By the Numbers: The Benefits and Administrative Costs of Local Building Efficiency Policies

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KEY FINDINGS

- Cities can pursue innovative building efficiency policies—specifically, those related to benchmarking and transparency, retrocommissioning, and time-of-sale disclosure—with fairly small administrative investments. Cities that are committed to addressing climate change will need to increase their clean energy investments. For resource-constrained cities, even a modest, manageable increase can still yield meaningful results.
- The minimum number of full-time equivalent (FTE) employees required for the design and implementation phases of these policies is fairly low across policy areas. The number of staff for each policy surveyed for this brief ranged from 1 FTE to 2.5 FTEs. The number of FTEs used to support a policy fell over the life cycle of the policy.
- Building benchmarking polices and retrocommissioning policies can result in GHG emissions reductions that exceed 5% in compliant buildings. Less information is available on the impact of time-of-sale policies for homes.
- Consultant costs and IT infrastructure costs (for software licenses, databases, etc.) are commonly the highest non-staff related administrative costs.
- Cities largely exclude the multifamily and affordable housing sectors from retrocommissioning and building tune-up policies as well as from time-of-sale disclosure policies, due to some stakeholder perceptions that compliance would increase rent prices.
- Cities track outcomes and benefits of these policies, including how they are affecting marginalized groups, to only a limited degree, if at all. Cities therefore lack the data to determine whether these policies are achieving equitable outcomes. More program evaluation is needed.

Introduction

Many local governments are continuing to adopt energy efficiency requirements for existing commercial, multifamily, and single-family buildings. Cities in the United States adopted 20 new energy efficiency requirements for existing buildings between April 2019 and July 2021 (Ribeiro et al. 2020; Samarripas et al. 2021). The uptick in policy adoption is encouraging, but a key issue persists: There is a lack of comprehensive data on the costs and benefits

associated with key energy efficiency policies. In localities that have not yet adopted energy efficiency policies, city staff and advocates may face challenges trying to make a case for a policy without this cost and benefit data. The lack of data may also make it more difficult to scale policy adoption across the country.

This topic brief and a related series of fact sheets aim to address this knowledge gap and provide important data on the costs and benefits of three local energy efficiency policies for existing buildings. City staff can use these resources to inform the energy efficiency policymaking process in their communities, and community advocates, nonprofit groups, and other organizations can use the information to influence energy efficiency policies at the local level.

Policies Covered

This topic brief is part of the *By the Numbers* series that ACEEE has developed for the city policies listed in table 1. We chose to investigate these policies because cities across the country are interested in replicating them. We considered studying building performance standards (BPS) as well. However, since cities have not completed initial compliance cycles for BPS, there is not enough information on costs, benefits, or other outcomes from which to draw conclusions.

Table 1. Policies included in this research

Policy	Description
Time-of-sale disclosure	These policies require owners of single-family homes to provide prospective buyers with energy information (e.g., a home energy report) about the home at the time of sale or time of listing.
Retrocommissioning and building tune-up*	Tune-up policies require building owners to optimize existing building operation systems, such as boilers and chillers, in order to reduce energy use. Retrocommissioning is different from but similar to tune-ups; the process targets the control and coordination of a building's automation system, among other systems.
Benchmarking and benchmarking plus	Benchmarking policies require building owners to track and disclose building energy use. Benchmarking-plus policies also require building owners to track and disclose energy use. However, benchmarking-plus policies call for building owners to take an additional energy efficiency action, such as an energy audit or retrocommissioning. Benchmarking-plus policies do not require buildings to achieve a performance standard.

***Though retrocommissioning and tune-ups differ in practice, we present these policies alongside each other in this topic brief because the activities are related, administrative costs and benefits are similar, and breaking out by each type of policy could compromise city anonymity.**

The policies listed in table 1 either require energy data disclosure (i.e., time-of-sale disclosure and benchmarking) or set baseline energy efficiency requirements (i.e., building tune-ups and benchmarking plus). Local governments may consider these policies for several reasons, from reducing energy use, energy costs, and greenhouse gas (GHG) emissions to offering consumer protections for renters and home buyers seeking properties with more affordable energy bills. These policies are also important catalysts for energy efficiency, often prompting building owners to pursue energy efficiency upgrades and driving participation in energy efficiency incentive programs.

Research Scope

The resources in the *By the Numbers* series provide information on the costs to municipal governments for developing and implementing these policies and, to the extent data were available, on the community-wide benefits, such as GHG emissions reductions. While we also supply some data on the costs to building owners to comply with the policies, we do not report the benefits of these policies at the individual building-owner level. We do not comprehensively report on other benefits associated with energy efficiency, such as health, well-being, and indoor air quality.

In addition to cost and benefit data, these resources provide insight into the design and implementation phases of each policy.[1] We sought to identify stakeholders involved in policy adoption, understand challenges to adoption, identify key tasks and activities related to design and implementation, and report on lessons learned from the experience of cities that have already implemented these policies. Further, we analyze whether, and how, cities have incorporated equity into their design and implementation processes.[2] We also identify trends across policy categories with respect to design, implementation, and costs and benefits. For more information on our methodology, the questions we asked city representatives, and the costs and benefits we asked them to report, see Appendix A.

We do not identify the individual cities that we interviewed for this study. We anonymized the data to encourage cities to share full cost and benefit information, and in our discussion

[1] For details on the differences between design and implementation, see Appendix A.

