

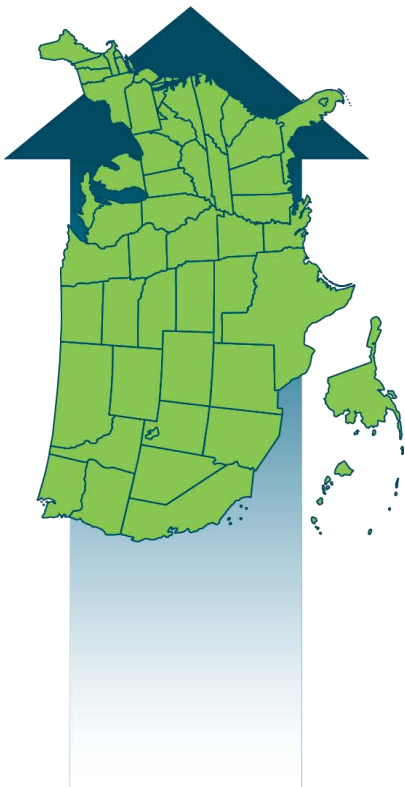
SEE Action

STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Energy Audits and Retro-Commissioning: State and Local Policy Design Guide and Sample Policy Language


Existing Commercial Buildings Working Group

July 2013



The State and Local Energy Efficiency Action Network 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.

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Energy Audits and Retro-Commissioning: State and Local Policy Design Guide and Sample Policy Language was developed as a product of the State and Local Energy Efficiency Action Network (SEE Action), facilitated by the U.S. Department of Energy/U.S. Environmental Protection Agency. Content does not imply an endorsement by the individuals or organizations that are part of SEE Action working groups, or reflect the views, policies, or otherwise of the federal government.

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1. Introduction

Commercial buildings consume nearly half of the building energy used in the United States, representing roughly 20% of total U.S. energy consumption and greenhouse gas emissions.^{1,2} With energy expenditures averaging more than \$2 per square foot (ft²) in commercial and government buildings,³ energy use is a cost worth managing. Energy audits and retro-commissioning are two strategies that can help building owners manage and reduce this consumption and related costs.

This guide provides information to help state and local policymakers better understand the value of energy audits and retro-commissioning; discussion to help them consider the applicability of policies to drive energy audits and retro-commissioning activity among public and private sector buildings; and resources to draft, enact, and implement policies addressing energy-related assessments of or improvements to existing commercial and public buildings. In recent years, a number of jurisdictions have enacted ordinances or taken other measures to require building owners to conduct energy assessments or “audits” of their facilities, to improve the operating efficiency of existing buildings through “retro-commissioning,” or both. This guide distills the experiences of early-adopter jurisdictions into three main elements required for consideration, development, and implementation of the above energy management policies: (1) an introduction to the concepts of energy audits and retro-commissioning; (2) a discussion of key issues for consideration in policy design; and (3) sample language for policy formulation and implementing regulations.

Energy audits can be seen as a starting point to provide building operators with the information they need to make better energy management decisions in the short and long term. A 2011 report notes that “energy audits are a powerful tool for uncovering operational and equipment improvements that will save energy, reduce energy costs, and lead to higher performance. Energy audits can be done as a stand-alone effort but may be conducted as part of a larger analysis across a group of facilities, or across an owner’s entire portfolio.”⁴ Undertaking an energy audit does not, by itself, result in energy savings. Frequently, though, utilities incentivize the cost of an energy audit based on the likelihood that the customer will take audit recommendations and subsequently invest in measures that will result in recommended energy savings.⁵

Moving beyond the audit itself, retro-commissioning is the process of reviewing a building’s operations to ensure that all systems are working as designed. Building owners can choose to engage in retro-commissioning on its own, or as a next step to implement the recommendations from an energy audit. Typically focused on low-cost enhancements to operations and maintenance, retro-commissioning can produce whole-building energy savings of 10% to 20% quickly and inexpensively, freeing up funds for more urgent needs.^{6,7} At a cost well below \$1 per ft² (normalized median cost of \$0.30 per ft² according to a 2009 study)⁸ and typical payback in slightly more than one

¹ See U.S. Department of Energy (DOE). *Buildings Energy Data Book*, Chapter 3. (March 2011). <http://buildingsdatabook.eren.doe.gov/ChapterIntro3.aspx>.

² See U.S. Environmental Protection Agency (EPA). *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009*, Table ES-8. (April 2011). www.epa.gov/climatechange/emissions/usinventoryreport.html.

³ See DOE. *Buildings Energy Data Book. Tables 3.3.8 and 3.2.1*. (March 2011). <http://buildingsdatabook.eren.doe.gov/ChapterIntro3.aspx>.

⁴ See DOE. *A Guide to Energy Audits*. (2011). Prepared by Pacific Northwest National Laboratory and Portland Energy Conservation, Inc. www.pnnl.gov/main/publications/external/technical_reports/pnnl-20956.pdf.

⁵ For example, Minnesota Energy Resources rebates 50% of the cost of an ASHRAE Level I or II audit after implementation of one of the audit-recommended and custom-program rebate-able energy savings measures. See www.minnesotaenergyresources.com/business/audits.aspx.

⁶ See Mills, E. *Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions*. (July 2009). Lawrence Berkeley National Laboratory. <http://cx.lbl.gov/documents/2009-assessment/LBNL-Cx-CostBenefit.pdf>. Key findings: “Commissioning is arguably the single-most cost-effective strategy for reducing energy, costs, and greenhouse-gas emissions in buildings today. Energy savings tend to persist well over at least a 3- to 5- year timeframe, but data over longer time horizons are not available. Median commissioning costs: \$0.30/ft² and \$1.16/ft² for existing buildings and new construction, respectively (and 0.4% of total construction costs for new buildings). Median whole-building energy savings: 16% and 13%. Median payback times: 1.1 and 4.2 years. Median benefit-cost ratios: 4.5 and 1.1, cash-on-cash returns of 91% and 23%.”

⁷ See “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.

⁸ See footnotes 6 and 7, above.

year, retro-commissioning can be a highly cost-effective energy and emissions reduction strategy.⁹ Furthermore, state and local governments can leverage the energy- and cost-saving benefits of retro-commissioning and audit policies to meet climate planning goals and accelerate economic growth due to demand for services, products, and skilled laborers, *creating an estimated 5 to 15 jobs per \$1 million invested*.¹⁰

Energy audits and retro-commissioning are elements in a larger suite of policy approaches that state and local jurisdictions can implement to achieve organization-specific or community-wide energy and carbon reduction goals. For example, benchmarking and disclosure policies can complement audits and retro-commissioning policies to provide the performance baseline against which subsequent energy performance improvement can be measured (see Figure 1 for one possible way to sequence these policies).

The definitions and terminology in this document are aligned with the SEE Action Network’s *Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language*.¹¹ These documents are meant to be used together to aid consideration of a suite of policies including benchmarking and disclosure, auditing, and retro-commissioning requirements. Conversely, each of the policies can be pulled out for use independently, i.e., one at a time, for a phased approach to building energy efficiency.

Furthermore, these policies can apply to both public and private buildings, and can even be phased so that initial implementation across public building stock can serve as a model or proof of concept for subsequent expansion of the policy to cover private (commercial) properties. Cities across the country are developing suites of policies that combine benchmarking with energy audits and/or retro-commissioning (for three leading examples, see Table 1).

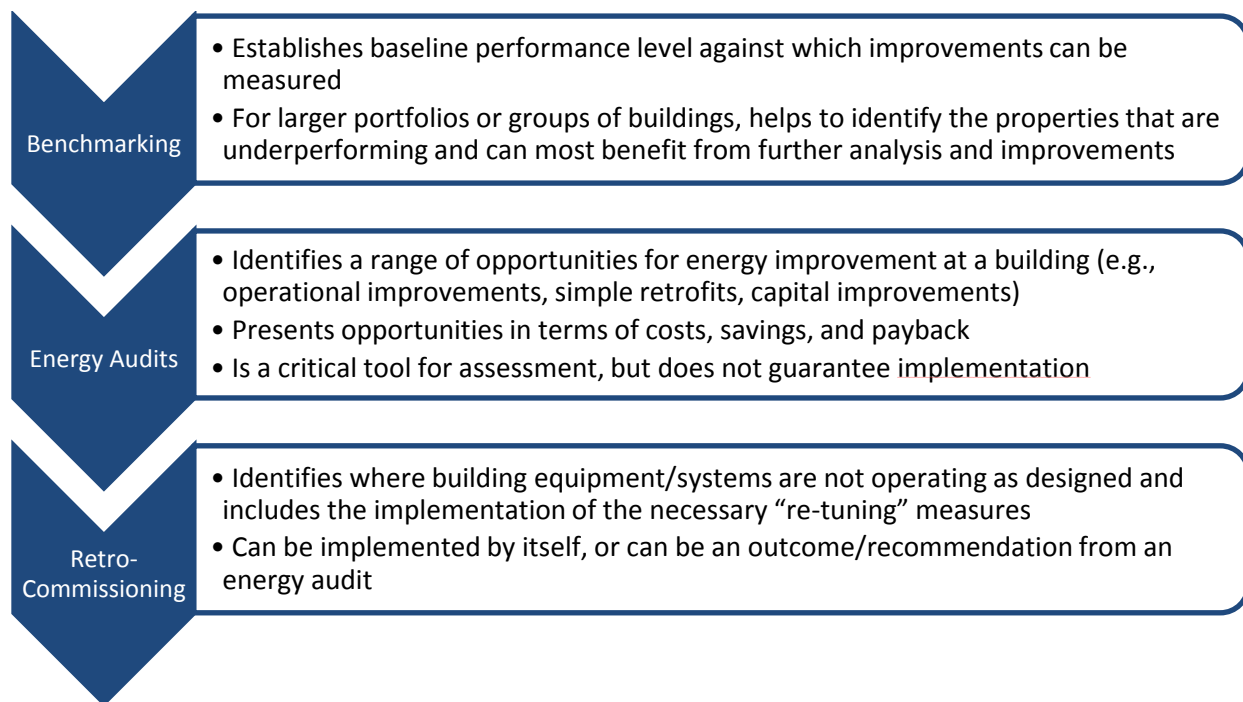


Figure 1. Example of how benchmarking, energy audits, and retro-commissioning can be sequenced through suites of policies

⁹ It is important to note that savings from retro-commissioning can vary widely, depending on a number of factors including the complexity of the building and the persistence of savings—which can be affected by the presence or absence of an ongoing operations and maintenance plan.

¹⁰ See National Action Plan for Energy Efficiency. *Rapid Deployment Energy Efficiency Toolkit: Planning & Implementation Guides*. (2009). Prepared by P. Lemoine, T. Huebner, D. Pickles, B. Prindle, and N. Buehler of ICF International.

www.epa.gov/cleanenergy/documents/suca/rdee_toolkit.pdf.

¹¹ See State and Local Energy Efficiency Action Network. *Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language*. (2012). Prepared by A. Burr, Institute for Market Transformation.

www.eere.energy.gov/seeaction/pdfs/commercialbuildings_benchmarking_policy.pdf.

Table 1. Audit, Retro-Commissioning, and Benchmarking Policies in Austin, Texas; New York, New York; and San Francisco, California

Jurisdiction	Benchmarking	Audit	Retro-Commissioning
City of Austin, Texas	Commercial buildings 10,000 ft ² and larger must benchmark energy performance and disclose results to a purchaser or prospective purchaser before the time of sale.	The City of Austin’s Energy Conservation Audit and Disclosure (ECAD) ordinance ¹² requires multifamily buildings to undertake energy audits and disclose results to current and prospective tenants. Multifamily buildings identified as “high energy use facilities” will be required to make specified improvements.	N/A
City of New York, New York	The cornerstone of New York City’s Greener Greater Buildings Plan is Local Law 84 (LL84) ¹³ which requires owners of buildings 50,000 gross ft ² and larger to annually benchmark their energy consumption and submit data online for public disclosure. ¹⁴	Local Law 87 (LL87) ¹⁵ mandates that buildings 50,000 gross ft ² or larger undergo periodic energy audit and retro-commissioning measures, as part of the Greener, Greater Buildings Plan (GGBP). ¹⁶	The City of New York requires buildings 50,000 ft ² or larger to perform retro-commissioning measures and energy audits on a periodic basis. ¹⁷
City of San Francisco, California	San Francisco’s Existing Commercial Building Energy Performance Ordinance ¹⁸ requires nonresidential buildings 10,000 ft ² or larger to annually summarize the energy used by the entire building, and to share an overview of energy benchmarking results with tenants and the city.	The Existing Commercial Building Energy Performance Ordinance was adopted in 2011. The ordinance requires nonresidential buildings 10,000 ft ² or larger to perform an energy efficiency audit once every five years. ¹⁹	Audit reports under the Existing Commercial Building Energy Performance Ordinance must include retro-commissioning.

