Building Performance Policies: A Comprehensive Approach

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ABSTRACT

The power of energy benchmarking and transparency policies to improve the performance of a city's building stock has been demonstrated by the reports of U.S. cities that have such policies in place; however, further energy efficiency actions can drive deeper and more rapid improvements that are crucial to meeting climate goals and increasing the competitiveness of real estate sectors. U.S. cities are increasingly pursuing more comprehensive and ambitious building performance policy packages that include elements such as energy audits, retrocommissioning, and mandatory upgrades, in addition to benchmarking. This paper examines how such a policy approach can deliver meaningful and timely energy savings by ensuring that owners of the least-efficient buildings make cost-effective efficiency investments, hastening the development of a robust local energy services industry.

We discuss how several U.S. cities have approached comprehensive building performance policies, outlining best practices for policy design. In addition, the paper focuses on the creation of a policy framework that recognizes the achievements of high-performing buildings through an exemption from beyond-benchmarking requirements, while requiring lower performers to achieve either a specified improvement in building performance or implement a prescriptive set of efficiency actions. A strong comprehensive building performance policy achieves these aims through flexible exemptions for buildings that are performing at a high level or have recently improved their performance significantly; specifying required efficiency actions for lower-performing buildings; and staggering the rollout of the policy to support the development of a robust energy services market.

Introduction

In the last several years, benchmarking and transparency policies have become increasingly common. As of March 2016, 15 cities, one county, and two states had passed policies requiring benchmarking and sharing of building energy use information (BuildingRating.com). By requiring owners of large buildings (often 50,000 square feet or more) to benchmark their buildings with ENERGY STAR Portfolio Manager and report certain metrics for public distribution, cities direct the attention of building owners and managers to the operational performance of their buildings, which appears to result in modest energy savings through more attentive operational practices (Palmer and Walls 2015). In the relatively short time that these policies have been in place, cities have seen encouraging signs that the requirements are resulting in measureable energy savings (BuildingRating.com Policy Comparison Matrix.)

Benchmarking policies that include transparency requirements inform market actors of the energy efficiency of buildings relative to their peers. This incentivizes owners to invest more deeply in efficiency to make their buildings more valuable to prospective tenants and investors. It remains too early to say that benchmarking information is being priced into leasing or

purchasing decisions by mainstream real estate market actors in the U.S., though evidence exists that high-performing buildings do command higher prices (Sale Premiums of Green Commercial Buildings in the U.S). As stakeholders get more familiar with benchmarking information, and as cities and third parties learn how to communicate benchmarking data more effectively, we should expect to see greater uptake of energy efficiency in buildings. However, it will likely take a considerable amount of time–years, if not decades–for such a sophisticated understanding of how to use benchmarking information in the valuation process to proliferate in an industry as large and fragmented as commercial and multifamily real estate. The need for significant reductions in greenhouse gas emissions, and thus energy consumption, is too urgent for this timescale. Increasingly, cities such as Denver, Los Angeles, New York City, and San Francisco have set aggressive climate goals calling for dramatic reductions in the energy used by their public and private building stock. Meeting these targets will require building owners to act on the information provided by benchmarking data and cut their energy use significantly in the near term. For this reason, a number of cities have embraced or are considering policies that go beyond benchmarking and transparency, in an effort to more quickly capture the deep energy savings needed to meet their climate goals.

In this paper, we use the term "comprehensive building performance policies" to describe these strategies. A comprehensive building performance policy, in addition to requiring building owners to benchmark and share information about their buildings' energy use, requires owners to act on this information, through either a prescriptive or performance-based compliance path. This paper investigates the design and rationale of these policies while discussing potential methods of minimizing regulatory burden by calibrating policy interventions to a building's level of performance.

Purpose of a Comprehensive Building Performance Policy

Comprehensive building performance policies are meant to move owners through the following steps:

1. Analyze Data: Use benchmarking data to understand how their buildings' energy and water performance compares to that of a nationwide database of peer buildings, and identify buildings among his or her portfolio that are performing considerably worse than other, similar buildings and are thus promising targets for energy efficiency improvements;
2. Identify Measures: Investigate these target buildings further to identify specific strategies and investments that can improve their energy efficiency; and
3. Implement Actions: Act on this information by instituting more-efficient operational procedures and investing in capital improvements.