[2] Ayala et al. (2021) define equity in clean energy as "policies and programs that are informed by the community's input and designed to meet the needs of all its residents. Equitable clean energy policies and programs are based on the principle that each action taken must not deepen existing social, environmental, or economic inequalities; such actions must instead address historic and systemic inequities."

of trends, we refer to each of the nine cities with a randomly assigned letter (City A through City I).[3]

Trends in Policy Costs and Benefits

POLICIES ARE MORE EXPENSIVE TO DESIGN THAN TO IMPLEMENT

For the three categories of policies, overall design costs are generally greater than the costs of implementation. In the design phase, full-time equivalent (FTE) employee costs were lower than others, but outlays for IT infrastructure build-out and consulting services were high. Meanwhile, in the implementation phase, FTE salaries were the greatest annual cost. IT infrastructure outlays remained one of the main expenses for cities, as some purchased yearly software licenses and ongoing IT maintenance. However, most cities managed to reduce IT infrastructure costs in the implementation phase. Some cities reduced consultant expenses from the design phase to the implementation phase, while others saw an increase in the cost of consultant services as they relied on consultants to assist in implementation of the policy.

The costs to develop and implement individual policies can also be affected by investments cities have made for related policies already on the books. The policies we analyzed interact with one another and affect development and implementation costs. For example, designing and adopting a benchmarking policy may help build the foundations for later policies, mitigating some of the design expenses of subsequent energy efficiency policies such as retrocommissioning (RCx) and building tune-ups.

Table 2, below, compares the costs of FTEs to other expenses. Detailed cost tables for the design and implementation phases can be found in Appendix B.

[3] We do not indicate the population of each locality because such information could compromise city anonymity. However, each city has a population of at least 100,000.

Table 2. Costs of FTEs and other expenses during design and implementation phases

City	Policy	Design phase				Annual implementation phase			
		FTEs	Cost of FTEs**	Other costs	Estimated total costs	FTEs	Cost of FTEs	Other costs	Estimated total costs
City A	Time-of-sale disclosure	1.5	$160,087	$90,000	$250,087	1	$106,725	$2,000	$108,725
City B	Time-of-sale disclosure	2.5	$266,812	$27,700	$294,512	1	$106,725	$43,699	$150,424
City C	RCx or building tune-up	1.5	$160,087	$30,000	$190,087	0.5	$53,362	$70,000	$123,362
City E	RCx or building tune-up	1.75	$192,105	$694,000	$886,105	1.5*	$160,087	$284,775	$444,862
City F	Benchmarking	1.5	$160,087	$60,000	$220,087	0.5	$53,362	$2,000	$55,362
City G	Benchmarking	1.25	$133,406	$371,000	$504,406	1.25	$133,406	$9,500	$142,906
City H	Benchmarking	1	$106,725	$120,000	$226,725	1.5	$160,087	$120,000	$280,087
City I	Benchmarking	2.5	$266,812	$157,000	$423,812	1	$106,724	$61,000	$167,724

***City E used 2.5 FTEs for implementation but hired consultants to provide one of these FTEs. The value of this FTE ($150,000) is included in consultant costs. Also note: We calculated the cost of FTEs by multiplying the number of FTEs reported by the city during our interviews by $106,724.80. This figure is calculated by multiplying 2,080 hours by $51.31 per hour, which is the average cost of wages and benefits for a state or local government public administration employee (BLS 2020). All dollar figures are rounded to the nearest dollar. Design phase costs are the total amount spent for the entirety of the design phase, which generally lasted one to two years regardless of the policy. We do not categorize cities by population in the table because it would compromise anonymity and because we found only a weak correlation between population and costs. City D is excluded because it did not report quantitative FTE data for design and implementation.**

Minimum FTEs used for design and implementation do modestly increase directly with city size. However, we found that other costs are largely dependent on the approaches taken, such as whether the city hired consultants or purchased customized or off-the-shelf IT infrastructure. We could not discern if a city's decisions to pursue particular approaches were due to city size or other factors. For example, a smaller city may have higher total costs than a larger city because it chose to hire consultants, while the larger city may have benefited from in-house expertise. Moreover, some cities received low- or no-cost technical assistance that reduced expenses. Therefore, while total costs do slightly increase with city size, one should not assume that larger cities will have higher costs and smaller cities will have lower costs.

MINIMUM FTES ARE FAIRLY LOW AND FALL OR STAY THE SAME DURING IMPLEMENTATION

Figure 1, below, illustrates the FTEs reported by each city for each policy type.