Although this guide focuses on energy audits and retro-commissioning policies, the policy language is designed to complement and work with the sample policy language for benchmarking and disclosure in a companion guide.²⁰ Jurisdictions may combine energy audits and/or retro-commissioning with energy benchmarking (as in the case of San Francisco) as a phased or separate approach. However, some jurisdictions may seek to implement the policies

¹² See www.austinenergy.com/about%20us/environmental%20initiatives/ordinance/ordinance.pdf.

¹³ See www.nyc.gov/html/dob/downloads/pdf/ll87of2009.pdf.

¹⁴ For more information, see www.nyc.gov/html/gbee/html/plan/ll84.shtml.

¹⁵ See www.nyc.gov/html/dob/downloads/pdf/ll87of2009.pdf.

¹⁶ For more information, see www.nyc.gov/html/gbee/html/plan/ll87.shtml.

¹⁷ For more information, see www.nyc.gov/html/gbee/html/plan/ll87.shtml.

¹⁸ For more information, see www.sfenvironment.org/sites/default/files/fliers/files/sfe_gb_ecb_ordinance_overview.pdf.

¹⁹ For more information, see www.sfenvironment.org/sites/default/files/fliers/files/sfe_gb_ecb_ordinance_overview.pdf.

²⁰ State and Local Energy Efficiency Action Network. (2012). *Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language*. Prepared by A. Burr, Institute for Market Transformation. www1.eere.energy.gov/seeaction/pdfs/commercialbuildings_benchmarking_policy.pdf.

together as part of a larger policy suite (this is the case in New York City). Jurisdictions taking this approach are encouraged to integrate, connect, and cross-reference the language, definitions, and terminology for ease of use and interpretation. By bundling these policies together, jurisdictions can establish a context that will not only encourage assessment of energy performance, but will also drive actual improvements in energy performance that will help building owners and managers save money, and will help governments achieve their sustainability goals.

The following sections will provide more detail on energy audits and retro-commissioning, as a preface to proposed policy language that jurisdictions can use to implement audit and retro-commissioning policies.

1.1 What are Energy Audits and Retro-Commissioning?

Energy audits employ energy bill analysis, site visits/walkthroughs, and energy modeling/simulation to establish baseline energy performance characteristics of a building and its energy consuming devices and systems. The information collected from an audit can be used to identify potential improvements to building operations, components and systems to reduce energy consumption and prioritize these energy reduction opportunities according to cost effectiveness. Audits tend to focus on upgrade opportunities to common systems such as lighting, heating, cooling, ventilating, and hot water, but can include building envelope/insulation, daylighting, occupancy control, and plug load management. Audits may address building automation, operations and maintenance issues. Through an audit, building operators seek to assess a building’s current energy-using systems and the performance of those systems in order to identify opportunities for improvement.

Audits are typically conducted by an energy auditor and follow processes ranging from a basic walkthrough of the building to a detailed study and sub-metering analysis of building operations and performance. The American Society for Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) has established different levels of audits, based on the complexity of the assessment performed (see Figure 2).²¹ The U.S. Environmental Protection Agency (EPA) defines audits as comprehensive reviews conducted by energy professionals and/or engineers that evaluate the actual performance of a facility’s systems and equipment against their designed performance level or against best available technology.²²

Retro-commissioning (often abbreviated as “RCx”) is a systematic process for identifying and improving suboptimal energy performance in an existing building’s equipment and control systems. According to the Federal Energy Management Program (FEMP), “the process includes testing and adjusting building systems to meet original design intent and/or optimize systems to satisfy shifting operational needs ... [and it relies] on building and equipment documentation along with functional testing to optimize performance.”²³ The intent of retro-commissioning is to “bring building performance back to its original design intent and operational efficiency.”²⁴



Source: ASHRAE’s *Procedures for Commercial Building Energy Audits*


Figure 2. Relationship of ASHRAE audit levels 1, 2, and 3

²¹ See ASHRAE. *Procedures for Commercial Building Energy Audits*. (2011). <https://www.ashrae.org/resources--publications/bookstore/procedures-for-commercial-building-energy-audits>.

²² See the ENERGY STAR® *Guidelines for Energy Management*, Section 2.5, pg. 12. www.energystar.gov/buildings/sites/default/uploads/tools/Guidelines%20for%20Energy%20Management%206%202013.pdf?80a5-f73e.

²³ See www1.eere.energy.gov/femp/program/om_comtypes.html.

²⁴ See www1.eere.energy.gov/femp/program/om_comtypes.html.



Planning Phase

1. Select the project
2. Set project objectives and obtain support
3. Select a lead agency or business unit
4. Document the current operating requirements
5. Perform an initial site walk-through
6. Develop an RCx plan
7. Assemble an RCx team
8. Hold a project kick-off meeting

Investigation Phase

1. Review facility documentation
2. Perform diagnostic monitoring
3. Perform functional tests
4. Perform simple repairs
5. Develop master list of findings
6. Prioritize and select operational improvements

Implementation Phase

1. Develop implementation plan
2. Implement selected operational improvements
3. Verify results

Hand-Off Phase

1. Develop final report
2. Compile a systems manual
3. Develop plan for recurring RCx
4. Provide training
5. Hold close-out meeting
6. Implement persistence strategies

Source: Adapted from California Department of General Services, California Commissioning Guide, 2006

Figure 3. Overview of a typical retro-commissioning process

Retro-commissioning is typically conducted by a commissioning agent or building operations specialist. Retro-commissioning involves the on-site evaluation of how building components are functioning both on a whole-building scale as well as a system or sub-system level including assessing the automation sequences of operation, ventilation rates, room temperature distributions and sensor calibration, pressure adjustments, and economizer operations.

In this guide, the term “retro-commissioning” is used to address a range of concepts, including “existing building commissioning,” “re-commissioning,” and “continuous commissioning.” The intent is to distinguish processes that take place at existing buildings with an operational history, as opposed to “commissioning,” which occurs when a building is first constructed and near occupation.²⁵ Figure 3 illustrates the retro-commissioning process for a typical building.

Additional overviews of retro-commissioning can be found in the SEE Action Network’s *Retro-Commissioning for State and Local Governments* fact sheet.²⁶ FEMP provides a more detailed guide for retro-commissioning in its *Operations and Maintenance Best Practices Guide*.²⁷

Energy audits and retro-commissioning are two distinct but complementary concepts. Audits provide a snapshot of information and data on building operations, systems, and energy usage, as well as potential energy and cost

²⁵ Some industry associations appear to be gravitating toward the term “existing building commissioning,” although it is possible that this terminology will continue to change until such point in time as there is a national guideline or certification for the process. Because the “first-mover” jurisdictions (New York City and San Francisco) have used the term “retro-commissioning,” that is what is being used throughout this document. Jurisdictions may choose to incorporate their own terminology as they see fit.

²⁶ See State and Local Energy Efficiency Action Network. *Retro-Commissioning for State and Local Governments*. (2012). www1.eere.energy.gov/seeaction/pdfs/commercialbuildings_factsheet_retrocommissioning_stateandlocal.pdf.

²⁷ See FEMP. “Commissioning.” www1.eere.energy.gov/femp/program/om_commissioning.html. Although the focus of the FEMP program is on federal buildings, the guidance contained in this resource is applicable to any commercial or public building.

savings opportunities or investments. Audits identify a list of energy conservation measures that may include equipment upgrades and replacements. However, audits do not, in and of themselves, result in energy savings. In order to achieve the potential energy reductions identified during the audit, the building owner or manager must decide to move forward in implementing these recommendations.²⁸ Retro-commissioning, on the other hand, includes both evaluation *and* on-site improvement of building operations, typically through adjustment of building controls and other immediate system corrections. These corrections optimize the performance of existing building systems and advance building performance to achieve energy and operational goals. Under this sample text policy, the audit evaluation would help identify improvements available through retro-commissioning. For example, the audit may uncover a controls sequence that was changed over time and is now inappropriate for the building occupancy. An audit would include this energy savings opportunity time in the audit report and leave it for the owner/operator to weigh the opportunity against others, whereas retro-commissioning might include a fix at the time of the evaluation.

Policymakers can deploy audit and retro-commissioning policies in a variety of ways. Leading by example through the adoption of internal audit and retro-commissioning policies in public buildings can help to prove the value of these approaches, in terms of benefits, costs, and savings, and can establish the context/rationale for adopting a policy covering private sector buildings.

Table 2. Comparison of Energy Audits and Retro-Commissioning


	Energy Audits	Retro-Commissioning
Objectives	Identify cost-effective upgrades/improvements to building systems that will result in energy savings and improve energy performance beyond the intent of the original building design.	Bring building systems and controls back to their intended level of performance.
Primary focus	Identification of capital projects addressing the energy performance in one or more of the building’s major systems; measures are presented and recommended as part of audit report, but implementation is up to building owner.	Identification of necessary improvements to building controls and other operational measures (typically low-cost); measures implemented as they are identified.
Impact on building energy performance	Depends on specific measures identified during the audit, as well as building owner’s willingness to implement.	Whole-building savings of 10% to 20% are reasonable ²⁹ —more if the building was never commissioned before going into service or has not been retro-commissioned in a number of years. ³⁰

²⁸ But Austin’s ECAD Ordinance requires multifamily owners with “high energy use facilities” to implement energy efficiency improvements sufficient to reduce the average per-square-foot energy usage of the facility by 20%. See www.austinenergy.com/About%20Us/Environmental%20Initiatives/ordinance/ordinance.pdf.

²⁹ See Mills, E. *Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions*. July 21, 2009. Berkeley, CA: Lawrence Berkeley National Laboratory. <http://cx.lbl.gov/documents/2009-assessment/LBNL-Cx-CostBenefit.pdf>. Key Findings:

“Commissioning is arguably the single-most cost-effective strategy for reducing energy, costs, and greenhouse-gas emissions in buildings today. Energy savings tend to persist well over at least a 3- to 5- year timeframe, but data over longer time horizons are not available. Median commissioning costs: \$0.30/ft² and \$1.16/ft² for existing buildings and new construction, respectively (and 0.4% of total construction costs for new buildings). Median whole-building energy savings: 16% and 13%. Median payback times: 1.1 and 4.2 years. Median benefit-cost ratios: 4.5 and 1.1, cash-on-cash returns of 91% and 23%.”

³⁰ Persistence of savings is a key issue where building owners are making changes to set points, controls and schedules that can easily be defeated or changed again. Sample language in this policy attempts to address the persistence issue through ongoing/interval audit and retro-commissioning requirements.



In expanding audit and retro-commissioning policies to include private buildings, state and local governments may wish to consider phased-in requirements (e.g., covering one system at a time for the first several years) as opposed to addressing whole buildings all at once, or voluntary retro-commissioning programs and resources (e.g., simple checklists, incentives, and technical assistance).³¹ Considerations of whether to use a voluntary approach depend on timing, the level of participation by the private sector in previous energy efficiency programs, and other factors unique to the jurisdiction.

These policies can be tailored in terms of when/how the requirements are triggered.³² New York, Austin, and San Francisco base audit and retro-commissioning requirements on specified time intervals. However, benchmarking and disclosure requirements are based on time of sale or major renovation in Seattle³³ and California.³⁴ Jurisdictions implementing these policies may wish to consider some or all of the following triggers for requiring energy audits and/or retro-commissioning:

- At specified intervals of time
- At the time of sale or major tenant turnover
- At the time of heating, ventilation, and air conditioning (or other major system) replacement
- At the time of a major renovation.

Audits and retro-commissioning policies may be implemented in parallel or sequentially. New York City's Local Law 87 requires audits and retro-commissioning in parallel. Austin and San Francisco similarly require benchmarking and audits in parallel. Austin requires benchmarking as a part of the audit report while San Francisco delayed the audit report to several months after the benchmarking report. Or, the policies could be implemented sequentially. This is the case in San Francisco where retro-commissioning recommendations are included as part of the audit reports.

1.2 Who Should Policymakers Engage in the Development of Audit and Retro-Commissioning Policies?

The benefits of audits and retro-commissioning policies flow not only to building owners, but also to state and local governments in the form of property taxes, title transfer taxes, and other revenues tied to the health of the commercial real estate market. Policymakers should consider engaging a broad spectrum of stakeholders early in the decision-making process. The following list outlines the potential impacts of the audit and retro-commissioning policies for key stakeholders.


- Public and private building owners may choose to undertake voluntary or more frequent energy audits or retro-commissioning activities as an energy management best practice.
- Interest groups that represent property owners and managers, tenants, and energy service providers may help educate customers on the value of energy audits and/or retro-commissioning.
- Energy services providers may “staff up” to meet emerging audit and retro-commissioning needs.