As a matter of policy, getting owners to take these three steps can be accomplished by requiring that buildings periodically improve their performance until reaching a specified level, or it can be done by requiring building owners to complete specific tasks that correspond to each of the three actions listed above. In this latter case, the first step is accomplished by the benchmarking and transparency requirement, which is the foundation of all building performance policies. The second step is normally accomplished by means of an energy consumption analysis of base building systems, most often in the form of an energy audit or retrocommissioning study.

The third step, getting owners to invest in their building's energy performance is accomplished when owners implement some or all of the energy conservation measures identified in the energy audit or retrocommissioning study.

In moving owners from step one through step three, jurisdictions must decide how to design policies that meet this goal while fairly distributing the regulatory burden among building owners. This means calibrating requirements so that high-performing buildings are recognized for their achievements and lower performers have flexibility in how they comply with the ordinance. A well-designed comprehensive building performance policy is one that provides real estate market actors with the information, at the correct level of detail, that they need to make the most economically efficient decisions they can where the energy performance of the buildings they own or occupy are concerned. It should also spur the development of a strong energy efficiency services market, creating sustainable demand for services and allowing high-quality providers to distinguish themselves from lower-quality competition. Finally, it should strike a balance between protecting private and proprietary information, and collecting data that will allow for a detailed analysis of the performance of the city's building stock to inform future policy and program design.

Principles for Policy Design

An important consideration in designing a comprehensive building performance policy is to balance aggressiveness with flexibility. A policy should result in the rapid and continuous performance improvement that climate goals demand, while affording building owners the greatest feasible degree of flexibility in complying with the law.

To achieve the right balance between flexibility and robustness, cities should design their comprehensive building performance policies so that owners may comply either through a prescriptive compliance path in which they must complete specified energy efficiency actions, or through a performance compliance path in which they must improve their energy efficiency by a certain predefined amount as measured by their benchmarking results. This dual compliance path reflects the approach increasingly being considered by designers of model energy codes. A summary of the performance and prescriptive compliance paths of the active comprehensive building performance policies is available in Table 1.

Performance Compliance Path

The performance path concept allows building owners the flexibility to determine the most suitable package of energy efficiency measures to meet their obligation under the law. This approach is not only potentially more cost efficient in the long run, it is also conducive to deeper energy savings over time as owners have the freedom to make the right investments at the right times.

There are two main ways that jurisdictions currently allow building owners to comply via performance. The first and most common way is to earn or at least qualify for a certification representing high performance, such as ENERGY STAR or LEED Existing Buildings Operation and Management. The second is to improve the building's energy efficiency by a certain percentage.

High Performance. Buildings that are already performing at a high level are already managing and investing in their building's energy efficiency, and thus should be considered compliant with

the performance path. They should be applauded for their performance and included in formal recognition programs or highlighted in case studies, as an example to others of what is achievable. Conversely, those buildings that are below-average performers often have the greatest potential for low-cost energy savings, which if addressed could have a more significant impact on the overall energy consumption of a city's building stock. For example, New York City found that its lowest-cost opportunity for capturing energy savings is addressing the worst-performing office and multifamily properties (New York City Benchmarking Report). This finding is illustrated in Figure 1. ENERGY STAR certification or eligibility for ENERGY STAR certification is a commonly used proxy for high performance used by Berkeley, Calif.; Boston; Boulder, Colo.; New York City; San Francisco; and Seattle as a path for compliance with the energy performance sections of their building performance policies. One consideration in using ENERGY STAR certification as a designator of high performance is that the certification process adds a cost for an engineer's verification of the benchmarking data used to compute the ENERGY STAR score. Jurisdictions may want to consider allowing buildings to forgo certification and qualify as high performers if they receive scores above a certain threshold that have been verified through an approved process. This would depend on the city establishing an acceptable lower-cost method of benchmarking verification. Another form of proof of high performance accepted by many jurisdictions is certification under LEED for Existing Buildings Operations and Management.