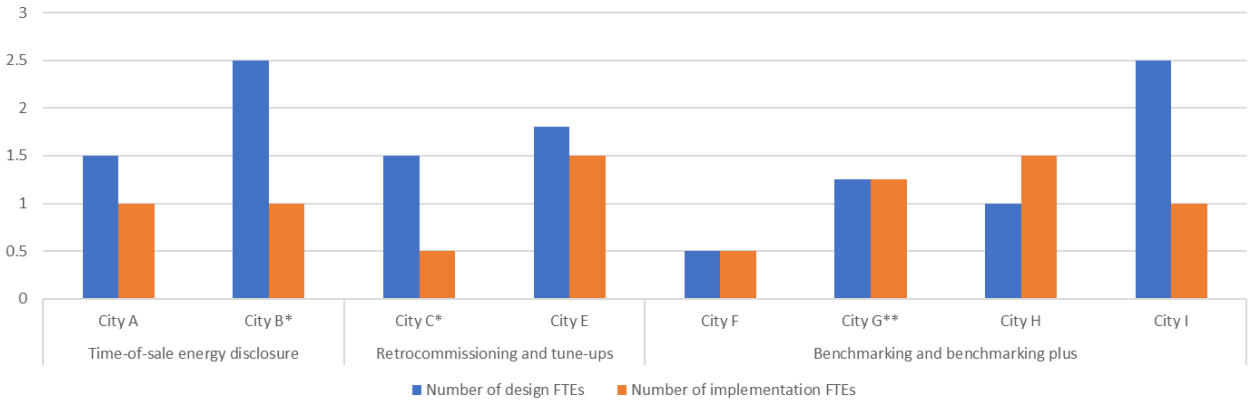

Figure 1. FTEs reported by cities for policy design and implementation. City D is excluded because it did not report quantitative FTE data. *City's reported FTEs for implementation were insufficient to successfully execute the program. **City's reported FTEs for design limited the number of ways it could approach policy development, and reported FTEs for implementation were insufficient to successfully execute the program.

As seen in Figure 1, the minimum FTEs used to design and implement the policies are fairly low. For any policy, cities reported using no more than 2.5 FTEs during the design phase; they reported using no more than 1.5 FTEs during implementation. In some cases, cities hired consultants, which lowered the number of FTEs cities used to design or implement the policy. However, while these costs are fairly low, it is important to note that most sustainability offices that would be tasked with implementing these policies are typically resource constrained. Allocating staff or hiring additional staff to design and implement these programs may be more difficult for some cities than for others.

FTEs generally fell from a policy's design period to implementation period. However, three cities—B, C, and F—noted that the FTEs devoted to the program were low and that additional staffing would allow them to better implement the program. This suggests that while FTEs may drop between the design and implementation phases, ideal staffing levels may see less of a drop-off between design and implementation.

IT INFRASTRUCTURE COSTS ARE COMMON AND HIGH

In the cities we examined, IT infrastructure costs were high in both the design and the implementation phases. Funds commonly went toward purchasing software licenses, access to databases, and tools to help implement the policy (e.g., infrastructure to help capture and track benchmarking data). Investments were also made to develop online web pages and portals to help building owners and managers comply with the policy. High IT infrastructure costs were common for benchmarking and disclosure policies and for retrocommissioning and building tune-up policies. Cities also had costs associated with the upkeep and maintenance of IT infrastructure.

ENGAGEMENT COSTS VARY

Most cities had costs associated with stakeholder and community engagement.[4] The costs depended on the approach taken. Some cities incurred expenses only for rented space to hold meetings, while others hired consultants to develop communication strategies or created ambassador programs. Ambassador programs recruit community residents to engage with and educate other residents on the specifics and benefits of a city's policy.

Only a few cities reported that they incorporated procedural equity into community engagement with low-income households, communities of color, and other marginalized constituencies (for example, by conducting a racial equity assessment). Those that did incorporate procedural equity did not report separate costs for doing so. Ayala et al. (2021) identify several engagement strategies that cities can employ to equitably engage with the public, such as compensating community-based organizations (CBOs) and community members for expertise and labor and creating formal decision-making roles for CBOs. As such, equitable engagement strategies would introduce additional costs, but these would be vital investments for cities aiming to achieve fair outcomes for all.

CITIES' TRACKING OF BENEFITS IS LIMITED AT BEST

While these energy efficiency policies do provide benefits, most cities are not tracking the impact of each individual policy. We did not investigate the reasons cities did or did not track benefits, nor did we probe how cities selected specific metrics to track. However, there are myriad reasons for limited tracking of outcomes. For instance, some policies may be too new to ascertain their benefits. Further, there is limited guidance available to cities on how best to evaluate these policies, and different policies may require different methods of evaluation. In addition, with cities' limited resources, some may opt to prioritize implementation over evaluation. Some cities track citywide building GHG emissions and energy use data as a rough gauge of overall policy progress. However, this approach does not allow them to directly attribute any reductions or benefits to specific policies.

Though few cities are tracking benefits, those that do can provide a glimpse into the type of benefits expected from these policies. Two cities found that the policies created jobs. For example, City B reported its time-of-sale energy disclosure policy created 7.7 jobs per 100,000 residents while City C projected that its retrocommissioning policy would create 31.6 to 37.9 jobs per 100,000 residents. City I's benchmarking policy resulted in cumulative

[4] Stakeholder engagement and community engagement are different. Upright Consulting Services (2020) defines stakeholder engagement as focusing on people or organizations historically recognized as having a direct stake in an initiative and its effects. Community engagement is designed to reach specifically targeted communities such as those that have been historically marginalized from decision making or those that have experienced disproportionately high burdens and low benefits from previous policies and programs.

cost savings of $3.06 million in properties that consistently benchmarked data over two years.

Though neither of the cities interviewed about time-of-sale energy disclosure policies reported data on GHG emissions, energy, and cost reductions, an independent evaluation of a time-of-sale policy indicated it led to increased levels of energy efficiency. The evaluation found that the policy led to an increase in energy efficiency investments of about 31% for home sellers and about 12% for home buyers (Myers, Puller, and West 2020).

Two cities reported energy use and GHG emissions reductions for local government operations. City E's retrocommissioning policy resulted in energy use reductions of 57,000 to 76,000 MMBtu and GHG emissions reductions of 1,500 to 2,000 $MTCO_2e$ in 27 municipally owned buildings. City I's benchmarking policy resulted in energy use reductions of 5% and GHG emissions reductions of 16% in 19 municipally owned buildings over two years. City C reported its retrocommissioning policy resulted in annual cost savings of $24,000 in one building.