³¹ Many utilities also offer energy audits and/or retro-commissioning as a form of technical assistance for customers. One of many examples of a statewide, public benefits-funded retro-commissioning program is the Wisconsin Focus on Energy Retro-Commissioning Program (see www.focusonenergy.com/business/efficient-facilities/retrocommissioning).

³² A staggered deadline is advised so as to not overwhelm building owners of multiple covered buildings and government staff. One way of staggering deadlines is by building size, as used here. Jurisdictions may want to modify the size classifications to reflect the jurisdiction's selected minimum size threshold. Note that suggested building size thresholds presented herein are intended as recommendations. Each jurisdiction is expected to establish its own size thresholds and deadlines for implementation. DOE is developing a data warehousing tool, known as the Standardized Energy Efficiency Database (SEED) platform that is intended to help minimize a jurisdiction's level of effort required to set up and maintain the infrastructure for data reporting, processing, and disclosure for jurisdictions adopting retro-commissioning and related policies that have a disclosure element.

³³ See Seattle's requirements for providing a Statement of Energy Performance www.seattle.gov/environment/disclosure.htm.

³⁴ See the California Nonresidential Building Energy Use Disclosure Program at www.energy.ca.gov/2010publications/CEC-400-2010-004/CEC-400-2010-004-CMF.pdf.

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- Manufacturers of equipment, controls, and energy management systems could consider how they can best respond to the building performance information provided through these policies.
 - Utility companies may need to develop strategies to meet the need for additional energy reporting requirements. These could include providing access to energy usage data,³⁵ offering technical and financial assistance to undertake energy audits and retro-commissioning, and/or providing financial incentives to move customers toward action in implementing identified energy efficiency projects.³⁶
 - Workforce development stakeholders may engage collaboratively with facility managers/operators and energy efficiency specialists to ensure that a pipeline of trained professionals is available to satisfy the demand for trained professionals. An example of one such training is the building re-tuning curriculum developed by DOE.³⁷
 - Local and state governments (with workforce development stakeholders) can re-train staff and create energy jobs in the collection and analysis of building energy information, the basic identification of building energy efficiency opportunities, and the operation of higher-performance buildings.
 - Energy professional organizations may provide training, certification, and other credentialing services related to energy audits and retro-commissioning.
 - Building, energy, or environmental agencies may monitor and disclose energy audit and retro-commissioning compliance status.

³⁵ For more information on the issue of data privacy, see State and Local Energy Efficiency Action Network. (2013). *A Utility Regulator's Guide to Data Access for Commercial Building Energy Performance Benchmarking*. Prepared by Andrew Schulte, ICF International. www1.eere.energy.gov/seeaction/pdfs/cib_regulator_privacy_guide.pdf. State and Local Energy Efficiency Action Network. 2012. *A Regulator's Privacy Guide to Third-Party Data Access for Energy Efficiency*. Prepared by M. Dworkin, K. Johnson, D. Kreis, C. Rosser, J. Voegele, Vermont Law School; S. Weissman, UC Berkeley; M. Billingsley, C. Goldman, Lawrence Berkeley National Laboratory. www1.eere.energy.gov/seeaction/pdfs/cib_regulator_privacy_guide.pdf.

³⁶ Further research may be needed with regard to the potential implications and considerations of audit/retro-commissioning policies on existing, ratepayer-funded efficiency programs. For example, might existing ratepayer-funded audit or retro-commissioning support through utility programs be eliminated or changed once audits and retro-commissioning become policy and hence the market "norm"?

³⁷ See www.pnl.gov/buildingretuning.



2. Items for Consideration

The following are topics that are not addressed by early adopters of existing policies. However, these items are important to note as emerging areas to be considered by policymakers in forecasting the needs and requirements of their governing body or implementing agency to interpret, execute, and enforce retro-commissioning and auditing policies. Considerations from this section are reflected in the following sample language, except with regard to multi-tenant properties, where the policy should vary according to specific circumstances in each jurisdiction (e.g., whole building, or common space only). Due to the emerging nature of best practices on these topics, policymakers should continue to research and weigh the issues as they apply within their jurisdiction and determine the appropriate scope of the policy based on the most current information available.

2.1 Standard Format for Data Collection

The U.S. Department of Energy (DOE) and its partners have several efforts under way to help the commercial buildings market take advantage of empirical data about building energy performance, such as the data that would be reported under an audit and/or retro-commissioning policy, or the “energy efficiency report”. The current lack of standardized data formats, terms, and definitions creates a significant ongoing barrier to realizing the full potential of energy data. Data standards have been vital to the growth of technologies like the internet and cellular communications, but building energy performance data is not currently standardized. The standardization of building energy performance data has the potential to increase interoperability between various datasets and platforms and mitigate the ambiguity and the transaction costs associated with aggregating, sharing, comparing, and analyzing across multiple building energy performance datasets.

To realize the full potential of energy data, implementing jurisdictions may want to consider employing a standardized electronic energy efficiency report template, in order to ensure consistency in the data submitted and easier aggregation and subsequent analysis by the implementing jurisdiction, utilities, and other stakeholders. The sample policy language in Section 3 of this guide incorporates the requirement for a standard energy efficiency report template that is consistent with DOE’s Building Energy Data Exchange Specification (BEDES).

BEDES provides a common set of terms and definitions for building energy performance data, including information on physical assets, operational characteristics, and energy usage. BEDES also defines and describes these data fields and their relationships. DOE has developed a draft BEDES,³⁸ based on a review of more than forty common federal and private sector energy performance data formats. This draft aligns with existing Federal Government tools such as ENERGY STAR® Portfolio Manager and is being used as the basis for DOE’s Buildings Performance Database and Standard Energy Efficiency Data (SEED) analysis platform.


DOE is currently conducting an assessment to understand which participants in the energy efficiency industry would benefit from a shared, standardized building energy data exchange specification. If this assessment confirms a need for a common data exchange specification, DOE will work with industry to develop a market-ready data specification and create a plan to encourage widespread adoption.

2.2 Workforce Development

The adoption of retro-commissioning and audit policies will drive demand for a qualified audit and retro-commissioning workforce. A shortage of qualified providers as well as consistency and quality of audit and retro-commissioning work can become an issue. Currently there is no national standard for certification or accreditation of energy auditors and retro-commissioning providers. For this reason, state and local jurisdictions will need to have the flexibility to adopt their own criteria for qualification in the near future.³⁹ However, DOE is developing

³⁸ As of the publication of this document, BEDES is in draft form. For more information, visit “Building Energy Data Exchange Specification (BEDES).” U.S. Department of Energy. www1.eere.energy.gov/buildings/commercial/buildings_energy_data_exch_spec.html.

³⁹ For a comprehensive, though not exhaustive, listing of energy auditor and commissioning provider credentialing programs, see www.imt.org/resources/detail/energy-assessor-credentialing-program-profiles.



voluntary national guidelines for advanced energy occupations.⁴⁰ Once these guidelines are available, policymakers should consider promoting the adoption of DOE’s national certification program to ensure the consistent quality of work completed and the adequate supply of qualified auditors and agents necessary to satisfy the requirements under this sample policy.

The sample policy language in Section 3 of this guide includes sample text that can be used as a starting point to explicitly address workforce development, particularly the requirement for properly qualified individuals (see Section C(9)). An exception for “insufficient workforce” under sample policy Section C(4)(a)(5) should extend for no more than the one to two years necessary to fill a local shortage in labor supply with proper planning.

2.3 Multi-Tenant Properties

Building energy efficiency reports for audits and retro-commissioning can and should encompass the whole building where possible. However, in multi-tenant properties, both commercial and residential or multi-family, the auditor or retro-commissioning agent may not be able to gain access to all tenant spaces. Furthermore, the building owner or manager may not have control over the execution of recommended measures and activities identified through audits or retro-commissioning. This disconnect may result in the delay and/or lack of information in audit and retro-commissioning reports as well as an incomplete assessment of whole building energy performance, cost, and savings opportunities.

The City of San Francisco’s Existing Commercial Buildings Energy Performance Ordinance includes tenant spaces under its auditing requirement but auditors have had trouble accessing tenant spaces, thus causing reporting delays. Some landlords have been able to use regulatory compliance as an allowable pass through to influence tenants in collaborating on energy savings retrofits or changes. However, this has not been consistently or uniformly applied. The New York Local Law 87 does not include tenant spaces in the “base building system” definition and thus excludes tenant-occupied areas from the audit and retro-commissioning reports. In Austin, building owners can request aggregated utility data for four or more tenants. But, owners are at the whim of the tenant for authorization to access tenant-occupied areas including very important information on equipment, appliances, plug loads, and other operations.

As is the case with many building efficiency efforts, tenant and landlord engagement and collaboration and education programs are essential to achieving optimized building energy performance. Building owners and managers with tenant engagement and education policies in place will benefit from improved energy performance as more benchmarking, audit, retro-commissioning, and other energy-related policies are adopted.

⁴⁰ DOE has enlisted the National Institute of Building Sciences to convene industry stakeholders and subject matter experts to develop voluntary national guidelines (“Better Buildings Workforce Guidelines”) for several commercial advanced energy occupations, including energy auditor and commissioning authority. These voluntary national guidelines will address both competency-based professional certifications and training or knowledge-based certificate programs, and may be licensed by qualified certification bodies, certificate program providers, or registered apprenticeship programs recognized by the U.S. Department of Labor and issuing interim credentials in accordance with 29 CFR Part 29.5(b)(16).

For competency-based professional certifications, the Better Buildings Workforce Guidelines will consist of a current, industry-validated job task analysis outlining the key duties, tasks, and competencies for each occupation, and a certification scheme identifying the prerequisites, exam blueprint, continuing education requirements, recertification process, and other components of the certification. These national guidelines will then be available to any qualified certification body to screen candidates, develop a psychometrically-valid assessment, administer examinations, and confer a high-quality certification. DOE will only recognize the certification programs that achieve third-party accreditation under the ANSI/ISO/IEC 17024 standard. For more information on the Better Buildings Workforce Guidelines, see <http://energy.gov/better-buildings>.

3. Policy Design Guide

This section provides policy language as synthesized from the early adopters of audits and retro-commissioning requirements.⁴¹ This language reflects feedback from those leading jurisdictions based on actual experiences in administration, implementation and enforcement, especially with regard to best practices, lessons learned, and key points to consider.

The language includes provisions for (1) recurring energy audits and retro-commissioning and (2) disclosure of compliance with the policy, including disclosure of energy audit and/or retro-commissioning results. To encourage the ongoing tracking of energy performance on a schedule more frequent than required by this policy, jurisdictions may wish to implement an integrated or separate suite of benchmarking, rating, and disclosure policies.⁴²

The sample policy language is organized into the following sections:

- Section A: Purpose
- Section B: Definitions
- Section C: Requirements
- Section D: Additional Provisions
- Section E: Rules.

Section A. Purpose

- (1) *[JURISDICTION] seeks to systematically identify, and, where appropriate, implement all cost-effective opportunities to improve the energy performance of commercial and multi-family buildings within its jurisdiction. The goal is to improve energy efficiency and performance and reduce energy use and associated expenditures and air pollution. Employing an energy audit plan and regular retro-commissioning schedule, coupled with energy performance benchmarking and disclosure, can increase energy use awareness and uncover opportunities for cost-saving energy efficiency improvements.*
- (2) *With energy expenditures averaging greater than \$2 per square foot in commercial and government buildings,⁴³ energy use is a cost worth managing. Further, commercial and government building energy use accounts for [XX] percent of [JURISDICTION]'s greenhouse gas emissions. Reducing energy use reduces greenhouse gas and other air pollutant emissions and [JURISDICTION]'s contribution to climate change and degraded air quality.*
- (3) *The evaluation, upgrade, and optimized operation of commercial and government buildings will expand opportunities for skilled energy efficiency services jobs. Investing in energy efficiency can contribute to stable, long-term economic growth, encourage job creation, and enhance stewardship of natural resources.*

Section B. Definitions

The following definitions inform the rest of the document. They are drawn from various sources; principally from government documents aimed at enacting or implementing energy audit and retro-commissioning policies.


A few notes are provided here for clarification:

- The term “city” (as in “city building”) can be replaced by “state,” “county,” “municipality,” or some other local jurisdiction type, depending on the entity affected by this policy.
- Throughout this document, the use of the term “commercial building” is intended to include multi-family facilities as defined below.


⁴¹ New York City, San Francisco, and Austin.

