Existing Commercial Buildings Energy Performance Ordinance**
Policy Description	San Francisco's ordinance requires non-residential buildings larger than 10,000 ft^2 to obtain a comprehensive energy efficiency audit of the entire building every five years. At a minimum, audits must meet ASHRAE Level 1 requirements (and ASHRAE Level 2 for buildings larger than 50,000 ft^2). Audits must be conducted by qualified professionals who meet minimum certification and experience requirements as specified by the San Francisco Department of Environment. The auditor must submit a "Confirmation of Energy Audit," which includes a summary of cost-effective energy efficiency measures, to the Department of Environment. Buildings can also choose to pursue retro-commissioning as an alternative means to satisfy the audit requirement. While there is no specific language outlining what qualifies as retro-commissioning, the buildings that have opted to comply this way have all done so through established pathways with utilities. San Francisco also defers to the California Commissioning Collaborative on protocol for existing building commissioning.
First year of compliance	2013
Frequency	Every 5 years
Impact	Audit reports require that the auditor note which upgrades the building owner intends to take, but it has been difficult to follow up to see whether or not they actually took place. Anecdotally, case studies indicate that buildings are acting on audit recommendations, even buildings that were unhappy about the audit requirement . To be more effective, San Francisco recommends allowing alternative compliance pathways for small/simple buildings with low overall energy use as audits are rarely cost effective for such buildings, as well as looking into remote audits as a tool to keep costs low for building owners.