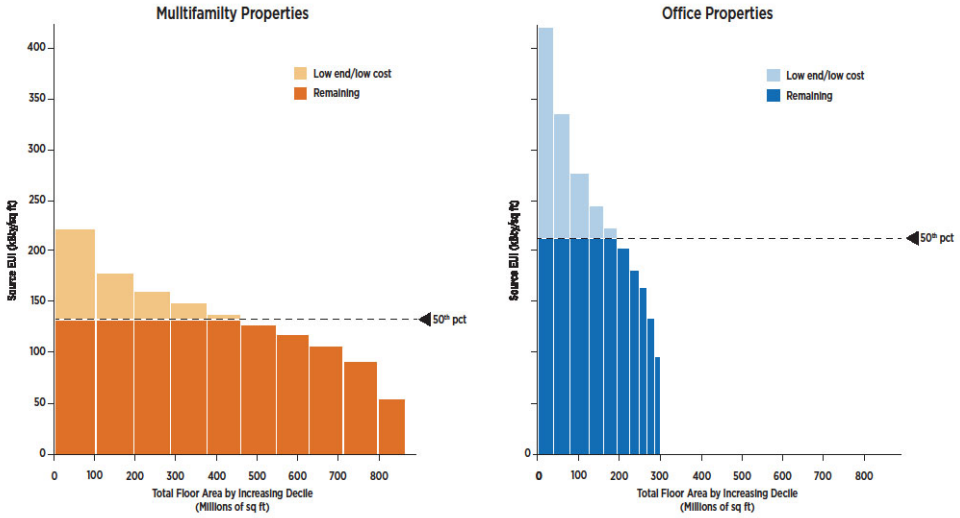

Figure 1. Total energy used by decile in New York City multifamily and office buildings. The light area in each chart is the energy that can be saved by implementing low-cost measures. *Source*: Redrawn from New York City Local Law 84 Benchmarking Report 2012.

Improved Performance. Some buildings are ineligible to receive ENERGY STAR scores. Other buildings may not have the potential to reach an ENERGY STAR score of 75, but may still have made significant improvements to their building's energy efficiency. To give these buildings a way to qualify for the performance compliance path, some jurisdictions have created a performance improvement target, which, if reached, counts as compliance with the law. Currently, Boston, Boulder, New York City, and Seattle recognize improvement in a building's efficiency as a method of achieving performance compliance, though only New York City and Seattle specifically define it numerically as a percentage improvement. Other cities, such as Boston and Boulder, have defined it more broadly as a "pattern of significant improvement."

Choosing the most appropriate numerical value for the improvement target is an important and difficult task. Jurisdictions have a choice in how this target is set. It can be written into the ordinance, but in this case the target will be difficult to adjust in the future. Another option is to give the director of the implementing department authority to define the performance target in rules and regulations. This allows the director and any expert advisors to review one or two years of initial local benchmarking data to determine an appropriate improvement target for their market, and it preserves flexibility should the City wish in the future to adjust the target or create separate targets for different performance tiers.

Performance Targets and Baselines. One of the chief difficulties of designing the performance path is determining appropriate targets and setting the baselines from which they will be measured. A recommended way of approaching this problem is to engage with stakeholders and local industry experts to determine the right targets and baselines for a particular jurisdiction's building stock. This process results in realistic figures and creates buy-in for the policy. The following chart summarizes the performance targets used by cities with comprehensive building performance policies in place:

Table 1. Comprehensive building performance policies – performance and prescriptive requirements

Jurisdiction	Performance requirements	Prescriptive requirements
Atlanta	ENERGY STAR certification, or LEED EBOM certification, or Energy performance is at least 25 points better than an average building, or Improved ENERGY STAR score by 15 points or reduce EUI by 15%	Energy Audit
Berkeley	Building Energy score or Green Building Rating demonstrating an effective level of efficiency as determined by City, or Completion of a multi-measure energy improvement project with minimum improvement as determined by City, or Completion of an income-qualified Weatherization Assistance project	Energy Audit
Boston	ENERGY STAR score of at least 75, or LEED certification, or Pattern of significant improvement in efficiency or GHG emissions, or Comprehensive Energy Management Plan	Audit or Energy Action (significant investment in efficiency, comprehensive energy management plan, retrocommissioning of energy systems)
Boulder	ENERGY STAR certification, or LEED EBOM certification, or Pattern of significant energy improvement	Energy Audit and Retrocommissioning, owner must implement any RCx measure with payback of 2 years
New York City	ENERGY STAR certification, or Energy performance is 25 points or more better than the performance of an average building, or LEED EBOM certification	Energy Audit and Retrocommissioning
San Francisco	ENERGY STAR certification, or LEED EBOM certification	Energy Audit or Retrocommissioning or Retrofits
Seattle	ENERGY STAR certification, or LEED Gold certification or Net-Zero Energy Certification from International Living Future Institute, or Active monitoring and continuous commissioning, or Energy savings of at least 15 percent	Building Tune-Up

Source: Cities' ordinances.