⁴² For sample benchmarking, rating, and disclosure policy language, see State and Local Energy Efficiency Action Network. *Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language*. (2012). Prepared by A. Burr, Institute for Market Transformation. www.eere.energy.gov/seeaction/pdfs/commercialbuildings_benchmarking_policy.pdf.


⁴³ This is a national statistic based on the U.S. Department of Energy's (DOE's) *Buildings Energy Data Book*. Substitute local data where available.

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- (1) *“Base Building Systems” means the systems of a building that use energy and/or impact energy consumption including the following:*
 - (a) *Building envelope*
 - (b) *Heating, ventilation, and air conditioning (HVAC) systems*
 - (c) *Distribution systems*
 - (d) *Domestic hot water systems*
 - (e) *Electrical and lighting systems*
 - (f) **Exceptions:** *The term “Base Building Systems” shall not include:*
 - (1) *Systems for which a tenant bears full maintenance responsibility and that is within the tenant’s leased space and/or exclusively serves such leased space.*
 - (2) *“Baselining” means the process of identifying the condition of the building, including energy use, at the outset of an energy analysis and/or performance evaluation.*
 - (3) *“BEDES” means the Building Energy Data Exchange Specification, a national, DOE-endorsed, standard specification for collecting building energy data.*
 - (4) *“Benchmarking” (a building’s energy performance) means the process of measuring how efficiently a building uses energy relative to the same building over time, other similar buildings, or modeled simulations of a building built to code or some desired standard.*
 - (5) *“Benchmarking Tool” means a software-based mechanism that allows a user to benchmark the energy performance of a building in a standardized way and assign a standardized numeric rating or score to the building being evaluated based on its performance compared with itself over time, other similar buildings, or modeled simulations of a building built to code or some desired standard.*
 - (6) *“Building Automation System” means a computer-based system that monitors and controls a building’s mechanical and electrical equipment, such as HVAC, lighting, power, fire, and security systems.*
 - (7) *“Building Manager” means an agent assigned by the building owner to manage a covered building, including the operation and maintenance of the base building systems.*
 - (8) *“Building Owner” means an individual or entity possessing title to a building, or an agent authorized to act on behalf of the building owner. In the case of a covered building held in cooperative or condominium form of ownership, the term “Building Owner” shall refer to the board of managers, board of directors, homeowners’ association, or other representative body of the jointly owned building with decision-making authority.*
 - (9) *“Common Area” means the space under common ownership outside of the space occupied by tenants.*
 - (10) *“Conditioned Floor Area” means the horizontal projection of the floors associated with the conditioned space.*
 - (11) *“Conditioned Space” means floor area of all spaces that are either heated or cooled.*
 - (12) *“Controls” means the equipment, appliances, sensors, etc. that control a building’s mechanical and electrical equipment and provide feedback to the building automation system on the state of the building conditions, operations, occupancy, scheduling, etc.*
 - (13) *“Covered Building” means a public or private building used for commercial, governmental, or multifamily housing purposes that has a minimum of [XXX,XXX] square feet of conditioned floor area and is covered under this policy.⁴⁴*
 - (14) *“Current Facility Requirements” means the building owner’s current operational needs and requirements for a building, including temperature and humidity set points, operating hours, filtration, and any integrated requirements such as building automation, warranty review, and service contract review.*

⁴⁴This definition simplifies the SEE Action Network’s *Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language* definition of a “covered building” by referring to building size as opposed to the number of dwelling units. Jurisdictions may want to customize this definition to meet local goals and priorities. For example, San Francisco excludes residential buildings, but New York City includes multifamily residential buildings. San Francisco and Austin include buildings 10,000 ft² or larger; whereas, New York City includes buildings 50,000 ft² or larger, which likely captures as large or larger percentage of its building stock despite the higher minimum size threshold.

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- (15) “Director” means the director of the [DEPARTMENT/OFFICE/AGENCY RESPONSIBLE FOR IMPLEMENTATION] or his or her designee.
- (16) “Energy” means electricity, natural gas, steam, heating oil, or other product sold by a utility for use in a building, or renewable on-site electricity generation, for purposes of providing heating, cooling, lighting, water heating, or for powering or fueling other end-uses in the building and related facilities.
- (17) “Energy Audit” means a systematic process of identifying and developing modifications of and improvements to the base building systems that meets or exceeds the Procedures for Commercial Building Energy Audits published by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE) or similar comprehensive whole-building evaluation approved by the Director pursuant to Section (C)(1)(a).
- (18) “Energy Auditor” means a person approved by the Director to perform energy audits and to certify audit reports pursuant to Section (C)(1)(b).
- (19) “Energy Efficiency” means the state of using less energy to provide the same level of energy service (e.g., light, heat).
- (20) “Energy Efficiency Measure” means an activity, practice, or technology that increases the energy efficiency of a product, system, or building.
- (21) “Energy Efficiency Report” means the report required to be filed pursuant to Section (C)(1)(d) for energy audits and Section(C)(2)(d) for retro-commissioning in order to demonstrate compliance with the requirements of this policy. The energy efficiency report includes reports submitted by the energy auditor and the retro-commissioning agent, or documentation of an exception, where applicable.
- (22) “Energy Performance” means how efficiently a product, system, or building uses energy to provide an energy service (e.g., light, heat).
- (23) “ENERGY STAR® Score” means the numeric rating generated by the ENERGY STAR Portfolio Manager tool or an equivalent tool adopted by the Director that compares the energy usage of the building to that of similar buildings
- (24) “ENERGY STAR Portfolio Manager” means the tool developed and maintained by the U.S. Environmental Protection Agency to track and assess the relative energy performance of buildings nationwide.
- (25) “Financial Hardship” means a building owner shall be considered to be subject to financial hardship if the building meets at least one of the following conditions:
- (a) Has arrears of property taxes that resulted in the property’s inclusion, within two years prior to the deadline for an energy efficiency report, on the [JURISDICTION]’s tax lien sale list
 - (b) Is under control of a court-appointed receiver due to financial distress
 - (c) Is owned by a financial institution through default by the borrower
 - (d) Is acquired by a deed in lieu of foreclosure
 - (e) The building’s senior mortgage is subject to notice of default
 - (f) Is exempt from property taxes pursuant to [APPLICABLE SECTION] of [APPLICABLE PROPERTY TAX LAW] and the owner had negative revenue less expenses during the two tax years prior to the deadline for an energy efficiency report as certified to the Director by a certified public accountant
 - (g) Has an active or effective commitment letter from a governmental agency that provides for the financing of the rehabilitation, within a period of five years or less, of a covered building by a government agency for the purposes of affordable housing for low or moderate income families.⁴⁵
- (26) “Gross Square Footage” means the total floor area of all floors of a building calculated with the external dimensions of the enclosing fixed walls of the building including structures, partitions, corridors, stairs, and conditioned below-grade spaces.


⁴⁵ Building owners that are facing financial hardship due to one or more of the conditions listed here, or others to be added by the adopting jurisdiction, are not likely to have access to sufficient funding to perform the audit, retro-commissioning, and reporting requirements of this ordinance and therefore may find the ordinance unduly burdensome. The examples included here are from existing retro-commissioning policies and may not be an exhaustive list.

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- (27) “kBtu” means one-thousand British thermal units, a common unit of energy measurement used to convert and combine other energy measurements such as kilowatt-hours (kWh) of electricity, therms of natural gas, and pounds of steam.
- (28) “Level I Audit” means a brief onsite survey of a building that identifies and provides cost analysis for no- and low-cost cost-saving energy efficiency measures and that meets the Level 1 standard of ASHRAE’s Procedures for Commercial Building Energy Audits.
- (29) “Level II Audit” means a detailed onsite survey and energy analysis of a building that identifies and provides energy savings and cost analysis of all practical energy efficiency measures and that meets the Level II standard of ASHRAE’s Procedures for Commercial Building Energy Audits.
- (30) “Multi-Family Facility” means a site with five or more dwelling units. Condominiums are included in the definition of multi-family facilities; a condominium facility is defined as a multi-family facility with separate ownership of dwelling units, and common ownership of other elements such as common areas.
- (31) “Net Present Value” means the value in today’s dollars of all future costs and benefits from an investment after compensating for the effects of interest.
- (32) “Registered Design Professional” means a professional engineer or registered architect.
- (33) “Retro-Commissioning” means a systematic process for optimizing the energy efficiency of existing base building systems through the identification and correction of deficiencies in such systems, including but not limited to repairs of defects; cleaning; adjustments of valves, sensors, controls or programmed settings; and changes in operational practices.
- (34) “Retro-Commissioning Agent” means an approved person, who shall not be a member of the operations and maintenance staff of the building being commissioned, who is authorized by the Director to perform retro-commissioning and certify retro-commissioning reports pursuant to Section (C)(2)(b).
- (35) “Simple Building” means a covered building with neither a central chilled water system nor a central cooling system that covers more than 10 percent of the building’s conditioned floor area.
- (36) “Simple Payback” means the number of years for the projected annual energy cost savings to equal the amount invested in the energy efficiency measure, as determined by dividing the investment by the annual energy cost savings.
- (37) “Source Energy” means the total amount of raw fuel required to operate a building, accounting for transmission, delivery, and production losses.
- (38) “[STATE/LOCAL GOVERNMENT] Building” means a covered building owned by [JURISDICTION] and for which [JURISDICTION] regularly pays all or part of the annual energy bills.
- (a) **Exception:** The term “[STATE/LOCAL GOVERNMENT] Building” shall not include:
- (1) [INSERT EXCEPTIONS]⁴⁶
- (39) “Space” means an area within a building enclosed by floor to ceiling walls, partitions, windows, and doors.
- (40) “Tenant” means a person or organization who leases space in a covered building.

Section C. Requirements

- (1) **Energy Audits.** The building owner shall ensure that an energy audit is performed on a covered building prior to filing an energy efficiency report as required by the schedule set forth in Sections (C)(3)(b) and (C)(3)(c). Energy audits shall be performed by or under the supervision of an energy professional meeting the qualifications set forth in Section (C)(1)(b) and shall be performed in accordance with rules promulgated by the Director.

⁴⁶ Exceptions are likely to be jurisdiction-specific and may include buildings used for public housing or health care, buildings leased solely to a single non-jurisdiction tenant, etc.


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- (a) **Energy Audit Standards.** Energy audits shall comprehensively examine whole buildings, including the base building systems, and shall meet or exceed the ASHRAE Procedures for Commercial Building Energy Audits. The level of detail required in an energy audit shall be proportionate to the scale of the covered building⁴⁷ as outlined below:
- (1) Covered buildings with more than 50,000 square feet of conditioned floor area, except for multifamily buildings, shall receive a comprehensive audit of the whole building that meets or exceeds the Level II Audit standard or equivalent as determined by the Director.
 - (2) Covered buildings with 10,000 square feet to 49,999 square feet of conditioned floor area, and all multifamily buildings shall receive a walkthrough audit of the whole building that meets or exceeds the Level I Audit standard or equivalent as determined by the Director.
- (b) **Energy Auditor Qualifications.** Until such time as there is a national standard establishing qualifications for persons performing commercial building energy audits and such standard has been adopted by the Director, an energy auditor performing or supervising energy audits must be able to demonstrate possession in good standing of at least one of the minimum qualifications set forth in this section. After the establishment of such a national standard, the Director may adopt the qualifications of the national standard with such modifications as the Director deems appropriate.⁴⁸
- (1) Licensed Engineer and at least two years of experience performing energy audits of similar scope and complexity.
 - (2) Association of Energy Engineers (AEE) Certified Energy Manager or Certified Energy Auditor and at least two years of experience performing energy audits of similar scope and complexity.
 - (3) At least 10 years of experience as a building operating engineer or at least five years of experience as a chief operating engineer and at least one of the following:
 - (i) Building Operator Certification
 - (ii) International Union of Operating Engineers Certified Energy Specialist
 - (4) Equivalent professional qualifications to manage, maintain, or evaluate building systems and specialized training in energy audits and maintenance of building systems as determined by the Director.
- (c) **Consultation of Operations and Maintenance Staff.** The covered building's operations and maintenance staff shall be consulted at the beginning of and during the audit process.⁴⁹
- (d) **Energy Audit Report.** The energy professional shall prepare, sign, and deliver to the owner of the covered building an energy efficiency report as prescribed below which meets or exceeds the reporting standards set forth in ASHRAE's Procedures for Commercial Building Energy Audits (2004 or later) or equivalent as determined by the Director pursuant to this Section. The signed report shall be provided in electronic format that uses BEDES format and delivered to the owner of the covered building. In the course of meeting the relevant ASHRAE standards for communication, the energy efficiency audit report shall include:
- (1) Energy Auditor Information
 - (i) Energy auditor name, affiliation, and contact information
 - (ii) A description of the energy auditor's qualifications for performing the work in compliance with Section (C)(1)(b).