Beyond the above findings, these policies have many additional energy and non-energy benefits. For example, benchmarking provides policymakers with information on energy use in their local multifamily and commercial building stocks, allowing them to make better-informed decisions on future energy efficiency policies. Tenants can benefit by knowing the utility costs associated with properties. Building owners who capitalize on benchmarked energy data and make energy efficiency improvements can gain by experiencing lower vacancy and turnover rates (Hart 2015). Retrocommissioning policies can allow policymakers to collect asset-level data on equipment used in buildings, such as the age of space-heating equipment and the type of fuel used. These data are helpful particularly when designing additional energy efficiency requirements for existing buildings. Like benchmarking policies, a time-of-sale energy disclosure policy can benefit policymakers by equipping them with data on the local single-family housing stock. It can also provide home sellers with an accurate assessment of a home's energy efficiency and home buyers with information on a home's energy costs prior to purchase (ACEEE 2018). In addition, each of these policies has health, well-being, and comfort benefits.

Though it may continue to be difficult to track overall energy savings and GHG emissions reductions attributable to these policies, cities could track these other benefits in order to better ascertain policy impacts.

Table 3 lists the data we collected on community-wide benefits from our interviews.

Table 3. Community-wide benefits

	Policy	Reporting period	Percentage of building stock required to comply	Energy reductions	Emissions reductions
City A	Time-of-sale disclosure	–	100%*	–	–
City B	Time-of-sale disclosure	–	100%*	–	–
City C	RCx or building tune-up	One year (projected)	10%	7%	5%
City D	RCx or building tune-up	–	1.3%	–	–
City E	RCx or building tune-up	One year (annual)†	7%	Average of 7% per building (first compliance year only)	10,300 $MTCO_2e$
City F	Benchmarking	–	25%**	–	–
City G	Benchmarking	First compliance year only	14%	–***	–***
City H	Benchmarking	One year (annual)†	30%	2.4%****	–
City I	Benchmarking	Two years††	20%‡	2.5%	9%

***Single-family housing stock only. **Of the total building area. ***City reported energy reduction benefits of 17% and GHG emissions reductions of 11%; however, these benefits were contingent on all eligible buildings achieving an ENERGY STAR® score of 75 or greater. ****Actual reduction is listed. The city reported a reduction of 1.5% after adjusting for the discount rate. †This is a one-year average. ††Benefits data apply only to buildings that consistently benchmarked over a two-year period. ‡Commercial building stock only. Also note: For retrocommissioning and benchmarking policies, the percentage of building stock required to comply was calculated by dividing the total number of buildings required to comply with the policy, as provided by the city, by the total building count for that city as listed in the NREL's State and Local Planning for Energy database (NREL 2022).**

CITIES ARE NOT TRACKING EQUITY-RELATED BENEFITS

We asked cities about benefits to low-income households and to those identifying as households of color. We found that no city directly tracked the impacts of these energy efficiency policies on these constituencies; cities reported not doing so because in most cases the policies applied only to the commercial building sector. However, there were opportunities to track equity-related benefits from policies applying to commercial

KEY STAKEHOLDERS

Cities commonly reported the following stakeholders regardless of the policy area. This list can serve as a foundation for cities exploring these policies, though they should conduct additional research to identify local stakeholders that also need to be engaged.

Real estate and buildings community: Building Owners and Managers Association, U.S. Green Building Council

Energy service providers: energy and water utilities, energy service companies

Nonprofit organizations: sustainable building and energy policy organizations, community groups serving marginalized populations

Governmental organizations: local and state energy commissions, state energy departments, U.S. Department of Energy

buildings. For example, some cities tracked the number of jobs created from their policies; they could have reported how many of these jobs were filled by low-income individuals or people of color. It also appears that cities did not take the opportunity to track impacts on minority- and woman-owned businesses or on building owners of color. In a similar vein, while one city conducted outreach with minority trade enterprises, it did not know if building owners used these contractors. Even for policies that did apply to the residential sector, cities did not have adequate procedures to collect impact data. As a result, we found that cities could not determine whether these policies were achieving equitable outcomes.

Trends in Policy Design

CITIES PURSUE POLICIES TO ACHIEVE CLIMATE GOALS

All cities adopted their policy to reduce greenhouse gas emissions in the buildings sector by reducing energy use. Several cities pursued a specific policy because it was already listed in a previous climate action plan, sustainability plan, or other related effort.

STAKEHOLDERS NEED EDUCATION ON POLICY DETAILS

Cities found that building owners and managers who were required to comply with policies were not familiar with the necessary tools—nor with the policies themselves. Cities needed to help stakeholders understand policy specifics and any associated tools (e.g., EPA Portfolio Manager). For policies that required data disclosure, cities needed to educate stakeholders on exactly how the information would be used and shared to alleviate privacy concerns.