Prescriptive Compliance Path

The prescriptive compliance path is meant to give owners a clearly defined way to comply with the law that is based on industry best practices for uncovering and implementing energy efficiency opportunities in buildings. Those owners who are unwilling or unable to meet the policy's performance targets may comply by completing the specified actions required by the prescriptive path. Very likely, some of the building owners who choose the performance path will already have a solid understanding of how their building uses energy and what investments they can make to improve it. However, many owners will not have such an understanding, and so the prescriptive path should provide them with this information and ideally result in some non-trivial energy savings while providing them regulatory certainty. When designing the prescriptive path, the cost burden of the prescriptive requirements should roughly equal the anticipated cost burden of meeting the performance compliance target for an average building. In cities with building performance policies in place, these prescriptive actions have generally included some combination of energy audits, retrocommissioning, simple building retrofits, and energy upgrades.

Energy Audits. Benchmarking information gives a sense of a building's energy efficiency and is useful in determining which buildings are good candidates for energy efficiency improvements; however, distinguishing which factors are driving the building's performance requires deeper investigation, in the form of either an in-person energy audit or perhaps some kind of virtual audit of the building's physical energy systems. Though energy audits do not result in direct energy savings–a building owner must elect to implement the energy efficiency measures recommended in the audit to achieve savings–they do provide the owner with detailed information about how energy is consumed within his or her building, as well as actions that he or she can take to improve their building's performance. In essence, energy audits provide a path to better building performance, complete with estimates of the relative cost-effectiveness of potential energy efficiency measures, but to realize energy savings the owner must actually implement the recommended measures.

An important secondary benefit of energy audits as a policy requirement is that they can be used to provide the jurisdiction with an inventory of the systems and equipment being used in its private and public building stock. This information can be analyzed to inform the development of further policies and make existing energy efficiency programs and incentives more impactful by aligning them more closely to the specific needs of the jurisdiction's buildings.

Retrocommissioning. Energy audits show owners how they can invest in their capital equipment and operational processes to improve their building's energy performance, but the process does not necessarily result in energy savings. This is the reason that some jurisdictions with comprehensive building performance policies require owners to perform retrocommissioning in their buildings as part of the prescriptive compliance path. While deeper investments in the physical assets of a building will be necessary to reach the energy savings needed to meet the most ambitious climate goals, there is a significant amount of energy that can be saved in most buildings from relatively simple repairs and careful calibration of energy systems and controls (Mills 2009). In the course of its operation, the performance of even the most efficiently designed building will gradually degrade. Small changes in how building components and systems interact, neglected maintenance, and suboptimal management of energy

systems by undertrained staff all contribute to losses in efficiency over time. Retrocommissioning is the process of diagnosing these problems and implementing no- or low-cost solutions for them. Retrocommissioning is recognized as one of the most cost-effective energy efficiency improvements the owner of an existing building can make, at a median cost of $0.30 per square foot and a median simple payback of 1.1 years. Additionally, retrocommissioning delivers considerable energy savings in existing buildings, with median whole-building energy savings of 16% (Mills 2009).

In defining the retrocommissioning process for the purposes of compliance, a jurisdiction must decide whether it will define the concept by referring to existing guidelines, such as ASHRAE Guideline 0.2, or whether it will take a more-regionally specific approach and develop a list of measures that a compliant retrocommissioning process must complete. This latter approach acknowledges the reality that, based on the climate zone and local construction practices, the building stock in each city has a unique set of characteristics and thus predictable actions that could be undertaken to produce cost effective energy savings. In this case, the jurisdiction should work with local experts to define the measures that are most appropriate for the local building stock. An example of such a list can be found in New York City's Local Law 87, which specifies the operating protocols, calibration, and sequencing that must be checked, the cleaning and repair work that must be done, and the training and documentation that must be completed in a compliant retrocommissioning process.