⁴⁷ Jurisdictions may want to modify the size classifications to reflect the jurisdiction's selected minimum size threshold.


⁴⁸ DOE has enlisted the National Institute of Building Sciences to convene industry stakeholders and subject matter experts to develop voluntary national guidelines for several commercial advanced energy occupations, including energy auditor and commissioning authority. These voluntary national guidelines will address both competency-based professional certifications and training or knowledge-based certificate programs, and may be licensed by qualified certification bodies, certificate program providers, or registered apprenticeship programs recognized by the U.S. Department of Labor and issuing interim credentials in accordance with 29 CFR Part 29.5(b)(16).

For competency-based professional certifications, the Better Buildings Workforce Guidelines will consist of a current, industry-validated job task analysis outlining the key duties, tasks and competencies for each occupation, and a certification scheme identifying the prerequisites, exam blueprint, continuing education requirements, recertification process, and other components of the certification. These national guidelines will then be available to any qualified certification body to screen candidates, develop a psychometrically-valid assessment, administer examinations, and confer a high-quality certification. DOE will only recognize the certification programs that achieve third-party accreditation under the ANSI/ISO/IEC 17024 standard. For more information on the Better Buildings Workforce Guidelines, see <http://energy.gov/better-buildings>.

⁴⁹ Building operations and maintenance staff can provide insight into the real-world, rather than theoretical, operations of the building, which can inform building-specific recommendations for improving energy performance. In addition, operations and maintenance staff will benefit from the energy audit findings.

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- (2) *Energy Audit Information*
- (i) *The date(s) that the audit was performed.*
 - (ii) *Affirmation by the energy auditor and building owner that the energy audit meets the applicable standards as set forth in Section (C)(1)(a) and that the covered building's operations and maintenance staff was consulted according to the requirements of Section (C)(1)(c).*
- (3) *Covered Building Information*
- (i) *Covered building address*
 - (ii) *Building owner name and contact information*
 - (iii) *Building manager name and contact information (if different from building owner)*
 - (iv) *Covered building gross square footage and conditioned floor area square footage*
 - (v) *List of all HVAC, domestic hot water, chilled water, electrical equipment, lighting, and conveyance equipment types in the base buildings systems including baseline conditions of the audited building (energy, equipment, scheduling, setpoints, etc.)*
 - (vi) *A general assessment of how the major energy consuming equipment and systems used within tenant spaces impact the energy consumption of the base building systems based on a representative sample of spaces.*
- (4) *Recommended Measures*
- (i) *List of all identified energy efficiency measures, including capital and operational improvements, that would, if implemented, reduce energy use and/or the cost of operating the building. For each identified energy efficiency measure, provide the following:*
 - (a) *A brief description*
 - (b) *Estimated implementation cost calculated using a method determined by the Director*
 - (c) *Estimated annual energy and operating cost savings calculated using a method determined by the Director*
 - (d) *Estimated simple payback calculated using a method determined by the Director*
 - (e) *Estimated net present value calculated using a method determined by the Director*
 - (f) *List of assumptions used to calculate above estimates.*
 - (ii) *A list of all retro-commissioning measures available to the owner.*
 - (iii) *An estimate of the approximate energy savings, avoided energy cost, and costs to implement each retro-commissioning measure available to the owner with a simple payback of not more than 5 years*
 - (iv) *The aggregate implementation costs and annual and lifetime energy and operating cost savings, calculated by a method determined by the Director, of all identified energy efficiency measures.*
 - (v) *A breakdown of energy usage by system and predicted energy savings by system after implementation of the proposed measures.*
- (5) *Installed Measures*
- (i) *List of all energy efficiency measures implemented prior to submission of the energy efficiency report required under Section (C)(3). For each implemented energy efficiency measure, provide the following:*
 - (a) *A brief description*
 - (b) *Actual implementation cost*
 - (c) *Estimated annual energy and operating cost savings calculated using a method determined by the Director*
 - (d) *Estimated simple payback calculated using a method determined by the Director*
 - (e) *Estimated net present value calculated using a method determined by the Director*
 - (f) *List of assumptions used to calculate above estimates.*
 - (ii) *The aggregate implementation costs and annual and lifetime energy and operating cost savings, calculated by a method determined by the Director, of all implemented energy efficiency measures.*
 - (iii) *A breakdown of energy usage by system and actual energy savings by system after implementation of the proposed measures.*

- (2) **Retro-Commissioning.** *The building owner shall ensure that retro-commissioning is performed on the base building systems of a covered building prior to filing an energy efficiency report as required by the schedule set forth in Sections (C)(3)(b) and (C)(3)(c). Retro-commissioning shall be performed by or under the supervision of a retro-*



commissioning agent⁵⁰ meeting the qualifications set forth in Section (C)(2)(b) and shall be performed in accordance with rules promulgated by the Director.

(a) **Retro-Commissioning Standards.** Covered buildings shall receive sufficient analysis, corrections, and testing so that the base building systems meet the following criteria demonstrating efficient and effective operation⁵¹:

(1) **Operating Protocols, Calibration, and Sequencing**

- (i) Heating, ventilation, and air conditioning (HVAC) temperature and humidity set points and setbacks are appropriate and operating schedules reflect major space occupancy patterns and the current facility requirements.
- (ii) HVAC sensors are properly calibrated.
- (iii) HVAC controls and building automation system are functioning and control sequences are appropriate for the current facility requirements.
- (iv) Loads are distributed equally across equipment (e.g., fans, boilers, pumps, etc. that run in parallel) when appropriate.
- (v) Ventilation rates are appropriate for the current facility requirements.
- (vi) System automatic reset functions are functioning appropriately if applicable.
- (vii) Adjustments have been made to compensate for oversized or undersized equipment so that it is functioning as efficiently as possible.
- (viii) Simultaneous heating and cooling does not occur unless intended.
- (ix) HVAC system economizer controls are properly functioning if applicable.
- (x) HVAC distribution systems, both air and water side, are balanced.
- (xi) Light levels are appropriate to the task.
- (xii) Lighting sensors and controls are functioning properly according to occupancy, schedule and/or available daylight where applicable.
- (xiii) Domestic hot water systems have been checked to ensure proper temperature settings.
- (xiv) Water pumps are functioning as designed.
- (xv) System water leaks have been identified and repaired.⁵²

(2) **Cleaning and Repair**

- (i) HVAC equipment, including but not limited to vents, ducts, coils, valves, and soot bin, is clean.
- (ii) Filters are clean and protocols are in place to replace as appropriate.
- (iii) Light fixtures are clean.
- (iv) Motors, fans, and pumps, including components such as belts, pulleys, actuators, dampers and bearings, are in good operating condition.
- (v) Steam traps have been replaced as required to maintain efficient operation if applicable.
- (vi) Manual overrides on existing equipment have been remediated.
- (vii) Boilers have been tuned for optimal efficiency if applicable.
- (viii) Exposed hot and chilled water and steam pipes three inches or greater in diameter with associated control valves are insulated in accordance with the provisions of the [STATE OR LOCAL] building energy code as in effect for new buildings constructed on or after [APPLICABLE DATE].
- (ix) In all easily accessible locations, sealants and weather stripping are installed where appropriate and are in good condition.


(3) **Training and Documentation**

- (i) Permits for all HVAC, electrical, and plumbing equipment are current.
- (ii) Critical operations and maintenance staff have received appropriate training, which may include maintenance and labor/management training, on all major equipment and systems and general energy conservation techniques.

⁵⁰ Although it is necessary to establish minimum qualifications for being able to perform the retro-commissioning required by this ordinance to ensure the quality and usefulness of data obtained from the retro-commissioning process, jurisdictions may want to weigh the pros and cons of requiring all members of a retro-commissioning team to meet the qualifications versus a subset of the team. At a minimum, the retro-commissioning supervisor should meet the requirements. This decision also applies to Section (C)(1)(b).

⁵¹ Local and state policymakers should consider using the ASHRAE Standard 202P, Commissioning Process for Buildings and Systems, once final. Recommended text: *The retro-commissioning process will meet or exceed the commissioning standard developed by ASHRAE (Standard 202), and the building-system specific commissioning standards identified by the Director.*

⁵² For a more detailed description of retro-commissioning requirements, see NYC Local Law 87: Final Rule, p.8-20.

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- (iii) *Operational and maintenance record keeping and tracking procedures (e.g., log books, computer maintenance records) have been implemented.*
 - (iv) *The following documentation is onsite and accessible to building operators: continuously updated operations manual or facility requirements document; building operations manual (including the basic sequence of operations, set points and resets, schedules, lighting and daylighting controls, plug load strategy, etc.); preventative maintenance plan; operations and maintenance manuals, if such manuals are still available from the manufacturer; maintenance contracts; and most recent retro-commissioning report.⁵³*
- (b) **Retro-Commissioning Agent Qualifications.** *Until such time as there is a national standard establishing qualifications for persons performing retro-commissioning of buildings⁵⁴ and such standard has been adopted by the Director, a retro-commissioning agent supervising and/or performing retro-commissioning must be able to demonstrate possession in good standing of at least one of the minimum qualifications set forth in this section. After the establishment of such a national standard, the Director may adopt the qualifications of the national standard with such modifications as the Director deems to be appropriate.*
- (1) *Licensed Engineer and at least one of the following:*
 - (i) *At least two years of experience performing retro-commissioning projects of similar scope and complexity*
 - (ii) *ASHRAE Commissioning Process Management Professional certification*
 - (iii) *ASHRAE High-Performance Building Design Professional certification*
 - (iv) *Building Commissioning Association Certified Commissioning Professional certification*
 - (v) *AEE Certified Building Commissioning Professional*
 - (vi) *University of Wisconsin Accredited Commissioning Process Authority Professional*
 - (vii) *Similar qualifications in retro-commissioning as determined by the Director.*
 - (2) *AEE Certified Energy Manager or Certified Energy Auditor and at least two years of experience performing retro-commissioning*
 - (3) *At least 10 years of experience as a building operating engineer or at least five years of experience as a chief operating engineer and at least one of the following:*
 - (i) *Building Operator Certification*
 - (ii) *International Union of Operating Engineers Certified Energy Specialist.*

⁵³ This list was adapted from New York City's Local Law 87 related to energy audits and retro-commissioning. Retro-commissioning is generally defined as a process for optimizing the way a building and its component systems operate. Adherence to processes is difficult to measure and enforce. Therefore, New York City found it necessary to develop a list of prescriptive measures that must be completed as part of the retro-commissioning process in compliance with the law. The list was developed in coordination with a stakeholder advisory group that included representatives from the retro-commissioning industry, city agencies, and other stakeholders. This list focuses on the effective and efficient operation of individual equipment and systems within a building. Retro-commissioning should also evaluate how the equipment and systems interact with each other to increase or decrease the overall efficiency and energy performance of the building. For example, retro-commissioning may evaluate the influence that de-lamping and installing occupancy sensors may have on reducing the building's cooling load and therefore the size of HVAC unit required. When considering policy language and enforcement mechanisms, jurisdictions may also want to consider including a provision that requires all base building systems to be operated such that the operation of one system enhances, rather than detracts from, the energy performance of another and the building as a whole. Although it may not be feasible to enforce this integrated systems approach in such a checklist, jurisdictions may require the inclusion of some qualitative discussion of the systems-wide evaluation performed in the retro-commissioning report (for example, see Sections (C)(2)(d)(iv) and (C)(2)(d)(v)).

⁵⁴ DOE has enlisted the National Institute of Building Sciences to convene industry stakeholders and subject matter experts to develop voluntary national guidelines for several commercial advanced energy occupations, including energy auditor and commissioning authority. These voluntary national guidelines will address both competency-based professional certifications and training or knowledge-based certificate programs, and may be licensed by qualified certification bodies, certificate program providers, or registered apprenticeship programs recognized by the U.S. Department of Labor and issuing interim credentials in accordance with 29 CFR Part 29.5(b)(16).

For competency-based professional certifications, the Better Buildings Workforce Guidelines will consist of a current, industry-validated job task analysis outlining the key duties, tasks and competencies for each occupation, and a certification scheme identifying the prerequisites, exam blueprint, continuing education requirements, recertification process, and other components of the certification. These national guidelines will then be available to any qualified certification body to screen candidates, develop a psychometrically-valid assessment, administer examinations, and confer a high-quality certification. DOE will only recognize the certification programs that achieve third-party accreditation under the ANSI/ISO/IEC 17024 standard. For more information on the Better Buildings Workforce Guidelines, see <http://energy.gov/better-buildings>.