MULTIFAMILY RESIDENTIAL AND AFFORDABLE HOUSING SECTORS ARE LARGELY EXCLUDED

Several cities' policies excluded the multifamily and affordable housing sectors due to stakeholder perceptions that including them would increase rents for low-income households and households of color. Some cities initially included these sectors in early drafts of their policies but ultimately removed them. However, those living in affordable

housing with high energy burdens can particularly benefit from energy efficiency interventions. Going forward, cities can better address this issue by including provisions or compliance support—discussed below in the recommendations section—mitigating the risk of rent increases while helping those most in need to reduce their energy bills. Some cities may have prioritized commercial buildings because the majority of GHG emissions associated with the buildings sector stems from large commercial buildings. Others may have faced technical limitations. For example, retrocommissioning and tune-up policies are more likely to focus on larger buildings with centralized building systems and to exclude residential buildings where the relevant systems may be installed in individual units.

KEY INFORMATION RESOURCES TO PROVIDE STAKEHOLDERS

Cities can improve compliance by providing the following resources:

- Template compliance guidance
- How-to guides and educational materials
- Public policy documents, copies of the ordinance, and rulemaking procedures

Cities should create a dedicated web page to host these resources.

Trends in Policy Implementation

CREATION OF A COVERED BUILDINGS LIST

Creating a list of all buildings that are required to comply with a policy is a key implementation task, according to several cities with retrocommissioning or benchmarking and disclosure policies.[5] For the cities we surveyed, determining the size of a building (i.e., square footage) to see if it needed to comply with a policy was an important step in creating a covered buildings list, although it can be labor- and time-intensive. One city used state tax data and CoStar data to confirm which buildings would have to comply. Since most policies exempt some buildings, cities also needed to determine which buildings were not covered, and to set compliance schedules for the remainder.

Cities also needed to collect and maintain contacts for each building on the list. The compilation, management, and updating of a covered buildings list should be one of the initial steps of implementation and should be repeated annually.

CITIES ASSIST RESOURCE-CONSTRAINED HOME AND BUILDING OWNERS

Some cities provided compliance assistance to building owners who had to comply with a policy, including through help desks. Several cities offered an additional level of assistance

[5] Cities did not report that the creation of a covered buildings list was necessary for time-of-sale disclosure policies. This is because all single-family homes are covered under such policies, and the mechanism used to trigger the requirement is associated with the act of selling a home. Thus, cities do not need information on building stock and building characteristics to determine which ones must comply with a time-of-sale disclosure policy.

to resource-constrained owners (e.g., nonprofits, houses of worship, low-income homeowners) who were required to comply with a policy but lacked either the financial capital or the staff to do so. The main forms of assistance included extending compliance cycles, partially or fully subsidizing compliance costs, providing hardship deferrals, and offering pro bono data verification services.

CITIES SWITCH TO ADVANCED DATA MANAGEMENT SOFTWARE MIDSTREAM

Midstream changes to IT infrastructure and reporting procedures were among the most significant challenges to implementation of these policies. Some cities initially used spreadsheets to manage data but realized these tools were inadequate to support policy implementation and transitioned away from this approach. For example, one city upgraded its compliance tool from Microsoft Excel spreadsheets managed in a Microsoft Access database to a Salesforce-based compliance tool. The switch allowed the city to automate some aspects of implementation that previously had required staff time to execute, such as sending reminder emails. Advanced data management software is generally more expensive than spreadsheet software, but it does offer cities more functionality. Cities should consider using web-based tools or customer relationship management software from the outset of implementation.

CITIES CHECK REPORTS FOR ERRORS AND ENGAGE NONCOMPLIANT BUILDING OWNERS

We found that for all policies, city staff needed to review compliance reports for errors, inconsistencies, and poor-quality data and to conduct follow-ups on problematic submissions. This ensures that all information received is accurate and that building owners or managers are not faking compliance. One city found that requiring certified professionals to submit reports improved the quality of the reports and reduced the frequency with which city staff had to follow up with building owners and managers. Likewise, automated utility data submissions can help building owners and managers better comply with policy requirements. When cities find a building to be noncompliant, they send violations and notices. Some cities send reminders to inform owners and managers of upcoming compliance deadlines to encourage them to submit reports on time.

Recommendations

TRY TO HIRE ADDITIONAL STAFF IF NEEDED

Many cities stated that policy implementation would be more successful if the number of FTEs committed to implementation increased. For optimal design and implementation, cities considering the policies included in this brief should anticipate scenarios in which an additional 0.5 to 1 FTE may be helpful.

SIMPLIFY ENERGY EFFICIENCY POLICY LEGISLATION

While cities did state that savings targets should be included in legislation establishing policies, they also said some details regarding implementation should be left out of the legislative language and saved for the rulemaking process. Cities can collaborate with both internal and external stakeholders to determine the level of specificity required for the legislative language. This gives them flexibility in the rulemaking process.

EMPHASIZE PROGRAM EVALUATION TO ASCERTAIN COMPLIANCE AND BENEFITS

Program evaluation is an important tool for understanding impacts and improving policies. One city included a provision in the original ordinance for city staff to conduct an evaluation and submit recommendations for energy efficiency requirements to the city council. Though the city did not include metrics such as reductions in energy use and greenhouse gas emissions, evaluation provisions can be leveraged to ascertain this information. Even if cities do not have resources for formal evaluations, they can track other key outcomes (e.g., uptake of energy efficiency incentives).[6] Another city began program evaluation early in the process, focusing on factors such as communication, compliance, energy savings, and greenhouse gas emissions reduction. This approach allowed the city to make changes to implementation and report community-wide benefits. Cities can also center equity in program evaluations by focusing on data collection, affordability, energy burden, and other factors (City Energy Project 2021).