Retrocommissioning is meant to optimize the systems already present in a building, and thus the energy savings reaped from it are in a sense "one-time" energy savings. Future retrocommissioning of a building, provided that its equipment and occupancy profile are more or less unchanged, will recapture energy savings lost due to the drift of controls and energy systems from their optimal configuration, but to get deeper "new" energy savings requires investments in capital equipment.

Prescriptive Compliance for Simple Buildings. Some buildings are better candidates for audits and retrocommissioning than others. In general, the more simple a building's systems, the less it has to gain from the findings of an energy audit or the testing and adjustments of a retrocommissioning process. For example, a building with a pneumatic control system may be a less-suitable candidate for retrocommissioning than one with a digital energy management control system, which is much easier to extract data from and which is more likely to hold its calibrated settings for a long period of time (Ivanovich 2010). In cases such as this, jurisdictions have the option of creating a list of improvements that "simple buildings" can implement in lieu of an energy audit and retrocommissioning. Los Angeles's proposed comprehensive building performance ordinance, discussed later in this paper, allows buildings without a central cooling system to comply by implementing six prescribed energy retrofit measures within five years of the compliance due date. The retrofits are upgrades to common area and exterior lighting, improving pipe insulation, converting to a cool roof, commitment to participate in a utility-sponsored demand response program, installing a solar water heater, and ensuring that domestic hot water is in compliance with California Title 24, Part 6. For water, within five years of the due date, the building would need to make all faucets and shower heads compliant with the current provisions of the California Plumbing Code and replace all washing machines with front loading units.

Mandatory Energy Upgrades. There are two main ways in which jurisdictions have approached mandatory energy upgrades.

1. The first is to specify an energy efficiency investment that buildings owners must make.
    - Boulder's ordinance requires all covered buildings to upgrade their lighting systems to the requirements of the current version of the International Energy Conservation Code within five years of the first benchmarking report due date.
    - New York City's Local Law 88 requires lighting upgrades and the installation of submeters.
2. The second is to require that building owners implement all recommended energy conservation measures from an energy audit or retrocommissioning that fall within a stipulated simple payback criteria.
    - Boulder requires owners to implement cost-effective energy efficiency measures, defined as any investment or project with a predicted payback period of two years or less, identified in retrocommissioning.
    - Seattle will require building owners to carry out all measures recommended in a tune-up that have a projected payback of three years.

Both approaches have the advantage of generating energy savings, rather than just recommended measures; however, they restrict owners' choice in how they invest in the performance of their buildings. The second method also introduces the possibility of a conflict of interest between owner and service provider. One can imagine a scenario where service providers feel pressure not to recommend certain measures to spare their client the mandatory expense of implementing them.

Establishing Covered Buildings List for Beyond-Benchmarking Requirements

An important variable in any building performance policy is the classification (often size and type) of buildings that will be subject to its requirements. Larger buildings are more likely to have the technical and financial capabilities to implement the energy efficiency actions needed to comply with either a performance or compliance path. Large buildings are also responsible for the majority of a city's building energy use and thus can leverage more potential energy savings per dollar than smaller buildings. For this reason jurisdictions may consider establishing different thresholds for buildings that are required to report their energy performance than for those that must also take beyond-benchmarking actions. Furthermore, as noted above, jurisdictions may want to define the appropriate criteria for "simple buildings" that are subject to a reduced set of beyond-benchmarking requirements.

Another consideration is that implementing a comprehensive building performance policy is a much more complex endeavor than implementing a standalone energy benchmarking and transparency policy. A jurisdiction will need to devote more resources to helping owners of covered buildings comply. This work could become overwhelming if the jurisdiction chooses a building size threshold for its beyond-benchmarking requirements that is too low. Jurisdictions must carefully consider the financial and staffing resources they can realistically allocate to policy implementation before adopting classification thresholds for covered buildings.

Policy Support

Successful implementation of a comprehensive building performance policy requires active and sustained support. Just like benchmarking policies, comprehensive building

performance policies must be accompanied by a campaign of outreach to covered building owners. Owners must be notified of their responsibilities under the law and they must be educated on how they can meet those responsibilities. Processes such as energy audits and retrocommissioning may be familiar to some owners, particularly those that own larger, class A commercial properties, but many owners will not have experience selecting an energy auditor or retrocommissioning agent. This lack of experience could lead to the selection of the lowest-cost service providers in sacrifice of quality, thus undermining the policy's purpose of providing owners with actionable information about the energy-saving opportunities in their buildings. Policy implementers should be aware that there may be reason to be concerned about the quality of the audits and retrocommissioning services being sold to the owners of covered buildings. Due to the lack of rigorous standardization in the methods of auditing and retrocommissioning, owners who are unaware of this fact will be especially susceptible to purchasing low-quality audits and retrocommissioning services without realizing it. Outreach and education by the jurisdiction through staff or through expert partners, or publishing criteria and a listing of qualified service providers, can help address this concern.