- (4) Equivalent professional qualifications to manage, maintain, or evaluate building systems and specialized training in retro-commissioning and maintenance of building systems as determined by the Director.⁵⁵
- (c) **Consultation of Operations and Maintenance Staff.** The covered building's operations and maintenance staff shall be consulted at the beginning of and during the retro-commissioning process.⁵⁶
- (d) **Retro-Commissioning Report.** The retro-commissioning agent shall prepare, sign, and deliver to the owner of the covered building an energy efficiency report per the requirements of this subsection.⁵⁷
- (1) **Report Contents.** The energy efficiency report shall be provided in electronic format that uses the BEDES format and include the following:
- (i) **Retro-commissioning Agent Information**
 - (a) Retro-commissioning agent name, affiliation, and contact information
 - (b) A description of the retro-commissioning agent's qualifications for performing the work in compliance with Section (C)(2)(b).
 - (ii) **Retro-Commissioning Information**
 - (a) The date(s) that retro-commissioning was performed
 - (b) Affirmation by the retro-commissioning agent and building owner that the retro-commissioning meets the applicable standards as set forth in Section (C)(2)(a) and that the covered building's operations and maintenance staff was consulted according to the requirements of Section (C)(2)(c)
 - (c) List of all systems and equipment types tested. For each equipment type tested, provide the following:
 - (i) The percentage of equipment tested out of the total number of pieces of equipment of the same type (i.e., the sampling rate)
 - (ii) The testing methodology
 - (iii) List of diagnostic equipment used (if any)
 - (iv) The test results:
 1. Outline of building operations and assumptions including reference to and location of any building monitoring and verification plan, sequence of operations, building operations manual and/or maintenance manual and plan
 2. List of integrated system testing performed.⁵⁸
 - (iii) **Covered Building Information:**
 - (a) Covered building address
 - (b) Building owner name and contact information
 - (c) Building manager name and contact information (if different from building owner)
 - (d) Covered building gross square footage and conditioned floor area square footage
 - (e) List of all HVAC, domestic hot water, chilled water, electrical equipment, lighting, and conveyance equipment types in the base buildings systems⁵⁹
 - (iv) **Master list of findings, including for each:**
 - (a) Name and brief description of the retro-commissioning measure
 - (b) Estimated annual savings (energy and cost)
 - (c) Estimated implementation cost
 - (d) Simple payback.


⁵⁵ Retro-commissioning agent qualifications may be modified to reflect local workforce development programs and/or market conditions.

⁵⁶ Building operations and maintenance staff can provide insight into the real-world, rather than theoretical, operations of the building, which can inform building-specific recommendations for optimizing base building systems and processes. In addition, operations and maintenance staff will benefit from the retro-commissioning findings and recommended training for continued high-performance operation of the building.

⁵⁷ As of the publication of this guide, *The Commissioning Process for Buildings and Systems* guidelines are being developed by ASHRAE. Once completed, these may provide additional context for the format and content of retro-commissioning reports.

⁵⁸ The benefit of retro-commissioning that looks at the whole building versus energy audits is that retro-commissioning analyzes the operating efficiency of not just individual pieces of equipment and individual systems, but also of how the equipment and systems interact with each other to increase or decrease the overall efficiency and energy performance of the building. For example, retro-commissioning may evaluate the influence that de-lamping and installing occupancy sensors may have on reducing the building's cooling load and therefore the size of HVAC unit required.

⁵⁹ This list can be used to assess the comprehensiveness of the testing performed pursuant to Section (C)(2)(d)(1)(ii).

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- (v) *Deficiencies corrected:*
 - (a) *List of repairs completed during investigation.*
 - (b) *List of deficiencies corrected, including, for each deficiency:*
 - (i) *Date corrected*
 - (ii) *By whom the correction was made*
 - (iii) *Actual cost*
 - (iv) *Projected savings.*

(3) **Schedule for Compliance.** No later than 180 days after enactment of this [ORDINANCE/ARTICLE/CHAPTER],⁶⁰ the Director shall establish a schedule for energy efficiency reports to be submitted according to the following guidelines:

- (a) **Submission Format.** The energy efficiency report shall include, in a format prescribed by the Director
 - (1) The energy audit report or documentation substantiating that an exception as set forth in Section (C)(4) applies to such building; and
 - (2) The retro-commissioning report or documentation substantiating that an exception as set forth in Section (C)(4) applies to such building.
- (b) **Submission Timeframe.** The building owner must submit the energy efficiency report to the Director within 12 months of the date that the audit and retro-commissioning were completed.
- (c) **Rolling Deadline.** To ensure sufficient audit, retro-commissioning, and data processing capacity, deadlines for initial energy efficiency reports for all covered buildings shall be staggered over a four-year rolling deadline⁶¹ according to the following guidelines:
 - (1) For a [STATE/LOCAL GOVERNMENT] building with conditioned floor area greater than 10,000 square feet, the [STATE/LOCAL GOVERNMENT] must submit the initial energy efficiency report on or before January 1, 2014, and every five years no later than January 1 thereafter.⁶²
 - (2) For a covered building with conditioned floor area greater than or equal to 50,000 square feet, the building owner must submit the initial energy efficiency report on or before January 1, 2015, and every 5 years no later than January 1 thereafter.
 - (3) For a covered building with conditioned floor area greater than 25,000 square feet but less than 50,000 square feet, the building owner must submit the initial energy efficiency report on or before January 1, 2016, and every five years no later than January 1 thereafter.
 - (4) For a covered building with conditioned floor area greater than 9,999 square feet but less than 25,000 square feet, the building owner must submit the initial energy efficiency report on or before January 1, 2017, and every five years no later than January 1 thereafter.⁶³
- (d) **Deadline Notification.** The Director shall notify the building owner of each covered building of the requirements of this [ORDINANCE/ARTICLE/CHAPTER] and the assigned energy efficiency report deadline at least one year prior to the deadline.⁶⁴


⁶⁰ Jurisdictions may need 12–18 months of preparation time before the first energy efficiency report deadline to allow sufficient time to educate building owners, energy efficiency professionals, and related stakeholders about the new requirements; promulgate rules needed to implement the ordinance; train staff; and develop a reporting and disclosure (if applicable) infrastructure.

⁶¹ DOE is developing a data warehousing tool, known as the Standardized Energy Efficiency Database (SEED) platform, that is intended to help minimize a jurisdiction's level of effort required to set up and maintain the infrastructure for data reporting, processing, and disclosure for jurisdictions adopting retro-commissioning and related policies that have a disclosure element. A staggered deadline is advised so as to not overwhelm building owners of multiple covered buildings and government staff. One way of staggering deadlines is by building size, as used here. Jurisdictions may want to modify the size classifications to reflect their selected minimum size threshold. Note that suggested building size thresholds presented here are intended as recommendations. Each jurisdiction is expected to establish its own size thresholds and deadlines for implementation.

⁶² Jurisdictions may want to lead by example, as provided in this sample policy, to (1) help ready the retro-commissioning workforce for the qualifications required by and the increased workload due to the policy and (2) identify and remedy any issues with the data submission and quality control processes prior to receiving data from the private sector. Jurisdictions may also consider posting the results of audits and retro-commissioning its public buildings on a public website to educate private sector building owners on the type of data that will be collected and disclosed (if applicable). Disclosure information is included in Section (C)(12).

⁶³ The submission deadlines included in this sample policy are provided as an example of the spacing that other jurisdictions have found valuable to handle the influx of data and minimize the reporting burden on building owners. Jurisdictions may want to modify the recurring deadline schedule to meet their local capacity, goals, market conditions, fiscal years, etc. As a rule-of-thumb, retro-commissioning should be conducted every three to five years.

⁶⁴ Building owners need sufficient time to become educated on the requirements of the policy, develop a compliance plan, and survey the market for available retro-commissioning agents ahead of the energy efficiency report deadline. When the policy is first being implemented,

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- (e) **Early Compliance.** Owners of covered buildings in existence on the effective date of this [ORDINANCE/ARTICLE/CHAPTER] may comply with the first assigned energy efficiency report deadline by submitting records of energy audits and retro-commissioning performed not more than three years prior to the assigned energy efficiency report deadline.⁶⁵ Submitted energy audit and retro-commissioning reports must be signed and dated by an energy auditor meeting the qualifications set forth in Section (C)(1)(b) and by a retro-commissioning agent meeting the qualifications set forth in Section (C)(2)(b). These professionals must certify that all work associated with the energy audit and retro-commissioning (including but not limited to surveys, inspections, and analyses) was completed not more than three years prior to the assigned energy efficiency report deadline, and that the audit and retro-commissioning met the standards specified in Section (C)(1)(a) and Section (C)(2)(a), respectively.

(4) Exceptions

- (a) No energy audit or retro-commissioning is required if the building complies with at least one of the following, as certified by a registered design professional.⁶⁶
- (1) **New Construction.** The covered building was newly constructed less than three years prior to the energy efficiency report deadline and was commissioned at the time of construction.⁶⁷
 - (2) **ENERGY STAR Certification.** The covered building has earned EPA's ENERGY STAR certification for at least two of the three consecutive years prior to the energy efficiency report deadline.
 - (i) If there is no EPA Energy Star score available for the building type, a registered design professional may submit documentation that the building's energy performance is 25 percent better than the performance of an average building of its type over a two-year period within the three-year period prior to the filing of an energy efficiency report.
 - (3) **LEED Certification.** The covered building has received certification under the United States Green Building Council's (USGBC's) Leadership in Energy and Environmental Design® (LEED®) 2009 for Existing Buildings: Operations and Maintenance Rating System or other rating system for existing buildings, as determined by the Director, within three years prior to the energy efficiency report deadline,⁶⁸ and has earned the LEED point for Existing Building Commissioning investigation and analysis and the LEED point for Existing Building Commissioning implementation.⁶⁹
 - (4) **Updated Code Compliance.** Neither energy audit nor retro-commissioning shall be required for the first energy efficiency report of a simple building that is in compliance with six out of seven of the following items as certified by a registered design professional:

the qualified workforce pool may be relatively small, so jurisdictions should be mindful of providing sufficient time to schedule the required retro-commissioning and report the findings as required by the policy.


⁶⁵ As a rule-of-thumb, retro-commissioning should be conducted every three to five years, so jurisdictions may want to modify this window between three and five years prior to the assigned energy efficiency report deadline.

⁶⁶ If a covered building is exempt from the retro-commissioning requirements, then it may be onerous to the building owner to require certification by a retro-commissioning agent. Therefore, a registered design professional (a professional engineer or registered architect) may be sufficient to certify the reason for the exception.

⁶⁷ Many newly constructed buildings are not commissioned and may therefore not operate as efficiently or effectively as designed. Therefore, a newly constructed building must be commissioned to qualify for the exception. As a rule-of-thumb, retro-commissioning should be conducted every three to five years, regardless of building age, so jurisdictions may want to modify this window between three and five years prior to the assigned energy efficiency report deadline. Among the jurisdictions that are pursuing audit and/or retro-commissioning policies, New York City provides a deferral of up to 10 years for buildings that are less than 10 years old when their first assigned report date arrives. In San Francisco, an audit is not required for buildings constructed within five years of the reporting deadline; these properties would be included in the subsequent audit cycle. In Austin, a multifamily property is not required to undertake an audit if it was less than 10 years old on June 1, 2009; but it would need to receive an audit during the subsequent audit cycle.

⁶⁸ This exception is meant to reward building owners who have voluntarily made investments to retrofit, operate, and/or maintain a high energy-performing building. To earn LEED for Existing Buildings: Operations and Maintenance certification, buildings must achieve a minimum number of points related to energy use.


⁶⁹ This exception is meant to reward building owners who have voluntarily made investments to retrofit, operate, and/or maintain a high energy-performing building. To earn LEED for Existing Buildings: Operations and Maintenance certification, buildings must achieve a minimum number of points related to energy use. Two of those points are specific to retro-commissioning. Achieving LEED for Existing Buildings: Operations and Maintenance certification and the retro-commissioning points would demonstrate that the building owner is operating and maintaining its building as desired by the policy and that additional retro-commissioning requirements, therefore, may not be cost-effective. Jurisdictions may want to modify the number of years for which the covered building received LEED for Existing Buildings: Operations and Maintenance certification to match local goals, market conditions, etc.