SUPPORT THE AFFORDABLE HOUSING SECTOR TO PROMOTE COMPLIANCE

Many cities excluded the residential and affordable housing sector from their policies because of some stakeholder perceptions that compliance would increase rents. On the contrary, those living in affordable housing can particularly benefit from energy efficiency interventions, as high energy burdens are a driver of unaffordable housing. To mitigate the concern regarding potential rent increases, cities with policies requiring energy efficiency actions can offer compliance assistance such as extended deadlines, financial assistance, and technical assistance. Cities should also consider the extent to which noncompliant buildings pursued compliance when assessing penalties, allowing buildings that attempted to comply but fell short of policy requirements to pay a reduced fine (Nedwick and Ross 2020).

[6] Cities considering program evaluation can engage an independent program evaluator during program design, determine key performance indicators up front, and begin conducting a process evaluation during implementation to determine how processes are working together and what improvements may be needed (Peters 2018).

CONNECT WITH NONPROFIT PARTNERS

Some cities had received low- or no-cost support from nonprofits, think tanks, national labs, and other organizations. This type of support generally serves as a substitute for more expensive consultant fees, lowering costs of design or implementation or both. Cities considering these policies can reach out to these groups to determine needs and opportunities.

USE MUNICIPAL BUILDINGS AS A CASE STUDY

Requiring municipal buildings to comply with a policy before it applies to the broader community can provide several benefits. For example, cities can use this phase of policy implementation as an opportunity to build relationships with service providers. For retrocommissioning and tune-up policies, cities can use municipal buildings to determine which building systems the process should target. These policies can also help cities decrease energy use, costs, and GHG emissions, moving them closer to their climate goals for municipal operations.

LEVERAGE ONE-TIME COSTS FOR FUTURE POLICIES AND PROGRAMS

High one-time costs in the design phase of a policy can be leveraged to reduce the costs of subsequent policies and programs. For example, a building stock analysis is an important resource for cities designing clean energy policies and programs. This can be costly—one city hired consultants to perform such an analysis for $45,000—but it can provide value beyond a single policy. Similarly, one-time costs for benchmarking policies can reduce the costs of subsequent benchmarking plus and retrocommissioning and tune-up policies implemented in the same city.

Conclusion

This project aimed to determine the administrative costs and the community-wide benefits of benchmarking, retrocommissioning, and time-of-sale energy disclosure policies. The intent was to equip decision makers and advocates with the data needed to advance these energy efficiency policies for existing buildings. These three policies have drawn attention from cities interested in replicating them and are important catalysts for energy-saving actions. For more detailed information on each of the policies included in this topic brief, see our fact sheets here.

We found that while cities had detailed data on design phase and implementation costs, only a few tracked benefits such as reductions in energy use and greenhouse gas emissions. Cities could better gauge the impact of these policies by tracking other key program outcomes, including uptake of energy efficiency incentives in buildings that need to comply with policies. We also gained insights into key tasks and activities related to the design and implementation phases, as well as stakeholders, assets, and challenges associated with policy adoption. Cities considering the policies in this brief should anticipate hiring additional staff if possible, leverage one-time costs, emphasize policy evaluation, provide the affordable

housing sector with compliance support, and draft legislation that allows flexibility. Appendix C provides additional resources on these policies that cities may find useful.

As cities begin to adopt more stringent energy efficiency requirements for existing buildings, such as energy performance standards, new research into the costs and benefits of these policies can help scale them nationwide. As decision makers in cities consider the policies discussed herein, they can use this brief—and the accompanying fact sheets—as a starting point for informed and better-formed policy development and implementation.

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Appendix A. Methodology

We first developed lists of costs and benefits to include in our analysis. The list of costs covered three categories: design costs, implementation costs, and participation costs. Likewise, the list of benefits included three categories: community-wide benefits, equity-related benefits, and benefits to local government operations. Before interviewing city staff, we conducted a literature review on the availability of cost and benefit data for the three policy categories. We also sought data on best practices in policy design and implementation. Our literature review revealed a scarcity of data on the costs and benefits of time-of-sale disclosure policies and retrocommissioning and building tune-up policies. However, there were some data on the costs and benefits of benchmarking policies.

Table A1 presents the list of costs we used both for the literature review and in our interviews with cities.

Table A1. List of policy costs

Policy costs
Design administrative costs *(costs incurred by the city to establish the policy and program)*
Number of local government staff needed for policy and program design. Please indicate the number of full-time equivalent employees that worked on program design and community engagement.
Cost of professional consulting services (if applicable). Please indicate the total contract award and any other costs associated with consultants. Please also indicate the services provided.
Cost of IT infrastructure build-out (if applicable). Please indicate the cost of licensing software, hardware, etc.
Cost of community engagement supplies (if applicable). Please indicate the cost of any materials (brochures, rented space, etc.) used for community engagement.
Other costs. If there are any other costs not captured above, please describe here. Please indicate what the costs pertain to.
Implementation administrative costs *(costs incurred by the city to operate and administer the program)*
Local government staff needed for administration. Please indicate the number of full-time equivalent employees that work on program administration and compliance each year.
Annual cost of professional consulting services (if applicable). Please indicate the average contract award and any other costs associated with consultants. Please also indicate the services provided.
Annual cost of IT infrastructure (if applicable). Please indicate the average annual cost of service and maintenance of IT infrastructure.