Owners and property managers will need training not only on how to properly benchmark their properties but also on how to meet the requirements of either the performance or the prescriptive compliance path. Live trainings, webinars, and case studies can help owners understand the rationale for the policy and use its requirements to derive the most value for their buildings. In addition to trainings, jurisdictions should at a minimum provide guidance documents on how to comply with the beyond-benchmarking requirements of their ordinances, whether through the performance or prescriptive compliance path. This should include information about minimum levels of effort for different building sizes, minimum qualifications for service providers, and how to file reports proving compliance. Further guidance on available incentives, utility programs, and financing options can help owners reduce the cost of compliance and pay for the implementation of recommended energy efficiency measures.

Implementation Timeline

When setting the timeline for implementation of beyond-benchmarking requirements, the jurisdiction must keep two important considerations in mind. The first is that if the jurisdiction requires all covered buildings to complete their beyond-benchmarking requirements in the same year it will create a situation in which there is a surge in demand for energy efficiency services such as audits and retrocommissioning that could potentially exceed the capacity of local service providers. The jurisdiction should try to make a reasonably accurate estimation of the number of energy efficiency service providers serving its area. Even if there is a sufficient number of providers, the demand for services will likely be diminished until the next compliance due date five to ten years later, creating boom and bust cycles for providers. The other consideration is the jurisdiction's ability to provide the necessary outreach and education to owners and service providers as well as conduct compliance tracking. Requiring all building owners to comply at once could be overwhelming for even the best-funded programs.

A recommended roll-out strategy for implementation is to divide the covered buildings up into tranches, with the number of tranches equaling the number of years in a compliance cycle. For example, if working on a ten-year compliance cycle, one tenth of all covered buildings would need to demonstrate compliance each year. This keeps the amount of outreach that the city needs to do manageable and creates a steady flow of projects for the jurisdiction's service providers to compete for each year.

Los Angeles Policy Design

The City of Los Angeles' proposed comprehensive building performance ordinance, the Existing Building Energy and Water Efficiency Program, is an example of the approach described in this paper, allowing building owners to comply by meeting the requirements of either a performance or a prescriptive path. The ordinance will require all privately owned commercial and multifamily buildings over 10,000 gross square feet to report annual benchmarking information on their energy and water use to the city. Beginning in 2019, the City will require a randomized portion of the covered buildings to comply with the performance or prescriptive path. In order to spread out the demand for energy services, the City staggers the number of buildings that must comply with this section of the policy over five years. This truncated phasing-in of buildings' compliance due dates attempts to balance the need for immediate building energy savings, the administrative burden on the city as it notifies owners of their responsibilities and enforces compliance, and the need to allow the energy services industry to develop capacity to serve the demand. After its initial due date for compliance, a building must repeat the process of meeting the performance or prescriptive path requirements once every five years.

The Los Angeles policy has different requirements for energy and water. To comply under the performance path for energy, building owners must have received an ENERGY STAR certification from the EPA for two of the three years preceding its due date or it must have reduced its weather normalized source energy use intensity by 15% compared to five years preceding the building's due date for compliance. This approach creates a way for both eligible and ineligible ENERGY STAR buildings to comply, and it offers an option for owners that do not wish to pursue ENERGY STAR certification. For water, the performance path requires a 20% reduction in water use intensity compared to five years preceding the due date for compliance. Additionally, a building can qualify for the water performance path if its water use meets the requirements of the Los Angeles Municipal Code that are in effect in the same year as the due date.

If a building fails to meet the requirements of the performance path for either energy or water, it must complete the requirements of the prescriptive path for that commodity. In the case of energy, the owner must produce reports proving the completion of an energy audit on the base building systems (systems affecting common area energy use, as opposed to tenant spaces) that meets or exceeds an ASHRAE Level 2 standard as well as a retrocommissioning of the base building systems, which must at a minimum include the HVAC system and controls, the indoor lighting systems and controls, the water heating systems, and any renewable energy systems.