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- (i) **Individual HVAC controls.** (1) Each tenant unit in the building has one or more thermostatic controls controlling all the HVAC units within the tenant unit and any conditioned space not within a tenant unit has one or more thermostatic controls controlling all the HVAC units within the space, or (2) the building has a central HVAC system controlled by an energy management system or a building automation system that incorporates temperature sensors located in at least 10 percent of the dwelling units and 10 percent of the conditioned spaces, except that the total number of sensors required within the building shall not be less than 10.
 - (ii) **Common area and exterior lighting.** Common area and exterior lighting, at a minimum, comply with the provisions of the [STATE OR LOCAL] building energy code as in effect for new systems installed on or after [APPLICABLE DATE].
 - (iii) **Low-flow faucets and shower heads.** All faucets and shower heads within the building, at a minimum, meet the standards of the [STATE OR LOCAL] plumbing code as in effect for new systems installed on or after [APPLICABLE DATE].
 - (iv) **Pipe insulation.** All exposed pipes that are used to convey heat, conditioned air, or chilled or hot water are insulated, at a minimum, in accordance with the standards of the [STATE OR LOCAL] building energy code as in effect for new systems installed on or after [APPLICABLE DATE].
 - (v) **Domestic hot water.** All domestic hot water tanks that do not have built-in insulation are insulated with a minimum insulation value of R-8.
 - (vi) **Washing machines.** All common area clothes washing machines are certified by ENERGY STAR or the Consortium for Energy Efficiency.
 - (vii) **Cool roof.** The roof complies with the provisions of the [STATE OR LOCAL] building energy code as in effect for new building constructed on or after [APPLICABLE DATE].⁷⁰
- (5) **Insufficient Workforce Availability.** In the event that no energy auditor or retro-commissioning agent meeting the qualifications set forth in Sections (C)(1)(b) or Section C(2)(b) is available to perform an energy audit meeting the standards set forth in Sections (C)(1)(a) or Section C(2)(a) prior to the energy efficiency report deadline, a building owner may apply to the Director for an extension of the deadline not to exceed one year. The Director may grant no more than two such extensions of no more than one year each. Extensions granted pursuant to this provision shall not extend the scheduled due dates for subsequent energy efficiency reports.
 - (6) **Financial Hardship.** Building owners of covered buildings in financial hardship as defined in Section (B)(26) may apply for no more than two extensions from the Director of not more than one year each for submission of a completed energy efficiency report.⁷¹
 - (7) **Common Ownership.** Where the same person or entity owns three or more covered buildings and the energy efficiency report deadlines for more than one-third of those buildings fall within a single twelve-month period, the building owner may apply to the Director for—and shall be granted—an extension not to exceed one year of the deadlines for up to two-thirds of the buildings under common ownership. The application shall specify which buildings are to be covered by the extension.⁷²
- (5) **Verification of Exception Applicability.** Where energy audits and/or retro-commissioning are not required due to one of the exceptions in Section (C)(4), the building owner shall submit a written statement to the Director citing the exception that applies and including a copy of relevant documentation as outlined below or as otherwise determined by the Director.
 - (a) **New Construction.** Date of new construction may be verified using a copy of the Certificate of Occupancy issued by [APPLICABLE DEPARTMENT].
 - (b) **ENERGY STAR Certification.** ENERGY STAR certification may be verified using one or more of the following types of documentation:

⁷⁰ This exception is meant to reward building owners who have voluntarily made investments to bring their buildings up to the most recent code. Jurisdictions may want to modify the specific technologies included in the exception list or the number of technologies that must be brought up to code to be exempt to match local goals, market conditions, etc.

⁷¹ This exception is meant to alleviate the compliance burden for building owners with insufficient financial means to perform the retro-commissioning and reporting requirements of this ordinance. Jurisdictions may wish to modify the number of extensions that can be granted and/or the extension period to match local goals, market conditions, etc.

⁷² This exception is meant to alleviate the compliance burden for building owners with multiple buildings. Jurisdictions may wish to modify the number of covered buildings that a building owner must own to qualify and/or the extension period to match local goals, market conditions, etc.

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- (1) A copy of the ENERGY STAR certificate
 - (2) Written confirmation that the building is included in the EPA's database of ENERGY STAR certified buildings
 - (3) If there is no EPA Energy Star score available for the building type, a registered design professional may submit documentation that the building's energy performance is 25 percent better than the performance of an average building of its type over a two-year period within the three-year period prior to the filing of an energy efficiency report. This calculation should be consistent with the methodology of the LEED 2009 rating system for Existing Buildings published by the USGBC or other rating system or methodology for existing buildings, as determined by the department.
- (c) **LEED Certification.** LEED for Existing Buildings: Operations and Maintenance certification may be verified using one or more of the following types of documentation:
- (1) A copy of the LEED for Existing Buildings: Operations and Maintenance certificate. For exception from the retro-commissioning requirement, this must also include verification that the building has earned the LEED point for Existing Building Commissioning investigation and analysis and the LEED point for Existing Building Commissioning implementation.
 - (2) Confirmation that the building is included in the USGBC's LEED certified project directory.⁷³
- (d) **Updated Code Compliance.** Compliance with the most recent building energy code in effect for the building technologies eligible for exemption in Section (C)(4)(a)(5) may be verified using a written statement signed by a registered design professional.
- (e) **Insufficient Workforce Availability.**
- (1) Energy Auditors. Exceptions due to insufficient availability of energy auditors meeting the qualifications set forth in Section (C)(1)(b) prior to the energy efficiency report deadline shall be verified using both of the following types of documentation:
 - (i) A list of all energy efficiency professionals contacted to determine their eligibility as an energy auditor and their availability to perform an energy audit prior to the energy efficiency report deadline
 - (ii) Copies of written statements from three or more qualified, unique energy auditors stating their inability to perform energy audits prior to the energy efficiency report deadline and an explanation for their unavailability.
 - (2) Retro-Commissioning Agents. Exceptions due to insufficient availability of retro-commissioning agents meeting the qualifications set forth in Section (C)(2)(b) prior to the energy efficiency report deadline shall be verified using both of the following types of documentation:
 - (i) A list of all energy efficiency professionals contacted to determine their eligibility as a retro-commissioning agent and their availability to perform retro-commissioning prior to the energy efficiency report deadline
 - (ii) Copies of written statements from three or more qualified, unique retro-commissioning agents stating their inability to perform retro-commissioning prior to the energy efficiency report deadline and an explanation for their unavailability.
- (f) **Financial Hardship.** Financial hardship may be verified using one or more of the following types of documentation as applicable to the condition creating the financial hardship as defined in Section (C)(26):
- (1) An affidavit from the [TAX COLLECTION BODY]
 - (2) Foreclosure documentation from applicable financial institution
 - (3) An active or effective commitment letter from a governmental agency that provides for the financing of the rehabilitation, within a period of 5 years or less, of a covered building by a government agency for the purposes of affordable housing for low or moderate income families
- (g) **Common Ownership.** Exceptions due to common ownership of three or more covered buildings may be verified using one or more of the following types of documentation:
- (1) A copy of the most recent year's property tax statement for each covered building
 - (2) A copy of the deed for each covered building.
- (6) **Publication of Limited Summary Data.** The Director shall make available to the public in electronic format and update at least annually⁷⁴ the following information:

⁷³ The current list of LEED-certified buildings can be accessed at: www.usgbc.org/LEED/Project/CertifiedProjectList.aspx.

⁷⁴ Jurisdictions may wish to modify the updating timeline to reflect local capacity, goals, market conditions, etc.

- (a) Summary statistics on overall compliance with this [ORDINANCE/ARTICLE/CHAPTER]
- (b) Summary statistics on energy use in covered buildings derived from received energy efficiency reports, including relevant additional aggregate data as available⁷⁵
- (c) Summary statistics on the energy- and cost-saving potential in covered buildings derived from received energy efficiency reports, including relevant additional aggregate data when available⁷⁶
- (d) An analysis of the most commonly recommended capital improvements of base building systems recommended in the energy audits of such buildings.
- (e) For each covered building:
 - (1) The status of compliance with this [ORDINANCE/ARTICLE/CHAPTER]
 - (2) The most recent date when an energy audit and retro-commissioning were conducted in compliance with this [ORDINANCE/ARTICLE/CHAPTER]
 - (3) The date of the next required energy audit and retro-commissioning.
 - (4) ENERGY STAR score (if available)
 - (5) Indication of whether an exception was requested and granted per the provisions of Section (C)(4).

(7) Transactional Party Notification

- (a) **Tenant and Prospective Tenant Notification.** To engage building occupants to participate in efforts to save energy and educate current and prospective tenants on covered buildings' energy performance and energy-saving potential, building owners must make the most recent energy efficiency report available to all tenants occupying the building and prospective tenants considering leasing space in the building.
- (b) **Prospective Purchaser or Investor Notification.** To educate prospective purchasers of or investors in covered buildings on the building energy performance and energy-savings potential, building owners must make the most recent energy efficiency report available to all interested purchasers or investors in all or part of the building.⁷⁷

(8) Quality Assurance. To assist with the reliability and utility of energy audit and retro-commissioning report data and to verify good faith compliance with this [ORDINANCE/ARTICLE/CHAPTER], the Director shall have the authority to review relevant documents, including energy efficiency reports, and related surveys, calculations, and other supporting documentation. In the event an energy audit or retro-commissioning report or supporting documentation is found to have failed to meet the criteria in Sections (C)(1)(d) and/or (C)(2)(d), the Director may apply the administrative penalties specified in Section (C)(12)(b), and the building owners shall correct the errors and resubmit the relevant report and/or supporting documentation within 90 days⁷⁸ of being notified by the Director of the insufficiencies of the original submission. Any energy-related information obtained in the course of Quality Assurance beyond items explicitly required to be made public in Section (C)(6) shall remain confidential to the extent permitted by law, unless designated in writing by the building owner to be public or otherwise demonstrated to be common knowledge.

(9) Workforce Development. To ensure proper planning for workforce availability, the Agency in charge of workforce development will, within one year of adoption of this [policy], undertake a Workforce Evaluation and Gaps Analysis. The Workforce Evaluation and Gaps Analysis will identify the current availability of workforce able to meet the needs of this [policy] as well as the pipeline of candidates likely to satisfy the needs of this [policy] within the next two years.

⁷⁵ Potential data sources include:


- 1) Aggregate energy consumption data from a local utility provider
- 2) DOE's *Buildings Energy Data Book*: <http://buildingsdatabook.eren.doe.gov>
- 3) U.S. Energy Information Administration: www.eia.gov.

⁷⁶ Potential data sources include:

- 1) Deemed savings estimates approved by energy efficiency program regulators. A list of energy efficiency program regulators can be accessed at: www.naruc.org/commissions.cfm.
- 2) Mills, E.; Mathew, P. (2009). *Monitoring-Based Commissioning: Benchmarking Analysis of 24 UC/CSU/IOU Projects*. LBNL-1972E.: Lawrence Berkeley National Laboratory. <http://cx.lbl.gov/MBCx.html>.
- 3) Mills, E. (2009). *Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions*. Lawrence Berkeley National Laboratory. <http://cx.lbl.gov/documents/2009-assessment/LBNL-Cx-Cost-Benefit.pdf>.

⁷⁷ Rather than, or in addition to, requiring the public disclosure outlined in Section (C)(6), jurisdictions may consider requiring disclosure among transactional parties. This form of disclosure may require an additional layer of verification to ensure the required information is being shared with intended parties.


⁷⁸ Jurisdictions may want to modify the timeframe for remedying incorrect/incomplete information to match local capacity, goals, market conditions, etc. For example, San Francisco allows a 45-day window.

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- (a) Based on the definitions used in the National Certification Program, the Workforce Evaluation and Gaps Analysis will include:
 - (1) The number of existing qualified workforce
 - (2) The number of related professionals including but not limited to certified professional designers, certified energy managers and auditors, professional engineers, retro-commissioning agents, auditing agents, etc.
 - (3) The number of qualified workforce necessary to meet the needs under this [policy].
 - (b) The Agency conducting the Workforce Evaluation and Gaps Analysis will consult with local and regional workforce development stakeholders including but not limited to the U.S. Department of Labor's Workforce Investment Board, the local community college management board or other oversight group, and relevant Labor Unions.
 - (c) The Agency will present the results of the Evaluation and Gaps Analysis to the (Energy) Director and the Workforce Development Agency Director.
 - (d) Based on the Evaluation and Gaps Analysis, the Agency will, within two years of the adoption of this [policy] and in coordination with local workforce development representatives, develop a Plan for Workforce Availability. The Plan for Workforce Availability will include, at minimum, the following:
 - (1) A clear definition of the competencies and credentials required for auditors and retro-commissioning agent
 - (2) A list of local certification providers or opportunities for local training through national providers
 - (3) A description and plan for filling any gaps identified through the Evaluation and Gaps Analysis.