Policy costs
Annual cost of marketing (if applicable). Please indicate the average annual cost of marketing (mailers, advertisements, etc.).
Annual cost of incentives or subsidies to assist participants with compliance (if applicable). Please indicate the average annual budget allocated for incentives and the average annual amount withdrawn from it.
Annual cost of data quality assurance. Please indicate the annual average cost of scrubbing, standardizing, and correcting data.
Other costs. If there are any significant costs not captured above, you may capture them here. Please indicate what the costs pertain to.
Participant costs
Typical approximate annual cost of compliance per participant before subsidies.
Average subsidy per participant (if applicable).

Administrative costs illustrate to cities the resources needed during the design and implementation phases of a policy. There is often not a clear distinction between the end of the design phase and the beginning of the implementation phase, and the activities that fall within each phase may vary, depending on the city. Therefore, we allowed each city to define the phases, their respective costs, and the activities those costs correspond to.

Table A2 presents the list of policy benefits. We asked cities about community-wide benefits, equity in program-related benefits, and benefits to local government buildings.

Table A2. List of policy benefits

Policy benefits
Community-wide benefits
Total number of participating buildings. Please indicate the total number of buildings covered by the policy.
Total number of interventions. Interventions include energy audits, retrofits, retrocommissioning, and other energy efficiency actions.
Total greenhouse gas emissions reductions. Please indicate the total GHG emissions reduction in covered buildings from the effective year of the policy to the most recent year for which data are available.
Total dollars saved. Please indicate the total dollars saved from reduced energy costs in covered buildings from the effective year of the policy to the most recent year for which data are available.

Policy benefits
Total energy reductions. Please indicate the total energy reductions in covered buildings from the effective year of the policy to the most recent year for which data are available.
Total direct and indirect jobs created. Please indicate the total number of jobs created.
Other benefits. If there are other benefits not captured above, you may capture them here.
Equity in program-related benefits
Total dollars saved in low-income and households of color. Please indicate the total dollars saved from reduced energy costs in low-income and households of color from the effective year of the policy to the most recent year for which data are available.
Total number of participating low-income and households of color. Please indicate the total number of low-income and households of color covered by the policy.
Total number of interventions in low-income and households of color. Interventions include energy audits, retrofits, retrocommissioning, and other energy efficiency actions.
Total direct and indirect jobs created for marginalized residents. Marginalized residents include people of color, low-income residents, youth, the elderly, recently arrived immigrants, those with limited English proficiency, people with disabilities, and the homeless.
Total greenhouse gas emissions reductions in low-income and households of color. Please indicate the total GHG emissions reduction in low-income and households of color from the effective year of the policy to the most recent year for which data are available.
Total energy reductions in low-income and households of color. Please indicate the total energy reductions in low-income and households of color from the effective year of the policy to the most recent year for which data are available.
Other benefits. If there are other benefits not captured above, you may capture them here.
Local government benefits *(if applicable; this category relates only to benefits associated with municipal government buildings)*
Total greenhouse gas emissions reductions. Please indicate the total GHG emissions reduction in covered municipal buildings from the effective year of the policy to the most recent year for which data are available.
Total dollars saved. Please indicate the total dollars saved from reduced energy costs in covered municipal buildings from the effective year of the policy to the most recent year for which data are available.
Total energy reductions. Please indicate the total energy reductions in covered municipal buildings from the effective year of the policy to the most recent year for which data are available.
Total number of participating buildings. Please indicate the total number of municipal buildings covered by the policy.

Policy benefits
Total number of interventions. Interventions include energy audits, retrofits, retrocommissioning, and other energy efficiency actions.

After choosing the three policy categories included in this report, developing the lists of costs and benefits, and conducting the literature review, we aimed to interview at least three cities per policy.[7] For time-of-sale disclosure policies, however, only two cities agreed to participate. In addition to inquiring about costs and benefits, we drafted questions on the design and implementation phases of the policies to catalog city experiences. We asked cities the following questions:

- In what year did your city formally adopt the policy? In what year did the policy come into effect? In what year did your city require building owners to first report compliance?
- What goals did your city have in mind when it chose to pursue the policy? Why did your city pursue this particular policy to achieve its goals instead of another energy efficiency policy?
- Can you discuss the key steps and milestones in the process of developing and adopting the policy? What categories of stakeholders most informed policy development?
- What factors were most important in terms of a.) challenges to overcome to establish the policy and b.) assets that were most helpful in enabling the policy (e.g., people, organizations, information)?
- What are the key tasks and activities associated with program implementation?
- What lessons have you taken away from city experiences in implementation thus far? If applicable, how has implementation changed over time?
- How have equity considerations been centered in decisions regarding the policy design or program implementation?

Our goal in each interview was to capture the city's experience in designing and implementing the policy and to record detailed cost and benefit information. We believed cities would be

[7] We selected the three policies based on interest from stakeholders and potential for replicability.

more open to sharing data if their names were dissociated from the data. Therefore, we anonymized the data and only refer to the cities by a letter from *A* to *I* (e.g., City A).