In the case of water, if an owner does not meet the requirements of the water performance path, then that owner must produce reports proving the completion of a water audit and retrocommissioning at a minimum of the building's potable water distribution systems, landscape irrigation systems, and water reuse systems. The structure of Los Angeles' proposed policy is illustrated in Figure 2.

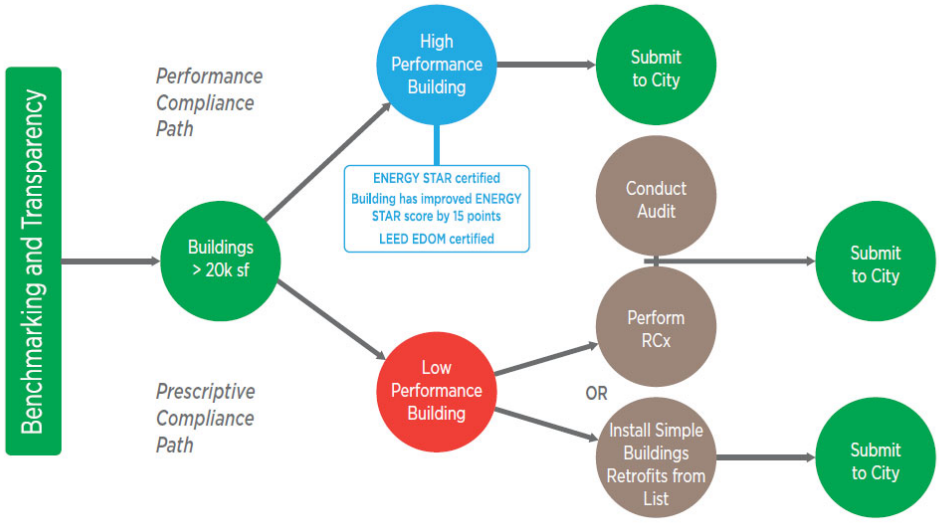

Figure 2. Los Angeles proposed comprehensive building performance policy compliance paths.

Future Policy Design Considerations

Lessons learned from today's comprehensive building performance policies could be used to design future policies that are more effective and easier to implement. Below are several issues that future policy designers should keep in mind when considering a comprehensive building performance policy.

Leave Room for Alternate Processes. As the energy efficiency industry continues to develop, new technologies may arrive which could have a role in comprehensive building performance policies. Comprehensive building performance policies have tended to require building owners to complete ASHRAE Level 2 audits of their base building systems; however, the continued development of the DOE's Building Energy Asset Score, as well as automated virtual audit tools, relying on a more cost-effective remote analysis of building performance to attempt to identify high level inefficiencies and savings opportunities, may lead jurisdictions to consider them as a compliance path for audit requirements. It is still an open question whether virtual audits will ever provide comparable value to a Level 2 audit, but, in the event that they do, cities could consider writing their ordinances so that the administrator has authority to set audit standards in administrative rules, thus giving the city more flexibility in choosing the audit procedures it will accept should viable alternatives to on-site ASHRAE audits emerge.

Clarification of the Relationship Between Energy Audits and Retrocommissioning. One difficulty facing jurisdictions considering adopting a comprehensive building performance policy is the lack of clarity on the difference between an energy audit, in particular a whole-building ASHRAE Level 2 energy audit, and retrocommissioning. The confusion stems from the fact that both processes include base-building analyses of a building's energy-consuming systems, including the building's operating parameters. An audit is intended to document the conditions of the building's equipment and operating settings, set a baseline, and determine potential energy-saving capital upgrades. Retrocommissioning is intended to retune and correct operating and maintenance processes, as well as make repairs. This creates the concern that a portion of the

work in a Level 2 audit and retrocommissioning is redundant. Jurisdictions that require both an audit and retrocommissioning have written language into their ordinances stating that owners may pursue both processes together at once; however, it remains unclear how many owners have been able to implement a combined process.