(10) Confidentiality

- (a) Consistent with the provisions of this section and to the extent permitted by law, the Director shall maintain confidentiality of any information submitted by building owners in compliance with this [ORDINANCE/ARTICLE/CHAPTER] where the building owner has informed the Director in writing within 15 business days⁷⁹ of the submittal of such information that the information is confidential business information of the building owner or a building tenant. Lists of cost-effective energy efficiency measures as well as associated estimated costs and benefits for individual buildings shall be presumed confidential unless otherwise indicated in writing by the building owner or it can be demonstrated that the information is already available to the public.
- (b) The building owner shall not be required by this [ORDINANCE/ARTICLE/CHAPTER] to disclose to third parties or the public confidential business information of the building owner or individual tenants. However, the items identified in Section (C)(6), except as noted, shall not be considered confidential.
- (c) If a building owner believes that any information required to be reported or disclosed by this [ORDINANCE/ARTICLE/CHAPTER] includes confidential business information, the building owner shall provide the information to the Director and shall notify the Director in writing of that belief, detailing the basis of the belief as to each specific item of information that the building owner claims is confidential business information. The building owner designating information as confidential business information shall also provide the Director with a name and contact information for notification purposes and shall be responsible for updating such information. The Director shall not disclose any properly substantiated confidential business information as designed by a building owner except as required by this [ORDINANCE/ARTICLE/CHAPTER] or as otherwise required by law.
- (d) Information designated as confidential business information may be disclosed to an officer or employee of the [JURISDICTION], the State of [STATE], or the United States of America for use in connection with the official duties of such officer or employee acting under authority of law, without liability on the part of the [JURISDICTION].
- (e) When the Director or other [JURISDICTION] official or employee receives a request for information that has been designated as, or which the [JURISDICTION] determines may be, confidential business information, the [JURISDICTION] shall notify the building owner of the request. The [JURISDICTION] may request further evidence or explanation from the building owner as to why the information requested is confidential business information. If the [JURISDICTION] determines that the information does not constitute confidential business information, the [JURISDICTION] shall notify the building owner of that conclusion and that the information will be released by a specified date to provide the building owner the opportunity to obtain a court order prohibiting disclosure.

⁷⁹ Jurisdictions may want to modify the timeframe for notifying the Director of confidentiality requests to match local capacity, goals, market conditions, etc.

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- (f) *In adopting this [ORDINANCE/ARTICLE/CHAPTER], the [JURISDICTION] does not intend to authorize or require the disclosure to the public of any confidential business information protected under the laws of the State of [STATE].*
 - (g) *This section is not intended to empower a person or business to refuse to disclose any information, including but not limited to confidential business information, to the Director as required by this [ORDINANCE/ARTICLE/CHAPTER].*
 - (h) *Notwithstanding any other provision of this [ORDINANCE/ARTICLE/CHAPTER], any officer or employee of the [JURISDICTION] or former officer or employee or contractor of the [JURISDICTION], who by virtue of such employment of official position has obtained possession or has had access to information, the disclosure of which is prohibited by this section, and who, knowing that disclosure of the information is prohibited, knowingly and willfully discloses the information in any manner to any person or business not entitled to receive it, shall be guilty of a misdemeanor.*

(11) Implementation

- (a) *The Director may adopt rules and regulations for the implementation of this [ORDINANCE/ARTICLE/CHAPTER], including rules for electronic submittal and notification of receipt of energy efficiency reports.*
- (b) *The Director may modify or suspend the requirements of this [ORDINANCE/ARTICLE/CHAPTER] if any of the following is true:*
 - (1) *The State of [STATE] or federal government adopts a similar or more comprehensive existing commercial building retro-commissioning program.*
 - (2) *The Director makes written finding to [JURISDICTION'S OVERSIGHT BODY] that a technological deficiency in the evaluation tool or tools specified under this [ORDINANCE/ARTICLE/CHAPTER] precludes compliance with this [ORDINANCE/ARTICLE/CHAPTER]. The Director may lift all or part of such suspension upon the written finding that any such deficiency has been corrected.*

(12) Enforcement

- (a) **Written Warning of Violation.** *The Director shall issue a written warning to any building owner he or she determines is violating any provision of this [ORDINANCE/ARTICLE/CHAPTER]. In the event a building owner fails to file an energy efficiency report for 30 days or more after the energy efficiency report deadline,⁸⁰ the Director shall indicate that building's non-compliant status via the publicly accessible electronic reporting interface. If 45 days after issuing a written warning of violation from the Director,⁸¹ the Director finds that the building owner continues to violate any provisions of this [ORDINANCE/ARTICLE/CHAPTER], the Director may impose administrative fines as provided in Section (C)(12)(b).*
- (b) **Administrative Fines.** *Violations of the provisions of this [ORDINANCE/ARTICLE/CHAPTER] or of any regulations issued by the Director pursuant to Section (C)(11), may be punished by administrative fines as follows:*
 - (1) *For a covered building with conditioned floor area greater than or equal to 50,000 square feet, up to \$100 per day for a maximum of 25 days in one twelve-month period for each building in violation.*
 - (2) *For a covered building with conditioned floor area greater than 25,000 square feet but less than 50,000 square feet, up to \$50 per day for a maximum of 25 days in one twelve-month period for each building in violation.*
 - (3) *For a covered building with conditioned floor area greater than 9,999 square feet but less than 25,000 square feet, up to \$25 per day for a maximum of 25 days in one twelve-month period for each building in violation.⁸²*
 - (4) *Except as to the amount of administrative fines, set forth above, [APPLICABLE ADMINISTRATIVE CODE], as may be amended from time to time, is hereby incorporated in its entirety and shall govern the imposition, enforcement, collection, and review of administrative citations issued by the Director to enforce this*

⁸⁰ Jurisdictions may want to modify the timeframe for publicly posting a non-compliant status to match local capacity, goals, market conditions, etc.

⁸¹ Jurisdictions may want to modify the timeframe for imposing administrative fines to match local capacity, goals, market conditions, etc.

⁸² One commonly used method of assigning administrative fines is to tier the dollar amount of the fine by the covered building's size. Jurisdictions may want to modify the building size classifications and/or the dollar amount of the fine. To limit the maximum fine paid by a building owner, jurisdictions may want to enact a cap on the aggregate fine amount. One method of determining this cap is to impose a daily fine that cannot be accrued for more than a certain number of days in a single year, as provided in this policy. Jurisdictions may want to modify the cap amount or the method of determining the cap to match local capacity, goals, market conditions, etc.

[ORDINANCE/ARTICLE/CHAPTER] and any rule or regulation adopted pursuant to this [ORDINANCE/ARTICLE/CHAPTER].

- (c) **Use of Proceeds.** Administrative fines collected under Section (C)(12)(b) shall be used to fund implementation and enforcement of this [ORDINANCE/ARTICLE/CHAPTER].

(13) *Energy Efficiency Measures in [STATE/LOCAL GOVERNMENT] Buildings*

- (a) **Implementation.** No later than one year after the submission of an energy efficiency report for a [STATE/LOCAL GOVERNMENT] building, energy efficiency measures that are recommended in the energy audit or retro-commissioning report and that have a simple payback of not more than seven years, or measures that, when combined, would equal or exceed the overall reduction in energy consumption of such recommended measures having a simple payback of not more than seven years, shall be implemented.
- (b) **Reporting.** The [FACILITIES MAINTENANCE DEPARTMENT] shall submit annual reports to the [JURISDICTION'S OVERSIGHT BODY] on energy efficiency measures completed pursuant to Section (C)(13)(a) for each [STATE/LOCAL GOVERNMENT] fiscal year beginning [MONTH] [DATE], 2014. The first such report for the fiscal year beginning [MONTH] [DATE], 2014, shall be submitted by [MONTH] [DATE], 2015. Subsequent reports shall be due six months after the close of the fiscal year covered by the report. Each report shall include, at a minimum, the following:
- (1) The latest report submitted pursuant to Section (C)(3)(a) for each covered [STATE/LOCAL GOVERNMENT] building
 - (2) An analysis of the most commonly recommended energy efficiency measures in the energy efficiency reports
 - (3) An analysis after one year of implementation of the recommended energy efficiency measures of the accuracy of required reports in predicting the actual costs of recommended energy efficiency measures
 - (4) An analysis after one year of implementation of the recommended energy efficiency measures of the accuracy of reports in predicting the actual energy and cost savings achieved by the measures
 - (5) Recommendations as to appropriate legislative or administrative actions or a statement as to why no action is needed.⁸³

Section D. Additional Provisions

- (1) **General Welfare.** In adopting and implementing this [ORDINANCE/ARTICLE/CHAPTER], [JURISDICTION] is assuming an undertaking only to promote the general welfare. It is not assuming, nor is it imposing on its officers and employees, an obligation for breach of which it is liable in money damages to any building owner who claims that such breach proximately caused injury.
- (2) **Conflict With State or Federal Law.** This [ORDINANCE/ARTICLE/CHAPTER] shall be construed so as not to conflict with applicable federal or state laws, rules, or regulations. Nothing in this [ORDINANCE/ARTICLE/CHAPTER] shall authorize any [STATE/LOCAL GOVERNMENT] agency or department to impose any duties or obligations in conflict with limitations on municipal authority established by state or federal law at the time such agency or department action is taken.
- (3) **Severability.** If any section, subsection, sentence, clause, phrase, or other portion of this [ORDINANCE/ARTICLE/CHAPTER] is for any reason declared unconstitutional or invalid, in whole or in part, by any court of competent jurisdiction, such portion shall be deemed severable, and such unconstitutionality or invalidity shall not affect the validity of the remaining portions of this local law, which remaining portions shall continue in full force and effect. To this end, the provisions of this [ORDINANCE/ARTICLE/CHAPTER] are severable.

Section E. Rules

- (1) The director shall promulgate such rules as deemed necessary to carry out the provisions of this article.

⁸³ In addition to including public buildings in the definition of a covered building, jurisdictions may also want to require their facilities management departments to implement energy efficiency measures identified and/or report progress and recommendations to an oversight body (bodies) on a recurring basis, as provided in this policy. Jurisdictions may want to modify the implementation criteria and implementation and reporting timeframe to match local capacity, goals, market conditions, etc.



4. Further Reading

4.1 Local Policies Requiring Energy Audits and/or Retro-Commissioning

Austin Energy Conservation Audit and Disclosure Ordinance:

www.austinenergy.com/about%20us/environmental%20initiatives/ordinance/ordinance.pdf.

New York City's Greener Greater Buildings Plan

www.nyc.gov/html/gbee/html/plan/plan.shtml

San Francisco's Existing Commercial Buildings Energy Performance Ordinance

www.sfenvironment.org/sites/default/files/fliers/files/sfe_gb_ecb_ordinance_overview_2.pdf.

4.2 Information on Energy Audits

Institute for Market Transformation (IMT) Energy Assessor Credentialing Program Profiles: Commissioning and Energy Auditor Programs

www.imt.org/uploads/resources/files/7.2Certification_Profiles_IMT_Cx_EA.pdf

Pacific Northwest National Laboratory (PNNL) Technical Report: *A Guide to Energy Audits*

www.pnnl.gov/main/publications/external/technical_reports/pnnl-20956.pdf

4.3 Information on Retro-Commissioning

Building Commissioning Association (BCA): *Best Practices in Commissioning Existing Buildings*

www.bcx.org/wp-content/pdf/BCA-Best-Practices-Commissioning-Existing-Construction.pdf

California Commissioning Collaborative: *California Commissioning Guide: Existing Buildings*

www.cacx.org/resources/documents/CA_Commissioning_Guide_Existing.pdf

Federal Energy Management Program (FEMP) Resources on Commissioning

www1.eere.energy.gov/femp/program/om_commissioning.html

Institute for Market Transformation (IMT) Energy Assessor Credentialing Program Profiles: Commissioning (Cx) and Energy Auditor Programs

www.imt.org/uploads/resources/files/7.2Certification_Profiles_IMT_Cx_EA.pdf

Lawrence Berkeley National Laboratory (LBNL) Resources on Building Commissioning

<http://cx.lbl.gov/>

PNNL Building Retuning

www.pnl.gov/buildingretuning

Portland Energy Conservation, Inc. (PECI): *A Retrocommissioning Guide for Building Owners*

www.peci.org/sites/default/files/epaguide_0.pdf

4.4 Additional Information

DOE Building Energy Data Exchange Specification (BEDES)

www1.eere.energy.gov/buildings/commercial/buildings_energy_data_exch_spec.html

State and Local Energy Efficiency Action Network (SEE Action): *Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language*

www1.eere.energy.gov/seeaction/pdfs/commercialbuildings_benchmarking_policy.pdf



SEE Action: *A Utility Regulator’s Guide to Data Access for Commercial Building Energy Performance Benchmarking*
www1.eere.energy.gov/seeaction/pdfs/commercialbuildings_data_access_guide.pdf

SEE Action: *A Regulator’s Privacy Guide to Third-Party Data Access for Energy Efficiency*
www1.eere.energy.gov/seeaction/pdfs/cib_regulator_privacy_guide.pdf

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