Appendix B. Detailed Cost Tables

Table B1. Detailed costs of time-of-sale energy disclosure policies

Cost type	City A	City B
Design costs		
Minimum FTEs used	1.5	2.5
Consulting services	$30,000*	$27,700
IT infrastructure build-out	$60,000	—
Community outreach	—	Cost of rented space
Total non-FTE design costs	$90,000	$27,700+
Annual implementation costs		
Minimum FTEs used	1	1**
Consulting services	—	$94,000 over three years***
IT infrastructure upkeep	$2,000	Included in consulting costs
Marketing	500 to 700 mailers	—
Quality assurance	—	—
Incentives and subsidies	—	$26,000 over three years***
Other	—	$3,700
Total non-FTE implementation costs	$2,000	$43,699+
Participant costs		
Approximate cost of compliance	Dependent on size of building; $110 per deferral†	$125 per assessment

***Consultant costs for program evaluation that led to a policy amendment.**
****City's reported FTEs were insufficient to successfully implement the program.**
*****In totaling the non-FTE costs, we included the annualized cost to better compare with other cities. †Cost of compliance is dependent on size of building. For the average-size single-family home, the cost of an assessment is about $300 plus a filing fee of $79. For an average commercial or multifamily building, the cost of an assessment is about $1,000 plus a filing fee of $152.**

Table B2. Detailed costs of retrocommissioning and building tune-up policies

Cost type	City A	City B*	City C
Design costs			
Minimum FTEs used	1.5	—	1.75
Consulting services	$15,000 + small contract	—	$145,000
IT infrastructure build-out	$15,000	—	$549,000 over three years
Community outreach	—	—	$83,000 (included in consulting costs)
Total non-FTE design costs	**$30,000+**	—	**$694,000**
Implementation costs			
Minimum FTEs used	0.5**	Small team	1.5***
Consulting services	$70,000	—	$150,000
IT infrastructure	—	—	$134,775
Marketing	1 to 2 mailers per building	Reminder letters	Mailers and violations
Quality assurance	—	Staff time†	—
Incentives and subsidies	—	—	$0.12 per sq. ft. for nonprofits
Total non-FTE implementation costs	**$70,000+**	—	**$284,775+**
Participant costs			
Approximate cost of compliance	Cost of hiring specialist or the cost of exemption	—	—

***City B reported limited cost and benefit data; though there are additional costs, we include only what the city reported. **City's reported FTEs were insufficient to successfully implement the program. ***City uses 2.5 FTEs for implementation; however, the city hired consultants to provide one of these FTEs. The cost of this FTE is included in consultant costs in order to provide the number of local government FTEs used for implementation. †"Staff time" indicates that the cost associated with quality control is accounted for in the "minimum FTEs used" value.**

Table B3. Detailed costs of benchmarking and disclosure policies

Cost type	City A	City B	City C	City D
Design costs				
Minimum FTEs used	1.5	1.25*	1	2.5
Consulting services	—	$70,000	$5,000	—
IT infrastructure build-out	$60,000	$300,000**	—	$100,000
Community outreach	—	$1,000 and 10 events	$70,000	$7,000
Other costs	—	—	$45,000	$50,000
Total non-FTE design costs	**$60,000**	**$371,000+**	**$120,000**	**$157,000**
Implementation costs				
Minimum FTEs used	0.5	1.25*	1.5	1
Consulting services	—	—	$120,000	$5,000
IT infrastructure	$2,000	—	—	$53,000
Marketing	1,000 to 2,000 mailers	$1,500 to $2,000	3 mailers	$3,000
Quality assurance	Staff time***	$8,000 to $10,000	—	Staff time***
Incentives and subsidies	—	—	—	—
Total non-FTE implementation costs	**$2,000+**	**$9,500 to $12,000**	**$120,000+**	**$61,000**
Participant costs				
Approximate cost of compliance	Cost of assessment if necessary	—	$800 for a vendor or $3,500 for noncompliance	$500 or cost of third-party benchmarking and verification

***City's reported FTEs were insufficient to successfully implement the program. **Includes $300,000 of IT investments for both the design and the implementation periods of multiple policies. ***"Staff time" indicates that the cost associated with quality control is accounted for in the "minimum FTEs used" value.**

Appendix C. Further Reading

The resources below may provide additional help to city staff, decision makers, and advocates on the costs and benefits of time-of-sale energy disclosure, retrocommissioning and building tune-up, and benchmarking and disclosure policies. They may also provide insight into the design and implementation of these policies.

RESOURCES ON TIME-OF SALE ENERGY DISCLOSURE POLICIES

ACEEE (American Council for an Energy-Efficient Economy). 2018. *Home Energy Efficiency Policies: Ratings, Assessments, Labels, and Disclosure*. Washington, DC: ACEEE. www.aceee.org/sites/default/files/pdf/topic-home-energy-assessment.pdf.

Cluett, R., and J. Amman. 2013. *Residential Energy Use Disclosure: A Review of Existing Policies*. Washington, DC: ACEEE. www.aceee.org/research-report/a131.

Myers, E., S. Puller, and J. West. 2020. *Mandatory Energy Efficiency Disclosure in Housing Markets*. voxeu.org/article/mandatory-energy-efficiency-disclosure-housing-markets.

RESOURCE ON RETROCOMMISSIONING AND BUILDING TUNE-UP POLICIES

Gahagan, R. 2021. *Implementing Energy Audit and Tune-Up Policies*. Washington, DC: Institute for Market Transformation. www.imt.org/wp-content/uploads/2021/04/Implementing-Energy-Audit-and-Tune-Up-Policies_4.6.2021.pdf.

RESOURCES ON BENCHMARKING AND DISCLOSURE POLICIES

ACEEE. 2018. *Commercial and Multifamily Building Energy Benchmarking, Transparency, and Labeling in US Cities*. Washington, DC: ACEEE. www.aceee.org/sites/default/files/pdf/topic-benchmarking.pdf.

City Energy Project. 2022. "City Energy Project Resource Library." www.cityenergyproject.org/.

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