More clarification is needed from industry on the overlap between the two processes. For instance, it is unclear whether retrocommissioning can be done within the same contract or by the same professional as an audit. Similarly, clarification is needed on the possibility of omitting a portion of the audit work if the owner plans to implement a separate retrocommissioning process. A definitive answer to questions such as these in the form of guidance from nationally recognized standard-setting organizations in the engineering field would help jurisdictions assure that their prescriptive path requirements do not cause owners to pay for redundant work.

Improving Data Quality. The data produced and reported to the city under a mandatory benchmarking program is self-reported, potentially leading to many unintentional or even intentional sources of errors. Since the ENERGY STAR Score or Energy Use Intensity value that a building receives could determine whether the owner has to undertake further actions that could cost hundreds or thousands of dollars, the accuracy of these numbers is critical. There are a number of approaches that have been adopted by different cities in an attempt to improve the quality of benchmarking results, ranging from automated flagging of suspicious entries to requirements for third party oversight and review of results. There will likely need to be a heightened emphasis on improving the reliability of benchmarking results within jurisdictions that choose to implement a more comprehensive building performance policy.

Tiered Requirements for Performance and Prescriptive Paths. A worthy consideration for future policy designers is how to more-closely match regulatory requirements to a building's energy performance for both the performance and the prescriptive paths. Current policies require all buildings to meet the same performance or prescriptive requirements, so that above-average performers are expected to do the same as middle-of-the-road and low performers. By creating a structure in which different performance "tiers" are subject to different requirements, the responsibility for improvements can be meted out more equitably. Better-performing buildings would be subject to lighter requirements than middle-tier performers, who would in turn be subject to lighter requirements than the poor performers below them. An example of how such a structure might be configured is illustrated in Figure 3. Tiers could theoretically be defined by calculating quartile ENERGY STAR scores or Energy Use Intensities for building types. Buildings in the two lowest quartiles would be subject to the most-stringent requirements, while buildings in the third quartile would be subject to lighter requirements, and upper quartile buildings would only be responsible for benchmarking. This policy design, while possibly more difficult to administer, would distribute requirements and the cost of compliance according to a building's performance.

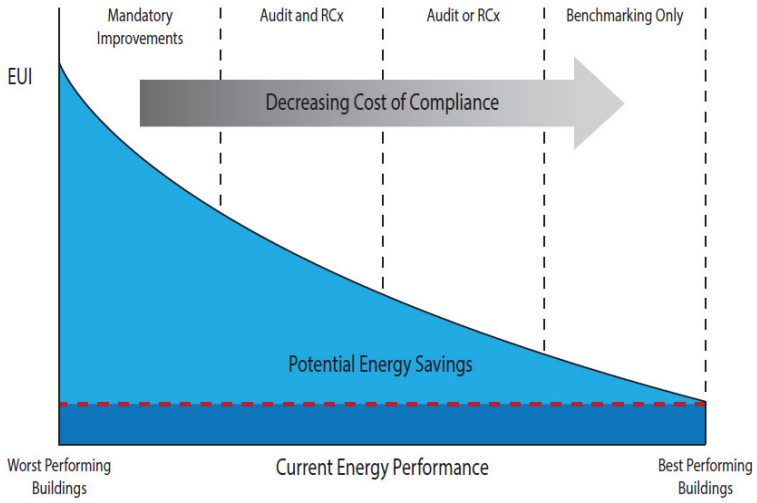

Figure 3. Example of potential tiered-requirements for a comprehensive building performance policy.

Conclusion

Jurisdictions with ambitious climate goals must address energy use in buildings, which can account for more 50 to 75 percent of a city's greenhouse gas emissions. These jurisdictions need the owners of large existing buildings not only to measure and report the efficiency of their buildings but also to take action in the near term to make significant reductions in their energy use. In order to do this, building owners must address energy efficiency at both through capital improvements and operational adjustments. Comprehensive building performance policies provide a framework in which owners of buildings identified through benchmarking reporting as middle- and low-performers must take action to improve the energy efficiency of their buildings. By providing a dual compliance path – one performance-based and one prescriptive – these policies strike a balance between flexibility and regulatory certainty, offering owners more choice in how they will meet their requirements. As jurisdictions and owners gain more experience with comprehensive building performance policies, methods of targeting performance and prescriptive requirements more granularly based on a building's performance, size, complexity, or other factors may emerge, potentially leading to lower compliance costs, increased investment in energy efficiency, and continuous improvement in the performance of existing buildings.

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